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Dislike for insects aligns with human-centered and anti-egalitarian beliefs

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Title

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Abstract

An outgroup can be defined as that which is perceived as different or dissimilar from oneself. The Interspecies Model of Prejudice (TIMP) predicts that negativity to human outgroups align with animal negativity. Human-centered and anti-egalitarian beliefs have shown to correlate with outgroup rejection. Experiencing a close relationship to nature has, on the other hand, been linked to outgroup acceptance.

The aim of this study was to investigate the valuation of animal charismatic appeal overall, and as a function of outgroup acceptance - rejection. An online survey collected data on animal image ratings, attitude instruments, psychosocial and demographic factors from 231 high school senior students in the greater Stockholm area. Images of human-similar (anthropomorphic high-charismatic mammals) versus human-dissimilar (feral low-charismatic insects) animals were used to, respectively, predict the attitudes anthropocentrism, ethnocentrism and nature relatedness.

Overall, mammals were rated significantly more positively than insects. The findings also suggest support for TIMP. It may be inferred that animal charismatic appeal is linked to individual differences in outgroup cognitions. Anthropocentrism and ethnocentrism associated negatively with general animal liking, and were predicted by insect negativity once significant covariates adjusted the models. Nature relatedness correlated positively with animal liking and was predicted by insect positivity.

Our valuation of animal charisma may, thus, be linked to our appraisal of their more or less human-like qualities. Our valuations are proposed as underlied by identification mechanisms that may guide our varying tendencies to divide the world into 'us and them'. The findings could be informative of psychological factors involved in intergroup behaviors and environmental concerns.

Keywords

animal charisma, social identity, equality, biodiversity, anthropocentrism, ethnocentrism, nature relatedness, interspecies model of prejudice

“The animal does not reserve a special look for man. But for no other species except man will the animal’s look be recognised as familiar. Other animals are held by the look. Man becomes aware of himself returning the look” (Berger, 1980)

Dislike for insects aligns with human centered and anti-egalitarian beliefs

A 2002 UNESCO World Summit Roundtable report proposed that the preservation of biodiversity is tied to human multiculturalism, and should be addressed as a “complex exchange of interdependence, where the loss of cultures and languages mirror the loss of species and habitat” (p.12). In 2015 the United Nations adopted Agenda 2030, which outlines 17 global goals that seek to work toward a more sustainable world (United Nations, n.d.). The program includes biodiversity conservation and social equality as priorities, asserting that we need to foster a more inclusive world with concern for all inhabitants. Or as Yusoff (2010) puts it: “living with rather than against (in-)significant others” (p.76).

How do we, then, come to live with, rather than against, ‘the other’? And what factors and mechanisms may underlie our inclusion versus exclusion of ‘otherness’? Answers to these questions are, of course, complex and multifactorial. Nevertheless, in order to facilitate environmental protection and biodiversity conservation, while combating also human division, it would be important to understand more about the mechanisms linked to the perception of ‘otherness’.

According to Allport (in Tajfel, 1982) the necessary elements of identification with a group is the sense of membership or belonging to a group, which would be based on the assessment of the group’s value to oneself. In the case we perceive intergroup value due to sameness, we tend to affiliate with it as an ingroup. Conversely, if we value the group less due to a perceived dissimilarity and distance from it, we tend to differentiate it from oneself. The group would then be perceived as an outgroup. Research has found that we tend to favor and support ingroups, while disfavor and reject outgroups (Pratto, Sidanius, Stallworth & Malle, 1994; Tajfel, 1982).

Costello & Hodson (2012) propose that knowledge about human – nature relations can be informative about human intergroup biases and conflicts. The Interspecies Model of Prejudice (TIMP) suggests that negative attitudes and prejudice toward distinct and differentiated human outgroups predict similarly negative attitudes toward nature (Costello & Hodson, 2012). Stronger beliefs in human - animal separateness and animal prejudice were in a Costello and Hodson study (2009) shown to predict anti-immigrant attitudes and negativity toward other-ethnic groups. Anti-egalitarian and dominionistic orientations have also been linked to a stronger ingroup identification (ingroup favoritism bias) fueling negativity and prejudice toward differentiated and distinct outgroups (Pratto et al., 1994). This suggests that human-centered and anti-egalitarian orientations tend toward an overall negativity and intolerance toward outgroups. TIMP predicts that such a non-inclusive tendency should also be reflected in the negative valuation of animals.

Animals are, however, not equal to the ‘human eye’ (Lorimer, 2007; Small, 2012). The charismatic animal is a concept that in the widest sense refers to the popular animals, those who receive the greatest positive attention. Or simply, the animals we like the most. There seems to be no clear consensus on what exactly makes an animal charismatic, but it is suggested that a particularly disliked, thus low-charismatic, animal group is the invertebrate species (Cardoso, Erwin, Borges & New, 2011; Kellert, 2012). Research has found that the general public dislike these type of animals, attract less conservation efforts and research

funding (Cardoso, Erwin, Borges & New, 2011) even elicit feelings of anxiety and disgust (Lorenz, Libarkin & Ordning, 2014). There are reports warning that the invertebrate species are declining at an alarming rate, which pose a risk to ecosystem functioning (Lister & Garcia, 2018) The insects are a class of invertebrates widely perceived as far from human with their alien appearance and dissimilar behavior (Lorimer, 2007). Insects, thus, present an aesthetic virtually anti-thetical to the human form, eliciting negativity, aversion and distrust as the essence of ‘the abject other’ (Lorimer, 2007, p 920). Small (2012) cautions that there may be a human to animal ‘speciesism’ at work, and that we may be underway of creating a new ‘Noah’s Ark’ of mostly human-appealing species undermining biodiversity conservation goals.

In contrast, it is believed that the strongest charisma is embodied by the mammalian species (Mullan & Marvin, 1999; Small, 2012). Research reports that mammals rank highly as our favorite animals (Albert, Luque & Courchamp, 2018). Mammals are frequently presented on magazine covers as ‘poster animals’ (Clucas, Mchugh & Caro, 2008), they attract audiences to zoos (Mullan & Marvin, 1999), and draw tourists to safaris (Caro & Riggio, 2013). Mammals are also reported to receive more research funding and conservation support (Colléony, Clayton, Couvet, Jalme & Prevot, 2017). A reason for why mammals are found more charismatic could be anthropomorphism, which means to attribute “human mental states (thoughts, feelings, motivations and beliefs) to nonhuman animals” (Serpell, 2003, p 437). We humans share physiological and behavioral similarities with other mammals due to our common evolutionary origins (Kellert, 2012). We perceive them as closer to human and may, thereby, more readily anthropomorphize them.

Through its perceived ‘otherness’, the insects could be perceived as an outgroup. And, as such, less identified with, less charismatic and less liked. The reverse would apply to mammals. However, the way we view these animal groups may be influenced by individual differences (Bizumic & Duckitt, 2007; Lorimer, 2012). Depending on our tendency to either include or exclude ‘otherness’, we may find mammals and insects more or less charismatic, also reflecting our tendency to include or exclude ‘other’ human groups. Lorimer (2007) argues that *Anthropomorphic Charisma* stimulates a positive response, given that one is inclined toward sameness, or affiliation with the human-like. There is also *Feral Charisma*, embodied by the insects, which “is grounded in a sense of respect for the other and for its complexity, autonomy, and wildness” (p. 920). Lorimer suggests that the naturalistically inclined would be particularly appreciative of the feral charisma of insects. Such individuals, Lorimer suggests, may even tend toward rejection of the anthropomorphic type. Conversely, human centered and anti-egalitarian individuals should tend to particularly reject the feral insects.

Anthropocentric attitudes entail beliefs of humanity as superior to nature (human centered), and therefore having the right to use and control nature for human gain (Kopnina, Washington, Taylor & Piccolo, 2018). An anthropocentric orientation has been linked to low concern for nature and the environment (Zhu & Lu, 2017) and social equality (Costello & Hodson, 2009). *Ethnocentrism* has been defined as belief in one’s own ethnic group as superior (anti-egalitarian) to other ethnic groups (Bizumic & Duckitt, 2007). Ethnocentric attitudes have been linked to outgroup negativity and prejudice, as well as to ethnic discrimination and racism (Carginan, Sanders & Pourdavood, 2005; Tajfel, 1982). These distinct attitudes should be representative of non-inclusive orientations and should tend toward outgroup rejection extending across the human – nature domain. Animal liking would overall be weak and the insects especially disliked.

Nature Relatedness is an attitude that would stand in contrast to the non-inclusion and ingroup bias of anthropocentrism and ethnocentrism. Exposure to nature, and in particular experiencing a close affiliation with non-human elements of nature has been linked to concern for nature, the environment and other people (Lorimer, 2007; Kellert, 2012; Schultz, 2001). Schwarz (1992) contends that “concern for nature is closely linked to concern for the welfare of *all* humankind”...[a motivator]...“to protect the natural environment...to understand people who are different, and to treat them justly” (p. 39). Nisbet, Zelenski and Murphy (2009), moreover, suggest that our individual relationship with nature, our variable capacity for including the non-human domain in our sense of self, underlie the way we relate to all life on earth. During these researchers’ development of the Nature Relatedness Scale (Nisbet et al., 2009), it was shown that a stronger affiliation and close identification with nature correlated with pro-environmental behavior, love and care for animals, humanitarianism and spending time in nature. People more strongly connected to nature have also been suggested to show greater concern for the ‘other’ animal species, such as insects, reptiles and amphibians, over the more generally charismatic mammals (Colléony et al., 2017). These findings support Lorimer’s (2007) proposal that the naturalistically inclined tend toward inclusion of otherness, and would be more likely to hold positive attitudes toward a non-humanlike outgroup. It is therefore proposed that individuals oriented towards nature relatedness should be drawn toward feral charisma. They should, thus, rate the feral insects more positively than the anthropomorphic mammals.

