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Rationalizing the Many Uses of Animals:

Application of the 4N Justifications Beyond Meat

Jared Piazza

Lucy Cooper

and

Shannon Slater-Johnson

Lancaster University, Department of Psychology

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First author contact info:

Jared Piazza

Department of Psychology

Lancaster University

Fylde College

LA1 1YF

Email: j.piazza@lancaster.ac.uk

Tel: +44 (0) 1524594869

Abstract

Past research has uncovered four common justifications for using animals as food—the 4Ns—that eating meat is Natural, Normal, Necessary, and Nice. The current research investigated the extent to which the 4Ns might apply more generally to other animal uses. Two studies examined the moral justifications people spontaneously offered for various animal uses, including household products, clothing, culling, and horse racing (Study1), and in zoos, TV/film, as pets, and for medical testing (Study 2). Participants offered reasons for why it is okay to use animals and the responses were coded by independent raters. The 4N categories accounted for the majority of justifications across most uses. There was great variability in justification categories offered for each use, and some uses generated justification categories not covered within the 4N scheme, including humane treatment, prioritization of human lives, and sustainability arguments. This research provides a large-scope investigation of animal-use justifications that moves beyond meat consumption.

Keywords: animal use; rationalization; moral justification; 4Ns; humane treatment

Rationalizing the Many Uses of Animals:

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Our relationship with animals is full of complexities and even contradictions. We treat some animals, such as cats and dogs, very kindly; we care for them as pets and companions—we house them, feed them, love them. Other animals, such as mice and badgers, we view as pests to be culled or exterminated. Still, other animals we use for a variety of purposes: cattle for their milk, meat, and hides, horses to awe and entertain us with their speed and agility, birds and rabbits to experiment on to advance our scientific knowledge. Understanding the ways in which people reflect upon different animal uses and defend these practices is an important, understudied aspect of our relationship with animals, and it is an understanding which is central to many animal advocacy efforts.

How we use and treat animals depends on a variety of factors not limited to the characteristics we perceive animals to possess, the characteristics of perceivers themselves, and the motivations we have for using animals (Dhont, Hodson, & Leite, 2016; Herzog, 2010; Knight, Vrij, Cherryman, & Nunkoosing, 2004; Loughnan, Bastian, & Haslam, 2014; Loughnan & Piazza, 2018). Research suggests that animals that have "charismatic" features, that are appraised as highly intelligent, capable of emotion, that are perceived as cute and benevolent toward humans, are afforded greater concern and protections than those perceived to lack intelligence, sentience, or that are perceived as unattractive and harmful (see, e.g., Borgi & Cirulli, 2013, 2015; Colléony, Clayton, Couvet, Jalme, & Prévot, 2017; Piazza, Landy, & Goodwin, 2014; Serpell, 2004; Sytsma & Machery, 2012; Tisdell, Wilson, & Nantha, 2006). The characteristics of perceivers, too, moderate the treatment of animals. For example, research by Morris, Knight, and Lesley (2012) has shown that familiarity with animals, by way of pet ownership, encourages attributions of primary and secondary emotions to several animal species. Similarly, Rothgerber and Mican (2014) showed that

individuals who develop an attachment to their pets as children are more likely later in life to empathize with animals and avoid eating meat. Dhont, Hodson and colleagues have shown that individuals high on social dominance orientation and right-wing authoritarianism, who endorse the supremacy of human beings over animals, tend to have less concern for animals, particularly those animals used for purposes such as food production (Dhont & Hodson, 2014; Leite, Dhont, & Hodson, 2018; see also Caviola, Everett, & Faber, 2018; Piazza, Ruby, Loughnan et al., 2015, Study 2). Furthermore, as a group, men tend to be more supportive than women of a variety of animal uses (Herzog, 2007; Knight et al., 2004; Serpell, 2005).

How we treat animals is also shaped by the motivations we have for using them. When we are accustomed to using an animal in a particular manner that we benefit from, we may be tempted to alter our perception of an animal (e.g., what characteristics they possess) or rationalize its use (see Bastian, Loughnan, Haslam, & Radke, 2012; Bilewicz, Imhoff, & Drogosz, 2011; Loughnan et al., 2014; Loughnan & Piazza, 2018). For example, Piazza and Loughnan (2016) demonstrated how motivations to consume meat can impact on how information about an animal's intelligence impacts on our moral concern for an animal. They found that British omnivores only used information about an animal's intelligence in their judgments about the animal's treatment when they did not consider the animal a food source and, thus, consideration of the animal did not impinge upon their own consumer motivations. Likewise, Bastian et al. (2012) found that meat eaters adjusted their attribution of mind to an animal (lamb/cows) when thinking about its use as meat, as opposed to thinking about it as a living animal.

People can also be motivated to defend their endorsement of an animal use when it comes under scrutiny by others (Piazza et al., 2015). *Rationalizing*, or offering reasons in support of an action or belief, can preserve a sense of moral integrity, that one's actions are justified, when one's actions or beliefs are challenged (Haidt, 2001; Tsang, 2002). In the

present research, we sought to explore whether there are categories of moral justifications that people tend to offer for animal uses that cut across animal-use domains, and how people's justifications might differ as a function of the specific animal use.

The 4Ns of Justification

One domain of animal use that has drawn recent empirical attention is meat consumption (Dowsett, Semmler, Bray, Ankeny, & Chur-Hansen, 2018; Joy, 2010; Piazza et al., 2015; Rothgerber, 2013). In her seminal book, *Why we love dogs, eat pigs, and wear cows*, Melanie Joy (2010) argues that three principal justifications—that eating meat is normal, natural, and necessary—undergird the ideology of "carnism," her term for the ubiquitous culture of meat eating and the beliefs that promote it. *Normal* justifications involve appealing to the historical precedence or widespread endorsement of meat eating. *Natural* justifications appeal to the natural fit between our bodies and meat consumption (e.g., our evolved ability to hunt animals or digest meat). *Necessary* justifications build on assumptions about the necessity of meat for nutrition, health or building muscle. Joy argues the 3Ns have been applied, in a general way, throughout human history not only to defend meat eating but to support other ideologies, such as racism and gender inequality, that today are widely condemned.

Piazza et al. (2015) built on Joy's theorising about the 3Ns and sought to test its empirical application to meat consumption. They asked meat eaters in the U.S. to morally defend the use of animals for food. They found that the 3Ns, and a fourth 'N', that eating meat is *nice* (i.e., tasty, pleasurable), together accounted for 83% (undergraduate student sample) to 91% (older adult sample) of the justifications participants offered. The remaining 9%-17% of responses were comprised of other, miscellaneous arguments, including appeals to humane slaughter and treatment of animals used for meat (1%-3%) and the sustainable nature of meat products (1%). Even more recently, Dowsett et al. (2018) found corroboration

for the 4N scheme among a student and adult sample in Australia. They examined meat eaters' reasons for remaining committed to eating meat. They found that the 4Ns accounted for the majority of reasons offered (67%); however, they found a somewhat larger occurrence of other rationales (26%). These related to some of the less frequently observed categories observed by Piazza et al. (2015), including belief in humane slaughter and the ethical treatment of farmed animals, the purchasing of ethically sourced animal products (e.g., free range eggs), the sustainability of meat products, and the perception that one is reducing one's intake of meat.[1] The relative greater proportion of justifications beyond the 4Ns in Dowsett et al.'s study might be accounted for by the phrasing of the question posed to participants. While Piazza et al. asked meat eaters to justify why it is "OK to eat meat," Dowsett et al. asked participants if they planned to continue to eat meat and what were their reasons. Arguably, personal reasons for eating meat need not rise to the level of a moral defense of its acceptability. For example, a person might recognise that they eat meat because they enjoy it, and plan to continue eating it, while also believing that eating meat, merely because one enjoys it, is morally indefensible.

