The Impact of Cartoon Animals on

Mind Perception, Moral Standing, and Cuteness

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Abstract

Increased public interest in the conservation of endangered animals is critical for the continued survival of many threatened and endangered species around the world. However, our understanding of what influences public interest in endangered animals is limited. Previous research found correlational evidence suggesting cartoon animals can increased public interest and conservation support of endangered animals. The current study aimed to examine the physical and psychological characteristics of endangered animals that may lead to increase public interest. Specifically, we examined how cartoons and cuteness affected mind perception and moral standing of endangered animals. We also explored other potential predictors of moral standing.

Six hundred and twenty eight participants from the United States (aged 18-81 years) were recruited via Prolific. Participants were randomly assigned one of 16 images depicting a cartoon or photo image of one of four endangered animals endemic to New Zealand. Mind perception, moral standing, cuteness, and general impression measures were administered.

We found that while cartoon images had no impact on mind perception or moral standing compared to photo images, cuteness positively predicted attributions of mind perception and moral standing. An exploratory factor analysis extracted three factors of mind perception: sociality, autonomy, and fundamentality. Multiple linear regression modelling found that cuteness, sociality, and fundamentality positively predicted moral standing attributions of endangered animals. Furthermore, we found evidence to suggest that cuteness and beauty are related but distinct characteristics that impact moral standing attributions.

Our results are consistent with previous research that supports an association between cuteness and general positive interactions with animals. Additionally, cuteness, sociality, fundamentality, and beauty were found to inform moral standing attributions of endangered animals. Our findings highlight the utility of cuteness to inform conservation goals of endangered

animals via mind perception and moral standing. These results may help conservationists to identify more effective strategies to increase public interest in endangered animals.

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The Impact of Cartoon Animals on Mind Perception, Moral Standing, and Cuteness

The International Union for Conservation of Nature (IUCN) is the global authority on the status of the natural world and the measures needed to protect it. Currently, 25% of all assessed species face the threat of extinction, and the number of threatened animal species has steadily increased over the last 15 years, with the IUCN reporting an increase of 21% between 2007 and 2020, (IUCN, 2021). Estimates of extinction rates vary significantly. The Millennium Ecosystem Assessment, a statement prepared with the input of more than 1,300 experts from nearly 100 countries, estimates an extinction rate of about 24 species a day (Millennium Ecosystem Assessment, 2005). The Convention on Biological Diversity also estimates that as many as 150 species are lost daily due to human activities (Djoghlaf, 2007). Species extinction rates are currently 1000 times higher than natural rates. This number is expected to continue to increase, with future extinction rates estimated to be around 10,000 times higher than natural rates (De Vos et al., 2015). In New Zealand, a staggering 74% of terrestrial bird species and up to 94% of reptiles are reported as threatened with extinction or at risk of becoming threatened (Department of Conservation; DOC, 2021).

Conservationists have sought the best ways to slow the decline in animal diversity and aid in the recovery of threatened species. Common methods to aid in the preservation of endangered species are: (1) The designation of protected areas such as national parks and nature reserves, (2) captivity breeding and reintroduction into the wild, (3) laws and regulations, and (4) public awareness strategies (Croteau & Mott, 2011). Public awareness strategies expose the population to the current dilemma endangered and threatened species face and offer the chance for people to contribute to the success of conservation efforts. Avenues such as activism, volunteerism, and fundraising via donations can be important determinants of conservation outcomes (Igoe, 2010). Animal conservationists can garner increased public interest in animal conservation and the protection of threatened animal species by appealing to human interests or emphasising the

qualities of the animals themselves. Appealing to human interests can incentivise and encourage people to support animal conservation by highlighting the economic, scientific, cultural, or recreational benefits of supporting and protecting animal diversity (Brown & Shogren, 1998).

For example, Kiwi birds – the national animal of New Zealand – are treasured among New Zealanders as the national icon of the country. New Zealanders colloquially refer to themselves as "Kiwis", and this deep cultural connection has helped with conservation efforts to slow the species' decline compared to other native birds (Holzapfel et al., 2008; Craig et al., 2011). Emphasising the endangered qualities of animals themselves promotes the idea that animals matter for their own sake, independently and alongside human interest. Promoting the idea that animals are capable of emotions such as happiness and have a moral right to a healthy life may be an avenue to support conservation efforts (Klebl et al., 2021).

Direct engagement and interaction with threatened animals can be achieved in situ via nature trail walks, hiking, visits to parks, and gardening (Clayton et al., 2017a; Massingham et al., 2019). However, authentic interactions with threatened animals can be exceedingly rare. Due to increased urbanisation, many threatened species have little to no population sizes outside captivity (Miller & Hobbs, 2002). This lack of opportunity to interact with nature was first described in 1978 as the "extinction of experience" (Pyle, 1978). Increased urbanisation and the degradation of natural habitats reduces the opportunity for experience, reducing people's connectedness with nature, which leads to a decrease in concern and ultimately, less support for conservation efforts (Massingham et al., 2019; Pyle, 1978).

Direct interactions with threatened animals are most easily achieved ex-situ through zoos, wildlife parks, and aquariums. Upwards of 700 million people visit zoos worldwide annually, and the zoo and aquarium community reportedly spend about US$350 million yearly on wildlife conservation (Gusset & Dick, 2011). Visits to zoos can improve conservation knowledge, increase general concern about threats to biodiversity, and potentially influence future behaviour (Clayton et al., 2017b; Moss

et al., 2015). Although the zoo setting remains a valuable opportunity for raising public interest, achieving conservation objectives while upholding welfare standards presents significant challenges to zoos. This is especially true if individual animals' interests conflict with conservation priorities (Clay & Visseren-Hamakers, 2022). Others argue that unintended and unavoidable genetic and epigenetic drift towards favourable adaptations in the zoo setting is inevitable for animals in captivity despite zoos' best efforts to stop them (Learmonth, 2019). Thus, conservation education may be detrimental to zoo animals' welfare. Positive human-animal interactions ex-situ can be of great importance to the conservation of animals outside the zoo setting.

What Increases Conservation Support?

An appeal to people's emotions, feelings and attitudes may be the most effective way to increase conservation support for endangered animals. Martín-López et al. (2007) explored the attitudes people may have towards conservation and the potential motives for supporting animal conservation efforts financially. Using face-to-face interviews with visitors to a national park in Spain, the researchers gathered participants' attitudes towards the conservation of a selection of animals and their willingness to allocate funds to the animal's conservation. They found that individuals' attitudes towards species strongly correlated with their willingness to donate to conservation efforts of animals. Furthermore, animals that individuals found more familiar receive greater conservation support (Martín-López, 2007). The researchers also found that affective factors (i.e., moods, feelings, and attitudes) had a substantially more significant impact on conservation support than ecological-scientific considerations like the importance of an animal to the ecosystem or its scarcity of distribution. This suggests that to help address the biodiversity crisis, people's moods and attitudes towards endangered animals are essential to target.

Negative Attitudes

Animals possessing characteristics relating to fear or danger may have a more challenging time attracting conservation support. Kellert and Berry developed a national survey of American

attitudes towards animals for the US Fish and Wildlife Service. They administered 65 attitude questions and 33 animal knowledge items to over 3000 Americans and extracted nine distinct attitude subscales (Kellert & Barry, 1987). They characterised nine dimensions of animal-related attitudes that describe how humans interact with animals. The nine attitudes extracted were naturalistic, ecologistic, humanistic, moralistic, scientistic, aesthetic, utilitarian, dominionistic, and negativistic. Their research attitude scales are widely cited and still popular today. Of the nine attitudes they extracted, negativistic attitudes were estimated to be held by the highest percentage of Americans (approximately 37%), followed by humanistic and aesthetic attitudes (about 25% and 15%, respectively).

Negativistic attitudes are described as attitudes that orientate people towards active avoidance of animals due to indifference, dislike, or fear (Kellert & Barry, 1987; Serpell, 2004). Liordos et al. (2017) demonstrated that negativistic attitudes were negatively correlated with support for the conservation of animals regardless of the base level of conservation support. Phenomena similar to negativistic attitudes towards animals have also garnered interest with regard to human-animal interactions. Piazza et al. (2014) looked at the influence of harmfulness on judgements of moral standing in animals. They demonstrated that, independently from an animal's intelligence, harmfulness can impact how people view the moral status of animals. Knight utilised regression models to analyse the effect of aesthetic and negativistic attitudes on a group of ten endangered species. Contrary to Piazza et al., they found that negativistic attitudes inconsistently predicted support for endangered species throughout eight regression models controlling for various factors (Knight, 2008). These studies highlight the importance for conservationists looking to increase conservational support for dangerous or unappealing animals to find alternative ways to increase positive engagement.

Aesthetic

Aesthetic and attractiveness are other factors that may impact people's attitudes towards animals. Knight (2008) found that attractiveness related to support for governmental protection of species for all but three species tested; the attractiveness of an endangered bat, spider, and snake, was not associated with conservation support. The author suggests this is likely linked to phobias and cultural views of said animals (Knight, 2008). Liordos et al. (2017) also found that endangered animals rated as more attractive generally received the highest support from participants in a Greek population, suggesting that the effect of attractiveness on conservation support may be cross-cultural. Gunnthorsdottir (2001) found evidence that more attractive animals receive greater conservation support. In their study, participants were shown either attractive or unattractive images of an ape or bat. Both species observed higher levels of conservation support for the attractive picture conditions. Interestingly, images initially perceived as unattractive were rated as more attractive if the animal was framed as endangered, though the effect was very weak (Gunnthorsdottir, 2001). Whether or not the framing of unattractive animals as endangered increased conservation support as well as perceived attractiveness was not reported.

Where Gunnthorsdottir (2001) focussed on opinions of animal species, McNally (2017) utilised a more practical experiment in which participants were given a sum of money to divide among several animals. They found that donation behaviours were only significantly affected by knowledge of conservation support for two of the ten endangered species (McNally, 2017). Though the sample size was small, attractiveness seems to influence which species receive more conservation support and was a stronger predictor of donation behaviours. Knowledge of conservation status may not play an as significant role in determining conservation support compared to aesthetic characteristics such as attractiveness.

Flagship Species

In conservation, flagship species describes those selected as an icon or symbol for a defined conservation cause (World Wildlife Fund; WWF, 2020). Flagship species can be divided into three

categories – international, cultural, and ecological. International flagship species are those that are recognised worldwide, generally for their size and charismatic appeal. A classic example is the giant panda, which the WWF utilises as their logo to represent its efforts as the world's leading conservation organisation. Cultural flagship species are those that represent a specific culture and are often significant to the culture's identity and everyday life. For example, to the Dayak tribal peoples of Borneo, the Bornean ironwood is used for medicinal purposes and rituals. Furthermore, they also believe the Bornean ironwood acts as a protective talisman to avoid attack from large predators. Finally, ecological flagship species are those with unique diversity, such as the baobab species, found exclusively in Madagascar.

Many flagship species are large, mammal, and charismatic, including tigers, elephants, giraffes, great apes, and whales (Milner-Gulland & Woodroffe, 2001). Highly charismatic species, defined as species that often possess symbolic value, are widely popular, and often large, garner significantly more public interest than less charismatic animals. The hope for conservationists is that less appealing vulnerable species which share the habitats of flagship species may also see conservation improvements. Though many species with flagship qualities share the same charismatic charm, there are exceptions. For example, while the Komodo dragon is generally regarded as unattractive and dangerous, there has been success in its use as a flagship species (Walpole & Leader-Williams, 2002). Thus, there is hope for species that do not fit the ideal archetype of a flagship species.

A survey of Swiss students looked at people's attitudes towards 27 different symbolic species with varying levels of flagship qualities. The list of species was comprised of classic flagship species and species that have received little to no attention and spanned the taxonomic range, including mammals, birds, reptiles, amphibians, insects, and butterflies (Schlegel & Rupf, 2010). The findings suggest that butterflies, birds, and most mammals are more highly appreciated than reptiles, insects, and amphibians. Furthermore, familiarity with species seemed to impact affinity

towards animals – more familiar animals were seen as more favourable. The rareness and worthiness of protection of the species contributed the most to participants' affinity towards species (Schlegel & Rupf, 2010). This suggests that participants' background knowledge of animals contributes to their attitudes, and conservationists may be able to use this avenue to strengthen affinity towards less appealing species.

There is a disparity of conservation support between flagship species and those lacking flagship qualities. Marketing efforts may help raise donor interest in animals with less appeal to the population. Researchers looked at the marketing and species-specific characteristics of animals appearing in WWF-US and EDGE flagship campaigns to test whether marketing context influences a species' fundraising performance (Veríssimo et al., 2017). Increased marketing effort was operationalised in the study as the distinction of a species as a "focal species", resulting in that species being more prevalent on the website. While species' appeal best explained donor interest, increased marketing efforts positively impacted the most and least appealing species (Veríssimo et al., 2017). Surprisingly, they found that marketing efforts could attract 60% more potential donors to the least appealing species. Furthermore, recategorising the least appealing species as focal species or placing them on the first page of the EDGE website further increased potential donors to said species by a factor of 15 and 26, respectively. The study highlights the utility of conservation marketing when deciding how to attract more public interest and financial support for species traditionally deemed less charismatic.

