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Experimental evidence on the impact of biodiversity conservation videos on charitable donations

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Abstract

We explored how different types of audio-visual media content impacted charitable donations using a lab experiment. Subjects chose to donate to a charity in a modified dictator game, after being randomly assigned to watch videos featuring either a non-charismatic species (Bats), a charismatic species (Lions) a composite habitat composed of both species (Bats and Lions in the Savanna), with and without additional content on the anthropogenic cause of endangerment. In addition to this, a subset of subjects was offered public recognition alongside videos. We found media content influences pro-social behaviour on both the intensive and extensive margins of giving: videos with charismatic Lions increased the probability of donating (intensive margin of giving), but content about human cause of endangerment, increased the amount donated conditional on having decided to donate (extensive margin of giving). There is heterogeneity in treatment effects based on past pro- social behaviour: public recognition increases donations only for those reporting donating to charities in the past.

1. Introduction

Rapid, human-induced depletion of species and ecosystem services characterises the sixth mass extinction event - the average rate of vertebrate species loss over the past 100 years is 100 times higher than the historical background rate of 2 mammal extinctions per 10,000 species (Ceballos et al., 2015). Funding shortfalls are a barrier to increasing the scope and scale of current conservation efforts (Butchart et al., 2010; Dirzo et al., 2014; Ceballos et al., 2017). Illustratively, one estimate suggests only 12% of the estimated cost of reducing the extinction risk of threatened bird species is currently funded (McCarthy et al., 2012). Consequently, experts have highlighted the vital role of charitable giving and private philanthropy in raising resources and support for biodiversity conservation (Balmford and Whitten, 2003; Sachs et al., 2009; Miller, 2014). A central challenge, therefore, is how to motivate people to act pro-socially to raise charitable donations for biodiversity conservation?

In seeking to address this question, this article explores the causal effect of different types of audio-visual media content from brief biodiversity conservation videos on charitable giving. Videos are mass informational tools that provide informational narratives in a visual, salient and memorable manner. They can induce individuals to update their beliefs and revise their preferences over a given course of action, and potentially change behaviour (La Ferrara, 2016; Moyer-Gusé, 2008).[1] Similarly, Nicholson-Cole (2005) notes that visuals with animals and people are particularly effective at bringing abstract global environmental phenomena into people's everyday lives because they grab attention and are likely to initiate thought process and emotions that the issue is salient and worth doing something about. Accordingly, conservation and news organisations increasingly rely on audio-visual mass media, like short videos, for fundraising. These videos commonly feature charismatic megafauna (or 'flagships', which are commonly large, popular vertebrates associated with a particular habitat) on the basis that they generate greater awareness, sympathy and funding which can be deployed for the conservation of less charismatic species and the broader habitat in which they live (Desvousges et al., 1993; Kahneman et al., 1993). However, others sound a note of caution about the unintended adverse effects of this approach: the possible decreased attractiveness and public acceptance of non-flagship species, increased risk of ex situ conservation for charismatic species, and 'flagship fatigue' which may reduce giving in the long-run (Douglas and Winkel, 2014; Sitas et al., 2009; Clucas et al., 2008; Kontoleon and Swanson,

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[1] La Ferrara (2016) conceptualises mass media can change individual behaviour by providing new information through specific forms of narrative content, changing beliefs and preferences, providing role models, and modifying time use (directly through increased time spent in front of the TV and indirectly through the intensity of exposure to particular types of messages). In this paper, we focus on the distinct behavioural effects of media content rather than media exposure; most literature focuses on the latter. For instance, see Sakellari (2015) and Howell (2011) for a review of how exposure to environmental documentaries/mass media can change environmental behaviour, and Della Vigna and Ferrara (2015) for a review of how mass media can change other socio-economic outcomes like voting, contraception, crime and migration.

2003; Lindenmayer et al., 2002; Bowen-Jones and Entwistle, 2002). Another concern is that media narratives showcasing charismatic megafauna in pristine habitats may breed complacency and inaction by misrepresenting natural environments as 'utopian' and untouched by humans instead of educating the public about the human-made causes of the sixth mass extinction (Hughes-Games, 2017). Correcting such misperceptions are crucial given the ongoing public controversies about the role of human activity in causing climate change and breaching planetary boundaries in the Anthropocene (Oreskes, 2004; Zalasiewicz et al., 2008; Steffen et al., 2011; Lewis and Maslin, 2015).