Extending the 4N Justification Scheme to Other Animal Uses

Despite the recent work on the topic of meat consumption, it remains to be seen if many of the same categories of reasons people invoke to justify meat eating might extend to other animal uses as well, and, if so, to what extent these categories vary by animal use. These were the central aims of the present research. Here we report two studies where we

[1] Dowsett et al. (2018) labelled these additional justifications "neutralisation," a category which aggregated responses related to concern for animal welfare, ethical or humane treatment, and sustainability, as well as arguments that a person cannot change things or is actively engaged in reducing their intake of meat. The designation was meant to reflect that these types of arguments may help neutralise the perceived negative impact of engaging in meat consumption. Dowsett et al. also uncovered a sixth category, "acknowledgment," which involved meat eaters recognising the ethical dilemma of eating meat, without providing a justification for continuing to eat it.

sought to investigate whether the 4N scheme might account for the majority of justifications consumers offer for a diverse array of animal uses beyond meat consumption. Having a firmer grasp of the sorts of justifications people offer in defense of various animal uses would certainly be useful to organizations that endeavour to influence people's opinions about the treatment of animals. Across the two studies, we examined the use of animals as companions (pets), for entertainment (horse racing, TV and film), product development (clothing, household products), scientific and medical testing, and animal management (culling, zoos). Our investigation was guided by three research questions:

RQ1: To what extent does the 4N justification scheme apply to other animal uses beyond meat?

This is a question about the coverage of the 4N scheme *across* various animal uses. Some pre-existing work already suggests that at least some of the 4Ns might have a broader application beyond meat. A study by Knight, Vrij, Bard, and Brandon (2009) identified "perceptions of choice" as a category of beliefs that relate to the perceived *necessity* of using animals for various uses. Knight et al. probed medical scientists, animal welfare advocates, and laypersons' beliefs concerning the existence of viable alternatives to using animals for medical research, dissection, personal decoration, and entertainment, with items such as, "We have to use animals for medical research because there isn't anything else we could use for this purpose." They found that viable alternatives were most strongly endorsed by animal welfare advocates and least among scientists, and this was true for all four animal uses. This study points to *Necessary* as a likely meta-category of justification that has applications across several animal-use domains.

Likewise, other research by Knight, Bard, Vrij, and Brandon (2010) has examined beliefs related to affection for animals (e.g., "Animals give me a lot of pleasure"), perceived

benefits of using animals (e.g., “You have to consider what happens to the animals and what end result is; then you can decide whether animal use is right or wrong”), perceptions of choice (e.g., “There is no substitute to using animals”), need for control (e.g., “We need to control the numbers of animals, or things would get out of hand”), and human superiority (e.g., “I think that humans are more worthy than animals”), as factors predicting acceptability of four animal uses (same four as in Knight et al., 2009). Arguably, the factors of “affection for animals” and “perceived benefits” relate to the category of *Nice* within the 4N scheme, and “perceptions of choice” and “need for control” relate to *Necessary*. The authors found perception of choice to be the strongest predictor of support for three of the four animal uses, with the exception of entertainment use, which was best predicted by need for control beliefs. Here, we sought to build on this pre-existing work, by extending the domains of animal use investigated and by exploring in an open-ended manner the forms of rationales people offer within and across domains.

RQ2: Are certain Ns particularly relevant as justifications for specific animal uses?

This is a question about the relevance of particular N justifications *within* various animal-use domains. Here we speculated that Nice justifications might be employed particularly with regards to entertainment-related uses of animals (TV and film, zoos, horse racing). We speculated that Necessary justifications might be particularly relevant when arguing in support of the use of animals for experimentation (medical and scientific testing) and animal management (culling, zoos). We were less certain about which domains of animal use Natural and Normal justifications might be invoked. Arguably, companionship (pets) may be one use which lends itself to arguments about the biological *naturalness* of our interactions with and emotional attachment to certain animals, like cats and dogs. Horse racing, in particular, seems relevant for arguments that appeal to the cultural or historical

normativity of an animal use (e.g., the popularity and cultural significance of horse racing in countries like England).

RQ3: Might there be other justification categories, beyond the 4Ns, that apply within or across animal uses?

This is a question about what the 4N scheme lacks or overlooks when examining justifications offered for animal uses beyond meat. We speculated that humane treatment, identified by Piazza et al. (2015) and Dowsett et al. (2018), might be one category that could be relevant across animal uses insofar as respondents might believe humane practices are available for various uses. For example, perhaps it is commonly believed that horses used for racing or animals used in TV/film production are humanely treated and cared for, and this justifies these practices. Likewise, perhaps many people believe that animals adopted as pets live better lives than they would otherwise. Finally, research into human supremacy beliefs (e.g., Dhont & Hodson, 2014; Rothgerber, 2013) suggests that the prioritization of human lives over animals might be another category of justification that emerges with some frequency. Indeed, the previously mentioned study by Knight et al. (2009) directly probed participants' beliefs about human superiority and found that these beliefs were endorsed more strongly by scientists and laypeople than by animal welfare advocates. Furthermore, the study by Knight et al. (2010) found human superiority beliefs to contribute to endorsement levels for all four animal uses they examined.

Overview of Studies and Recruitment Strategy

We conducted two studies in which we directly solicited reasons why it is "okay" to use animals for household products, clothing, culling, and horse racing (Study 1), and in zoos, TV/film, as pets, and for medical testing (Study 2). We used a phrasing that approximates that used by Piazza et al. (2015), since we were primarily interested in people's

moral justifications for these uses, that is, their arguments for why the use is acceptable or permissible, as opposed to people's beliefs about why they personally engage in the use/practice (e.g., why they might acquire a pet or visit a zoo). This definition aligns with oft-used operationalizations of moral justification in psychology (see, e.g., Cushman, Young, & Hauser, 2006). To ensure that we have suitable coverage of views, in our recruitment strategy we aimed to recruit 100 participants per study, soliciting up to 12 justifications from each participant (three per animal use). The studies were undergraduate-student projects run in parallel from October to November 2017. Participants were recruited using a combination of convenience sampling (Lancaster University, UK, undergraduate-student recruitment via Sona© systems) and snow-ball sampling techniques (e.g., web links to the survey emailed or posted via social media by the undergraduate-student recruiters). Participants recruited via Sona© for Study 1 were prevented from participating in Study 2, and vice versa. Because of our use of convenient and snow-ball sampling, high rates of incompletes were expected. Thus, we solicited responses from more than 100 participants in each study before ceasing data collection. Ethical approval for both studies was received from Lancaster University's Psychology Department Ethics Committee in September of 2017. Anonymized data sets and qsf files for both studies may be found at https://osf.io/8jn2e/.

Study 1

Participants

One-hundred and twenty-four participants started the questionnaire. A total of 84 participants completed the entire survey (16 males, 68 females; M_{age} = 20.08 years, *SD* = 3.44). Ninety-two percent of the sample was British, with Canadian, Chinese, and Indian nationalities accounting for the remaining 8%. Participants were asked to classify their dietary practices with regards to animal-product consumption by selecting one of eight categories, taken from Piazza, McLatchie and Olesen (2018), representing degrees of animal-

product restriction: meat lover, omnivore, semi-vegetarian, pescatarian, lacto-ovo vegetarian, strict vegetarian, dietary vegan, and lifestyle vegan. Definitions were provided for each classification. The majority of the sample identified as either a meat lover (22.4%) or omnivore (52.9%), with the remaining participants falling into classifications of semi-vegetarian (12.9%), pescatarian (1.2%), lacto-ovo or strict vegetarian (4.8%), and dietary or lifestyle vegan (4.8%); 1.2% did not report their diet.