The aim of this study is to examine the valuation of anthropomorphic and feral animal charisma, and the relationship between animal liking, charismatic appeal and attitudes to outgroups. Is it possible that negativity toward animals is linked to the rejection of differentiated human groups? If we tend to reject the animal ‘other’, may we also tend toward rejection of a human ‘other’? If so, it stands to reason that individual differences in outgroup cognitions may be used to predict attitudes linked to diverging concerns for biodiversity conservation and social equality.

A study by Bizumic and Duckitt (2007) suggest that anthropocentrism and ethnocentrism tend toward ingroup bias and exclusion of otherness. They did, however, not find significant animal negativity predicting ethnocentrism. The researchers suggest that the animal ‘other’ is not specific or relevant enough for ethnocentric individuals, who instead direct their ingroup bias toward ‘other’ human groups. Thereby, these findings casts doubt on The Interspecies Model of Prejudice which would predict that both attitudes have a negativity bias to an animal outgroup. Albeit, a problem in Bizumic and Duckitt’s study (2007) was that they had the participants rate their degree of liking for animal species that included a wide variety of representatives: mammals, insects, reptiles, wild animals and house pets alike. In other words, by applying a mean statistic for a wide variety of animal species the design did not recognize the possibility of anthropomorphic versus feral charisma playing a role in the valuation.

This study instead proposes a design with two distinct classes of animals – the anthropomorphic mammal class and the feral insect class – presented also visually through images. The human gaze upon animal visual aesthetics has been linked to our perception of their varying charismatic appeal (Mullan & Marvin, 1999). Presenting images, rather than rating appeal from a list of species names as in Bizumic and Duckitt’s (2007) study, would contribute a more ecologically valid measure of animal charisma based on visual aesthetics. The respondents will be asked to rate twelve animal images – six anthropomorphic mammals and six feral insects - from negative to positive, theoretically representing low to high charismatic appeal. Mammals should be favored over insects, generally. Mean ratings for all

animal images, representing animal liking, should according to TIMP correlate negatively with anthropocentrism and ethnocentrism. Animal liking should be positively correlated with nature relatedness. The feral insects should be viewed as a distinct outgroup by anthropocentrists and ethnocentrists, and be rated negatively. Nature related individuals should be more accepting of the ‘other’ insect aesthetics, and rate them positively. Mammal appeal predictions are more uncertain. The variable should, nevertheless, show weaker correlations with the dependent variables and function weakly, or insignificantly, as a predictor. This pattern is expected due to the marginalized importance of mammal appeal as compared to the polarized strength of insect liking – disliking in the dependent variables.

Hypotheses

H1: Anthropomorphic mammals will be rated significantly higher than feral insects.

H2: Nature relatedness will correlate positively with animal liking, whereas anthropocentrism and ethnocentrism will correlate negatively with animal liking.

H3: Anthropocentrism and ethnocentrism will be positively correlated, while inversely correlated with nature relatedness.

H4: Insect positivity will predict nature relatedness whereas insect negativity will predict anthropocentrism and ethnocentrism. Mammal appeal will function weakly as a predictor of any of the dependent variables.

Covariate controls and exploratory factors

A range of factors theoretically intercorrelate with the dependent and independent variables, and will therefore be included as controls. Accounting for the influence of such factors in the models allows for statistically isolating the predictive value of animal appeal ratings on the dependent measures.

Male gender has been linked to self centeredness, anti-egalitarian and dominionistic orientations, whereas female gender has been linked to other-centeredness, egalitarianism and nature connectivity (Gifford & Nilsson, 2014; Pratto et al.,1994). It would, then, be more likely that males are drawn toward anthropomorphic charisma, and females toward feral charisma. However, it has also been noted that females can be particularly averse toward the invertebrate species and prefer ‘lovable’ animals, as compared to males (Rakison, 2009, Schelgel & Rupf, 2009). Male gender has also been connected to beliefs in the instrumental value of nature – controlling and utilizing nature to satisfy one’s own needs (Hills, 1993). Political ideology has also been linked to gender, where it has been found that “men hold more hierarchy-enhancing attitudes, such as support for ethnic prejudice, racism, and rightwing political parties, than do women” (Pratto et al.,1994, p. 742). Female gender has, on the other hand, been linked to empathy for nature and animals (Tam, 2013) and could be expected to score higher on nature relatedness and animal caring. It should, moreover, be more likely that males score higher on both anthropocentrism and ethnocentrism. Gender, political leaning and other- versus self centeredness thus seem interconnected with the dependent and independent variables, and will therefore be included as controls in each model.

Spending time in nature has been found to associate to nature connectivity and concern, which in turn have been linked to other centeredness (Frantz, Mayer, Norton & Rock, 2005; Nisbet et al., 2009). Inversely, lower levels of nature contact and environmental concern have been linked to self- and human centered values (Schwarz, 1992). It has, for example, been found that “persons who hold more self-transcendent and biospheric values report being more environmentally concerned, and the opposite is true for those who hold self-enhancement and egocentric values” (Gifford & Nilsson, 2014, p. 144). In particular, childhood experiences of nature contact has been found to be a strong predictor of environmental concern (Gifford & Nilsson, 2014). Two measures of nature exposure – the extent to which a respondent seeks nature contact and rural/urban upbringing – will therefore be included in the models.

However, research findings are inconclusive, since there is also evidence of rural populations being less concerned with nature’s welfare (Gifford & Nilsson, 2014). It is possible that the diverging findings are due to different sociocultural norms, but it could also be explained by people having different motivations for having, or seeking, contact with nature. For example, farmers and individuals engaged in hunting and fishing are invariably exposed to, and familiar, with elements of nature. However, these type of activities are commonly meant for consumption, which have been linked to lower nature and environmental concern (Hills, 1993). On the other hand, individuals concerned about nature tend to seek nature contact for non-consumption (Gifford & Nilsson, 2014). Experiencing the joy of natural beauty would qualify as such a nature activity. A measure of engaging in nature’s beauty, found also to predict nature connectivity and other centeredness (Diessner, Solom, Frost, Parsons & Davidson, 2008), will therefore be used in the nature relatedness model. Hunting and fishing interest will, on the other hand, be brought into the models linked to self centeredness: anthropocentrism and ethnocentrism. The ethnocentrism model will also include the social dominance variable, since this trait has been suggested to enhance outgroup negativity and anti-egalitarian beliefs (Pratto et al., 1999).

Knowledge of nature is another factor linked to greater concern for nature, and implicated in nature exposure. The more familiar people are with nature, the more they know and understand how nature functions, the more they would care for nature (Gifford & Nilsson, 2014). People who, for example, watch more documentaries about nature and engage in natural science education show an enhanced concern for nature (Gifford & Nilsson, 2014). Pro-environmentalism has also been linked to nature relatedness (Nisbet et al., 2009), and found to associate in a negative way with self- and human centered orientations (Gifford & Nilsson, 2014). The influence of knowledge of nature and pro-environmentalism will therefore be taken into account in all models.

Variables of more tentative influence, but that may yet have a noteworthy impact, will be introduced individually as more exploratory variables. Exposure to the arts has been found to associate with openness to experiences and greater empathy (Mangione et al., 2018), which tentatively suggests a link between an aesthetic appreciation and the other centered attitude nature relatedness. Diessner et al. (2008) also point out that the artistically inclined tend to appreciate distinct visual forms and patterns; ornamentations which can be seen in the animal images. It is possible that particularly valuing such forms could have an impact, which is why aesthetic inclination will be explored in the nature relatedness model.

Caring for animals should be negatively associated with anthropocentrism due to it entailing beliefs in the separateness between humanity and nature. There is, however, to my knowledge no theoretical evidence for this notion. It would be interesting, however, to assess whether

animal caring may influence animal appeal ratings in this nature averse attitude. Animal caring will, thus, be explored in the anthropocentrism model.

Method

Participants

Participants were selected as a convenience sample and recruited via e-mail sent to principals at six high schools in the greater Stockholm area. Two principals responded and gave permission. Two hundred and forty third-year students from the two schools responded to the survey. Three respondents were initially removed due to inconsistent responses and data delivery error within the Google form. Six more participants checking the gender option 'hen' (gender neutral pronoun) were also removed since the low number would contribute to a skewed and unreliable measure as controlling for gender. Altogether this left 231 participants: 99 females and 133 males in the ages 18 – 20 (as verified by class lists noting year of birth). All respondents were students at a variety of Swedish standard national secondary level programs (Economics = 8 %, Electrics = 6 %, Natural sciences = 35%, Health, child & social care = 11 %, Social sciences = 7 %, Technical sciences = 34 %). A majority of the respondents reported having grown up in Sweden (Swedish = 97 %, Other = 3%).