A better understanding of the distinct effects of types of media content can help organisations design audio-visual messages that complement environmental protection and conservation by taking advantage of the rapid spread of online mass communication media. YouTube alone has over a billion users amounting to almost one-third of all people on the Internet (YouTube, 2018). Moreover, emerging research notes the growing public proclivity to obtain information about environmental issues from photographic images and videos, especially from online digital platforms and social media (Nicholson-Cole, 2005; Sakellari, 2015; Painter et al., 2018). On a related note, others remark on the new human tendency to increasingly absorbed in sedentary activities involving electronic media, arguing that there is a fundamental shift away from nature-based recreation choices ('biophilia', to 'videophilia') (Pergams and Zaradic, 2006, 2008; Kareiva, 2008; Soga and Gaston, 2016). While these trends have broader implications for how we value and protect biodiversity, they also underscore the need for a better understanding of what type of media content promotes prosocial behaviour change.

In an initial step towards addressing these concerns, we randomly assign subjects to different types of biodiversity conservation videos in a lab experiment with 377 individuals. We vary media content about focal species and habitats, and the human cause of endangerment. We specifically consider non-charismatic species (Bats), charismatic species (Lions), and a biodiversity habitat composed of both charismatic and non-charismatic species (Bats and Lions in the Savanna habitat), and additional content on the endangerment affects due to human activities like hunting, illegal trade and poaching. As conservation organisations often combine informational strategies with non-pecuniary incentives such as recognising donors for their contributions (e.g. publishing their names in newsletters), our study also attempts to measure if such incentives yield additional benefits through increased donations when combined with videos.

Our work offers several innovations. We mapped the causal effect of audio-visual media content about focal species and the cause of endangerment experimentally, in contrast to previous research which relies primarily on text and photographic appeals in surveys or stated preference economic valuation studies, or administrative data on public spending. We also examined changes in giving across appeals with different focal species within the same biodiversity habitat, and the biodiversity habitat itself, compared to previous work which tends to look at differences in charitable giving across different

species from different habitats, or one or many animals from the same species. Finally, we measured changes in revealed charitable donations using a dictator game with monetary stakes after individuals watch the videos, compared to most previous research that relies on estimates of stated (hypothetical) willingness to pay for conservation or donations intentions. Using monetary stakes allows us to measure behaviour rather than behavioural intentions to address concerns about hypothetical bias and the intention-behaviour gap. In a meta-analysis of experimental studies, List and Gallet (2001) find evidence of hypothetical bias inflates willingness to pay estimates as subjects overstated their preferences by a factor of three in hypothetical settings. Estimates from some recent meta-analyses also suggest that intentions account for less than one-third of the variance in actual behaviour change (Sheeran and Webb, 2016).[2]

We found that charitable donations are responsive to the type of audio-visual media content that people watch and can have distinct effects on the extensive margin of giving (probability of donating), and the intensive margin (amount donated). Specifically, videos featuring charismatic Lions increased the probability of donating relative to a control group exposed to non-charismatic Bats, but not the amount donated conditional on subjects having decided to donate. Conversely, videos with the anthropogenic cause of endangerment increase the amount donated conditional on deciding to donate, but not the probability of donating. We also find, interestingly, that treatment effects are heterogeneous based on past behaviour. 'Pro-social types', i.e., those reporting to be donors to charities in the past, are more responsive when videos include the human cause of endangerment since content about charismatic Lions had little effect on their donations. Also, public recognitions raised giving only for past donors. Taken together, these results suggest that the impact of both media content and incentives depend on individual heterogeneity and interventions need to account for past pro-social behaviour.

The rest of the paper is organised as follows. The next section locates the contributions of the current article in the related literature, and section 3 outlines the hypotheses. Section 4 outlines the experimental approach, materials and procedures used in the experiment, and section 5 notes the data analysis strategy. Section 6 presents the results and section 7 concludes with a discussion.

2. Related literature

2.1 Charismatic species and donations

Metrick and Weitzman (1996, 1998) found charismatic species attracted a larger share of federal expenditures under the Endangered Species Act in the United States of America (also see Brown and Shogren (1998) and Dawson and Shogren (2001)). Similarly, stated preference valuation studies,

[2] Engel (2011), however, finds that the differences in giving in dictator games with and without monetary takes are not statistically significant in a meta-analysis. See Read (2005) for a detailed discussion on the use of monetary incentives in experimental economics.