Design, Materials and Procedures

We used a single variable (animal use) repeated-measures design with 4 levels: household products, clothing, culling, and horseracing. Participants were invited to take part in a study titled, 'How we relate to animals'. The study was an online Qualtrics© survey which each participant was able to access via a weblink. On average, participation in the study took a little over twenty minutes (M_{Study1} = 29.53 min; M_{Study2} = 23.31 min). Participation was anonymous. Participants provided their informed consent before starting the survey. A 'captcha' question was included to prevent bots from participating.

Participants were presented descriptions of each animal use one at a time in a random order. The descriptions were written to inform participants of the animal use and the primary species involved while avoiding leading participants to any particular justification for the use (for descriptions, see Supplementary Materials). Each description was followed by an acceptability rating, which asked participants to rate the acceptability of using animals in the manner described, ranging from 1 = "never okay" to 5 = "always okay". Next, participants were instructed to: "Please give three reasons why it is okay to use animals for [animal use]." They were provided three separate textboxes to type in their responses. Participants were encouraged that, if they were unable to offer three reasons, to give as many as possible. This sequence of questions was repeated for each animal use. Afterwards, participants answered 35 items from Knight et al. (2004), used to assess attitudes towards six domains of animal

use: experimentation, educational uses in classrooms, personal decoration, entertainment, animal management, and financial gain, and a separate measure of belief in animal mind (BAM) – see Knight et al. (2004) for items. Our study already captures in a direct way participants' acceptability of the four animal uses under investigation. The animal uses questionnaire was included merely to offer richer information about our samples, the details of which can be found in Table 1. Table 1 also reports correlations between the animal uses questionnaire (each subscale) and the acceptability ratings of each animal use, for both studies.

Finally, participants provided demographic information, including gender, age, nationality, and diet, were debriefed, and thanked.

Coding of Justifications

Of the 84 participants that completed the survey, five participants offered no responses at all for the open-ended response part of the survey, either because they did not offer a response or they found the animal use unjustifiable. A total of 542 responses were collected (0-3 responses could be offered per domain). We used a combination of top-down and bottom-up approaches for coding the responses. We first sought to determine whether Piazza et al.'s (2015) coding classifications[2] (Natural, Necessary, Normal, Nice, Humane treatment, Sustainability, Religion) might apply to the data. The three authors first developed a more inclusive, generic version of Piazza et al.'s categories that applied the same logic of each category to animal uses beyond meat. In other words, the categories were meant to capture thinking with regards to *any* animal use. For example, the new Nice category did not focus exclusively on the tastiness and enjoyment of meat, but the wider benefits of an animal use, for example, related to pleasure, entertainment, profit or education.

[2] Piazza et al.'s (2015) coding scheme also included "miscellaneous" and "unscorable" categories, which were applied here as well.

In the coding of the responses for Study 1, the second author first independently read each response and sought to apply the coding scheme, while also allowing for other categories to emerge from the data. After first applying the scheme, the first and second author met and discussed any problematic or uncertain cases, including miscellaneous and unscorable responses. Sixty-six responses were deemed unscorable, leaving a grand total of 476 coded responses (84 for household products; 112 for clothing; 137 for culling; 143 for horseracing). The second author coded all the responses a second time, and a second rater, blind to the aims of the study, independently coded a sample of the responses from 46 participants (55%). Both raters used the coding system shown in Table 2, which includes definitions and examples for each category.

An agreement of 71.9% was found, with a Cohen's $\kappa = .66$, which takes into account the agreements that would have happened by chance. This fell below the conventional .70 level of satisfaction, which prompted a closer scrutiny of the coding system. There were 11 disagreements between the necessary and sustainable categories, mainly in the domain of culling. Therefore, the descriptions for necessary and sustainable were refined to make the distinction clearer, specifically with regards to the perceived necessity of using animals to protect the environment or ensure the survival of a species, as opposed to the longevity or sustainable use gained from an animal product. When rescored by the independent coder, the disagreements reduced to three in this domain, and the overall percentage of agreement rose to 76.6% (Cohen's $\kappa = .73$). See https://osf.io/8jn2e/?view_only=d56b32203643425096916e4016c77654 for data files containing all the responses and final classifications for both studies.

[Insert Tables 1 and 2 about here]

Results

Acceptability of Animal Use

Horse racing had the highest acceptability rating (M = 2.71, SD = 1.20), followed by culling (M = 2.51, SD = 0.99), clothing (M = 2.07, SD = 1.03), and household products (M = 1.77, SD = 0.82). All pair-wise comparisons were different at $p < .01$ (ds ranged from .296 to .899), except horse racing and culling, $t(83) = 1.47$, $p = .144$, $d = .158$. We observed a number of relationships between the animal uses questionnaire and acceptability ratings (see Table 1). Participants who found it acceptable to use animals for household products and clothing tended to endorse, at moderately high levels, other animal uses (as measured by the animal uses questionnaire) and tended to have lower beliefs in animal mind (BAM). Participants that found culling acceptable tended to endorse most other uses, at moderately high levels, with the exception of entertainment uses. Yet culling endorsement did not correlate at significant levels with belief in animal mind. Participants who approved of horse racing tended to endorse most other uses, with the exception of experiment and classroom uses. Horse racing endorsement did not correlate with BAM.

RQ1: Coverage of the 4Ns Across Animal Uses

Our first research question asked about the extent of the application of the 4Ns. Figure 1 presents the percentage of justification classifications by animal use. Total 4N coverage varied between domain: clothing (46%), household products (73%), horse racing (74%), and culling (89%). Thus, for all domains, except clothing, the 4Ns accounted for the majority of justifications offered. Necessary was the most common justification offered for all uses except horse racing, for which Nice was the most frequent category. Moreover, Necessary arguments highly dominated justifications for animal culling and household products, comprising the lion's share of justifications for both domains (62%-86%), while the domains of clothing and horse racing generated a much greater diversity of responses.

[Insert Figure 1 about here]

To more rigorously examine the use of specific N justifications across domains, we carried out Cochran's Q tests for each N category, with animal use as the 4-level within-participants variable. Note that this analysis was conducted using only those participants (N = 79) who provided at least one response for at least one animal-use domain. The percentages will differ slightly from those presented in Figure 1, as they are a percentage of the number of participants out of 79 that provided a response at least once for a given domain, as opposed to a percent of the total number of justifications observed. All 4Ns differed significantly across the four animal-use domains: Necessary $Q(3) = 120.91$, $p < .001$; Normal $Q(3) = 21.15$, $p < .001$; Natural $Q(3) = 50.00$, $p < .001$; Nice $Q(3) = 87.25$, $p < .001$. Necessary rationales had their greatest use as justifications for culling (87.3% of participants) and household products (57.0%), and significantly less for clothing (29.1%) and horse racing (2.5%). Nice rationales were employed most frequently for horse racing (54.4%), followed by clothing (13.9%), with much less use for household products (6.3%) and culling (2.5%). Normal arguments were used with some frequency with regards to horse racing (12.7%) and clothing (6.3%), but were not employed at all for household products (0%) and culling (0%). Natural arguments appeared most frequently for horse racing (30.4%), and much less for the other three domains, though with some frequency (6.3%) for household products (culling = 1.2%; clothing = 2.5%).