Procedure

A Google form survey titled *Study about attitudes regarding nature and culture* (Undersökning om uppfattningar om natur och kultur) was distributed via e-mail among class supervisors. They shared the link to the Google form survey with the class during a lesson time of their own choosing. The supervising teachers were asked to instruct the students to click on the link and read the initial instructions and then carry on to take the survey, if they chose to participate. The study title informed respondents about the general nature of the study and presented an overview of survey content and procedures. They were also informed of the requirement to be at least eighteen years of age. In order to avoid expectation bias and demand characteristics no further details concerning specific aims or hypotheses were given. There followed information of respondents' right to choose not to participate, to withdraw at any time, to take part of the results once completed, and assurances of the anonymity of responses. At the end of the form they were informed that by clicking 'submit' participation consent was given. When the survey had been sent there followed an onscreen message thanking them for their participation, with contact information should they have questions or comments for the researcher. In order to avoid order effects the form was set to randomly rotate the order of the survey questions.

Instruments

The survey contained 8 attitude scales, 11 single questions and 12 animal images. All attitude scales were scored in their original point scale and translated from English to Swedish by the researcher (who holds a Master's Degree in English). The original language versions and the translated versions can be found in the appendices.

Anthropocentrism

Anthropocentric beliefs were measured by six items extracted from the original New Ecological Paradigm questionnaire (Zhu & Lu, 2017) Three items targeted human superiority attitudes (AP_A) and three items targeted an instrumental type of anthropocentrism where humans can justifiably use and modify nature (AP_B). The two subscales were scored on a 5-point Likert scale and were combined to yield a mean score for anthropocentrism. The Cronbach's alpha of .54 suggests low internal consistency, probably due to the very low alpha of .21 for sub-scale AP_B. The alpha for subscale AP_A of .61 was within acceptable parameters for internal consistency, given that only three items were included (Field, 2012;

Rudmin, 1999). The APA subscale alone would be appropriate to the aim and hypotheses, since it specifically assesses dominionistic attitudes toward the non-human domain. Statements such as *'Humans were meant to rule over the rest of nature'* and *'Plants and animals have as much right as humans to exist'* (reverse coded) were deemed specifically relevant. Therefore, the three-item AP_A subscale was the only one used in the final tests and analyses.

Ethnocentrism

The short form of *Generalized Ethnocentrism scale* (Wrench, 2001) consists of 10 items scored on a 5-point Likert scale. The instrument assesses an individual's degree of negativity toward other ethnic groups, by using seven ethnocentric items and three non-ethnocentric ones (reverse coded). Items two and seven were removed as virtually identical to items nine and three. Item four (*I don't respect values and customs of other cultures*) was changed to a positive statement (*I respect values and customs of other cultures*) in order to maintain the relative proportion of reverse coding overall. The Cronbach's Alpha of .70 indicates sufficient internal consistency.

Nature relatedness

The *Nature Relatedness Scale* was used for its proposed ability to not only measure an individual's interest in nature and the environment, but additionally tap into "one's appreciation for and understanding of our interconnectedness with all other living things on the earth" (Nisbet et al., 2009, p.718). It is scored on a 5-point Likert scale. The study used the short form (NR-6) consisting of six questions derived from, and highly correlated to, the original 21-item scale (Nisbet & Zelenski, 2013).

Item 1 and 3 were somewhat modified. Item 1 (*My ideal vacation spot would be a remote, wilderness area*) was translated to: *Jag skulle gärna söka mig till vilda, mer avlägsna platser i naturen*). High school students may not be able to choose their own vacation forms or destinations, so the formulation was adapted to better fit the sample context. Item 3 (*My connection to nature and the environment is a part of my spirituality*) was changed since the Swedish equivalent word 'andlighet' ('spirituality') was assessed as carrying religious connotations. This could potentially have confounded the results, considering the Swedish secularized social context (Hagevi, 2017). The item was therefore changed into *'I feel a strong soulful connection to nature and the environment'* (*Jag känner en stark själslig koppling till naturen och miljön*). The Cronbach's Alpha, $\alpha = .86$ indicates high internal consistency.

Animal images

An advanced Google image search was used to find pictures allowed to be freely used, shared and edited. Twelve images of animals were selected as a best possible fit to the aim of creating two overall categories representing high-appeal mammals and low-appeal insects. In order to reduce confounding elements, images of animals presented a similar composition and proportional size within the image frame. The selection was made by the researcher, who was also aided by an initial assessment by a group of 28 ethology students at Stockholm University. The students were shown thirty images of mammals and insects, and asked to rate them for high to low appeal and scariness. Based on the ratings of these thirty images, the final 12 were chosen as appropriate representatives of the respective mammal and insect class.

Appeal was measured on a scale ranging a negative to a positive perception of the image. The scale ranged from low appeal (1 = very negative) to high appeal (5 = very positive). The higher mean rating, the higher appeal, and in theory, higher charisma.

The images were edited in Adobe Photoshop to conform to the same size (1280 x 800 px), reduced by 50% to allow for quick loading in the online form. The resolution (113 ppi) remained the same for all images. Lighting, contrast and saturation levels, were adjusted for each individual image in order to obtain a homogenous set of images.

The mammal class images (Anthropomorphic charisma)

Six images of mammals (lion, cheetah, leopard, fennec fox, red panda, pygmy possum) were selected to represent anthropomorphic high charisma. The images feature endoskeletal terrestrial furred mammals. They all have the large and front facing eyes of predatory species – elements shown to have a particularly high human appeal (Small, 2012). Images of three *large mammals* (lion, cheetah, leopard) and three *small mammals* (fennec fox, red panda, pygmy possum) were chosen, in order to control for size appeal. Large mammals have been found to exert particular appeal (Small, 2012), which is why they were matched by three small ones in order to create a more representative mammal class category.

Anthropomorphic appeal was reinforced by the animals presenting a non-threatening pose or expression (as assessed by the researcher and ethology student group). Threat perception was deemed especially important to reduce for the large mammals, all potentially dangerous and fierce predatory large cats. This was done in order to avoid a potentially skewed instrument influenced by threat perception, which could reduce anthropomorphic appeal even in generally high-charismatic animals (Serpell, 2003; Small, 2012).

Some animal species would be more known, or familiar, to the public, than others. In an attempt to reduce the familiarity variable, none of the animals species have, to my knowledge, been used in well-known logotypes (such as WWF's great panda), used as icons of endangered status (like the tiger or polar bear) or subject to divisive social debates, such as the wolf. Care was also taken to not include an animal conspicuously native to Scandinavia in order to reduce familiarity bias. The Cronbach's Alpha of .85 suggests high internal consistency.

The insect class images (Feral charisma)

As representatives of feral, and thus generally lower, charisma, six exoskeletal insects (weevil, moth, cricket, dragonfly, beetle 1, beetle 2) were chosen. Care was taken not to include insects with a stronger threat or disgust level, such as the cockroach, wasp or flea (Sumner, Law & Cini, 2018). Also here this functioned to reduce the potential influence of threat and/or disgust perception, over common insect features. Brightly colored and ornamented animals, in particular butterflies, have been found to be more familiar to us, and hold higher aesthetic appeal (Manesi, Lange & Pollett, 2015). The three naturalistic looking insects (weevil, moth, cricket) was therefore matched by three colorful and ornamented ones (dragonfly, beetle 1, beetle 2), in order to create a more representative insect category. The size of the insects in the respective insect categories was largely uniform. The Cronbach's Alpha of .87. suggests high internal consistency.

Animal liking

All twelve animal images ratings were summed up and averaged for a mean measure of overall animal liking. The Cronbach's Alpha of .87 suggests high internal consistency.

Engagement in Nature's Beauty

Diessner et al. (2008) created the *Engagement in Beauty Scale (EBS)* motivated by the perceived necessity for an instrument assessing a multifactorial, yet exclusive, emotional

response to beauty experiences. It consists of three subscales: Natural Beauty, Artistic Beauty and Moral Beauty, shown to correlate strongly, but also to validly function as separate constructs. This study used only the subsection *Engagement in Nature's Beauty*, a four-item section, rated on a 7-point Likert scale. This section, in addition, stands out in correlating most strongly to other centeredness (Diessner et al., 2008) and has also been shown to predict a positive relationship with nature connectedness (Zhang et al, 2014). The Cronbach's Alpha of .84 suggests high internal consistency.

Animal Caring

The 4-item measurement assessing *Animal Caring Beliefs*, was extracted from the *Wildlife Value Orientations*, "representing beliefs about human-wildlife relationships" (Manfredo, Teel & Henry, 2009, p 416). The items are, however, not phrased in terms of 'wildlife' but refers generally to 'animals'. It is scored on a 7-point Likert scale. Items three and five were deemed very close in formulation and meaning, and were merged into one in order to make the survey shorter. The Cronbach's Alpha of .83 indicates high internal consistency.

Schwartz's Value Survey (Self-enhancement and Self-transcendence)

In order to assess the tendency toward self centered and other centered values, *The Schwartz's Value Survey* was used (Lindeman & Verkasalo, 2005). The two dimensions *Self enhancement* and *Self transcendence* was extracted from the 10-dimension original scale. Self enhancement is directed toward Power and Achievement values and self transcendence measures values of Benevolence and Universal concern for others. Each dimension was scored as a separate measure, by adding a respondents' scores for the two associated items and dividing by two. The Cronbach's Alpha for self enhancement was $\alpha = .73$ and for self-transcendence it was $\alpha = .71$. The statistics indicate an acceptable internal consistency, particularly considering that each subscale consisted of only two items (Field, 2012; Rudmin, 1999).

Social Dominance

In order to assess the influence of *Social Dominance* in the ethnocentric models, the 8-item short form of the *Social Dominance Orientation Scale* was used (Ho et al., 2013). It is scored on a 7-point Likert scale. The instrument was brought down to four items due to the similarly formulated questions: two reverse coded items (3 and 7, indicating egalitarianism) and two social dominance items (2 and 5) were kept. The Cronbach's Alpha of .83 suggests high internal consistency.