Cuteness

Konrad Lorenz first described the concept of cuteness as *Kindchenschema* (hereafter, *baby schema*), a set of physical traits perceived as cute or cuddly (Lorenz, 1942). The physical features described in the baby schema include a larger head proportion, higher and protruding forehead, larger eyes, chubby cheeks, a small nose and mouth, short and thick extremities, and a plump body shape (Lorenz, 1942). Lorenz's baby schema is widely used in the literature to conceptualise

cuteness as the recognition of or response to the infant-like visual qualities mentioned above. In the literature, different terms have been used to refer to the specific perception of and responses to the infantile features associated with a baby schema. Some terms used are *cuteness*, the *cute-emotion*, and *aww* (Buckley, 2016). Some scholars propose that baby schema features should extend beyond the visual to include positive sounds and smells associated with infants (Kringelbach et al., 2016). The term *cuteness* will be used henceforth to refer to the visual, physical features described in the baby schema.

Cuteness as a phenomenon emerges across several cultures, with some developing a more comprehensive conceptualisation (Buckley, 2016). In Japan, the word *kawaii* roughly translates to cute in English (Nittono & Ihara, 2017). While kawaii and cuteness appear to be similar, the terms differ in their level of nuance. While cuteness refers to infantile physical attractiveness, kawaii has wider utility to describe a broader range of stimuli not necessarily related to babies. Ihara and Nittono (2011) conducted a survey where university students were asked to judge the extent to which several animate and inanimate objects were kawaii or infantile. While there was a positive correlation between mean scores of kawaii and infantility, some items exhibited high levels of kawaii simultaneously with low levels of infantility. In the study, images of cherry blossoms, a plate of dessert, and macaroons stimulated physiological responses equal to images of human baby faces and baby animals. The results suggest that baby schema and kawaii may describe overlapping but conceptually distinct ideas (Ihara & Nittono 2011; Nittono & Ihara, 2017).

Several studies have experimentally tested whether child schema features described by Lorenz impact cuteness perceptions and responses for human and non-human faces (Aragón et al., 2015; Borgi et al., 2014; Glocker et al., 2009; Little, 2012). Little (2012) created composite images of adult, infant, and cat faces to find the average position of the main features of the face (e.g., eyes, nose, mouth, jawline, and hairline). Features of the individual faces were then altered to the relevant average face shapes for both infants and adults, and participants were asked to rate the

cuteness of each face. Results suggest that transforming human and animal faces to include more baby schema features caused them to appear cuter. Borgi et al. (2014) similarly manipulated images of humans, cats, and dogs and analysed young childrens' responses using cuteness ratings and gaze allocation. The children in the study allocated more viewing time and reported greater cuteness perceptions to faces exhibiting high-infantile features independent of species.

Studies that alter animal faces to present more baby schema features are limited in the specific species they decide to utilise in their research. These studies tend to exclusively manipulate baby schema features of companion animals, primarily cats and dogs. An argument can be made that cats and dogs are regarded as highly cute regardless of the presence of baby schema features. Studies that manipulate baby schema features in less appealing animals may provide further evidence to support the impact of baby schema features on cuteness.

Empathy, Compassion, and Caregiving Behaviours

In the cuteness literature, there is a significant focus on the impact cuteness has on empathy, compassion, and caregiving behaviour. In these studies, empathy, empathic concern, or sympathy is operationalised as a prosocial emotional response directed towards a vulnerable target. Throughout this thesis, empathy will be used to refer generally to prosocial emotional responses.

Various theories have linked cuteness to empathy. Sherman and Haidt (2011) identified cuteness as a physical prompt that motivates sociality. They posited that as a direct motivator of sociality, cuteness might trigger positive shifts in behaviour that lead to increased concern and empathy as part of a moral circle (Sherman & Haidt, 2011, Zickfeld et al., 2018). Batson et al. (2005) tested this explanation by challenging one popular explanation for differences in empathy – that increased empathy results from a higher level of similarity with the target. They found that feelings of empathy may be grounded in the caretaking impulses of humans to nurture their vulnerable offspring rather than the similarity of the target person to themselves. Other studies have found that manipulating adult faces to be more infant-like results in more empathic concern. This provides

experimental support for the idea that increasing baby schema features, even in adults, can affect feelings of empathy (Lishner et al., 2008).

Cuteness also induces caretaking behaviours in infants exhibiting baby schema features. Glocker et al. (2009) manipulated images of toddlers to feature high, low, and unmanipulated levels of baby schema features and then measured participants' motivation to care for the toddlers, along with their level of cuteness. They found that cuteness positively correlated with caretaking motivation. Aragón et al. (2015) similarly manipulated images of babies to exhibit high and low levels of baby schema features. They found that cuter babies were appraised more positively than less cute babies, and participants reported stronger feelings associated with caretaking behaviours towards cuter babies.

Similar results utilising fine motor and visual search task experiments have found that cuteness may result in increased carefulness because people tend to be more careful with cute entities. Japanese participants viewed either cute or non-cute images and were asked to perform fine motor tasks and non-motor visual search tasks and were measured on their number of successful trials. Researchers reported that performance on both tasks improved more when participants viewed cute images beforehand (Nittono et al., 2012). They concluded that cuteness induced participants to operate more carefully on tasks requiring focused attention. Sherman et al. (2009) similarly assessed American participants' performance on a fine-motor task after viewing cute images of kittens and puppies or less cute cats and dogs. Their results also found that participants who were presented the cute stimulus made fewer errors.

The effect of cuteness on caretaking behaviours is not only induced by infants and animals. Cuteness may also induce caretaking behaviours towards adults too. One study utilised the lost letter technique to test cuteness's effect on eliciting helping behaviours. Fictional resumes were attached with pictures of male and female adult faces exhibiting cute or mature features and were distributed throughout America and Kenya. Resumes with baby-faced adults were returned more

often than mature-faced adults, suggesting that cuteness may elicit caretaking and help behaviours even in adults.

Lorenz theorises that child schema traits were an evolutionary adaption to elicit caretaking behaviours to activate in others the motivation to care for the infant (Lorenz, 1942, Karraker & Stern, 1990). That is, baby schema is thought to be an "evolved elicitor of attention, liking, approach, [and] compassion to care for and protect one's own infants and those of close kin." (Steinnes, 2019, p.3). In light of the empirical research, theories of cuteness are congruent with an evolutionary perspective of cuteness, where cuteness acts as an indicator to evoke more empathy and concern, increased carefulness, and greater caregiving behaviours. Hence, an infant's survival depends on the adults around them, who are entirely responsible for their nurturing. Greater cuteness in infants and young children, thus, enhances their chances for survival. Bradshaw & Paul (2010) posit that through an evolutionary psychology lens, animals can take advantage of humans' increased sensitivity to cuteness.

Cuteness in Human-Animal Interactions

Just as infants and adults with baby schema features are preferred over infants and adults who lack these features, similar preferences have been found with non-human animals, namely cats and dogs (Borgi et al., 2014; Little, 2012; Sherman et al., 2009; Steinnes, 2019). One study into the impact of cuteness on the length of stay of shelter cats found that objective measures similar to other studies on animals (such as Borgi et al., 2014) were not consistent with subjective measures of cuteness obtained from participants (Jack & Carroll, 2022). The researchers suggest the objective measures used previously may be more suited to comparison studies where measurements of baby schema features are manipulated to express levels of baby schema as opposed to measuring them. The features reflected in baby schema for human babies extend to baby- and fully-grown animals. When applied to animals, baby schema features may elicit in humans the perception of vulnerability in the animal and thus, a higher need for protection.

Many animal welfare groups have used the cuteness of baby animals to tackle the issue of meat consumption. Groups such as PETA, Animal Equality, and the Humane Society utilise images of baby animals on their websites to evoke feelings of care and empathy in consumers. Using baby animals in promotional material to tackle meat consumption seems intuitive. A few studies have looked into the interactions between cuteness and meat consumption. In a cross-cultural survey assessing how disgust and cuteness impact people's willingness to consume meats, Ruby and Heine (2012) found that animal appearances that deviated from neutral (e.g. ugly or cute) resulted in less willingness to consume meat, suggesting that cuteness may be an important factor for meat consumption. Researchers presented participants with images of either a baby or adult farm animal designated for eating (i.e., sheep-lamb and pig-piglet) and images of cooked meat suggestive of meat sourced from the aforementioned animals (Piazza et al., 2018). They followed up by asking participants to rate their appetite and willingness to eat the meat dish. Results indicated that meat which was sourced from baby animals was less appealing. If cuteness can affect people's meat consumption behaviours, it is likely that it can alter people's behaviours in other contexts.

In the area of animal conservation, much research has looked into how the perceived attractiveness of an animal species can be an important determinant of conservation support (Gunnthorsdottir, 2001; Wang et al., 2017; Curtin & Papworth, 2020). However, the effect of cuteness on animal species has had little attention in the conservation literature. Some researchers have looked into the impact of animal posture and human likeness on perceived cuteness and willingness to protect. Researchers compared various species of insects, reptiles, and mammals. They found that bipedal animals were rated as less cute than quadrupedal animals, though smaller bipedal animals were rated as more cute than larger animals (Prokop et al., 2021). In addition, they found that bipedal animals more closely related to humans and more anthropomorphic-looking were associated with higher levels of cuteness and received greater conservation support. Their results suggest that animals that more closely resemble humans should perform better in

conservation campaigns. While this may be an effective strategy for conservation of bipedal animals, alternative strategies are needed for animals which do not fit these criteria.

Cuteness may be the avenue to increase conservation support for less appealing animals. Cuteness responses towards animals in nature can be a meaningful experience for people – with significant consequences for human-animal relations. Marx (2019) examined how hikers responded to and perceived wildlife on the Appalachian Trail in the United States. Analysing qualitative data from an abundant source of blogs, just under one-third of hikers were found to make observations about the cuteness of wildlife. Cuteness seems to be an important avenue through which people's interest in animal conservation can be explored.

In the conservation literature, cuteness has been found to potentially impact the breeding and retention of animals in the zoo setting. Along with animals that are large, humanlike, colourful, and communicate and travel in family groups, cute animals are good economical choices for zoos due to their popularity (Estren, 2012). Furthermore, cute characteristics are overwhelmingly found in mammals compared to other animal groups. This can be illustrated in the vast popularity of large mammals in zoos and the vast difference in scientific investment between animal groups, where the mean number of published papers about threatened mammals is orders of magnitude more than birds, reptiles, and amphibians (Estren, 2012).

Applying cute features to less cute animals may garner more conservation support. Just as many animal rights groups utilise cute imagery in promotional material, so too have many zoos and wildlife conservation groups. On the Lincoln Park Zoo YouTube channel, the top 10 viewed videos feature baby and cute animals ranging from gorillas, gibbons, and macaque to red panda cubs (Lincoln Park Zoo, n.d.). Similar trends can be found on the YouTube channels of other zoos. Weiler et al. (2016) found that just under half of the visitors to a Tasmanian devil exhibit cite the level of cuteness as important for facilitating or influencing emotional engagement. In practice, zoos and animal welfare organisations utilise cuteness to take advantage of human empathy and nurturing

behaviours towards cute animals. Despite this, little empirical evidence exists for the effect of cuteness on conservation support.

Companies also harness the power of cuteness to market their merchandise to make profit. The Hello Kitty brand harnesses cuteness to build a multi-billion dollar brand, and Budweiser has utilised the cuteness of a puppy to net the most popular Super Bowl commercial to date (Henry, 2016). Baby schema features can also be found in many media characters that elicit greater attention. Lange and Holtfrerich (2017) presented participants with images of popular media figures Sonic the Hedgehog and Mickey Mouse with varying degrees of baby schema traits to demonstrate that images with higher levels of baby schema traits caused significantly increased prioritised attention via a dot-probe task. Cuteness as a marketing strategy for conservation efforts is a promising area requiring more attention.

In summary, child schema features such as a larger head proportion, higher and protruding forehead, larger eyes, chubby cheeks, and small nose and mouth often evoke a cuteness response. Child schema features increase perceptions of cuteness in infants, adults, and non-human animals. Cuteness is linked to increased empathy and caretaking behaviours. Most of the literature on cuteness in animals focuses on cuteness's impact on meat consumption, where higher perceptions of cuteness in animals decrease the consumption of meat. Cuteness perceptions of wild animals may positively impact human-animal relations and could be a fruitful target for increasing public interest in animal conservation. Many wildlife and zoo organisations and brands utilise cute baby animals to garner interest though little empirical evidence exists for its efficacy. Yet, little empirical evidence exists to document the consequences of cuteness on conservation animals.