RQ2: 4N Usage within Domains

As can be seen in Figure 1, Necessary was the most common 4N justification for all animal uses except horse racing. Necessary dominated justifications of culling and household products, while clothing justifications involved a diversity of Necessary, Normal, and Nice arguments. Horse racing was justified most commonly by Nice justifications, however, Natural was also a common justification for horse racing, as was Normal, though with less frequency.

RQ3: Justifications beyond the 4Ns

Humane treatment and sustainability were common justifications for clothing use, and humane treatment was offered frequently as justification for horse racing. Humane treatment also appeared to some extent in participants' justifications for household products and culling. There was also quite a large percentage of miscellaneous arguments for household products (n = 15 responses), and, to a certain extent, clothing as well (n = 12 responses). Five of the miscellaneous justifications for household products had to do with the prioritization of human lives over animal lives, a category which we return to in Study 2; two miscellaneous responses questioned or discounted the cognitive awareness of animals used for clothing.

Discussion

Study 1 addressed our three research questions with regards to four animal uses: household products, clothing, culling, and horse racing. We found that the 4N scheme provided wide coverage of the justifications participants offered for the four uses, with the exception of clothing, where two justifications—sustainability and humane treatment—provided substantial additional coverage. Necessary was by far the most common justification offered, particularly for culling and household products. Nice (i.e., invoking the benefits of the animal use for enjoyment, entertainment, profit, etc.) was quite a common justification for horse racing—a domain in which Necessary had little to no bearing. Normal was the least used N, and Natural was invoked primarily to justify horse racing (i.e., racing as a domain for horses to practice their natural behaviors), and somewhat for household products too.

The animal uses examined in Study 1 related primarily to animal management, decoration, financial gain, and entertainment. In Study 2, we sought to expand the scope of our investigation to four new animal-use domains: keeping animals in zoos, as pets, using animals for TV and film, and for medical and scientific testing. This second set of uses

widens our scope to include experimental uses of animals and animals for companionship. It also touches on another use of animals for entertainment, i.e., TV and film. Arguably, TV/film may relate also to education/classroom use, insofar as some television programs are aimed at educating the public about animal behavior. Likewise, zoos arguably straddle at least three animal-use domains: entertainment, education, and management.

Study 2

Participants

One hundred and thirty-seven participants started the questionnaire, but 55 participants were omitted from the data set due to non-completion. After these exclusions, there were 82 participants total (17 males, 64 females, 1 other). Twenty-two participants were undergraduates at Lancaster University; 60 participants were from the general population recruited through social media (M = 22.82 years, SD = 9.43); 18% were meat lovers, 45% omnivores, 10% semi-vegetarians, 6% pescatarians, 6% ovo/lacto-vegetarians, 4% strict vegetarians, 11% dietary or lifestyle vegans. Eighty-nine percent of the sample was British, with the remaining 11% "other" (one did not report nationality). We included an item about pet ownership since pets was one of the animal uses. Fifty-six of the participants (68%) were pet owners, mostly dog and cat owners (n = 26 non-owners; see Supplementary Materials for further analysis of pet owners).

Materials and Procedures

The materials and procedures were identical to Study 1; however, the four animal uses from Study 1 were replaced with animals in zoos, TV and film, pets and companion animals, and medical and scientific testing (see Supplementary Materials for full descriptions presented to participants). Knight et al.'s (2004) 35-item animal use questionnaire was included as in Study 1 (see Table 1).

Coding Justifications

We observed 200 responses for zoos, 184 for TV/film, 225 for pets, and 162 for medical testing. The coding procedures were similar to Study 1, except the third author took the lead on first reading and coding the responses, using the generic coding scheme developed from Piazza et al.'s categories, before meeting with the first author to review its application. Beyond the 4N justifications, humane treatment emerged as a frequent category, for certain uses, and a new category, labeled "prioritization of human lives," emerged as common justification for medical testing (see Table 2 for category definitions and examples). Next, the third author coded the entire data set a second time, and an English-speaking undergraduate student independently coded half of the responses using the same coding scheme. Interrater agreement was found to be high: there was 362 agreements out of 385 between the two coders (94.03% agreement rate); Cohen's $\kappa = .81$. There were a number of unscorable justifications for each domain: 22 for zoos, 19 for TV/film, 9 for pets, and 36 for medical/scientific testing, leaving a total of 685 scored responses.

Results

Acceptability of Animal Use

Having animals as pets was rated the most acceptable ($M = 4.10$, $SD = 0.51$), followed by animals in TV and film ($M = 3.39$, $SD = 0.75$), zoos ($M = 2.91$, $SD = 1.00$), and medical/ scientific testing was rated least acceptable ($M = 2.15$, $SD = 1.01$). Significant mean-level differences in acceptability were found between each domain, paired-samples *t*s (81) > 4.21, all *p*s < .001, *d*s ranged from .469 to 2.01. Correlations between acceptability ratings and subscales of the animal use questionnaire appear in Table 1. As can be seen, participants who found it acceptable to use animals in TV/film, zoos, and for medical/ scientific testing, tended to also endorse a wide range of animal uses. They also tended to attribute lower levels of mind to animals, compared to those who found these uses less acceptable. Participants who found pet ownership acceptable tended to endorse the majority

of animal uses with the exception of animal management and financial uses. These participants also tended to deny animals mind.

RQ1: Coverage of the 4Ns across Animal Uses

Figure 2 presents the percentage of justification categories by animal use for Study 2. Overall, the 4Ns accounted for the majority of justifications offered in all four domains: TV/film (66.1%), medical and scientific testing (72.2%), zoos (91.9%), and pets (92.6%). Necessary was the dominant justification for zoos and medical testing, and Nice dominated TV/Film and pets. Nice was also frequently employed for zoos and medical testing, and Necessary was invoked often for TV/Film and pets.

[Insert Figure 2 about here]

We again carried out Cochran's Q tests to investigate the distribution of particular N uses across animal uses. Again, this was done only with those participants (N = 82) who gave at least one response for at least one animal use; the test is based on the percent of participants out of 82 offering a response at least once for a given domain. All Ns differed significantly across the four uses, with the exception of Normal, which did not appear much at all: Necessary $Q(3) = 67.48$, $p < .001$; Normal $Q(3) = 7.08$, $p = .069$; Natural $Q(3) = 15.00$, $p = .002$; Nice $Q(3) = 75.10$, $p < .001$. Necessary was used as a justification most frequently for zoos (78.0% of participants), followed by medical testing (64.6%), and much less for TV/film (25.6%) and pets (29.3%). Natural was used most frequently with regards to pet use (17.1%), followed by TV/film (9.8%). It was not used much at all for zoos (6.1%) and medical testing (1.2%). Nice was offered by participants most commonly for pets (90.2%), followed by zoos (58.5%) and TV/film (57.3%), and much less so for medical testing (22.0%). Finally, while Normal did not appear much at all as a justification, its most frequent use was in the domain of pets (6.1%; medical testing = 0%; zoos = 1.2%; TV/film = 3.7%).

RQ2: 4N Usage within Domains

Zoos were justified primarily on the basis of Necessary and Nice arguments. Pets were justified mainly with Nice arguments, and, to a lesser extent, Necessary, Natural, and Normal arguments. Nice was the primary justification for TV and film uses of animals, followed by Necessary and Natural arguments. Appeals to Necessary were the main justification for medical testing uses, though Nice also played a role in this domain.