Social Desirability

Due to the possibly sensitive nature of measures asking about socially divisive and debated issues the study assessed *Social Desirability* bias. In order to detect the potential tendency to present oneself in a more positive way, and thus in extenuation risking confounding results, the short form of the *Marlow-Crowne Social Desirability Scale* (Rudmin, 1999) was used. This 10-item version of the instrument was developed within a Norwegian context and thus seen as culturally suitable for a Swedish sample. The responses are scored True or False, dummy coded as 0 (false) and 1 (true) with four reverse coded items. The higher positive mean score the stronger indication for social desirability bias. Consequently, positive correlations with other measures flag for social desirability bias. Two items were removed, one due to a double negation deemed confusing in the translation (item 4) and one close to identical to another (item 8 omitted while item 6 kept). The Cronbach's Alpha of .56 can be deemed insufficiently low, given it also consisted of ten items (Field, 2012).

Single Questions

Three questions collected information on gender, study program and place of upbringing. Eight questions assessed social factors and activity-based characteristics. These eight items, and gender, were included due to their theoretical association with the dependent and independent variables. The items included *seeking nature contact* (going out in nature), *childhood residence* (rural vs urban upbringing), *hunting/fishing interest*, *pro-environmental concern*, *knowledge of nature*, *aesthetic inclination* (interest in art and design) and *political leaning* (left – right). The questions were scaled 1 (do not agree at all) – 5 (agree completely). Childhood residence ranged from 1 (very urban) to 5 (very rural) and political leaning from 1 (far left) to 5 (far right).

Results

The data was initially explored in SPSS, where means and standard deviations for all variables were computed (see Table 1). The analysis revealed significant Shapiro-Wilkes statistics for all variables, indicating non-normal distributions. The sample size ($n=231$) can be considered large and Shapiro-Wilkes statistics are likely to be overestimated, and thus unreliable as a measure of normality (Field, 2009). A further visual inspection of histograms and QQ-plots revealed a positive skew for hunting & fishing, social dominance, ethnocentrism, anthropocentrism and social desirability, and a negative skew for mammals and self transcendence. Z-scores were then computed for all variables, in order to further assess non-normal distributions in regard to skewness and kurtosis. No z-scores above 3.29 were found, which can count as the upper limit for a large sample size (Field, 2012). Since also no anomalous outliers were indicated in the variable boxplots, the data was treated as within the parameters of normality.

Descriptive statistics

Table 1

Mean and standard deviation for the instruments and items in the survey

Variable	Mean	Standard deviation
Mammals	4.27	.70
Insects	3.08	.95
Nature relatedness	3.01	.95
Nature exposure	2.94	1.20
Childhood residence	2.51	1.03
Self transcendence	5.64	1.31
Engagement in nature's beauty	4.06	1.55
Aesthetic inclination	3.05	1.31
Animal caring	4.17	1.54
Animal liking	3.69	.69
Knowledge of nature	3.45	1.07
Pro-environmental behavior	2.58	1.17
Anthropocentrism	2.26	.87
Ethnocentrism	2.37	.81
Self enhancement	4.56	1.37
Social Dominance	2.97	1.35
Hunting/Fishing	2.42	1.52
Political leaning	3.39	1.07
<u>Social desirability</u>	<u>.35</u>	<u>.22</u>

Inferential statistics

The hypothesis (H1) that mammals would be rated significantly more positively than insects was confirmed. It can, thus, be inferred that mammals are generally more appealing, or charismatic, than insects. A paired t-test showed a statistically significant preference for mammals over insects, $t(230) = 19.9, p < .01, d = 1.33$. The effect size (Cohen's d) can be considered large (Field, 2012). It can thus be inferred that the animal class construct elicited expected differential responses in the sample, and that anthropomorphic mammals were generally favored over feral insects (see Table 2). The mammal variable showed a negatively skewed distribution and the Shapiro-Wilkes indicated non-normality significance ($p < .01$). The QQ-plot looked within acceptable parameters for normality. There were no problematic outliers or leverage values indicating undue influence. As there was also a large sample size the data was treated as normal (Field, 2012).

Table 2

Means and standard deviations for the mammal and insect variables

Animal group	Mean	Standard deviation
Mammals	4.27	.70
Insects	3.08	.92

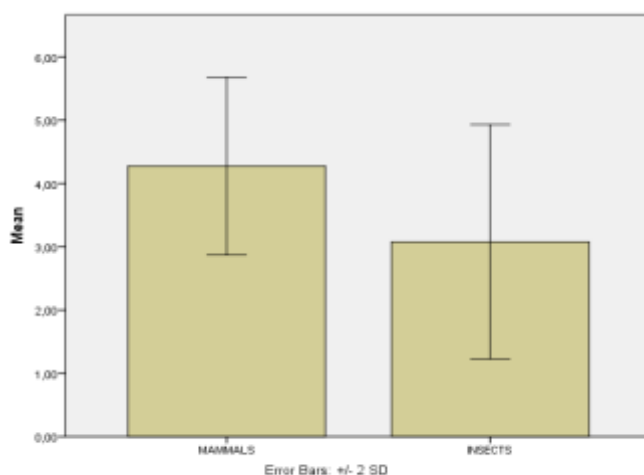


Figure 1: Means and standard deviation for mammals and insect ratings

Hypotheses H2 and H3 were confirmed. Animal liking correlated positively with nature relatedness and negatively with anthropocentrism and ethnocentrism (see Table 3). It can be pointed out that nature relatedness showed a strong positive correlation, also of high significance. Anthropocentrism and ethnocentrism correlated significantly, but yet in a low to medium way and more weakly. It may be inferred that there was greater variance in animal liking in anthropocentrism and, particularly, in ethnocentrism. From the Pearson bivariate correlation matrix it can also be noted that anthropocentrism and ethnocentrism were positively correlated, while inversely correlated with nature relatedness. A finding such as this indicates that human centered and anti-egalitarian beliefs 'go hand in hand', as differentiated from the more nature affiliated individuals.

Table 3

Bivariate correlations animal liking, nature relatedness, anthropocentrism and ethnocentrism

Variable	1	2	3	4
1 Animal liking	1	.560***	-.185**	-.130*
2 Nature relatedness	.560***	1	-.258***	-.189**
3 Anthropocentrism	-.185**	-.258***	1	.354***
4 Ethnocentrism	-.130*	-.189**	.354***	1

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

To test the final hypothesis (H4) a multiple hierarchical regression was produced for each of the three dependent variables: nature relatedness, anthropocentrism and ethnocentrism. In each model the independent variables were mammals and insects. These were introduced together in the first step, in order to assess their comparative predictive function on the dependent variable. Covariates followed blockwise in subsequent steps to allow for an observation of their impact as controls in the models. Variables introduced as explorative, and for a potentially modifying effect, were added in the final step of the models (Field, 2012).

Each model was carried out, and inspected for assumption violations, in accordance with Field's (2012) recommendations. There were no problematic outliers or residuals of influential leverage points, as assessed by Cook's distance values well below 1, and leverage values below 0.2. As indicated by standardized residual PP-plots and scatterplots, there were no problematic issues with linearity, normality nor heteroscedacity. In all models VIF and tolerance values were well below 10, and greater than 0.1, respectively, so multicollinearity was not revealed as a problem. The findings from each regression model are reported in standardized beta coefficients, as appropriate given that instrument Likert scoring scales varied in range. In order to produce more precise and reliable models, they initially included all selected covariates, then run again with insignificant predictors removed (Field, 2012).

Nature Relatedness

A multiple hierarchical regression was carried out to predict values on nature relatedness from appeal ratings of mammals and insects in step one. In block two, the regression model accounted for the covariates gender, nature contact, urban – rural childhood residence, knowledge of nature, engagement in nature's beauty, animal caring, pro-environmental concern, political leaning, self transcendence and social desirability. The variable aesthetic inclination was added to the model in block three, in order to explore its individual influence.

The first model with all covariates included was statistically significant, $R^2 = .79$, $F(13, 217) = 60.99$, $p < .001$, adjusted $R^2 = .77$. The model significantly accounted for 77 % of variance in nature relatedness. There was independence of residuals, as indicated by the Durbin-Watson test of 1.95. With all covariates included insects did not predict nature relatedness ($\beta = .11$, $p = .06$), and neither did mammals ($\beta = .05$, $p = .26$). The insignificant covariates gender ($\beta = .06$, $p = .13$), self transcendence ($\beta = .05$, $p = .15$), political leaning ($\beta = .00$, $p = .96$), social desirability ($\beta = .03$, $p = .41$), and aesthetic inclination ($\beta = .07$, $p = .06$) were then removed and the model was run again. The final model produced was statistically significant, $R^2 = .78$, $F(8, 222) = 97.03$, $p < .001$, adjusted $R^2 = .77$ (see Table 4). The included variables significantly accounted for 77 % of variance in nature relatedness. There was independence of residuals, as indicated by the Durbin-Watson test of 1.96.

In step one, mammals and insects alone significantly predicted nature relatedness. Insect positivity contributed to twice as high values on nature relatedness as compared to mammals. In step two, having adjusted for the influence of significant covariates, only insect ratings significantly predicted nature relatedness. As hypothesized positive insect appeal, independently of the controls, predicted nature relatedness whereas mammal appeal did not.