Mind Perception

Who or what is perceived as having a mind can be crucially important and highly controversial (Dennett, 1997). Mind perception entails ascribing mental capacities to other entities. The ability to perceive minds in other entities is a skill nearly all humans possess and is a crucial

component of social life. It is not only the minds of other people that may be perceived but also the minds of non-people entities such as animals, computers, inanimate objects, and even Gods and spirits (Gray et al., 2012). People perceive the minds of entities differently and to different degrees, even in the presence of objective biological evidence of mental capacities.

In one experiment, participants were asked to rate their perceptions of a person's mind while alive, dead or in a persistent vegetative state (PVS; Gray et al., 2011). Unsurprisingly participants perceived the most mental capacity to the alive person. But surprisingly, participants attributed more mind to the dead person than the PVS person. Whether a mind is perceived in a person in a PVS, an early-term foetus, or an animal facing extinction, there will be consequences for the fate of the perceived entity.

Waytz et al. (2010a) highlight three fundamental research questions related to the attribution of mind to others: (1) Do people ascribe mind to a particular entity? (2) in what state is that mind? and (3) what behavioural consequences arise from perceiving a mind in another entity? While the second question has had considerable focus, attention is being expanded to the first and third questions – what causes people to ascribe a mind to another and what are the consequences of this? Mind perception is distinguishable from other capacities for understanding other minds. Whereas the latter often explore specific mental content (for example, what someone is thinking or feeling), mind perception is concerned with the ascription of a mind to another. Here, the ability to perceive a mind is a prerequisite – before one can start understanding other entity's thoughts, feelings, and beliefs, a mind must be perceived first (Epley & Waytz, 2010). Once a mind is perceived, it is crucial to understand how people conceptualise these minds.

Dimensions of Mind Perception

While research into mind perception suggests that people come to think of the minds of other entities as organised into a few fundamental dimensions, there is no consensus as to the exact number of those dimensions. Where some extract as few as two, others have found that as many as

five dimensions can emerge in some situations (Malle, 2019). One of the most popular and more simple concepts of mind perception posits that mind perception consists of two dimensions: experience and agency (Gray et al., 2007; Waytz et al., 2010a). Experience describes the capacity of an entity to sense and feel, including the capacity to feel hunger, fear, pain, pleasure, rage, and pride. Agency describes an entity's capacity to plan and act – including capacities for self-control, morality, memory, planning, communication, and emotion recognition (Gray et al., 2007). The experience-agency model of mind perception has been successfully replicated via two independent studies (Takahashi et al., 2016; Weisman et al., 2017) and is widely used and cited in the mind perception literature.

Two-dimension models of how people perceive mind have also emerged in dehumanisation and stereotype research. In this research, dehumanisation occurs towards others by (1) denying fundamental attributes of human nature, such as interpersonal warmth and emotionality, and (2) likening them to animals, resulting in the denial of uniquely human attributes, such as higher cognition and morality (Fiske et al., 2002; Haslam, 2006; Loughnan & Haslam, 2007).

Other studies suggest a three-dimension model of mind perception. Kozak et al. (2006) extracted three dimensions they labelled emotion, intention, and cognition. Emotion corresponded to experience (e.g., feelings, pain, emotion, and pleasure), and intention corresponded to agency (e.g., planned action, goals, and purpose). The cognition dimension contained concepts relating to consciousness, memory and thought – items that had previously aligned with the agency dimension in Gray et al. (2007), suggesting that agency may be a multidimensional factor in some contexts.

Weisman et al. (2017) identified a three-dimension model of mind perception markedly different from the experience-agency model. Rather than experience and agency, a body-heart-mind framework was identified. The body dimension corresponded to physiological sensations and behaviours related to biology (i.e., getting hungry and feeling pain), the heart dimension corresponded to primary and social emotions (i.e., feeling embarrassed and feeling disrespected),

and the mind dimension corresponded to perceptual-cognitive abilities (i.e., recognising someone and making choices). Gray et al.'s experience and agency items were scattered among the body-heart-mind dimensions, suggesting that both frameworks explain distinct ways individuals come to understand the minds of others and mental life itself.

Another recent study found a three-dimension model of mind perception. Furthermore, they found evidence to suggest that people may think of the minds of non-human entities different to humans. Malle (2019) extracted three dimensions: affect, moral and mental regulation, and reality interaction. Affect was similar to the experience dimension, but agency seemingly had broken down into two dimensions: moral and mental regulation, and reality interaction. Moral and mental regulation consisted of concepts relating to morality and planning, whereas reality interaction included concepts related to perception and cognition. Interestingly, when people considered the desired mental capacities of robots, a five-dimension structure emerged, which breaks affect into positive and negative affect, and moral and mental regulation into moral cognition and social cognition (Malle, 2019). Their results suggest that how people conceptualise the minds of others may be dependent on the target entity.

Mind Perception, Moral Agency, and Patiency

Whereas mind perception is assigning mental capacities to other entities, morality is concerned with labelling entities as good or bad and actions as right or wrong (Gray et al., 2012). Some have linked the dimensions of agency and experience to Aristotle's classical distinction between moral agents and moral patients (Gray et al., 2007; Waytz et al., 2010b). Moral agents are entities whose actions can be morally right or wrong, whereas moral patients can have moral right or wrong enacted upon them. What distinguishes an entity as a moral agent and moral patient is their capacity for agency or experience, respectively. An entity high in agency has a strong status as a moral agent and therefore becomes more responsible for its actions. Likewise, an entity high in experience has a strong status as a moral patient and therefore possesses more moral rights, i.e., a

life free from harm. In other words, the dimensions of mind perception map onto moral types – agency onto agent and experience onto patient.

Looking at particular entities can help exemplify the analogous structure of mind perception and morality. Human adults are perceived as having both high agency and patiency; thus, when we think of the typical adult human, we view them as capable of good and bad deeds and able to benefit/suffer from deeds done to them. Babies are perceived as having low agency and high patiency, thus, we do not think of babies as being capable of good and bad deeds, yet they can benefit/suffer from deeds done to them. Conversely, corporations are perceived to have the opposite profile, being highly agentic and responsible though possessing few rights (Knobe & Prinz, 2008).

One theory of morality places mind perception at its core. Dyadic morality theory views moral judgements related to agency and experience. It posits that all moral transgressions are fundamentally understood as a perceived intentional moral agent acting upon a suffering moral patient (Gray et al., 2012). Importantly, whether the harm is intended or outright, it is merely the perception of wrongness that leads to suffering. In other words, if a person believes they have been put in danger by another (i.e., they perceive a threat), they may feel they have been wronged (i.e., perceive wrongness has been done to them) and thus suffer regardless of the presence of real danger.

While some scholars claim that all moral violations can be explained via the dyadic view of morality, the link for some moral violations appears weaker than others. For example, the claim that "violence results when social structures are threatened" (Gray et al., 2012, p.107) is an example of suffering via authority violations and "promiscuous sex [leading] to sexually transmitted infections" (p.107) is an example for purity violations are so dubious as to undermine the significance of this claim. Gert & Gert (2020) cast doubt on Gray et al.'s dyadic view of morality, having problems with the content of their template. They believe the dyadic viewpoint of morality is more concerned with

the template people use to think about matters of morality rather than the nature of morality itself. Regardless, the dyadic viewpoint of Gray and their co-authors seem to fit the majority of the violations of morality of moral foundation theory. Mind perception and its close ties with morality are present and often at the forefront of many human-animal interactions and may affect animal conservation outcomes. Moral standing will be discussed in more detail in later sections.

Mind Perception in Human-Animal Interactions

How we perceive the minds of animals can inform our understanding of human/animal interactions in a number of areas, from animal consumption and welfare to wildlife conservation and pet companionship. In the existing literature, mind perception of animals has explored the belief in animal minds, perceived emotions, and meat consumption. I will begin by describing how each of these informs our understanding of human-animal interactions, then summarise the importance of mind perception for animal conservation.

Knight et al. (2004) found that when compared with other variables such as age, gender, political leaning, and meat consumption status, perception of animal minds was a consistent and strong predictor of attitude towards animals in multiple areas of animal use, including experimentation, classroom education, decoration, entertainment, and financial gain. While the perception of animal minds measure only contained four items with questionable reliability ($\alpha = .62$), the results suggest that how people think of animal minds significantly impacts their interactions with animals.

Further research into the perception of animal minds has utilised a qualitative approach. Via open-ended interviews with participants from various occupations, three key themes were found to influence perceptions of animal minds: the type of animal, the purpose of animal use, and knowledge of animal use (Knight & Barnett, 2008). That is, the role of the animal for humans, the individual's understanding of animals, and the animal species explain why some people support some animal use practices while others oppose them. Beliefs come to dictate attitudes; for example,

people who grow up with companion animals will be less likely to condone the consumption of dog meat and have greater empathy and compassion towards animals (Knight & Barnett, 2008; Hawkins et al., 2017). Thus, the extend of our interactions with animals shapes our attitudes towards them. If we can invoke positive interactions between people and animals, we may be able to alter attitudes for the better.

In their research on the factors which influence the attributions of emotion towards animals, Wilkins et al. (2015) concluded that perception of animal minds similarly was the strongest and only predictor of emotion attribution towards animals, compared to other factors tested, such as gender, meat consumption status, pet ownership, and emotional intelligence. The perception of animal minds measure was identical to that of Knight et al. (2004). One item in the four-item measure taps into animals' experiences of emotion. Thus, it is likely that while the perception of animal minds was a significant predictor of emotion attribution towards animals, both are attempting to measure the same underlying construct. Nonetheless, how we conceptualise the minds of animals seems to shape human-animal interactions.

The processes by which we ignore animal minds may explain how we engage with animals in exploitative industries. The denying of minds to animals – especially the denial of emotions – as a tool to continue engagement with meat consumption has had considerable attention on how mind perception can impact human-animal interactions. The link between moral standing and mind perception has been demonstrated to affect how people rationalise meat-eating in the context of meat consumption. People justify their meat-eating via a 4N classification system, claiming it is natural, normal, necessary, and nice (Joy, 2020; Piazza et al., 2015). That is, people defend their meat-eating choices by claiming it is written in our biology, accepted by society, required for a healthy diet, and enjoyable to consume. Individuals who appeal more to 4N justifications attribute less mind to and have less moral concern for animals (Piazza et al., 2015).

People may deny the minds of animals farmed for meat to avert cognitive conflicts between an unwillingness to harm animals while simultaneously being willing to consume them. In a series of three studies, researchers found that compared to non-food animals, fewer mental capacities were ascribed to animals farmed for meat. Additionally, when participants were informed of the link between meat consumption and animal suffering, there was an increase in mind denial. The researchers concluded that this "motivated denial" results in dissonance whereby people are able to ignore "cognitive conflicts which interfere with effective behaviour" (Bastian et al., 2012a, p.248). Other research has demonstrated how perceptions of mind and moral standing interact to rationalise meat consumption. Loughnan et al. (2010) had participants consume either meat or a non-meat substitute, complete a moral circle task and rate a cow's intellectual and sensational capacities. Participants who consumed meat generated smaller moral circles and rated cows with lower moral standing. Researchers have dubbed this dilemma the *meat paradox*, the conflicting beliefs that people dislike harming animals while simultaneously enjoy eating meat (Bastian et al., 2012a; Loughnan et al., 2010; Piazza et al., 2015).

To summarise, mind perception strongly predicts attitudes towards animals and the emotions we attribute to animals. The literature on the effect of mind perception on meat consumption further adds to the literature linking morality to mind perception. Furthermore, it may be the case that to maintain the cultural practice and enjoyment of meat consumption, meat-eaters may engage in the denial of minds to animals to shift the moral status of the animal away from that as a moral patient making it easier to dissociate the suffering of an animal from eating meat (Gray et al., 2007; 2012; Bastian, 2012a). These findings have vastly important implications for animal conservation. It stands to reason that if perceptions of endangered animals' minds can be changed insofar as people attribute more mind to them, it can shift their moral status towards deserving moral recognition – lives free from harm and worthwhile of conservation. Exposing the public to endangered animals in such a way that draws attention to their mind and mental capabilities seems to be a promising avenue to assist in animal conservation efforts.

Moral Standing

The perspectives discussed thus far relate mind perception to moral standing – the dimensions of experience and agency to moral patients and agents, respectively. Other views contend that there are factors that contribute to moral standing independent from mind perception. Piazza et al. (2014) investigated the impact of harmfulness on people's judgements of the moral standing of animals. Not only did they find evidence to suggest that harmfulness contributes to negative judgements of moral standing, but this effect was independent of patiency and intelligence. The authors claimed their patiency measure tapped into the capacity of the animals to experience pleasure and suffering and the measure of intelligence tapped into a sub-component of agency. They contended that people's lay understandings of moral standing were not solely viewed through the lens of mind perception (Piazza et al., 2014).