RQ3: Justifications beyond the 4Ns

Humane treatment arguments were used with some frequency in all four domains and occurred quite often as a justification for TV/film. For medical/scientific testing, an additional category—prioritization of human lives—emerged that did not appear with much frequency in Study 1. This category relates to the assertion that human lives should be given priority over the lives of animals, thus, for example, justifying the use of animals for developing life-saving drugs and medical treatments (see Table 1 for definition and examples). Though infrequent, we observed some miscellaneous and idiosyncratic justifications for pets and medical uses. For example, at least one participant argued that animals, such as mice used for medical testing, do not have much value due to their low intelligence. These miscellaneous justifications did not rise to a level that warranted a separate classification, but are worth noting.

General Discussion

Coverage of the 4Ns

Past work has shown that people's reasons for why it is acceptable to use animals for food involve four principal lines of argumentation: that eating meat is Necessary, Normal, Natural, and Nice (Piazza et al., 2015). Across two studies, and eight different animal uses, we found that the 4N justification categories, when defined in a less restrictive manner, not simply delimited to meat consumption, consistently emerged within people's spontaneous arguments for why it is acceptable to use animals for entertainment (horse racing, TV/film),

population control (culling, zoos), personal decoration (clothing, household products), companionship (pets), and experimentation (medical and scientific testing). With the exception of clothing, the 4Ns accounted for the large majority of justifications participants offered for why it is okay to use animals in these various ways. Thus, it would appear that the 4Ns may be a more general scheme of justifications people employ in their defense of animal use.

Variation in the Justification of Animal Uses

While the 4Ns accounted for the lion's share of justifications participants volunteered in defense of animal uses, the coverage offered by the 4N scheme varied considerably by use. Looking across animal-use domains, Necessary and Nice probably had the widest usage as moral defenses. Uses such as culling, medical testing, and household products were dominated by arguments appealing to the *necessity* of using animals to achieve a particular end (e.g., protecting another species from extinction, or testing the safety of a product for human usage). Other uses, such as pets and TV/film, were dominated by Nice appeals that stressed the enjoyable benefits of the use for improving the quality of human and animal lives. Natural and Normal arguments had a much more restrictive usage. Natural arguments emerged with some frequency for pets, TV/film, and horse racing, while Normal arguments did not factor much at all in people's moral justifications except in the domain of horse racing, where some participants invoked the historical, cultural, or normative aspect of horse racing, such as the importance it had for one's national identity.

Justifications beyond the 4Ns

Several other lines of argumentation emerged with some frequency alongside the 4Ns, relating to: (a) the humane or ethical treatment of animals, (b) the sustainable nature of using animals, particularly in the generation of clothing and household products, and (c) the moral prioritization of human lives over animal lives. Arguments for the humane treatment of

animals extend the findings of Piazza et al. (2015) and Dowsett et al. (2018), who found similar kinds of arguments used in defense of meat consumption. However, different from what these authors found in the domain of meat, arguments for the humane treatment of animals were quite common moral defenses, particularly for clothing, entertainment, and medical uses, with frequencies ranging from 12% to 33% in these domains (see Figures 1-2). Sustainability was a common defense for animal-based clothing and household products, which aligns with the findings of Piazza et al. and Dowsett et al., in which participants defended meat consumption on the grounds that it was not sustainable to feed people on an exclusively plant-based diet.

The argument that human lives are more valuable than animal lives emerged as a common defense for medical testing on animals. While this line of argumentation occurred a few times for other animal uses, it appeared particularly frequently for medical testing, a domain in which there is a clear trade-off between benefits which can accrue to humans at the cost of animal lives. Past research suggests that many people find such a utilitarian trade-off morally acceptable insofar as the harm caused to animals is regulated by a recognized authority and the potential benefits are substantial (see Piazza, Sousa, & Holbrook, 2013, Study 3). Additionally, research by Knight et al. (2010) has shown that human supremacy beliefs are predictive of a wide range of animal uses, including medical research, dissection, personal decoration, and entertainment. Valuing human lives and interests over the lives and interests of nonhuman animals, all else equal, has been criticized as a form of prejudice ("speciesism") akin to sexism and racism (i.e., judging someone's worth based on their membership within a category; Francione, 2007; Ryder, 1971, 2006; Singer, 1975/2009). Yet research from psychology has shown that speciesism is a widespread phenomenon (e.g., Caviola et al., 2018; Dhont & Hodson, 2014; Piazza et al., 2015), and, as we see here, may be employed as a justification for animal uses that offer demonstrable benefits for human lives.

Limitations and Future Directions

One potential limitation of our methodology is that we asked participants to volunteer reasons for why it is okay to use animals without having to defend their reasons in the context of an argument with another person. According to argumentative theory (Mercier, 2011; Mercier & Sperber, 2011), human reasoning is designed for the purpose of winning arguments, as opposed to improving knowledge or discovering the truth. Debating animal uses with another person could potentially lead to new forms of justification, not captured by our methodology, as a person's initial position is challenged and refined in argumentation. Thus, future research might be enhanced by adopting dialogic methods for sampling people's animal-use justifications in an interactive context. Furthermore, we asked participants to provide justifications for why an animal use is acceptable, and not why they themselves engage in a particular use (e.g., why they have a pet, attend zoos, buy animal products). Much like with the studies of Piazza et al. and Dowsett et al., discussed earlier, it is possible that asking participants for their own reasons for engaging in an animal use might lead to somewhat different range of justifications. For example, we might have observed some participants denying personal responsibility for the harm inflicted on animals used for product testing, or assertions that one shops for cruelty-free articles of clothing—arguments related to Dowsett et al.'s "neutralization" category. While our focus here was on moral justification, future studies should indeed widen the investigation to assess the broader considerations people have for personally engaging in animal uses or for minimizing the perception of their involvement.

Another limitation with our methodology is that we asked participants to provide us with three justifications even if they had selected "never okay." While some participants chose not to provide any justification when they disapproved of the animal use, arguably, our methodology encouraged some participants to provide a justification that they did not

endorse. Thus, we cannot be certain that all of the justifications we sampled here represent deeply held beliefs of our participants. They may simply reflect arguments that they believe others endorse. Moreover, since the focus of our research was to identify the scope of justifications people offer in defense of animal use, our findings are agnostic about which beliefs in particular are most predictive of support for animal use. Future research would benefit greatly from studies that assess people's perceptions of the validity and persuasiveness of the animal-use arguments identified here. Such studies would help determine which rationales most strongly relate to animal use endorsement in various domains. Additionally, future research would benefit from comparing the rationales offered and endorsed by individuals as a function of their level of involvement in different animal uses (e.g., how frequently they attend zoos), given that past research has uncovered important, motivation-based individual differences in animal-use endorsement based on animal-use involvement (e.g., Knight et al., 2009; Morris et al., 2012).

Finally, it should be noted that our research focused on the beliefs and justifications people have for various animal uses. It should be acknowledged that the justifications people offer in support of animal uses may not necessarily reflect the true psychological causes of their endorsement, since people's moral justifications are at times post hoc rationalizations of psychological factors they may fail to recognize (for further discussion, see, e.g., Cushman et al., 2006; Haidt, 2001). For example, while perceptions of the necessity of using animals appears to be a widespread belief, people may continue to support an animal use even after this belief is addressed simply because the use is desirable and prevailing social norms do not prohibit it, such as in the case of meat.