The findings point to a marked influence of nature associated factors in the model, rendering also mammal appeal insignificant. This suggests that nature related individuals may indeed be particularly drawn to feral insect ‘otherness’, independently of nature contact, emotional affiliation with nature, knowledge of nature and pro-environmental inclination. A notable finding is that although beauty experiences of nature’s aesthetics strongly predicted nature relatedness, an interest in art and design per se did not make a significant contribution to the model. Also noteworthy is that gender, political leaning and self transcendence did not significantly contribute an influence. It does not mean that these factors are unimportant in this context, but may have been statistically marginalized in these large models of more strongly intercorrelated variables.

Table 4

Final model of hierarchical multiple regression on Nature Relatedness

Predictor variables	Step 1	Step 2
	β	β
Mammals	.23***	-.05
Insects	.43***	.11***
Seeking nature contact		.33***
Childhood residence		.07*
Knowledge of nature		.13***
Engagement in nature’s beauty		.28***
Pro-environmental work		.12***
Animal caring		.24***

Note: $p < .05$ * $p < .01$ ** $p < .001$ ***. $\Delta F = 52.30$ *** for Step 1, $\Delta F = 77.05$ *** for Step 2. Childhood residence – a positive correlation indicates more rural residence.

Anthropocentrism

A multiple hierarchical regression was carried out to predict values on anthropocentrism from appeal ratings of mammals and insects in block one. In block two, the regression accounted for gender, nature contact, childhood residence, knowledge of nature, hunting and fishing, pro-environmental concern, political leaning, self enhancement and social desirability. The variable animal caring was added to the model in block three, in order to explore its potential impact in the model.

The first model with all covariates included was statistically significant, $R^2 = .38$, $F(12, 218) = 10.98$, $p < .001$, adjusted $R^2 = .34$. The model significantly accounted for 34 % of variance in anthropocentrism. There was independence of residuals, as indicated by the Durbin-Watson test of 1.93. With significant and insignificant covariates included insects did not predict anthropocentrism ($\beta = -.10$, $p = .18$) and neither did mammals ($\beta = .10$, $p = .16$). The insignificant covariates social desirability ($\beta = .02$, $p = .74$), nature contact ($\beta = .03$, $p = .61$), pro-environmental concern ($\beta = -.01$, $p = .95$), hunting and fishing ($\beta = .10$, $p = .12$) and knowledge of nature ($\beta = -.11$, $p = .10$) were then removed and the model was run again.

The final model produced was statistically significant, $R^2 = .35$, $F(6, 224) = 19.70$, $p < .001$, adjusted $R^2 = .33$ (see Table 5). The included variables significantly accounted for 33% of variance in anthropocentrism. There was independence of residuals, as indicated by the Durbin-Watson test of 2.00.

In step one, mammals significantly predicted a negative association with anthropocentrism, whereas insects did not function as a significant predictor. These results showed the opposite of the hypothesis: negative ratings for mammals, not insects, predicted anthropocentrism. In step two, however, the results supported the hypothesis. In step three, the coefficients yet again changed. While mammal ratings remained insignificant, insect appeal was rendered insignificant as a predictor of anthropocentrism. The beta coefficient was also reduced in roughly half.

Generally, then, anthropocentrics seem to tend toward mammal negativity. However, introducing the control factors clearly had a marked effect in the model. Notably, most factors related to nature did not have a significant impact. Gender stood out as the strongest predictor, which could mean that mammal and insect ratings, in their association with anthropocentrism, were essentially subjected to a gender effect. Once male and female gender was accounted for, along with right wing political leaning and self enhancement which have also been linked to male gender (Gifford & Nilsson, 2014), insect negativity did predict anthropocentrism. The fact that animal caring negatively correlated in the strongest way with anthropocentrism in the final step, and also nullified insect appeal as a predictor, suggests that caring for animals may act as a modifying factor (Baron & Kenny, 1986). The addition of animal caring also, marginally, elevated the importance of childhood residence as a predictor. A mediation analysis was carried out to further assess the more precise function of animal caring (see Figure 2).

Table 5

Final model of hierarchical multiple regression on Anthropocentrism

	<u>Step 1</u>	<u>Step 2</u>	<u>Step 3</u>
Predictor variables	β	β	
Mammals	-.18*	-.05	.09
Insects	-.05	-.17**	-.09
Gender		.38***	.30***
Political leaning		.14*	.16**
Self enhancement		.20**	.17**
Childhood residence		.07	.12*
Animal caring			-.34***

Note: $p < .05$, * $p < .01$ ** $p < .001$ ***. $\Delta F = 5.03$ ** for Step 1, $\Delta F = 23.67$ *** for Step 2, $\Delta F = 25.12$ *** for Step 3. Gender – a positive correlation indicates male gender. Political leaning – a positive correlation indicates right leaning politics. Childhood residence – a positive correlation indicates more rural residence.

Mediation analysis

A mediation analysis using the Hayes' process in SPSS was done in order to assess the relationship between the variables insect appeal, animal caring and anthropocentrism (see Figure 2). The analysis adjusted for the regression model covariates: gender, political leaning, childhood residence and self enhancement. The mediation revealed that animal caring functioned as a partial mediator between insect appeal and anthropocentrism. This effect

would have been responsible for the insect variable being rendered insignificant with the addition of animal caring to the regression model. Insect appeal predicted increased values on animal caring $\beta = .38$, $t(23) = 6.43$, $p < .001$, which in turn predicted reduced values on anthropocentrism $\beta = -.33$, $t(22) = -5.29$, $p < .001$. The completely standardized indirect effect was significant, as indicated by confidence intervals not crossing zero, $\beta = -.13$, $SE = .03$, 95% CI $[-.19, -.07]$. This finding lends support to the hypothesis (H4) by suggesting an inverse relationship between insect ratings and anthropocentrism, but as reduced in strength when animal caring was taken into account. Insect appeal served to enhance animal caring, which in turn served to decrease anthropocentrism. Noteworthy is also that childhood residence predicted animal caring, $\beta = .28$, $t(26) = 3.17$, $p < .001$, which suggests an indirect influence of early nature contact.

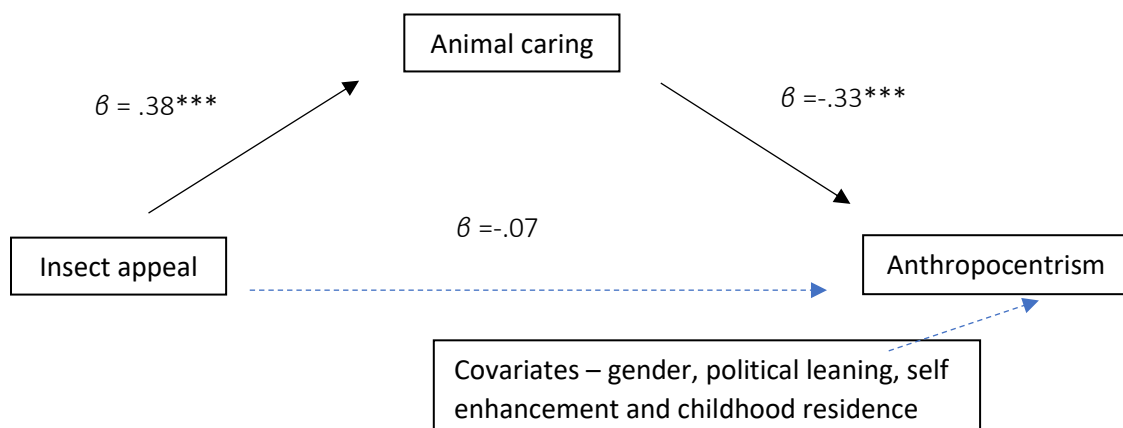


Figure 2: Mediation analysis on insect ratings predicting anthropocentrism via animal caring, with direct effect standardized beta coefficients. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Ethnocentrism

A multiple hierarchical regression was carried out to predict values on ethnocentrism from appeal ratings of mammals and insects in block one. In block two, the regression accounted for gender, nature contact, childhood residence, knowledge of nature, hunting and fishing, pro-environmental concern, political leaning, self enhancement and social desirability. The variable social dominance was added to the model in block three in order to assess its modifying influence. Social dominance also showed a particularly strong correlation with ethnocentrism ($r = .68$), which was thought to warrant an assessment of its individual contribution.

The first model with all covariates included was statistically significant, $R^2 = .50$, $F(12, 218) = 17.92$, $p < .001$, adjusted $R^2 = .47$. The model significantly accounted for 47 % of variance in ethnocentrism. There was independence of residuals, as indicated by the Durbin-Watson test of 2.00. With significant and insignificant covariates included insects did not predict ethnocentrism ($\beta = -.04$, $p = .53$) and neither did mammals ($\beta = .04$, $p = .52$). The insignificant covariates social desirability ($\beta = -.03$, $p = .67$), nature contact ($\beta = -.09$, $p = .20$), pro-environmental concern ($\beta = .03$, $p = .70$), hunting and fishing ($\beta = .12$, $p = .06$), childhood residence ($\beta = .11$, $p = .07$) and knowledge of nature ($\beta = .03$, $p = .70$) were then removed and the model was run again. The final model produced was statistically significant $R^2 = .48$, $F(6, 224) = 34.32$, $p < .001$, adjusted $R^2 = .47$ (see Table 6). The included variables significantly

accounted for 47 % of variance in ethnocentrism. There was independence of residuals, as indicated by the Durbin-Watson test of 1.98.