Research into the impact of beauty on animals' moral standing further suggests that moral concern for animals involves more than perceptions of mind. A recent study found that beauty perceptions may predict moral standing attributions of animals independently of perceived agency, patiency, and harmfulness (Klebl et al., 2021). Furthermore, mixed-methods approaches looking at how perceptions of similarity between humans and animals impacts moral concern for animals have found evidence to suggest that comparing animals to humans can expand moral concern for animals (Bastian et al., 2012b). The similarity between beauty and cuteness makes cuteness a prime target to study regarding increased moral standing.

Conservation of endangered animals has focused on the similarity, familiarity, aesthetic, and physical characteristics of animals and how these factors can influence conservational support. Increasing knowledge, marketing, and exposure to animals may help even the least popular species. Cuteness has been studied with regard to child schema, a series of traits present in infants that induce empathy and caretaking behaviours. Child schema features likely work on non-pet animals,

though no research has looked into the impact of the cuteness of animals and how it relates to endangered animal support.

Mind perception shapes how we view the moral status of entities – including endangered animals. It stands to reason that perception of mind in endangered animals will impact the moral standing of endangered animals, insofar as animals that are perceived of as having more mind will receive more conservation support as their perceived moral standing increases. Cartoons may be a medium that conservationists can exploit to raise cuteness, mind perception, and moral standing of endangered animals. Cartoons may make it easier to signal baby schema features which in turn may elicit caretaking behaviours resulting in higher perceptions of mind and moral standing. Suppose endangered animals are viewed as having more mind and moral standing in the form of cartoons. In that case, cartoons may be a valuable tool for conservationists to increase public interest and attention.

Cartoon Animals

Media can expose audiences to conservation messages via cartoons and animated movies. Cartoon and animated movies and T.V shows featuring animated animals have become a dominant form of entertainment, with the likes of the Lion King (2019) peaking as high as the 7th highest-grossing film of all time globally (Dydynski & Maekivi, 2021). The animated film industry has achieved incredible reach to audiences due to the large budgets available for advertising, making animated films and T.V shows widely accessible worldwide (Silk et al., 2018). The incredible reach and wide accessibility make it a popular medium to transmit information to many people (Fukano et al., 2020; Wright, 2013). A downside of animated film, however, is that conservation messages risk getting lost in the background, as the core aim of animated films is entertainment. Alternatively, other media, such as wildlife documentaries, orientate themselves towards a clear, detailed message for conservation issues associated with wild animals while sacrificing reach and accessibility (Dingwall & Aldridge, 2006).

Though conservation messages are often secondary to entertainment, animated films containing animals may affect human-animal interactions. The release and success of Bambi in 1942 led to an anti-hunting movement (Dydynski & Maekivi, 2021), and Disney/Pixar published a responsible fish ownership guide alongside Finding Dory, with expectations that the release of the movie could result in audiences being more interested in fish ownership as pets (Dydynski & Maekivi, 2021; Lutts, 1992; Veríssimo et al., 2020). Cartoons and animation can offer animal conservationists the utility to approach sensitive topics to affect people's behaviours and attitudes towards animal conservation that other mediums, such as film and documentaries, cannot. For example, trophy hunting and hunting of animals for sport, poaching of endangered wildlife, and the impact of human-led climate change and pollution are topics that people may find sensitive. Cartoons may be the best medium to tackle serious topics for children, whereas more mature media, such as documentaries, may be seen as inappropriate. For example, Zoos Victoria released a series of collectible cards depicting a variety of cartoon zoo animals dressed as superheroes on one side and educational information and facts about the species on the other to engage more with zoogoers to increase public awareness of conservation (Zoos Victoria, n.d.).

While film and TV programs have long produced content with a wild-life focus, there has been surprisingly little effort to quantify their impact on endangered animal conservation. A recent study examined an animated TV program's effect on increasing public interest in the conservation of threatened animals. Fukano and colleagues (2020) examined the impact of an animated TV show, *Kemono Friends*, on online search volume data for threatened animal species appearing in the show. They found that Google search volume data and Wikipedia page views for animal species that appeared in the TV show were significantly higher after the broadcast period than those before the show aired (Fukano et al., 2020). This suggests that the mere occurrence of the animal in the animated show – regardless of conservation status – increased public interest in the animal. They also found that in zoos where people chose a specific species to donate to, there was a larger increase in donations towards species featured in the show (Fukano et al., 2020).

While their research was informative, the study had a few limitations. First, the study was purely correlational, and thus causal relationships could not be drawn. Second, the animation style and design depicted endangered animals as heavily anthropomorphised – more reminiscent of humans than animals in most cases (see Appendix A). Because the animation style used was Japanese and analysis was undertaken on a Japanese audience, further research into animated animals must be appropriate to the culture of the sample used. For example, the traditional Western cartoon style may be more suitable for use in a Western population. Despite the limitations, the study reveals evidence to suggest that the use of cartoons and animation may impact public interest in threatened animal conservation and that this interest may result in real financial support via donations. Whether cartoon animals could change how we perceive the minds and moral standing of animals remains to be tested.

The Current Study

While previous research suggests that cartoon/animated animals may raise public interest in endangered animals, no study has looked into the underlying factors cartoon animals possess compared to real endangered animals. Furthermore, little research has looked into how we perceive endangered animals' minds and moral standing. The presentation of endangered animals in the form of cartoons may activate particular phenomena that change people's perceptions of them. The cartoonification of endangered animals may enhance the baby schema characteristics of some animals that are inherently less cute than others. For example, the wētā, a large flightless cricket native to New Zealand, via cartoonification, may exhibit more baby schema characteristics such as larger eyes and more simplified, round body and head shapes. There is the possibility that cartoon depictions of endangered animals are perceived to be cuter than photo images of endangered animals. Cartoons may have better utility in activating empathy and caretaking behaviours by introducing more baby schema features. By inducing increased caretaking behaviours in the population, an increase in willingness to support the conservation of endangered species may arise.

There is also the possibility that cartoon endangered animals are depicted in such a way that people perceive more mind in the animal. It stands to reason that when people attribute more mind to animals, it shifts the animal's moral status towards that of a moral patient – deserving of more moral recognition. This shift in moral position may also result in increased public interest in the conservation of endangered animals, as they are seen as more vulnerable and in need of help. That is, the effect of cartoon images on mind perception and moral standing may be partly or fully due to the cuteness of the images. Thus, my hypotheses are as follows:

H1a: Perceived mental capacity ratings will be higher for cartoons than photos.

H1b: Moral standing ratings will be higher for cartoons than photos.

H2a: Cuteness will positively correlate with perceived mental capacity

H2b: Cuteness will positively correlate with moral standing

Furthermore, there is the possibility that the effect of cuteness on the mind perception and moral standing of endangered animals is related in some way to the type of image presented, cartoon or photo. Thus, an additional research question is as follows: What effect does image condition have on the influence of cuteness on moral standing and perceived mental capacity.

Method

The objective of the current study was to experimentally investigate whether people perceive endangered animals as having higher levels of mental capacity and moral standing when presented as cartoon images compared to photo images. Secondarily, we investigate whether cuteness ratings of endangered animals positively correlate with perceived mental capacities and moral standing attributions. The research project was evaluated by peer review and judged low risk. Consequently, a low-risk ethics notification was lodged at Massey University (notification number: 4000026426). The methods for this study were pre-registered to promote open science practices. The pre-registration can be accessed at https://aspredicted.org/99jt9.pdf.

Participants

Participants (N = 651) were residents of the United States age 18 or older recruited through Prolific (www.prolific.co). Participants were paid USD$1 for their participation in a five-minute survey. The mean duration of the study was 5.02 minutes. Multiple exclusion criteria were applied to screen-out unreliable data. Data from participants who failed an attention check were excluded from the primary analysis (n=13). At the end of the survey, participants were asked if their data may be unreliable due to randomly selecting responses or doing background research on the animal presented in the study; the data from 10 participants who answered "Yes" to this question were also excluded. This left 628 participants in the final sample (350 male, 291 female, 6 prefer not to say; *M* = 31.6 years, *SD* = 12.1, range = 18 – 81).

Design

We used a 4 (Animal type: wētā vs. kākāpō vs. long-tailed bat vs. yellow-eyed penguin) x 2 (Image type: cartoon vs. photo) between-participants design. For each animal and image type, two exemplar images were used to help control for specific images' idiosyncrasies.

Materials

Animal Images

While animal image databases validated for human-animal studies are available (see Possidónio et al., 2018), they contain common animals globally recognised with a widespread distribution of habitat. Additionally, current animal image databases lack distinct threatened and endangered animal species. For example, in Possidónio et al.'s animal image database of 120 images, one species (i.e., great white shark) is used to represent entire taxonomic classifications (i.e., shark).

When selecting animals for this study, several criteria were considered. First, species were to be endemic to New Zealand and classified as either threatened or endangered. We chose animals that met the IUCN criteria for classifying species at high risk of global extinction of vulnerable or above. Animals with less international recognisability were prioritised to control for familiarity. For example, kiwis are recognised globally and synonymous with New Zealand, thus were excluded as target species. Animals that we believed would naturally attract more attention due to their charisma or cuteness were also excluded. For example, marine mammals endemic to New Zealand, such as the Hectors and Maui dolphin, were excluded due to their natural charisma.

Furthermore, we aimed to cover a broad range of biological categories, such as mammals, birds, insects, and reptiles. Finally, the species selected were to be unique enough that cartoon and photo images of the animals would be distinguishable from similar members of the same genus or family. For example, while there are many endangered species of skinks endemic to New Zealand, they are difficult to distinguish from species of other New Zealand skinks and those seen elsewhere in the form of cartoons and photos.

Photo images were procured from various websites. The web sources included Flickr, Shutterstock, Wikipedia, Reddit, eBird, Te Papa Museum, and Auckland Zoo. Image references can be found in the references section. We required images to contain the animal's full body with its head front-facing, depicting the animal in a neutral position. Backgrounds were not considered in

the selection process as these would be removed later with editing software. Cartoon images were procured via freelance artists on Fiverr (www.fiverr.com). We aimed to select two artists to create images for each of the four endangered animals. This process occurred in three stages: artist selection, procurement of images, and revisions. First, we reached out to six artists with an overview of our requirements for the images. Each artist was asked to create a cartoon image of a wētā with the brief that the cartoon must portray the animal as cuter than their real-life versions and be distinguishable from similar animals (such as a grasshopper). They were also given brief details of our definition of cute, which covered baby schema characteristics such as larger eyes and softer features. Four of the six artists responded. Reference images of the wētā and detailed instructions were sent to the remaining four artists. Two of the four artists came back with images that fit the criteria.

With the two artists selected, we commissioned cartoon images for the remaining three animals. Both artists were given reference images for the kākāpō, long-tailed bat, and yellow-eyed penguin, accompanied by detailed instructions on our requirements for each. Once we had received all the cartoon images, we entered our final revision stage. In our final phase, artists were asked to revise images that did not satisfy our requirements. For example, one yellow-eyed penguin cartoon image looked too generic, and nonrepresentative of our target species. For revisions, we worked with artists by providing additional notes on changes till the images satisfied our requirements.

Once eight photo and eight cartoon images had been selected, backgrounds were removed using editing software. All 16 animal images were presented on a transparent background with additional background removed (see Figure 1 for example). In all images, the animal's entire body was visible, facing the same direction with body positions as similar as possible. Due to a lack of good-quality photo images of long-tailed bats with similar body positioning, one bat photo image with a slightly different body position was selected. All photo and cartoon images used in this study can be found in Appendix B and C, respectively.

Figure 1

Cartoon and Real Animal Images for the Long-tailed Bat

Cartoon One

Cartoon Two

Photo One

Photo Two

Animal Information Page

All images of the same species were accompanied by a small text description of the animal. We aimed to minimise the depth and length of the description, so most of the focus was on the image content. For example, all four images of the wētā were accompanied by the text “The giant wētā are large flightless crickets native to New Zealand.”. Each animal was presented alongside a small information box detailing the class, order, family, genus, IUCN status, common name, and small animal descriptor (see Figure 2 for example).

Figure 2

Example of Animal Information Blurbs

Cuteness Scale

The perceived cuteness of animals was measured via a modified version of an established cuteness scale (Steinnes et al., 2019). Steinnes et al. constructed their 6-item cuteness scale based on a literature review attempting to identify the most common visual descriptors used to denote child schema characteristics. The internal consistency of the revised cuteness scale for study one of Steinnes et al. (2019) was reported as $\alpha = .91$ and $\alpha = .94$ for control and cute conditions, respectively. Several changes were made to the scale to fit this study. The item "it is not sweet" was removed due to ambiguous wording and the reversed wording in the item "it is not cute" was also removed. The resulting measure was a 4-item scale measuring the perceived cuteness of animals. It included items containing statements about the cuteness of the target animal, such as "a [target animal] is adorable and "a [target animal] looks soft". Participants rated each statement on a Likert

scale from 0 to 7, where 0 was labelled “Do NOT agree”, and 7 was labelled “Definitely agree”. The full scale can be found in Appendix D. Participants’ scores across the four items were averaged to create one composite cuteness score. Cronbach’s alpha for the 4-item cuteness scale was good, α = .88. The 4-item scale correlated highly with the single-item “[target animal] is cute”, r = 0.86, *p* <.001, suggesting the scale is a valid measure of cuteness.