Implications and Conclusion

Our findings may be of interest to animal advocacy groups focused on specific animal uses, or on a range of uses, and the beliefs that undergird them. Our studies indicate that the

4Ns are ubiquitous rationales people draw on for justifying the use of animals, though certain Ns were more ubiquitous than others. While the Ns of Necessary and Nice cut across domains, the Ns of Natural and Normal had a more restricted use. We also observed great variability in the frequency of arguments offered for each use. Some uses, such as household products and culling, were dominated by a single justification category (Necessary), whereas other uses, such as horse racing and medical testing, elicited a diversity of justifications (e.g., for medical testing: Necessary + Nice + Prioritization of Human Lives + Humane Treatment). This suggests that certain uses may benefit from more targeted campaign messages with a singular focus, while other uses might be better addressed using a multi-message strategy.

We also observed several lines of argumentation beyond the 4Ns. Belief in the humane treatment of animals was an especially common justification, which suggests it may be an important meta-belief to target within most campaigns. Finally, prioritization of human lives and sustainability arguments had more restricted uses, emerging mainly for medical uses of animals and clothing, respectively, domains where human and animal interests are in direct conflict. Further research is of course needed to determine the absolute scope of the 4Ns, including their application within human-directed controversies, but the present studies offer a first step in better understanding, and, thus, addressing, how a small set of rationales get applied to defend the diversity of animal uses humans engage in.

References

Bastian, B., Loughnan, S., Haslam, N., & Radke, H. R., M. (2012). Don't mind meat? The denial of mind to animals used for human consumption. *Personality and Social Psychology Bulletin, 38,* 247-256. Doi.org/10.1177/0146167211424291

Bilewicz, M., Imhoff, R., & Drogosz, B. (2011). The humanity of what we eat: Conceptions of human uniqueness among vegetarians and omnivores. *European Journal of Social Psychology, 40,* 1-9. Doi.org/10.1002/ejsp.766

Borgi, M., & Cirulli, F. (2013). Children's preferences for infantile features in dogs and cats. *Human-Animal Interaction Bulletin, 1(2),* 1-15.

Borgi, M., & Cirulli, F. (2015). Attitudes toward animals among kindergarten children: Species preferences. *Anthrozoös, 28,* 45-59. Doi.org/10.2752/089279315X14129350721939

Caviola, L., Everett, J. A. C., Faber, N. S. (2018). The moral standing of animals: Towards a psychology of speciesism. *Journal of Personality and Social Psychology.* Advance online publication. Doi:10.1037/pspp0000182

Colléony, A., Clayton, S., Couvet, D., Jalme, M. S., & Prévot, A.-C. (2017). Human preferences for species conservation: Animal charisma trumps endangered status. *Biological Conservation, 206,* 263-269. Doi.org/10.1016/j.biocon.2016.11.035

Cushman, F., Young, L., & Hauser, M. (2006). The role of conscious reasoning and intuition in moral judgment: Testing three principles of harm. *Psychological Science, 17 (12),* 1082-1089. Doi.org/10.1111/j.1467-9280.2006.01834.x

Dhont, K., & Hodson, G. (2014). Why do right-wing adherents engage in more animal exploitation and meat consumption? *Personality and Individual Differences, 64,* 12-17. Doi.org/10.1016/j.paid.2014.02.002

Dhont, K., Hodson, G., & Leite, A. C. (2016). Common ideological roots of speciesism and

generalised ethnic prejudice: The social dominance human-animal relations model (SD-HARM). *European Journal of Personality, 30,* 507-522. Doi.org/10.1002/per.2069

Dowsett, E., Semmler, C., Bray, H., Ankeny, R. A., & Chur-Hansen, A. (2018). Neutralising the meat paradox: Cognitive dissonance, gender, and eating animals. *Appetite, 123,* 280-288. Doi.org/10.1016/j.appet.2018.01.005

Francione, G. L. (2007). The use of nonhuman animals in biomedical research: Necessity and justification. *Journal of Law, Medicine & Ethics, 35(2),* 241-248. Doi.org/10.1097/MAJ.0b013e31822a6c35

Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review, 108,* 814-834. Doi.org/10.1037/0033-295X.108.4.814

Herzog, H. (2007). Gender differences in human-animal interactions: A review. *Anthrozoös, 20,* 7-22. Doi.org/10.2752/089279307780216687

Herzog, H. (2010). *Some we love, some we hate, some we eat: Why it's so hard to think straight about animals.* New York, NY: Harper Perennial.

Joy, M. (2010). *Why we love dogs, eat pigs, and wear cows: An introduction to carnism.* San Francisco, CA: Conari Press.

Knight, S., Bard, K., Vrij, A., & Brandon, D. (2010). Human rights, animal wrongs? Exploring attitudes toward animal use and possibilities for change. *Society & Animals, 18,* 251-272. Doi.org/10.1163/156853010X510771

Knight, S., Vrij. A., Bard, K., & Brandon, D. (2009). Science versus human welfare? Understanding attitudes toward animal use. *Journal of Social Issues, 65(3),* 463-483. Doi.org/10.1111/j.1540-4560.2009.01609.x

Knight, S., Vrij, A., Cherryman, J., & Nunkoosing, K. (2004). Attitudes towards animal use

and belief in animal mind. *Anthrozoös, 17*(1), 43-62. Doi.org/10.2752/089279304786991945

Leite, A. C., Dhont, K., & Hodson, K. (2018). Longitudinal effects of human supremacy beliefs and vegetarianism threat on moral exclusion (vs. inclusion) of animals. *European Journal of Social Psychology.* Advance online publication. Doi.org/10.1002/ejsp.2497

Loughnan, S., Bastian, B., & Haslam, N. (2014). The psychology of eating animals. *Current Directions in Psychological Science, 23(2),* 104-108. Doi.org/10.1177/0963721414525781

Loughnan, S., & Piazza, J. (2018). Thinking morally about animals. In J. Graham & K. Gray (Eds.), *The Atlas of Moral Psychology* (pp. 165-174). New York: Guilford Press.

Mercier, H. (2011). What good is moral reasoning? *Mind & Society, 10,* 131-148. Doi.org/10.1007/s11299-011-0085-6

Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioral and Brain Sciences, 34(2),* 57-74. Doi.org/10.1017/S0140525X10000968

Morris, P., Knight, S. & Lesley, S. (2012). Belief in animal mind: Does familiarity with animals influence beliefs about animal emotions? *Society & Animals, 20,* 211-224. Doi.org/10.1163/15685306-12341234

Piazza, J., Landy, J. F., & Goodwin, G. P. (2014). Cruel nature: Harmfulness as an important, overlooked dimension in judgments of moral standing. *Cognition, 131,* 108-124. Doi.org/10.1016/j.cognition.2013.12.013

Piazza, J., & Loughnan, S. (2016). When meat gets personal, animals' minds matter

less: Motivated use of intelligence information in judgments of moral standing. *Social Psychological and Personality Science, 7(8),* 867-874. Doi.org/10.1177/1948550616660159

Piazza, J., McLatchie, N., & Olesen, C. (2018). Are baby animals less appetizing? Tenderness toward baby animals and appetite for meat. *Anthrozoös, 31(3),* 319-335. Doi.org/10.1080/08927936.2018.1455456

Piazza, J., Ruby, M. B., Loughnan, S., Luong, M., Kulik, J., Watkins, H. M., & Seigerman, M. (2015). Rationalizing meat consumption. The 4Ns. *Appetite, 91*, 114-128. Doi.org/10.1016/j.appet.2015.04.011

Piazza, J., Sousa, P., & Holbrook, C. (2013). Authority dependence and judgments of utilitarian harm. *Cognition, 128,* 261-270. Doi.org/10.1016/j.cognition.2013.05.001

Rothgerber, H. (2013). Real men don't eat (vegetable) quiche: Masculinity and the justification of meat consumption. *Psychology of Men & Masculinity*, *14* (4), 363-375. Doi:10.1037/a0030379

Rothgerber, H., & Mican, F. (2014). Childhood pet ownership, attachment to pets, and subsequent meat avoidance: The mediating role of empathy toward animals. *Appetite, 79,* 11-17. Doi.org/10.1016/j.appet.2014.03.032

Ryder, R. D. (1971). Experiments on animals. In S. Godlovitch, R. Godlovitch, & J. Harris (Eds.), *Animals, Men and Moral* (pp. 41-82). New York, NY: Taplinger.