Step one did not support the hypothesis that negative insect ratings would predict ethnocentrism. Neither insects nor mammals functioned as significant predictors of the dependent variable. In step two the results supported the hypothesis. After adjusting for the influence of gender, political leaning and self enhancement, negative ratings for insects significantly predicted ethnocentrism, whereas mammals did not. Similarly to the anthropocentric model gender was a strong predictor, but more so rightwing political leaning, which also have previously been linked to male gender (Gifford & Nilsson, 2014). It, thus, seems relevant to account for these factors when assessing the relationship between insect appeal and ethnocentrism. Notable is also the exclusion of all covariates associated with nature contact and engagement, which suggests that such factors are of marginal, if not necessarily entirely unimportant, in ethnocentrism and valuation of animal appeal.

In step three, with the addition of social dominance, the coefficients yet again changed. While mammal ratings remained insignificant, insect appeal was rendered insignificant as a predictor. The beta coefficient was also reduced in roughly half. With the inclusion of social dominance also the significance and coefficient values for gender, political leaning and self enhancement were reduced. The strength of social dominance as a predictor most likely explains these alterations; it overtakes the impact of the other, weaker, factors. It is also possible that social dominance modifies the relationship between insect appeal and ethnocentrism (Baron & Kenny, 1986). A mediation analysis was done in order to examine its more precise influence (see Figure 3).

Table 6

Final model of hierarchical multiple regression on Ethnocentrism

Predictor variables	Step 1	Step 2	Step 3
	β	β	β
Mammals	-.08	.05	.04
Insects	-.08	-.17**	-.07
Gender		.29***	.15**
Political leaning		.36***	.13*
Self enhancement		.14*	.06
Social dominance			.53***

Note: $p < .05$, * $p < .01$ ** $p < .001$ ***. $\Delta F = 1.95$ for Step 1, $\Delta F = 31.12$ *** for Step 2, $\Delta F = 74.76$ *** for Step 3. Gender – a positive correlation indicates male gender. Political leaning – a positive correlation indicates right leaning politics.

Mediation analysis

A mediation analysis using the Hayes' process in SPSS was done in order to assess the relationship between the variables insect appeal, social dominance and ethnocentrism (see Figure 3). The model adjusted for the regression model covariates: gender, political leaning and self enhancement. The mediation analysis revealed that social dominance functioned as a partial mediator between insect ratings and ethnocentrism. This partial mediation effect would have been responsible for the insect variable being rendered insignificant with the addition of social dominance to the regression model. Insect appeal predicted reduction in social dominance $\beta = -.19$, $t(23) = -3.50$, $p < .001$, which in turn predicted increased values on ethnocentrism $\beta = .53$, $t(23) = -8.68$, $p < .001$. The completely standardized indirect effect was significant, as indicated by confidence intervals not crossing zero $\beta = -.10$, $SE = .04$, 95% CI

[-.16, -.04]. The mediator served to enhance the negative correlation with ethnocentrism with .10 standardized units, as predicted from insect ratings. This finding lends support to the hypothesis (H4) by suggesting an inverse relationship between insect ratings and ethnocentrism, enhanced in strength when social dominance was taken into account.

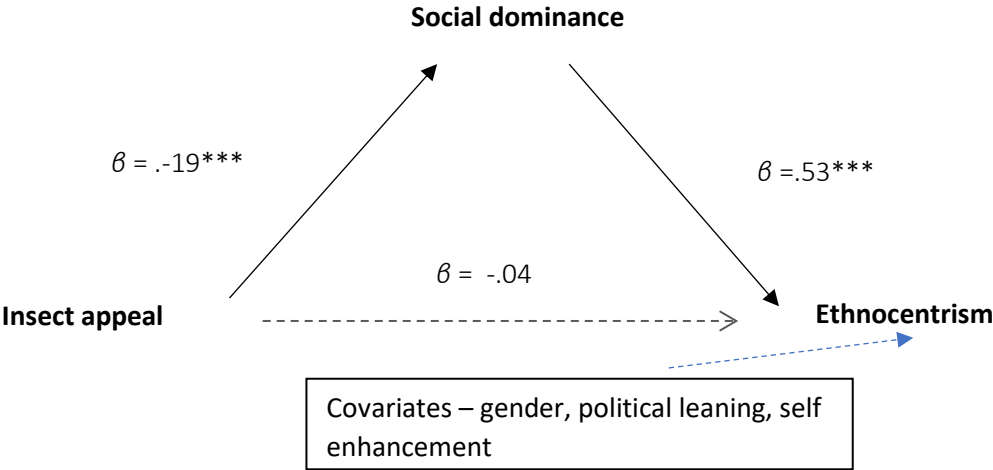


Figure 3: Mediation analysis on insect ratings predicting ethnocentrism via social dominance, with direct effect standardized beta coefficients. Note: * $p < .05$, ** $p < .01$, *** $p < .001$

Discussion

The findings support the hypothesis that anthropocentrism and ethnocentrism would rate animals negatively, whereas nature relatedness would rate animals positively. Animal liking, thus, seem more likely in people affiliated with elements of nature, than people stronger in human-centered and anti-egalitarian beliefs. Since these orientations have been theoretically linked to polarized outgroup attitudes (Pratto et al., 1994; Schwarz, 1992), it may mean that animal liking is linked to variable ability to identify with and accept outgroups. It was also found that mammals possess a stronger appeal than insects overall. This suggests that insects may be viewed as an ‘other’ animal aesthetic; human-dissimilar feral charisma as a distinct and differentiated outgroup, in contrast to the more human-similar anthropomorphic mammal charisma. Hypothesis H4 was partially confirmed. Insect positivity predicted nature relatedness, whereas insect negativity did not predict anthropocentrism and ethnocentrism. In line with the hypothesis mammal appeal functioned as a weaker predictor than insects in the nature relatedness model, while insignificantly predictive in the ethnocentric model. In the anthropocentric model, the findings went against the hypothesis: mammal negativity was a significant predictor whereas insect negativity was not.

However, as significant covariates adjusted the anthropocentric and ethnocentric models, the predictions fell in line with the hypothesis. Respondents high in anthropocentrism and ethnocentrism particularly rejected the feral insects. Bizumic and Duckitt (2007) found that a general animal outgroup bias aligned with anthropocentrism but not with ethnocentrism. The present findings, in contrast, suggest that an animal outgroup bias may emerge in both human-centered and anti-egalitarian beliefs, as charismatic appeal and associated extraneous factors are taken into account. The results follow Allport’s (in Tajfel, 1982) claim that if one tends toward outgroup acceptance one values and more readily includes other groups in one’s self. On the other hand, if one tends toward outgroup rejection, one tends to devalue and exclude ‘other’ groups. The Interspecies Model of Prejudice (Costello & Hodson, 2012) may thus be underlied by identity mechanisms.

Some important details and limitations should be addressed. In the nature relatedness model, insects were consistently favored over mammals, independently of more, and stronger, predictors included. This lends support to the notion that identification mechanisms and outgroup acceptance, via consistent feral insect appeal, may play a role. As in line with Lorimer’s (2007) proposal that the appeal of feral animal charisma may be “grounded in a sense of respect for the other” (920). The fact that nature concern and experiences are strongly linked to nature relatedness, and implicated in the perception of animal charisma should not, however, be overlooked. Nature contact, engagement in nature’s beauty and animal caring emerged as particularly important, which suggests that nature interaction and an experience of emotional closeness with nature are vital factors in nature bonding. Encouraging contact with, and engagement in, nature are proposed as important in stimulating concern for environmental, natural and social diversity.

In the anthropocentric model, mammal and insect ratings alone revealed a pattern that went against the hypothesis: mammals stood out as particularly unappealing and the insect variable was not significant. As significant covariates adjusted the model, the predictions reversed in line with the hypothesis. It would seem likely that gender could have played a role here, as correlating in the strongest way with anthropocentrism and as theoretically linked to the other

variables in multiple contrasting ways. Gender may thus be an essential factor to consider when assessing the link between animal charisma, outgroup bias and anthropocentrism. Interestingly, animal caring turned out to mediate the relationship between insect appeal and anthropocentrism. This suggests that anthropocentrism can be reduced by caring for animals, which in turn can be positively affected by an appreciation for feral insect charisma. It may even be that although one supports human-nature separateness insect aversion could be mitigated by animal caring. Since also rural childhood residence was found to predict animal caring, it is possible that early nature experiences could affect the development of anthropocentric beliefs. Further research, especially concerning contact with animals and nature, particularly such of the more feral type, would be needed to make more than tentative inferences.

Issues would be particularly relevant to address in the ethnocentrism model, where animal appeal ratings did not singly predict the outcome as hypothesized. This initial finding corresponds to Bizumic & Duckitt's (2007) proposal that ethnocentric outgroup bias does not extend to animals. Nevertheless, insect appeal negatively correlated with ethnocentrism as insignificant covariates were excluded and significant ones retained. This is problematic, but yet informative. Similarly to the anthropocentric model, gender, political ideology and self enhancement predicted ethnocentrism. Also notable, the nature contact and engagement variables, except for the influence of childhood residence in anthropocentrism, did not function as significant predictors in either of these dominionistic attitudes. This speaks for the similarity between human-centered and anti-egalitarian beliefs; they positively correlated and were predicted by the same factors, and also largely unrelated to nature contact and concern. An interesting question to look into, then, is to what extent nature experiences can at all influence the development of such attitudes?

Gender was a strong predictor also in this model and also theoretically relate to all significant covariates in conflicting ways, as in anthropocentrism. Adjusting for gender could, thus, have been key to finding support for the hypothesis. Also, social dominance was revealed as a potent mediating factor, enhancing the negative correlation between insect appeal and ethnocentrism. Social dominance may, thus, contribute to a stronger outgroup negativity in ethnocentrism and, possibly, be a key factor in ethnocentric beliefs. The interactive influence of gender, self centered and dominionistic traits could be of central relevance in understanding attitudes to outgroups and otherness.