especially contingent valuation surveys and choice experiments found naming charismatic flagships as attributes in a proposed conservation area elicited a higher stated Willingness to Pay (WTP) or Willingness to donate (WTD) to conservation programs (Loomis and White, 1996; Bulte and Van Kooten, 1999; Kontoleon and Swanson, 2003; Tisdell et al., 2007, 2006; Christie et al., 2006; Martín-López et al., 2007; Jacobsen et al., 2008; Marešová and Frynta, 2008; Morse-Jones et al., 2012). Currently, little research quantifies the effect of using donation appeals with charismatic flagships relative to non-charismatic species (Clucas et al., 2008; Sitas et al., 2009). To the best of our knowledge, only Thomas-Walters and J Raihani (2017) used a charitable giving game to quantify individual differences in giving and found average donations were marginally higher amongst Amazon Mechanical Turk workers when appeals featured charismatic species (USD 0.16 versus USD 0.13). They used photo-cum-text appeals featuring either charismatic or non-charismatic species (polar bear, tiger, elephant versus dusky gopher frog, North Atlantic cod, Western glacier stone fly) across different habitats. Taking this insight further, we examine if differences in giving persist when individuals are exposed to brief conservation videos. We measure individual's donations by using a dictator game with monetary stakes where the recipient is a charity. Furthermore, we attempt to control for underlying differences in the natural habitat by considering charismatic and non-charismatic species within the same larger habitat.[3]

2.2 Habitats and donations

To this end, we also investigated whether videos featuring a biodiversity habitat with both non-charismatic and charismatic species affect charitable giving, compared to videos and donation appeals featuring one focal animal species. A focal species may enhance charitable giving due to the well-established 'identifiable victim effect' in humans, i.e., solicitations identifying one human victim yield higher contributions than solicitations featuring statistical information about many human victims (Jenni and Loewenstein, 1997; Small and Loewenstein, 2003; Kogut and Ritov, 2005a; Small et al., 2007; Västfjäll et al., 2014). Possible explanations are that donors perceive identifiable victims as a psychologically coherent unit, which in turn stimulates more vivid and in-depth information processing, empathetic concern and helping behaviour (Jenni and Loewenstein, 1997; Kogut and Ritov, 2005b; Västfjäll et al., 2014). Few studies examine whether these results carry over to non-human recipients, and the scarce evidence available suggests the effects are not replicated. For instance, Hsee and Rottenstreich (2004) and Thomas-Walters and J Raihani (2017) found donations are not significantly different between one and many recipients of the same species (also see Markowitz et al. (2013)). Alternately, Smith et al., (2012) found donations were higher when many animals were described as a

[3] Differences in underlying habitats may affect donations if subjects are more likely to donate a higher amount to more favourable biomes or habitats. Forest and tundra biomes have been found to elicit more favourable rankings of preferences, scenic beauty, and restorative effects, compared to desert or grassland biomes (Han, 2007; Falk and Balling, 2010), and individual WTP is higher for blue spaces (White et al., 2010).

unit (e.g. 200 gazelles versus a herd of 200 gazelles).[4] These studies focused on numerous individuals from the same species (biological resource) and not a single habitat composed of different species (biodiversity). Natural habitats can be seen as a case of the latter, as constituent species interact with each other to form one coherent ecosystem. They are also a more accurate description of the ex situ conservation of wildlife, given people often prefer to conserve wildlife in their natural habitats (Kontoleon and Swanson, 2003). At the time of writing, we were unaware of studies examining differences in charitable giving due to appeals featuring biodiversity habitats.[5,6] Hence, we test whether naming one charismatic and non-charismatic species belonging to the same biodiversity habitat changes donations behaviour, compared to videos and solicitations featuring one focal animal.

2.3 Information about human-caused endangerment and donations

Then, we examine how media content on the anthropogenic cause of endangerment impacts pro-social behaviour towards conservation. Standard economic models of rational behaviour assume that individuals care only about consequences rather than causes (Kahneman and Knetsch, 1992; Kahneman et al., 1993; Ashraf et al., 2005). Kahneman et al., (1993) notes this assumption flows from the 'purchase' model for public goods which assumes that utility - and consequently WTP or WTD - is a function of ranking possible outcomes, rather than the manner in which an environmental good may be lost. However, subsequent work from economists and psychologists finds individuals state a higher WTP when environmental degradation is down to human causes rather than natural causes (Kahneman et al., 1993; Kahneman and Ritov, 1994; Walker et al., 1999; Brown et al., 2005; Bulte et al., 2005). Bulte et al., (2005) found WTP to protect seals is significantly higher when they appear to be threatened by an act of humankind (oil and gas drillers, greenhouse effect) rather than nature. Kahneman et al. (1993) term this the 'outrage effect' because individuals reported feeling more upset and interested when informed about the intentional harm caused by humans compared to unintentional harm arising from natural causes, leading them to lend more public support for ameliorative action (Kahneman et al., 1998). We contribute to this literature by studying if additional audio-visual media content on the human cause of biodiversity depletion impacts pro-social behaviour in this new experimental setting,

[4] Framing multiple individuals as a coherent unit draws on the notion of 'entitativity', i.e., the tendency of people to form in-depth, organized, and coherent impressions of and emotional responses to individual targets while groups are processed more superficially (see Vastfjall et al., 2014; Smith et al., 2012).