Ryder, R. D. (2006). Speciesism in the laboratory. In P. Singer (Ed.), *In Defense of Animals: The Second Wave* (pp. 87-103). Malden, MA: Blackwell Publishing.

Serpell, J. A. (2004). Factors influencing human attitudes to animals and their welfare. *Animal Welfare, 13,* S145-S151.

Serpell, J. A. (2005). Factors influencing veterinary students' career choices and attitudes to animals. *Animal Welfare, 32(4),* 491-496. Doi.org/10.3138/jvme.32.4.491

Singer, P. (2009). *Animal liberation* (4th ed.). New York, NY: Harper Perennial (Originally published in 1975).

Sytsma, J., Machery, E. (2012). Two sources of moral standing. *Review of Philosophy and Psychology, 3,* 303-324. Doi.org/10.1007/s13164-012-0102-7

Tisdell, C., Wilson, C., Nantha, H. S. (2006). Public choice of species for the 'ark': Phylogenetic similarity and preferred wildlife species for survival. *Journal of Nature Conservation, 14,* 97-105. Doi.org/10.1016/j.jnc.2005.11.001

Tsang, J. A. (2002). Moral rationalization and the integration of situational factors and psychological processes in immoral behavior. *Review of General Psychology, 6,* 25-50. Doi.org/10.1037/1089-2680.6.1.25

Table 1

Mean approval ratings on each subscale of the 35-item animal use questionnaire, and correlations between each subscale and acceptability ratings by animal use: Studies 1-2. Standard deviations in parentheses. *$p < .05$. **$p < .01$. *** $p < .001$

	Experiment	Classroom	Decoration	Entertainment	Management	Financial	BAM
Study 1	3.43	3.80	2.35	2.40	2.70	2.12	5.32
	(1.07)	(0.91)	(0.96)	(0.82)	(0.93)	(0.70)	(1.13)
Household products	.48***	.39***	.48***	.23*	.40***	.42***	-.24*
Clothing	.40***	.30**	.46***	.25*	.25*	.38***	-.29**
Culling	.44***	.51***	.33**	.12	.44***	.36**	-.17
Horse racing	.20	.17	.28*	.22*	.36**	.29**	-.17
Study 2	3.08	3.50	2.03	2.30	2.21	1.88	5.59
	(1.27)	(1.10)	(1.05)	(1.08)	(0.89)	(0.85)	(0.99)
Zoos	.35**	.41***	.26*	.52***	.30**	.09	-.24*
TV and film	.40***	.53***	.41***	.41***	.40***	.30**	-.26*
Pets	.45***	.42***	.44***	.47***	.19	.17	-.26*
Medical and scientific testing	.78***	.56***	.59***	.33**	.46***	.38**	-.23*

Note. BAM = Belief in animal mind. Scales ranged from 1-7 with higher scores representing greater approval of use, or greater mind attribution. The mean scores are quite consistent with those reported by Knight et al. (2004) in their Portsmouth, UK sample, with highest approval ratings for Experiment ($M = 3.70$) and Classroom ($M = 3.60$) uses. The mean BAM scores we observed were slightly lower than those reported by Knight et al. ($M = 5.80$, $SD = 1.00$).

Table 2. Justification categories used in Studies 1-2: Definitions and examples.

Justification	Definition	Examples
Necessary	Appeals to the necessity of using animals for the benefit of health, safety, advancing science and medicine, protecting the environment, conservation and the survival of a species, population control, or producing realistic media.	"Advances science/ knowledge"; "To ensure there is no risk to humans"; "The products produced help us to stay safe through layers of protection"; "Prevents the spread of disease"; "The medicine could save lives"; "Some animals wouldn't survive outside"; "To stop extinction"; "Animals need to be used to make realistic films"
Normal	Reasons appealing to cultural norms and normative behaviors around animal use that have been traditionally or historically part of society or family.	"Tradition"; "Heritage"; "It has been done for centuries e.g. our ancestors"; "Tied to national identity"; "It has been done for a long time"; "It's part of our culture and thus has greatly informed Western understanding of animals"; "I was raised with pets"
Nice	Appeals to the enjoyment, pleasure or economic gain achieved by the use, or its enjoyable benefits (e.g., entertainment, companionship, educational value, quality of life) for humans and/or the animals.	"They are considered fashionable and trendy"; "Entertainment"; "Cracking day out"; "Keeps businesses going"; "Zoos are fun"; "Trained animals usually enjoy their tasks"; "For companionship and love"; "Adults and children can learn a lot from keeping pets"; "To educate on different types of animals"; "Animals can have a good quality of life as pets"; "Pets are nice to have around"
Natural	Reasons appealing to biological factors of the animal or humans, including natural hierarchies, natural selection/ evolution, domestication, and maintaining natural behaviors.	"Humans have a natural bond with animals kept as pets"; "Horses bred for the purpose of being raced"; "Animals evolved to be trained"; "They have been bred to be domestic"; "Humans were meant to have dominion over animals"
Humane Treatment	The justification of a use if carried out in a humane way, with concern for the animal's welfare, or with the least amount of suffering.	"Horses can have high standards of living"; "Some materials can be collected without harming them"; "If the animal is not harmed in the process"; "If they are well-looked after" (for Zoos); "If they feel no pain" (for Medical Testing); "If the animals are not harmed during the filming"
Sustainability (Study 1 only)	Appeals to the increased longevity or sustainable use gained from an animal use or animal product.	"Long lasting"; "We have a lot of animals, they're expendable"; "It is better to use animals than finite sources"
Prioritization of human lives (Study 2 only)	Appeal to the moral priority or value of human lives above animal lives.	"A humans life is more important than an animal's"; "It's better to test on animals than on humans"

Miscellaneous	Arguments that could not be categorized elsewhere.	"It's easier to track the progress of animals"; "Animal won't know if it's dead"; "Animals of higher intelligence, or with particular awareness of what's happening to them shouldn't [be used]" (for Medical Testing)
Unscorable	Nonsensical suggestions or arguments against the animal use	"Morally not right"; "Cruel"; "In rural areas such as Africa"; "The animals are innocent and do not consent"