However, the final models depended upon the exclusion of insignificant covariates and the inclusion of significant ones. Problems associated with such choices should not be overlooked. In models with several variables introduced within the same block it may be difficult to ascertain which covariate, or interconnection in between them, is responsible for what outcome. Also, in multiple regressions there may be suppressor effects that would be important to consider. A suppressor variable may be an insignificant predictor but yet "correlates significantly with other independent variables, and accounts for, or suppresses, some outcome-irrelevant variations...as well as improving the overall predictive power of the model (Akinwande, Dikko & Samson, 2015)." Therefore, excluding insignificant covariates did not factor in such variations. The limited approach to the regression statistics, with also the omission of multiple analyses corrections (Mundfrom, Perrett, Shaffer, Piccone & Roozeboom, 2006) - albeit not necessarily recommended by all statisticians (Field, 2012) - leave some to be desired. More advanced analyses were beyond the scope of this study, but

could have reduced the risk of Type 1 errors in the process of excluding insignificant covariates (Mundfrom et al., 2006).

There were also issues with the instrument scales in the survey. The self-enhancement and self-transcendence measures were based only on two questions extracted from a larger instrument. Even though these traits are assessed as such in the original instrument, it may have been a limited assessment of self- vs other centeredness. The original instrument also statistically weighted each trait in order to produce a comprehensive measurement of an individual's value orientations (Lindeman & Verkasalo, 2005). A weighted calculation of the two questions could have improved the validity, and significance, of the respective variable construct. Moreover, the anthropocentrism measure entailed, in the end, of only three questions as opposed to the original six. These were also extracted from a larger instrument assessing environmental attitudes overall. Although the three questions used showed a reasonable internal consistency, and related appropriately to the aim of the investigation, a more reliable measure would have been preferred. As a note, given the indicated importance and applicability of anthropocentrism in social and environmental sustainability, it is recommended that future research could engage in the construction of such a reliable and valid measure of this human-centered orientation. Another issue to be examined further is the very meaning of anthropocentrism, which may be multifaceted and has even been discussed as essential to environmental sustainability (Kopnina et al., 2018).

Moreover, issues in the animal images construct need to be discussed. Attempts were made to select animal images representing low versus high charisma, exemplified by feral versus anthropomorphic charisma. This proved challenging. Each animal group should show an authentic representative variation of animal species belonging to the two taxonomical classes of mammals and insects. There were many elements to consider and a limited amount of appropriate online images available without risking copyright infringements. In the end, although the large cats have been reported as highly charismatic animals, this choice for the large mammal group could have been an issue for several reasons. Firstly, although care was taken to minimize that the animals signaled threat or risk in the respondents' appraisal, three large cats could have inflated valuations on predatory danger. Secondly, their counterpart, small mammals, presented different species and were more heterogenous in appearance to each other, than were the cats. The fennec fox did not feature as round and 'cute' features as the two others, and in the pygmy possum photograph the animal was holding on to a human hand. Merely the presence of a human element in the images could have yielded ratings not specifically elicited by the animal aesthetic per se. Even though the statistics indicated high internal consistency for the two overall groups, and the mammal class was found to be strongly preferred over the insect class, a more varied large mammal group could have been constructed. More detailed statistical analysis would potentially have revealed that the high mammal ratings came primarily from a large cat preference. If so, the mammal instrument would not validly represent furry, predatory, small and large mammals. Future research should also use more images, not only six per group, in order to ensure a more valid construct.

It proved also particularly challenging to present a highly charismatic mammal group while attempting to factor out the familiarity variable. Even though none of the cats should be immediately identified as a flagship icon, such as the tiger or polar bear which are commonly used in conservation campaigns, these large cats are likely more salient in the public mind than any of the smaller mammals. It is therefore possible that the familiarity factor, unaccounted for in the analysis, played a role in the ratings. A familiarity bias could be

reduced by the same procedures as previously discussed; adding more images and introducing more representative variability.

The insect group presented its own set of issues. Also here a representative construct of the highly diverse class ‘insects’ was desired. Typical insects on the one hand, and non-typical, or more ‘attractive’, on the other hand. The dragonfly image could have been a problem, since it had wings as opposed to the wingless beetles. A dragonfly is also more likely familiar and better liked, since it resembles the more overall appealing butterfly (Schlegel & Rupf, 2009), than the more anonymous beetles. In this way, more similar ‘bugs’ could have been used in order to present a more homogenous ‘attractive’ insect grouping. The typical insects were featured from above not looking at the viewer, which was supposed to ‘depersonalize’ them, thus decreasing anthropomorphic appeal in combination with their physical appearance. There was, however, no way to know for certain what other effect this manipulation could have had on the respondents. Had descriptive statistics been explored for each sub-group, and analyzed in more detail, more information about potential biases could have been detected and dealt with.

Lastly, the characteristics of the sample should be addressed. The respondents were recruited based on convenience, but was relatively large and involved students from a wide range of high school programs exemplifying an array of knowledge, interests and skills. These characteristics would increase the representativeness of the sample, but it is important to note that the respondents’ function within a comparatively urban context (the greater Stockholm area) and stemming from a middle-class, and possibly relatively affluent, background. An overwhelming majority of the sample were born and raised in Sweden, which makes it problematic to extrapolate the findings to other ethnic populations. Another issue was the uneven distribution between study programs. The majority of the respondents attended the Natural Sciences and Technical Sciences programs, which could have thwarted the outcomes. Further analyses linked to the respective study program could have specified and developed the understanding of the outcomes.

Conclusively, while recognizing the limitations in this research, the findings suggest that identification mechanisms underlying outgroup acceptance – rejection may be involved in the valuation of animal charisma. Since much of biodiversity conservation funding and effort depend on public opinion and support (Colléony et al, 2012), more focus on individual differences in the valuation of the particularly vulnerable invertebrates could be helpful. Marketing campaigns and educational efforts promoting biodiversity conservation could, for example, be directed differentially depending on the target audience preferences and beliefs. And if we do seek to foster a more tolerant world with concern for all inhabitants, these findings align with Yusoff’s (2010) advice: we need to pay “attention to how biopolitical worlds are ordered...aesthetics clearly does matter in the biopolitics of multispecies living”(76).

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APPENDICES

Scales

The Nature Relatedness Scale short form

The translated Swedish version used in the survey

1. Jag skulle gärna söka mig till vilda, mer avlägsna platser i naturen
2. Jag tänker mycket på hur mitt agerande påverkar miljön
3. Jag lägger märke till aspekter av naturen var jag än befinner mig
4. Min relation till naturen är en betydande del av den jag är
5. Jag upplever en närhet till allt levande på vår jord
6. Jag känner en stark själslig koppling till naturen och miljön

The English original version

1. My ideal vacation spot would be a remote, wilderness area.
2. I always think about how my actions affect the environment.
3. I take notice of wildlife wherever I am.
4. My relationship to nature is an important part of who I am.
5. I feel very connected to all living things and the earth.
6. My connection to nature and the environment is a part of my spirituality.

Engagement in Beauty Scale (Natural Beauty subscale)

The translated Swedish version used in the survey

Frågorna A - D nedan avser erfarenheter med NATUREN och den fysiska världen, inklusive berg, stenar, floder, sjöar, hav, öknar, växter, blommor, träd, djur, etc. (men INTE den mänskliga kroppen)

A) När jag uppfattar skönhet i naturen känner jag det rent fysiskt, såsom en klump i halsen, en expansion i mitt bröst, snabbare hjärtslag, eller andra kroppsliga reaktioner

B) Jag ser skönhet i en eller flera aspekter av naturen (naturen kan t ex vara vacker på många olika sätt)

C) När jag uppfattar skönhet i naturen upplever jag det känslomässigt, till exempel en viss känsla av vördnad eller förundran eller spänning eller beundran

D) När jag uppfattar skönhet i naturen känner jag något som en utomkroppslig upplevelse, kanske en känsla av samhörighet, som att vara del av något större, eller en kärlek till hela världen

The English original version

Statements 1–4 below refer to experiences with nature and the physical world, including, mountains, rocks rivers, lakes, oceans, deserts, plants, flowers, trees, animals, etc. (but NOT the human body).

A. I notice beauty in one or more aspects of nature.

B. When perceiving beauty in nature I feel changes in my body, such as a lump in my throat, an expansion in my chest, faster heart beat, or other bodily responses.

C. When perceiving beauty in nature I feel emotional, it “moves me,” such as feeling a sense of awe, or wonder or excitement or admiration or upliftment.

D. When perceiving beauty in nature I feel something like a spiritual experience, perhaps a sense of oneness, or being united with the universe, or a love of the entire world.