Mind Perception Scale

The mind perception of animals was measured via a 24-item perception of animal minds scale (Philipp, 2022). The items in the scale were derived from other scales measuring mind perception including, Malle (2019), Gray et al. (2007), and Birch et al. (2020), as well as the addition of two items about concepts that may be related to mind perception (can [target] dream, can [target] play). Participants were administered a questionnaire containing 24 statements and one attention check. They were then asked to rate their level of agreement with each statement regarding the target animal on an 8-point Likert scale ranging from 0 to 7, with higher scores representing higher levels of agreement. The lower end of the scale was labelled “Definitely NOT true” and the higher end was labelled “Definitely TRUE”. Items about the target animal were worded as statements such as “a [target animal] can be hungry”, “a [target animal] can plan for the future”, and “a [target animal] can dream”. The full scale can be found in Appendix E. Participants’ scores on all 24 statements were combined, and a mean score was derived to create a mind perception score. Cronbach’s alpha for the mind perception measure was excellent, α = .94.

Animal Impression Measures

We included five items pertaining to different characteristics that have been found to impact peoples’ impressions of animals for exploratory purposes. The five items ask about the perceived beauty, intelligence, aggressiveness, similarity to humans, and deliciousness of the target animal.

The items were included in the cuteness scale, acting as both distractor items and impression measures. The items can be found in Appendix D.

Moral Standing Scale

Moral standing was assessed using a five-item moral standing scale developed by Piazza et al. (2014). Two of the five items ask about the morality of specific actions towards the target animal (e.g., How morally wrong do you think it would be to harm a [target animal]?). Two items asked the extent to which the target animal deserves certain moral rights (e.g., to what extent do you think a [target animal] deserves to be protected from harm?). The final item asked about the moral value of saving the target animal from extinction (How important would it be to protect a [target animal] from extinction?). The full scale can be found in Appendix F. Participants were asked to rate each statement based on their perception of the target animal on an 8-point Likert scale ranging from 0 to 7, with higher scores representing higher levels of agreement. The lower end of the scale was labelled “Not at all”, whereas the higher end was labelled “Very much so”. Participants’ scores on all five statements were combined, and a mean score was derived to create a moral standing score. Cronbach’s alpha for the moral standing measure was excellent, $\alpha = .93$.

Procedure

Participants were assigned to one of 16 conditions in a 4 (animal) x 2 (image type) x 2 (stimuli type) design. After viewing the image alongside the animal information page, participants were asked to rate the animal on the perception of animal minds, moral standing, cuteness, and general impressions scales. Finally, participants were presented a manipulation check where they were asked to select from a dropdown box which image they were shown. The measures were presented in the same order for all participants, while item order within each measure was randomised.

Results

We interpreted our confirmatory and exploratory hypotheses using null hypothesis significance testing (NHST). For all our analyses, we interpreted p-values < .05 as statistically significant. We started by testing our confirmatory hypotheses. In our confirmatory hypotheses, we first looked at whether mind perception or moral standing ratings were higher for cartoon animals than photo animals. Next, we examined how cuteness interacted with mind perception and moral standing ratings. We followed up with exploratory analyses looking at the factor structure of the mind perception measure and whether our results were stable by animal type. Then we investigated the affect of other factors on moral standing. Finally, we investigated how beauty and cuteness predict moral standing together. Confirmatory hypotheses were pre-registered and can be accessed at https://aspredicted.org/99jt9.pdf.

Descriptive Analyses

Descriptive statistics for cuteness, moral concern, and mind perception ratings for each animal can be seen in Table 1. On average, each condition (animal x image type) was evaluated by 78.5 participants (range: 76 – 81). Both cuteness and moral standing ratings ranged from 0 to 7.0, and mind perception ratings ranged from 6.8 to 0.2. Generally, scores on cuteness, mind perception, and moral standing scales were lowest for the wētā, while the kākāpō and yellow-eyed penguin generally scored higher (for violin plots, see Figure 3).

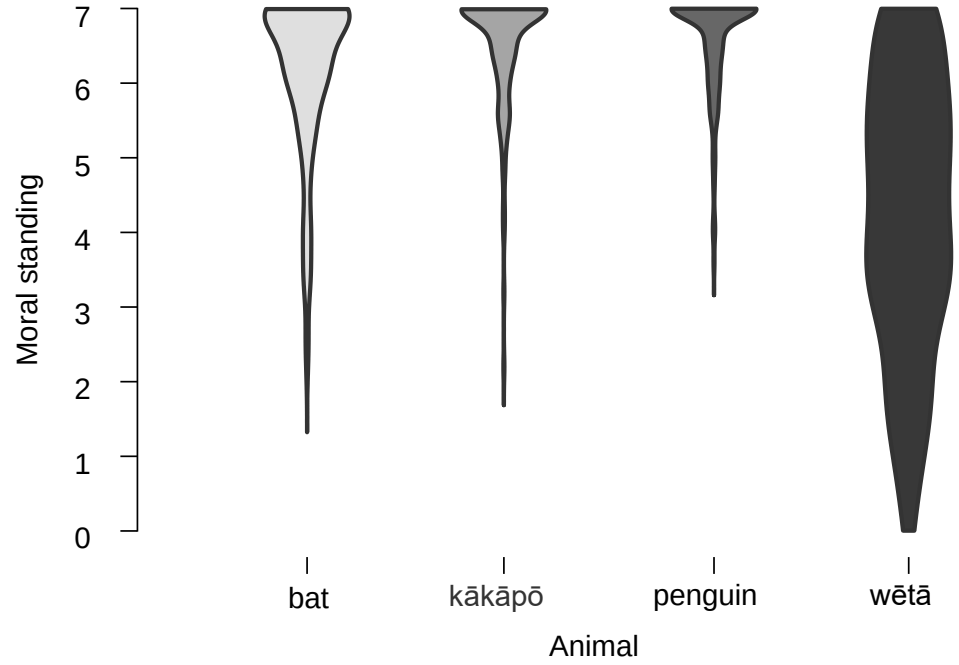
Table 1

Means and SD for Cuteness, Sociality, Autonomy, Fundamentality, and Moral Standing Scores Split by Animal.

	Group	N	Mean	SD
Cuteness	bat	159	3.06	1.86
	kākāpō	155	4.62	1.45
	penguin	155	4.47	1.40
	wētā	159	1.05	1.19
Sociality	bat	159	3.82	1.22
	kākāpō	155	4.45	1.06
	penguin	155	4.55	1.02
	wētā	159	2.37	1.37
Autonomy	bat	159	2.71	1.39
	kākāpō	155	2.86	1.30
	penguin	155	2.79	1.36
	wētā	159	1.89	1.43
Fundamentality	bat	159	5.89	0.86
	kākāpō	155	5.70	0.89
	penguin	155	5.84	0.83
	wētā	159	5.06	1.30
Moral standing	bat	159	6.15	1.09
	kākāpō	155	6.51	0.78
	penguin	155	6.57	0.69
	wētā	159	4.27	1.84

Figure 3

Violin Plots of Cuteness, Mind Perception, and Moral Standing Scores Split by Animal



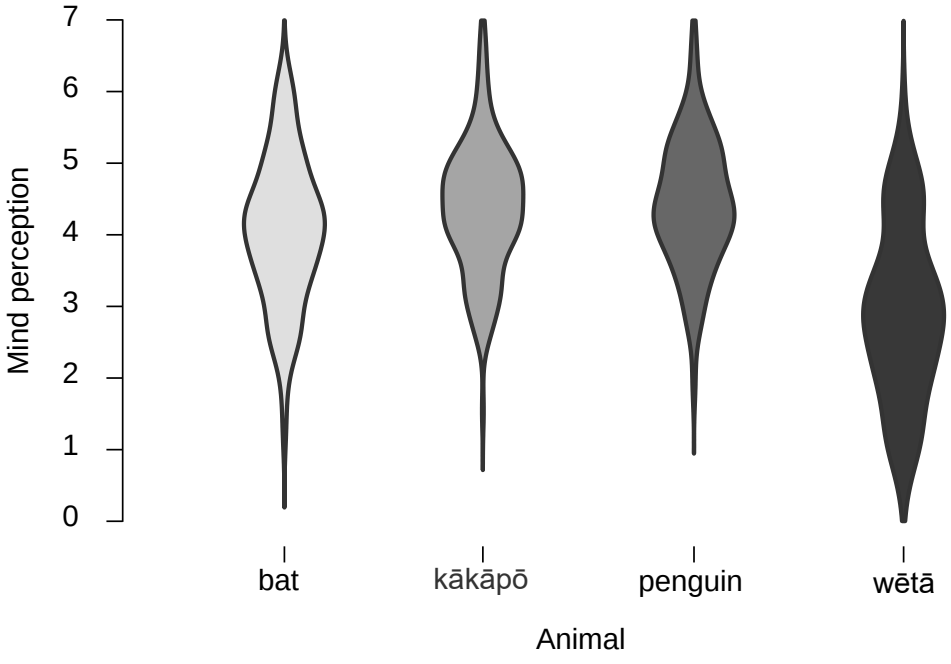
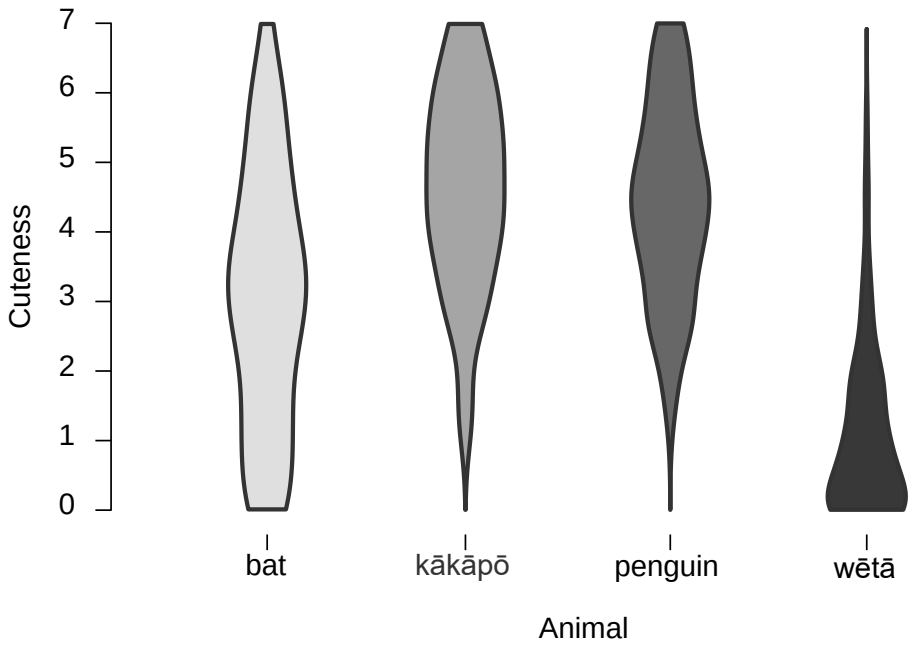


Figure 3 Continued



Confirmatory Hypotheses

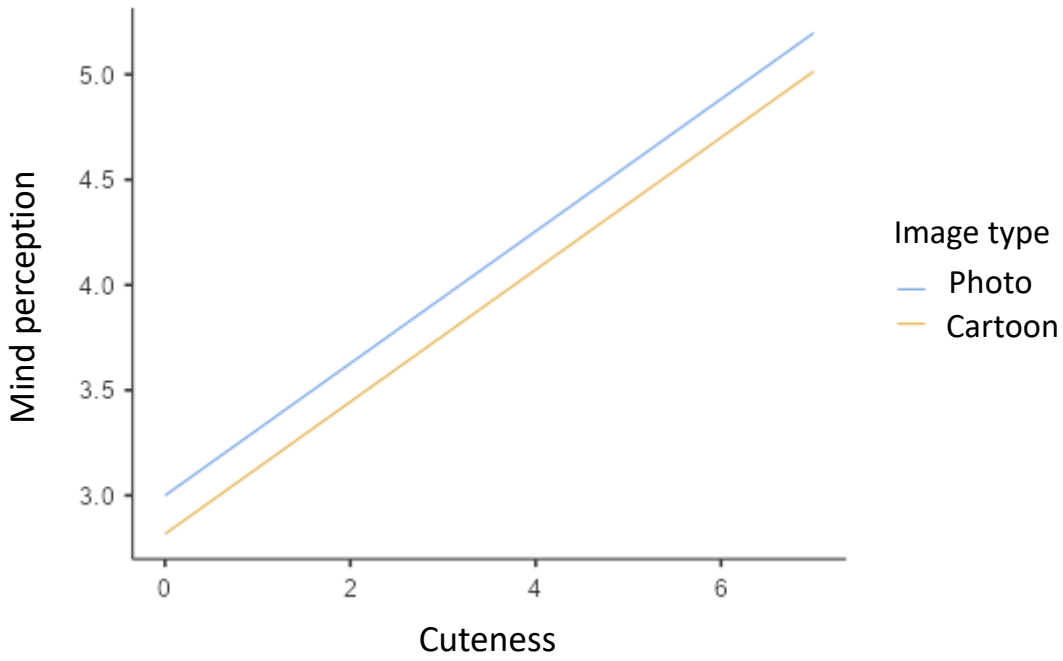
We first tested the hypothesis that mind perception ratings will be higher for cartoon animals than for photos of animals. There was no significant difference in mind perception between cartoon image (M = 3.89, SD = 1.24) and photo image (M = 3.99, SD = 1.14) conditions, $t(626) = 1.08$, $p = .859$, $d = 0.07$, 95% CI = [-0.07, 0.24]. We then tested the hypothesis that moral standing ratings will be higher for cartoon animals than for photos. There was no significant difference in moral standing, $t(626) = 0.62$, $p = .731$, $d = 0.05$, 95% CI [-0.11, 0.21]. We found no support for our hypotheses that mind perception and moral standing would be higher for cartoon animals than photos; cartoon images were not attributed more mind perception or moral standing than photo images.