Figures and Captions

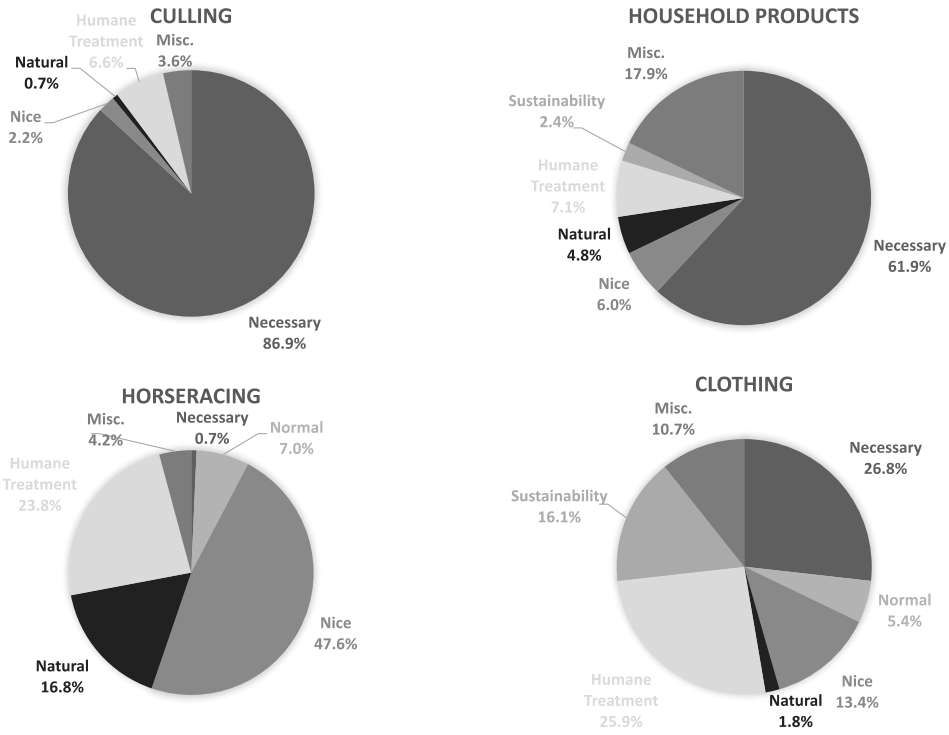

Figure 1. Frequency of justification category by animal use (Study 1).

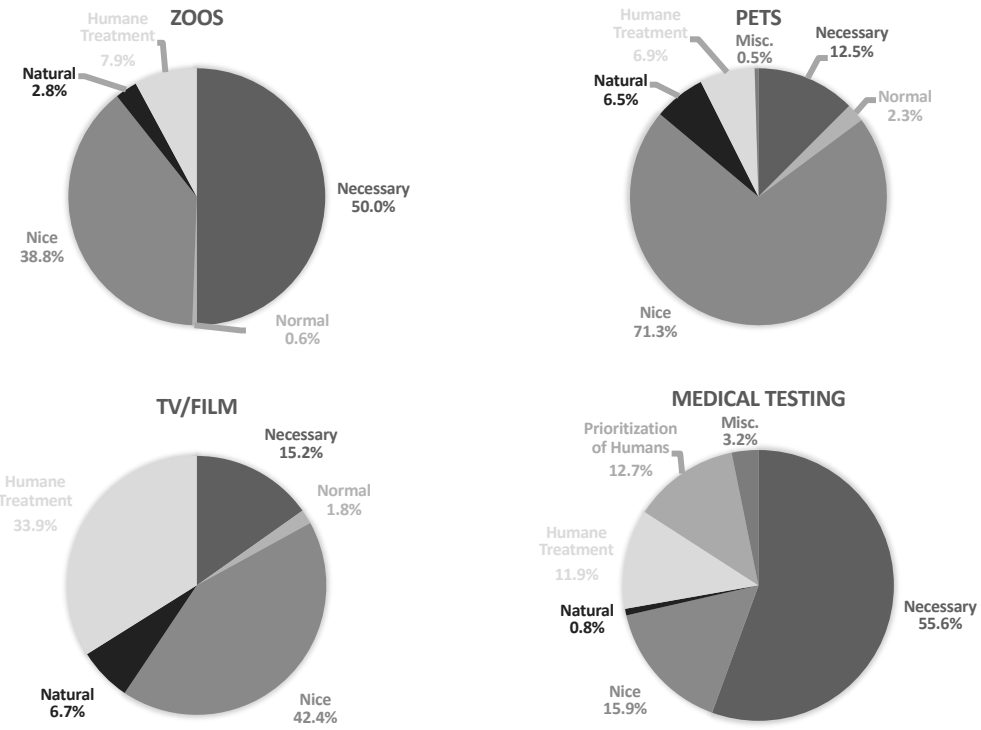

Figure 2. Frequency of justification category by animal use (Study 2).

Supplementary Materials for Piazza, Cooper & Slater-Johnson

Animal Use Descriptions

Study 1

Household products. The testing of 'finished' household products on animals has been banned in the UK since 2015; however, the ingredients that go into 'finished' products can still be tested on animals. Everyday household products such as washing up liquid, air fresheners, dishwasher tablets and paints are examples of products with ingredients that have been tested on animals. Animals are also often used in the manufacturing of furniture and household décor, such as duvets, pillows, rugs, and sofas. Animals injured or killed in the production of household products include ducks, geese, sheep, cattle, rabbits, mice, otters, minks, foxes and other mammals.

Clothing. For years the clothing industry has used animals in the production and testing of materials for their products, from footwear to belts to jackets. Animals are often harmed and/or killed in the production of these goods. Some of the most commonly used animal materials include: leather and suede from cattle, wool from sheep, silk from silk worms, and down (feathers) plucked from ducks and geese.

Culling. Animals are used in the process of culling, which refers to the capture and termination of an animal as a means of reducing or eliminating an undesirable species. A current example of this is the culling of badgers in the UK to reduce the spread of TB (tuberculosis) amongst livestock. Animals such as foxes, badgers, deer, and squirrel can be shot, poisoned or lethally trapped as part of a culling effort.

Horse racing. Animals are used for the purpose of entertainment in many situations. One of the most common forms of animal-based entertainment is horse racing. The UK is host to a number of 'Race days', including the Royal Ascot and 'Ladies Day'. Watching and placing bets on horses has become a part of British culture and pastime.

Study 2

Zoos. Zoos are places where wild animals are kept and exhibited to the general public. There around 500 zoos in the UK under the Zoo Licensing Act and around 10,000 worldwide. In zoos animals are kept in enclosures which may attempt to replicate their natural habitat. Animals in zoos are displayed to the public and may be part of a breeding programme.

Animals in TV and film. Animals of a variety of species are used in major feature films, independent films, commercials, TV drama and natural history documentaries as a means of appealing to viewers. The majority of TV and films use animals in some form during their creation.

Pets. In the UK it is estimated that 40% of households have pets. There are around 57 million pets in the UK, with the most popular pets being cats and dogs. Other pets also include small rodents, rabbits, horses, birds, fish and reptiles.

Medical and scientific testing. In the UK around 4 million animals are used for medical and scientific testing by universities, pharmaceutical companies, and other similar institutions each year (roughly 100 million animals are used globally each year). Animals are often used to test medicines and vaccines, and to study how animal bodies work, often, as models for understanding humans. Mice and fish are most often used in the UK but other animals used include hamsters, rabbits, cats, dogs, monkeys, chickens and horses.

Pet Owners

Unsurprisingly, pet owners found it more acceptable to keep an animal as a pet (M = 4.18, SD = 0.51) than non-owners (M = 3.92, SD = 0.48), $t(80) = 2.15$, $p = .035$, 95% CI = [.019, .492], $d = .525$. Pet owners exhibited equal levels of belief in animal mind (M = 5.61, SD = 0.99) as non-pet owners (M = 5.54, SD = 0.99), $t(80) = 0.29$, $p = .771$, 95% CI = [-.399, .537], $d = .070$.