Wildlife Value Orientations (Animal Caring Beliefs subscale)

The translated Swedish version used in the survey

1. Jag bryr mig om djur lika mycket som jag bryr mig om andra människor
2. Det skulle vara mer betydelsefullt för mig att hjälpa djur istället för människor
3. Jag upplever ett stort välbefinnande av den kamratskap jag upplever med djuren (*fråga 3 och 5 sammanslagen*)
4. Jag känner ett starkt känslomässigt band till djur

The English version

1. I care about animals as much as I do other people
2. It would be more rewarding to me to help animals rather than people
3. I experience a great sense of well-being in the companionship I experience with animals (*item 3 and 5 merged*)
4. I feel a strong emotional bond with animals

The English original version

1. I care about animals as much as I do other people
2. It would be more rewarding to me to help animals rather than people
3. I take great comfort in the relationships I have with the animals
4. I feel a strong emotional bond with animals
5. I value the sense of companionship I receive from animals

The Generalized Ethnocentrism Scale

The translated Swedish version used in the survey

1. Min kultur har vanligtvis rätt om saker och ting
2. Andra kulturer skulle försöka vara mer som min kultur
3. Folk som är kulturellt annorlunda kan göra mig nervös/orolig
4. Jag *tar hänsyn* till andra kulturers värderingar och traditioner (*r*)
5. Att möta andra kulturer är något jag uppskattar (*r*)
6. Jag upplever att jag inte behöver respektera andra kulturer
7. Jag respekterar kulturer som tror på andra saker än vad jag gör (*r*)
8. Jag skulle föredra att undvika samröre med andra kulturer

The English original version

1. My culture is generally right about things.
- ~~2. I respect differences between my culture and other cultures. (*r*)~~

3. Other cultures should try to be like my culture.
4. People who are different make me anxious.
5. I *don't respect* values and customs of other cultures.
6. I like conversing with culturally different people. (r)
- ~~7. Other cultures should model themselves after my culture.~~
8. I do not feel the need to respect other cultures.
9. I respect cultures that believe different things from me. (r)
10. I would prefer to avoid interaction with other cultures.

Social Dominance Orientation Scale

The translated Swedish version used in the survey

1. Vissa grupper är helt enkelt underlägsna andra grupper
2. Grupper på samhällets botten är lika mycket värda som grupper i det översta skiktet (r)
3. Jämlikhet mellan grupper borde inte vara vårt främsta mål
4. Vi borde göra vad vi kan för att utjämna skillnader mellan grupper i samhället (r)

The original English version

- ~~1. An ideal society requires some groups to be on top and others to be on the bottom~~
2. Some groups of people are simply inferior to other groups
- ~~3. No one group should dominate in society~~
4. Groups at the bottom are just as deserving as groups at the top (r)
5. Group equality should not be our primary goal
- ~~6. It is unjust to try to make groups equal~~
7. We should do what we can to equalize conditions for different groups (r)
- ~~8. We should work to give all groups an equal chance to succeed~~

Schwartz Value Survey (Self-enhancement and Self-transcendence subscales)

Self Enhancement

The translated Swedish version used in the survey

1. Hur viktigt är följande att sträva efter i livet / att ha som livsmål: INFLYTANDE & STATUS - social status och prestige, kontroll eller inflytande över människor och resurser (t ex: att ha mycket pengar och auktoritet)
2. Hur viktigt är följande att sträva efter i livet / att ha som livsmål: PRESTATIONER - personlig framgång högt värderad av andra människor/grupper som har status i samhället (t ex: att vara framgångsrik, att ha inflytande)

The English original version

1. How important do you think the following is to strive for in life/to have as a life goal: INFLUENCE & STATUS - social status and prestige, control or influence over other people and resources (i.e.. to have a lot of money and authority)
2. How important do you think the following is to strive for in life/to have as a life goal: ACHIEVEMENT - personal success highly valued by other high-status people and groups (i.e.. to be successful, to have influence)

Self Transcendence

The translated Swedish version used in the survey

1. Hur viktigt är följande att sträva efter i livet / att ha som livsmål: UNIVERSALISM - förståelse, tolerans, att värna om hela världens välfärd (t ex: att vara öppensinnad, värna om jämlikhet, fred och global rättvisa för alla människor och jordens miljö)
2. Hur viktigt är följande att sträva efter i livet / att ha som livsmål: VÄLVILJA - mot framförallt de människor som står en nära/som finns i ens närhet (t ex: att vara ärlig, lojal, hjälpsam, förlåtande och ansvarsfull)

English version

1. How important do you think the following is to strive for in life/to have as a life goal: UNIVERSALISM - understanding, tolerance, to care for the well-being of the whole world (i.e.. to be open minded, to care for equality, peace and global justice for all people and the environment)
2. How important do you think the following is to strive for in life/to have as a life goal: BENEVOLENCE - toward mainly people who are close to you/in your proximity (i.e.. to be honest, loyal, helpful, forgiving and responsible)

Marlow-Crowne Social Desirability Scale (short form)

The translated Swedish version used in the survey

1. Jag är en bra lyssnare oavsett vem jag pratar med
2. Det har funnits tillfällen då jag utnyttjat någon (r)
3. Ibland vill jag hellre hämnas än att glömma och förlåta (r)
4. ~~Om det är något jag inte vet eller kan har jag inga problem att erkänna det~~
5. Jag har nästan aldrig haft lust att skälla ut någon
6. Jag tycker aldrig illa om när jag blir ombedd att återgälda en tjänst
7. Jag har aldrig avsiktligt sagt något som har sårat någons känslor
8. ~~Ibland blir jag irriterad på människor som ber mig om tjänster. (r)~~
9. Det har funnits tillfällen när jag känt för att slå sönder saker (r)
10. Ibland när människor misslyckas tycker jag att de får vad de förtjänar (r)

The English original version

1. No matter who I'm talking to, I'm always a good listener
2. There have been a few occasions when I took advantage of someone. r
3. I sometimes try to get even, rather than forgive and forget r
4. ~~When I don't know something, I don't at all mind admitting it~~

5. There have been occasions when I felt like smashing things r
6. I never resent being asked to return a favor
7. I have almost never felt the urge to tell someone off
- ~~8. I am sometimes irritated by people who ask favors of me. r~~
9. I sometimes think when people have a misfortune they only got what they deserved. r
10. I have never deliberately said something that hurt someone's feelings

Single items

The Swedish version as it appeared in the survey comes first, followed by response scoring and the English version

I vilken miljö har du bott under större delen av ditt liv? Mycket centralt (1) - Mycket lantligt (5)

In what type of environment have you lived for the most part of your life? Very urban (1) - Very rural (5)

Jag är mycket intresserad av konst / design eller andra estetiska uttryck (ex: fotografi, måleri, arkitektur etc). Stämmer inte alls (1) - Stämmer helt och hållet (5)

I am very interested in art/design or other aesthetical expressions (ie. photography, painting, architecture etc). Do not agree at all (1) - Agree completely (5)

Jag fiskar och/eller jagar ELLER skulle vilja/planerar att skaffa jakt och/eller fiskelicens. Stämmer inte alls (1) - Stämmer helt och hållet (5)

I go fish and/or hunt OR would want to/plan to get a hunting and/or fishing license. Do not agree at all (1) - Agree completely (5)

Jag söker mig ofta ut i naturen. Stämmer inte alls (1) - Stämmer helt och hållet (5)

I often go out in nature. Do not agree at all (1) - Agree completely (5)

Jag är starkt engagerad i miljöarbete och/eller bidrar ekonomiskt till förmån för miljö/natur/djur. Stämmer inte alls (1) - Stämmer helt och hållet (5)

I am strongly engaged in environmental work and/or contribute financially to aid the environment/nature/animals. Do not agree at all (1) - Agree completely (5)

Jag är väl insatt i/ har goda kunskaper om natur, djur och/eller miljö. Stämmer inte alls (1) - Stämmer helt och hållet (5)

I am knowledgeable about nature, animals and/or the environment. Do not agree at all (1) - Agree completely (5)

Om jag fick rösta i riksdagsvalet idag så skulle jag rösta så här. Långt till vänster (1) - Långt till höger (5)

If I could vote today I would vote like this: Far to the left (1) – Far to the right (5)

Animal images

The same question and response scoring was used for all images, as follows:

Hur upplever du motivet? Starkt negativt (1) - Starkt positivt (5)

How do you experience the motif? Strongly negatively (1) - Strongly positively (5)

Large mammals

Image 1 – lion



https://en.wikipedia.org/wiki/File:Lion_waiting_in_Namibia.jpg

Image 2 – leopard



<https://www.pexels.com/photo/leopard-on-brown-trunk-tree-46254/>

Image 3 - cheetah



<https://pixabay.com/en/cheetah-wildlife-spots-close-2818829/>

Small mammals

Image 4 - fennec fox



<https://www.flickr.com/photos/greyloch/37802432115/>

Image 5 - red panda



<https://www.pexels.com/photo/brown-and-white-grizzly-bear-148182/>

Image 6 – pygmy possum



<https://imgur.com/gallery/Szp9Kxj>

Typical insects

Image 7 – weevil



[https://commons.wikimedia.org/wiki/File:Broad-nosed Weevil - Flickr - treegrow.jpg](https://commons.wikimedia.org/wiki/File:Broad-nosed_Weevil_-_Flickr_-_treegrow.jpg)

Image 8 – moth



[https://commons.wikimedia.org/wiki/File:Cactoblastis cactorum moth female.jpg](https://commons.wikimedia.org/wiki/File:Cactoblastis_cactorum_moth_female.jpg)

Image 9 - cricket



[https://commons.wikimedia.org/wiki/File:Dark bush-cricket, male larva \(9545316552\).jpg](https://commons.wikimedia.org/wiki/File:Dark_bush-cricket,_male_larva_(9545316552).jpg)

Non-typical insects

Image 10 - ornamented dragonfly



<https://www.flickr.com/photos/126953422@N04/16495223491>

Image 11 – beetle 1



<https://www.flickr.com/photos/126953422@N04/16495223491>

Image 12 – beetle 2



<https://www.flickr.com/photos/yokohamayomama/5790734866>