Second, we sought to investigate our hypotheses that cuteness positively correlated with mind perception and moral standing ratings. First, we conducted a linear regression analysis to investigate whether cuteness positively predicts greater mind perception. Cuteness and image type

were predictor variables, and mind perception was the dependent variable. We dummy-coded image type, so that photo images were coded = 0, and cartoon images were coded = 1. The model was statistically significant, $F(2, 625) = 133.51$, $p < .001$, $R^2 = 0.299$. Cuteness was a significant positive predictor of mind perception, $b = 0.314$, $SE = 0.02$, $t(625) = 16.29$, $p < .001$, 95% CI = [0.28, 0.35]; cuter animals were perceived to have more mind (see Figure 4). Furthermore, image type was a significant negative predictor of mind perception, $b = -0.183$, $SE = 0.08$, $t(625) = -2.29$, $p = .022$, 95% CI = [-0.34, -0.03]. Cuter animals received higher mind perception scores. Furthermore, when cuteness is kept constant, participants attributed less mind to cartoon images of animals than photo images.

Figure 4

Estimated Marginal Means of Cuteness x Image Type on Mind Perception

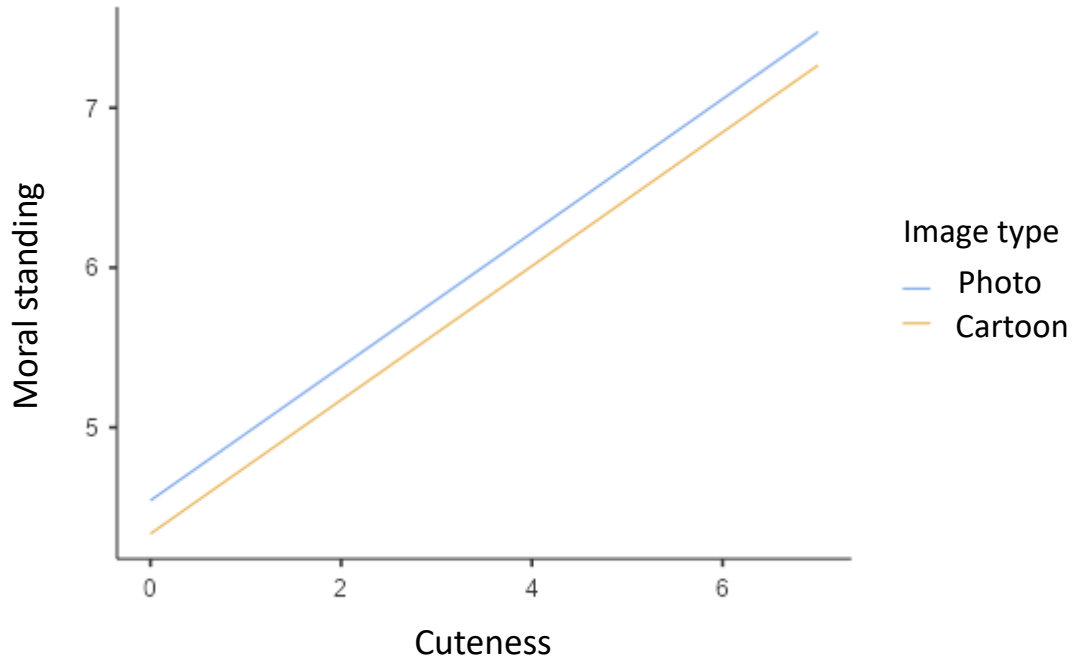


For the second analysis, we used cuteness and image type as predictor variables and moral standing as the dependent variable. Image type was coded identically to H2a. The model was

significant, $F(2, 625) = 136.10$, $p < .001$, $R^2 = 0.303$. Cuteness was a significant positive predictor of moral standing, $b = 0.404$, $SE = 0.03$, $t(625) = 16.48$, $p > .001$, 95% CI = [0.36, 0.45]. There was no significant interaction between image type and moral standing, $b = -0.180$, $SE = 0.10$, $t(625) = -1.76$, $p = .079$, 95% CI = [-0.38, 0.02] (see Figure 5). Cuter animals were attributed more moral standing than less cute animals. Additionally, participants did not attribute less moral standing to cartoons than photo images of animals when we control for cuteness. We found no support for our hypotheses that cartoon images received higher mind perception and moral standing scores. We did find support for our hypotheses that cuteness is a positive predictor of mind perception and moral standing. For mind perception and moral standing, cuteness and image type explained 29.9% and 30.3% of the variance, respectively. Furthermore, we found that when we control for cuteness, cartoon animal images were attributed less mind perception compared to photo images. Image type was found to have no significant effect on attributions of moral standing when we control for cuteness.

Figure 5

Estimated Marginal Means of Cuteness x Image Type on Moral Standing



Exploratory Analyses

After our confirmatory analyses, we explored several other interactions. First, we explored the factor structure of the mind perception measure. Following this, we investigated whether there were any significant differences between animal types in cuteness, dimensions of mind perception, and moral standing scores. Next, we investigated which factors were more or less important for moral standing attributions. Lastly, we looked at how beauty and cuteness interact with moral standing.

Factor Analysis

We conducted an exploratory factor analysis on the perception of animal minds scale to see if items loaded similarly to Philipp (2022). All 24 items were subjected to principal axis factoring with oblimin rotation. A parallel analysis suggested a three-factor solution. Three factors were extracted, which explained 50.2% of the total variance (see Table 2). The first factor explained 23.6% of the variance and grouped 12 items with loadings *l* ≥ .30. This *sociality* factor consisted of items related to social capacities (play, imitation, and friendships) and experience of emotions (happiness, anger, love, and compassion). The second factor explained 15.4% of the total variance and grouped six items with loadings *l* ≥ .40. This *autonomy* factor consisted of items related to decision-making and cognitive capacities (self-control, multitasking, planning for the future, and setting goals). The third factor explained 11.1% of the total variance and grouped 6 items with loadings *l* ≥ .40. This *fundamentality* factor consisted of items relating to fundamental animal capabilities such as moving by themselves, hunger, and making decisions.

Table 2

Factor Loadings for the Perception of Animal Minds Scale

	Factor			
	1	2	3	Uniqueness
Can form friendships	0.86			0.27
Can love others	0.86			0.30
Can play	0.81			0.38
Can be happy	0.79			0.34
Can feel compassion	0.68			0.34
Can experience humour	0.54			0.47
Can remember others	0.49			0.41
Can learn by imitation	0.47			0.55
Can dream	0.46			0.56
Can recognise itself in a mirror	0.43			0.61
Can be angry	0.42		0.37	0.57
Can remember past events	0.37			0.49
Can set goals		0.75		0.39
Can infer what others are thinking		0.72		0.40
Can plan for the future		0.72		0.44
Can understand other's minds		0.71		0.50
Can exercise self-control		0.46		0.56
Can manage multiple tasks at once		0.43		0.66
Can be hungry			0.66	0.58
Can move on its own			0.57	0.70
Can have intense urges			0.52	0.63
Can make decisions			0.51	0.48
Can perceive differences between large and small objects			0.50	0.66
Can communicate non-verbally			0.45	0.68

Note. 'Principal axis factoring' extraction method was used in combination with an 'oblimin' rotation. Table shows factor loadings > 0.35

One-way ANOVA of variables

We then investigated whether animals in our study differed in their cuteness, sociality, autonomy, fundamentality, and moral standing scores. Means for each animal type's cuteness, sociality, autonomy, fundamentality, and moral standing scores can be found in Table 1. One-way

ANOVA showed a significant effect of animal type on cuteness ($F(3,343.07) = 262.28$, $p < .001$), sociality ($F(3,345.51) = 100.23$, $p < .001$), autonomy ($F(3,346.60) = 16.50$, $p < .001$), fundamentality ($F(3,343.92) = 16.49$, $p < .001$), and moral standing ($F(3,336.23) = 76.75$, $p < .001$). We then ran Games-Howell post hoc tests for all five above variables (see Tables 3 – 7). Post hoc tests indicated that wētā scored significantly lower in all five variables compared to the long-tailed bat, kākāpō, and yellow-eyed penguin. Long-tailed bats scored significantly lower in cuteness, sociality, and moral standing than kākāpōs and yellow-eyed penguins. Wētās were consistently rated lower in all five measures compared to other animals. This suggests that wētā may be qualitatively different to the other animals in this study.

Table 3

Post-hoc Comparisons Using Games-Howell – Cuteness Scale

		bat	**kākāpō**	**penguin**	**wētā**
bat	Mean difference	—	-1.564 ***	-1.408 ***	2.006 ***
kākāpō	Mean difference		—	0.156	3.571 ***
penguin	Mean difference			—	3.414 ***
wētā	Mean difference				—

Note. * p < .05, ** p < .01, *** p < .001

Table 4

Post-hoc Comparisons Using Games-Howell – Sociality Dimension

		bat	kākāpō	penguin	wētā
bat	Mean difference	—	-0.626 ***	-0.724 ***	1.453 ***
kākāpō	Mean difference		—	-0.098	2.079 ***
penguin	Mean difference			—	2.177 ***
wētā	Mean difference				—

Note. * p < .05, ** p < .01, *** p < .001

Table 5

Post-hoc Comparisons Using Games-Howell – Autonomy Dimension

		bat	kākāpō	penguin	wētā
bat	Mean difference	—	-0.153	-0.082	0.822 ***
kākāpō	Mean difference		—	0.071	0.974 ***
penguin	Mean difference			—	0.904 ***
wētā	Mean difference				—

Note. * p < .05, ** p < .01, *** p < .001

Table 6

Post-hoc Comparisons Using Games-Howell – Fundamentality Dimension

		bat	kākāpō	penguin	wētā
bat	Mean difference	—	0.190	0.048	0.824 ***
kākāpō	Mean difference		—	-0.142	0.634 ***
penguin	Mean difference			—	0.776 ***
wētā	Mean difference				—

Note. * p < .05, ** p < .01, *** p < .001

Table 7

Post-hoc Comparisons Using Games-Howell – Moral Standing

		bat	kākāpō	penguin	wētā
bat	Mean difference	—	-0.357 **	-0.426 ***	1.878 ***
kākāpō	Mean difference		—	-0.068	2.235 ***
penguin	Mean difference			—	2.304 ***
wētā	Mean difference				—

Note. * p < .05, ** p < .01, *** p < .001

Exploratory Regression Analysis of Moral Standing

We then investigated to what extent our factors contributed to moral standing overall. Specifically, we wanted to see which factors were more or less important for moral standing. We ran a linear regression analysis with cuteness, sociality, autonomy, fundamentality, animal type, image type, and stimuli type as predictor variables and moral standing as the dependent variable. Image

type was coded as it was in our confirmatory hypotheses. Stimuli type was coded such that images designed by our first artist were coded = 1 and images of our second artist were coded = 2. The model was significant, $F(9,618) = 63.35$, $p < .001$, $R^2 = 0.48$. Cuteness, sociality, and fundamentality positively predicted moral standing (see Table 8). Moral standing scores were significantly lower for real and cartoon photos of wētās than for other animals (see Figure 5). The results suggest that perceived cuteness, sociality, and fundamentality are predictors of moral standing. Furthermore, when we control for the factors of mind perception, cuteness, and image nuance, wētā received distinctly less moral standing attributions than the other animals.

Table 8

Linear Regression Analysis: Factors Contributing to Moral Standing

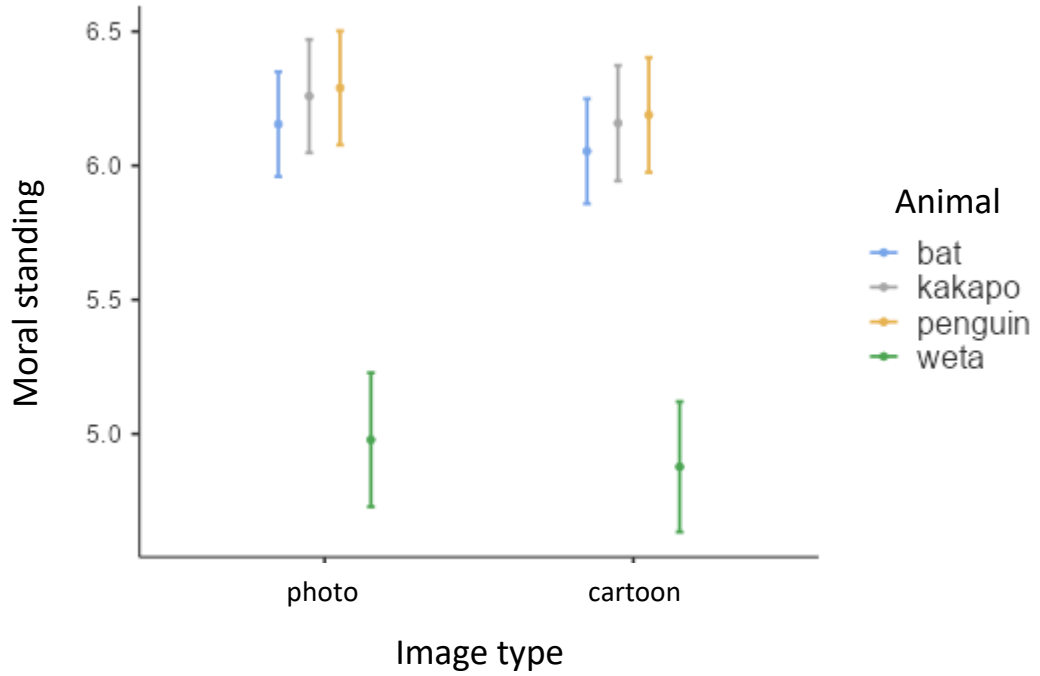
			95% CI		
Effect	Estimate	*SE*	*LL*	*UL*	*p*
Intercept	3.611	0.290	3.041	4.180	< .001
Cuteness	0.138	0.032	0.075	0.201	< .001
Sociality	0.161	0.063	0.038	0.284	.010
Autonomy	-0.058	0.047	-0.151	0.035	.221
Fundamentality	0.288	0.054	0.182	0.394	< .001
Image type [a]	-0.101	0.089	-0.276	0.074	0.259
Stimuli type [b]	0.022	0.088	-0.151	0.195	0.802

Note. N = 628; CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

[a] 0 = photo, 1 = cartoon. [b] 1 = first artists cartoons, 2 = second artists cartoons.

Figure 5

Estimated Marginal Means of Image Type x Animal on Moral Standing



Beauty and Cuteness' Impact on Moral Standing

Some researchers have found beauty to be an important dimension in moral standing attributions (Klebl et al., 2021). We looked at how the effect of cuteness on moral standing differed from the effect of beauty by analysing ratings of the single-item beauty measure used as a distractor in the cuteness scale. We first looked at how both cuteness and beauty predicted moral standing when we controlled for image type. H2b found that cuteness positively predicted moral standing. We then looked at beauty's effect on moral standing. We ran a linear regression analysis with beauty and image type as predictor variables and moral standing as the dependent variable. We dummy-coded image type similarly to our previous analyses. The model was significant $F(2,625) = 162.56$, $p < .001$, $R^2 = 0.34$. Beauty was a significant positive predictor of moral standing, $b = 0.38$, $SE = 0.21$, $t(625) = 18.01$, $p < .001$, 95% CI = [0.34, 0.42]. Both cuteness and beauty positively predicted moral standing.

We then tested whether beauty or cuteness would predict moral standing independently. If cuteness and beauty are conceptually distinct, both should emerge as significant predictors of moral standing. We ran an additional linear regression with cuteness, beauty, and image type as predictor variables and moral standing as the dependent variable. The model was significant, $F(3,624) = 121.63$, $p < .001$, $R^2 = 0.37$, and both cuteness and beauty emerged as positive predictors of moral concern, independent from image type and each other suggesting cuteness and beauty may be conceptually distinct (see Table 9).

Table 9

Linear Regression Analysis: Effect of Image Type, Beauty, and Cuteness on Moral Standing

			95% CI		
Effect	Estimate	*SE*	*LL*	*UL*	*p*
Intercept	4.327	0.107	4.116	4.538	< .001
Image type [a]	-0.173	0.097	-0.363	0.017	.074
Beauty	0.256	0.032	0.194	0.319	< .001
Cuteness	0.185	0.036	0.114	0.255	< .001

Note. N = 628; CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

[a] 0 = photo, 1 = cartoon.

Discussion

The purpose of this study was to better understand how cartoons can influence people's perceptions of the minds of animals and whether cartoons can change moral standing attributions. Our study experimentally tested the influence of cartoons and cuteness on mind perception and moral standing. Specifically, our hypotheses looked at whether cartoons increased mind perception and the moral standing of endangered animals and whether cuteness positively predicts mind perception and moral standing. Our hypotheses were met with mixed support. While cartoons may not be important, we found that cuteness emerged as an important dimension for moral standing and mind perception of endangered animals. Our findings highlight the importance of cuteness and its impact on impressions of the moral standing and minds of animals. Our research also informs moral standing, beauty, and mind perception literature.

We found no support for our hypotheses that cartoonifying endangered animals increased mind perception or moral standing attributions. This study aimed to test whether cartoon versions of animals possessed inherent qualities that influence mind perception and moral standing. The results of our research show that cartoon animals were not attributed more mind or moral standing compared to photos of animals. This was true for all four endangered species examined in this study.

We found support for our hypotheses that cuteness is an important dimension in attributions of moral standing and mind perception. Regarding moral standing, we found that cuteness was able to positively influence attributions of moral standing independent from image type across four endangered species. That is, cute animals were attributed more moral standing than less cute animals regardless of whether they were cartoon or photo images. Our findings build on previous research, which highlights the importance of cuteness on moral standing attributions (Piazza et al., 2018; Possidónio et al., 2019; Zickfeld et al., 2017). While previous research has focussed on the impact of baby schema and cuteness in the context of meat consumption, here we have experimentally demonstrated that cuter animals are regarded with more moral concern in

animal conservation. Our research highlights cuteness as an important determinant in the moral standing attributions of endangered animals. Our research can inform conservationists that exploiting an animal's cuteness may be an avenue to increase public interest and support for animals at risk of extinction. By enhancing feelings of empathy and inducing caretaking behaviours, cuteness may increase moral concern for endangered animals.

Little research has looked at the impact of cuteness on mind perception. Possidónio et al. (2019) have found that cuteness positively correlates with perceptions of animals' capacity to feel and think. Our research suggests that, across four endangered species, cuteness was an important dimension in the perception of animals' minds independent from image type. Cuter animals are perceived as having more mind regardless of their presentation as a cartoon or photo image. Our results were consistent with Sherman and Haidt's (2011) mentalising theory of cuteness which posits that cuteness is a direct motivator of sociality, which triggers a positive shift in behaviour towards the animal. More broadly, our results are consistent with the general trend that cuter entities tend to be viewed more positively (Aragón et al., 2015; Glocker et al., 2009; Possidónio, 2019).

We further hypothesised that cartoonification of animals might fundamentally change how people perceive them and thus change how we perceive their minds. We found that image type had a negative impact on sociality and autonomy. People tended to perceive less sociality and autonomy in cartoon animals compared to real animals. This has interesting ramifications for not only how we perceive the minds of animal but how we view their moral standing via a connection between mind perception and moral agency and patiency. People may prescribe moral standing to animals via their ability to do moral right or wrong and whether they are susceptible to having moral right or wrong done to them (Grey et al., 2007). Due to sociality's link to patiency and autonomy's link to agency, our results suggest that when we cartoonify animals, we may hinder how people conceptualise animals' moral rights and actions. Cartoon animals may lose some of their "animalness" and become an abstract representation of an animal rather than the actual animal itself. This result seems to

oppose Fukano et al. (2020), who found that cartoon animals increased donations and support for endangered animals.

Most of the previous research in mind perception has focused on exploring how people perceive the minds of a wide range of entities. For example, Malle's (2019) and Gray et al.'s (2007) studies looked into how people perceived the minds of infant humans, adults, robots, a small selection of animals, and companies, among others. The current study looked exclusively at the perceptions of animal minds. The resulting factor structure which emerged from the present study suggests that people come to think of the minds of animals differently from other entities. Specifically, people may distinguish animal minds by their sociality – their available affective and social functions, autonomy – their cognitive functions and control over their environment, and fundamentality – their essential survival functions. Fundamentality may be a dimension that emerges exclusively to animals compared to other entities in which people might perceive a mind. As mentioned above, fundamentality covers concepts associated with basic survival. Fundamentality may have resulted in higher moral standing for animals because it is an essential prerequisite to perceive an animal and in turn attribute moral standing. To see an animal as vulnerable enough to warrant moral concern, it must first be perceived as an animal with basic survival instincts.

Another result from this study merits comment. First, we obtained evidence that beauty positively predicts attributions of moral standing to endangered animals. This finding is consistent with previous work, which highlights the importance of beauty to attributions of moral standing in animals (Gunnthorsdottir, 2001; Klebl et al., 2021). Second, we find that beauty and cuteness predict moral standing independently of each other, despite sharing a sizable overlap of correlation. This suggests that while both concepts may measure similar aesthetic qualities of animals, cuteness and beauty cover distinct qualities which influence moral standing attributions of animals. While beauty is conceptualised as physical attractiveness, cuteness relates to a type of attractiveness associated

with sets of juvenile features which make entities look more baby-like. This study provides evidence that suggests both concepts are important for moral concern via different avenues.

A taxonomical hierarchy emerged in our findings which suggest that people come to think of animals along a spectrum of how similar they are to humans. Previous research has found that people tend to have preferences for animals more similar to humans ranging from mammals to birds, followed by reptiles and invertebrates (Batt, 2009; Tisdell et al., 2006; Wilkins et al., 2015). We found that the two bird species in our study, the kakapo and yellow-eyed penguin, scored significantly higher in cuteness, sociality, and moral standing scores than wētā and long-tailed bats. Unexpectedly, the long-tailed bat scored lower on cuteness, moral standing, and mind perception measures than the bird species. One possible explanation for this is that people may hold negative attitudes about specific species. Previous research has found that among other animals, such as snakes and spiders, bats may be conceptualised differently compared to other species due to cultural perceptions, emotional reactions to pictures, and irrational fears such as phobias (Knight, 2008).

Our findings highlight the importance of considering how conservationists portray endangered animals in need of protection from extinction. Cuteness may be one factor that can help shift the moral standing of more morally agentic endangered animals to that of a moral patient. Furthermore, different avenues for support may be more fruitful than calls to moral concern for more agentic endangered animals. Conservationists looking to increase public support for specific endangered species may need to be mindful of an animal's inherent qualities to create effective interventions and marketing strategies. For example, animals that are regarded as strong moral agents may benefit more when appeals are made to their cuteness to raise moral concern.

The current study was informed by Fukano et al.'s (2020) research on the impact of cartoon animals on increased public interest and support for endangered animals. They found that after the airing of a T.V. show featuring endangered animals, search volume and Wikipedia page views for the

endangered animals and monetary contributions towards animals that appeared in the show increased. We aimed to test whether it may have been via the mechanisms of mind perception, moral standing, and cuteness that this correlation arose. By manipulating the image type of a selection of endangered animals, we tested the impact of cartoons on perceived mind, moral standing, and cuteness and found no interaction. It may be that cartoons do not impact mind perception, moral standing, and cuteness, or the lack of interaction between cartoons and our variables may have been due to the differences between the cartoons in our study and Fukano et al. (2020).

While our cartoons similarly highlighted aspects of child schema to that of Fukano et al. – namely, larger eyes, plump body shape, and larger head proportions they differed in other ways. For example, the T.V. show in Fukano et al. (2020) heavily anthropomorphised animals. The cartoon animals in the T.V. show appeared human, walked upright, spoke, and were ascribed unique personalities. Furthermore, the heavily anthropomorphised style may be culturally specific and commonplace to the area where the T.V. show aired – in Japan. In comparison, the cartoon animals used in the current study contained fewer anthropomorphic characteristics. Animals remained in their usual form, but human-like eyes and facial expressions were added. As our study utilised an American population, we believe the cartoon style in our study was a better cultural fit.

Fukano et al.'s research was correlational and non-experimental, meaning the exact cause for the increased public interest in endangered animals is unknown. The results of the current study suggest that it may not be via the avenue of mind perception or attributions of the moral standing of cartoons alone that resulted in the impact of cartoons on donations and conservation support. It may be that cartoonifying animals alone is not enough to activate ascriptions of mind perception and moral standing.

Limitations and Future Research

To our knowledge, this is the first research of its kind which explores the impact of cartoons on perceptions of minds and attributions of the moral standing of animals. As such, our aim for this study was to create a starting point for further research into the impact of cartoons on shaping how people perceive the minds and moral standing of animals. Here we explored this relationship in the context of endangered animals and conservation. While we did find evidence to suggest cuteness is an important dimension for mind perception and moral standing, we found no such evidence for cartoon images. In fact, we discovered that cartoon images might have the opposite effect on mind perception.

While we aimed to highlight the cuteness of the endangered animals in our study, it may be the case that our images missed the mark. Future research might examine the impact of differing levels of baby schema features in cartoon animals on mind perception and moral standing. Creating cartoons containing various levels of cuteness, such as low, medium, and high levels of baby schema, may help us better understand how cartoons and cuteness work in tandem.

Furthermore, the cartoon style and how they are presented may have some bearing on cuteness, mind perception and moral standing. Some styles may better present baby schema features compared to others, and cartoon style may be culturally specific. Fukano et al. (2020) examined the impact of cartoon animals in a T.V. show on donations and public interest for endangered animals in the Japanese cartoon style of *anime.* First, anime may lend itself to cuter depictions of cartoon animals as baby schema features may be more readily and easily accessed. Second, anime as an art style may only apply to a Japanese audience. Whether anime would be an appropriate art style for enabling higher perceptions of cuteness, mind perception, and moral standing in the West and other cultures needs to be further investigated. It may also be that moving cartoon images change how people perceive animals' minds and moral standing. There may be some fundamental differences between static cartoon images and animated ones. Moving images may

give cartoon animals more personality and life and enable cartoon animals to be more expressive, potentially raising perceptions of mind and moral standing.

Our study is limited in part due to the types of animals we used. Our study evaluated participants' perceptions of four endangered animals from three taxonomic groups – mammals, birds, and invertebrates. Previous research suggests that animals more closely related to humans, such as mammals, are attributed more mind (Wilkins et al., 2015). Due to New Zealand's lack of larger land mammals, the mammal category was represented only by the long-tailed bat. Some studies suggest bats may be one of a few species of animal conceptualised differently due to negativistic attitudes such as fears and cultural perceptions (Knight, 2008). This effect may have interfered with participants' perceptions of mind for the long-tailed bat, which resulted in them scoring lower in mind perception than the two bird species.

Previous research suggests that knowledge of conservation status may not play a significant role in determining conservation support (McNally, 2017), whereas other research suggests the opposite (Tisdell et al., 2007). Future research should explore the difference between endangered and non-endangered animals in the context of mind perception and moral standing by comparing varying levels of endangered animals (i.e., vulnerable, endangered, critically endangered) to non-endangered animals. Additionally, a more comprehensive range of animal taxonomic groups should be considered, including reptiles, amphibians, fish, and aquatic mammals, alongside birds, invertebrates, and land mammals. Our findings suggest that species belonging to animal groups more distantly related to humans will receive higher mind perception and moral standing attributions.

Here we have provided a rough baseline on the effect of cartoons and cuteness on mind perception and moral standing. Future research should explore how these effects interact with actual conservation support and willingness to donate towards conservation efforts. Is it the case that people are more willing to donate to cuter endangered animals compared to comparatively less

cute animals? Our findings suggest that cuteness may raise moral standing attributions of endangered animals, strengthening their roles as moral patients. As stronger moral patients, people may be more inclined to support the preservation and protection of cute animals. Conversely, do cartoon animals reduce peoples' level of engagement with conservation support via a reduction in mind perception? Our findings suggest that cartoons reduce peoples' perceptions of the minds of endangered animals. This, in turn, may have an impact on conservation support. Future research should investigate the effectiveness of conservation campaigns that appeal to the degree of cuteness, mind perception, and moral standing of endangered animals.

Finally, the research presented here highlights the possibility that there is no single optimal strategy for increasing conservational support for endangered animals. Cuteness or cartoon imagery may have little impact on the mind perception and moral standing of invertebrates, namely insects, compared to more favourable bird and mammal species. Some species shrouded in negative cultural perceptions and other negative attitudes may not benefit from the positive impact of cuteness, such as bats, snakes, and spiders.

With this study, we aim to inform future conservation strategies by identifying the avenues through which people can effectively engage with endangered animals. Our study validates efforts in both the animal conservation and meat consumption field, both of which utilise cuteness as a means to help preserve endangered species and reduce the consumption of captive-bred meat animals. Little is known about the impact of cartoons on conservation efforts. Caution must be exercised when utilising cartoon animals to attract conservation support, as cartoons may negatively affect mind perception of animals. Increased exposure to animals via cartoons and animation may also increase market demand, leading to increased overhunting and poaching (Silk et al., 2017). Before cartoons are used in conservation campaigns, further evidence-based research must be done to ensure conservation strategies are not doing more harm than good.

Conclusion

Around one-quarter of all assessed species face the threat of extinction. As this number continues to increase, as it has over the last decade, conservation strategies need to adopt new strategies to raise public support against the declining populations of endangered species. Cuteness may be one of these strategies. The present study suggests that animals' cuteness leads people to perceive more mind in and attribute more moral standing towards endangered animals independent of their presentation as a cartoon. This knowledge can aid conservationists in developing more effective conservation strategies to raise public interest in endangered animals. Our findings align with previous research that posits that cuter entities are appraised more positively than less cute ones. Our results highlight the need for further experimental evidence on the use of cartoons as vessels for animal conservation to avoid unnecessary harm to the very animals conservationists are focussed on protecting.

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Appendices

Appendix A

Example of *Kemono Friends* Animation Style used in Fukano et al. (2020)

Appendix B

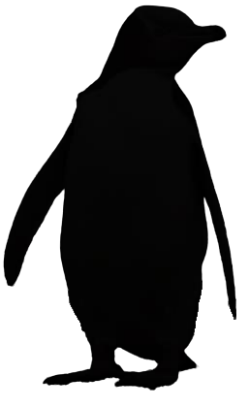
Stimuli for Photo Images of Endangered Animals

Photo images presented to participants before the survey. Blacked out images are those that copyright permission to reproduce were not obtained. Sources for each image are provided in References.

Kākāpō Photo Stimuli 1

Kākāpō Photo Stimuli 2

Yellow-eyed Penguin Photo Stimuli 1



Yellow-eyed Penguin Photo Stimuli 2

Appendix B (Continued)

Long-tailed Bat Photo Stimuli 1

Long-tailed Bat Photo Stimuli 2

Wētā Photo Stimuli 1

Wētā Photo Stimuli 2

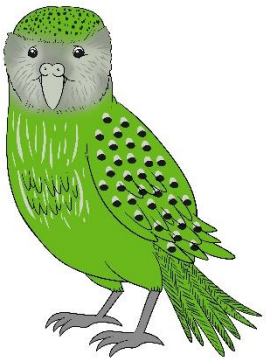
Appendix C

Cartoon Images of Endangered Animals

Cartoon images presented to participants in the survey. Stimuli were created by two different artists to keep the stye of images consistent.

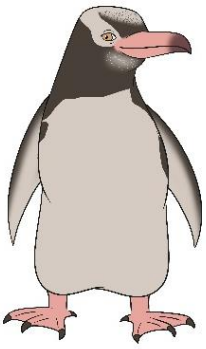
Kākāpō Cartoon Stimuli 1

Kākāpō Cartoon Stimuli 2



Yellow-eyed Penguin Cartoon Stimuli 1

Yellow-eyed Penguin Cartoon Stimuli 2

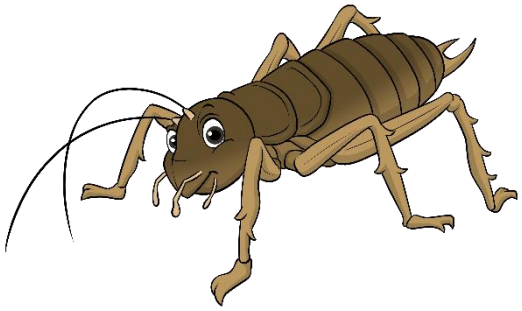


Appendix C (Continued)

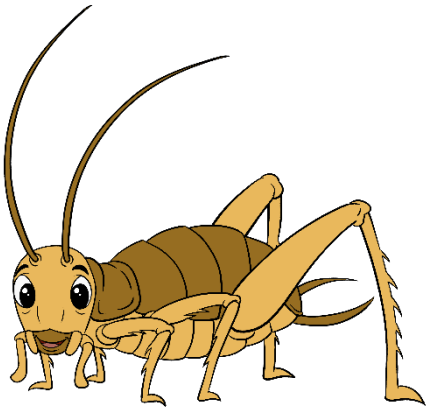
Long-tailed Bat Cartoon Stimuli 1

Long-tailed Bat Cartoon Stimuli 2

Wētā cartoon stimuli 1.



Wētā cartoon stimuli 2.



Appendix D

Cuteness and General Impressions Measure

Survey description and items for the 4-item modified cuteness scale based of Steinnes et al. (2019). The measure also contains six items measuring participants' general impressions of animals. The six general impression items had the dual purpose of acting as distractor items for the cuteness measure, and as predictors for exploratory purposes. Participants rated the target animal on an 8-point Likert scale ranging from 0 to 7, with higher scores representing higher levels of agreement.

We would like to ask you a few more questions about your overall impression of a [target animal].

Rate each statement below based on **your perception** of a [target animal].

1. *A [target animal] is adorable.
2. *A [target animal] looks soft.
3. *A [target animal] is cuddly.
4. *I would **not** like to pet a [target animal].
5. A [target animal] is cute.
6. A [target animal] is beautiful.
7. A [target animal] is intelligent.
8. A [target animal] is aggressive.
9. A [target animal] would be delicious to eat.
10. A [target animal] is very different from a human.

Note: Scale was presented alongside 6 items measuring other characteristics. Item scores ranged from 0 – 7 with the lowest score labelled "do NOT agree" and the highest score labelled "Definitely agree". items from the 4-item cuteness scale are represented with a *.

Appendix E

Mind Perception Measure

The 24-item perception of animal minds scale survey description and items presented to participants. Participants rated the target animal on an 8-point Likert scale ranging from 0 to 7, with higher scores representing higher levels of agreement.

Think about what a [target animal] can do.

You don't need to know anything about a [target animal] - please just rely on your first impressions of a [target animal].

Rate each statement below based on **your perception** of a [target animal].

1. A [target animal] can be hungry.
2. A [target animal] can be happy.
3. A [target animal] can be angry.
4. A [target animal] can love others.
5. A [target animal] can have intense urges.
6. A [target animal] can feel compassion.
7. A [target animal] can form friendships.
8. A [target animal] can plan for the future.
9. Please answer seven (definitely true) for this statement.
10. A [target animal] can set goals.
11. A [target animal] can understand others' minds.
12. A [target animal] can infer what others are thinking.
13. A [target animal] can exercise self-control.
14. A [target animal] can make decisions.
15. A [target animal] can move on its own.
16. A [target animal] can learn by imitation.
17. A [target animal] can communicate non-verbally.
18. A [target animal] can perceive differences between large and small objects.
19. A [target animal] can manage multiple tasks at once.

Appendix E (Continued)

20. A [target animal] can recognise itself in a mirror.
21. A [target animal] can remember others.
22. A [target animal] can remember past events.
23. A [target animal] can experience humor.
24. A [target animal] can play.
25. A [target animal] can dream.

Note: Item scores ranged from 0 – 7 with the lowest score labelled “definitely NOT true” and the highest score labelled “definitely TRUE”.

Appendix F

Moral Standing Measure

The 5-item moral standing scale survey description and items presented to participants. Participants rated the target animal on an 8-point Likert scale ranging from 0 to 7, with higher scores representing higher levels of agreement.

Think about the moral rights of a [target animal].

Rate each statement below based on **<u>your perception</u>** of a [target animal].

1. To what extent do you think a [target animal] deserves to be protected from harm?
2. How morally wrong do you think it would be to harm a [target animal]?
3. How important would it be to protect a [target animal] from extinction?
4. How morally wrong do you think it would be to kill a [target animal]?
5. To what extent do you think a [target animal] deserves to be treated with compassion?

Note: Item scores ranged from 0 – 7 with the lowest score labelled “not at all” and the highest score labelled “very much so”.