[5] Jacobsen et al., (2008) found that the WTP to conserve the Danish heath habitat was significantly higher when two lesser known species were 'iconised' by explicitly naming them, compared to a description of the habitat containing statistical information of different species; but they don't explore differences in WTP when only one of the species was named.

[6] Our work also connects to embedding and scope effects in the contingent valuation (CV) literature, i.e., the tendency of respondents to contingent valuation surveys to spend a particular amount of money on a good regardless of its scale (Desvousges et al., 1993; Kahneman et al., 1993). Carson (2012) notes obtaining distinct WTP estimates for the individual species or outputs as opposed to the entire program in such cases is particularly challenging because scope insensitivity may persist in situations where environmental programs provide multiple outputs, like protecting different endangered species in a biodiversity habitat. We do not address scope sensitivity in the current study as we focus on incentivized charitable donations, but refer to Carson (2012) and Dickert et al., (2015) for reviews of the literature.

i.e., with a different human-cause of endangerment (habitat destruction, hunting and illegal trade), informational medium (videos), and an incentive-compatible rather than stated behaviour (revealed charitable donations).

2.4 Public recognition and donations

We also build on the finding that people behave more pro-socially in public rather than in private due to reputational benefits it confers on the donor, i.e., visible giving signals to others and oneself that the donor is a 'good' pro-social type (Harbaugh, 1998; Bénabou and Tirole, 2006). Indeed, while charities give subjects the option to remain anonymous, they regularly use incentives to recognise individual donors through publishing their names in newsletters or visible gifts (like wristbands, T-shirts). The positive effect of the public recognition of donors has been revealed in both lab and field experiments (Rege and Telle, 2004; Andreoni and Petrie, 2004; Alpizar et al., 2008; Lacetera and Macis, 2010a; Cotterill et al., 2013; Karlan and McConnell, 2014). Andreoni and Petrie (2004) found virtually no subjects took the option to remain anonymous in a lab experiment to study subjects' contributions to a public good, and that giving was higher than when contributions were anonymous. Knowing that one's contribution is perceived by others even if they are not physically present can also motivate people to give - Silverman et al., (1984) found that viewers were most likely to give at the times when the names of pledging donors were shown on the screen during a telethon. Karlan and McConnell (2014) also found that charitable giving is higher when donor names are published in funding circle newsletters in a field experiment. However, Dufwenberg and Muren (2006) found that public visibility decreases giving in a dictator game, as less is given when the giver is paid on stage rather than in private. This may be due to individual heterogeneity in reputation concerns, i.e., some people are not comfortable signalling their pro-sociality due to socio-cultural factors (Lambarraa and Riener, 2012; Jones and Linardi, 2014; Mason, 2016; Cotterill, 2017).[4] Giving less when offered public recognition could also be because subjects try to mitigate perceivers beliefs that donors contribute for selfish reputational reasons (Berman et al., 2015). We complement this work by examining if public recognition yields additional benefits when used in conjunction with brief videos.

2.5 Past pro-social behaviour and donations

To shed light on the possible role of individual heterogeneity, we examined if treatment effects are contingent on whether subjects are 'pro-social types', i.e., those who have donated to charities in the past. Charities seek to identify pro-social individuals for several reasons including targeted messaging and special incentives/gifts. Pro-social individuals may donate for reasons like altruism, reciprocity or fairness (Becker, 1976; Fehr and Schmidt, 2001), warm glow (Andreoni, 1990, 1989), intrinsic motivations to act pro-socially either for its own sake or out of moral duty (Titmuss, 1970; Ryan and Deci, 2000), and genetic and neural factors (Tankersley et al., 2007; Ebstein et al., 2010; Zaki and Ochsner, 2012), apart from the signalling motivations discussed above. Others note that past behaviours

are a key determinant of decision-making in the current period, as they reinforce to attitudes, behavioural intentions, and habits (Ouellette and Wood, 1998; Glasman and Albarracín, 2006). In a field experiment conducted at a university, Frey and Meier (2004) found students who occasionally contributed to the same charity in the past (weak pro-social types) increased their donations when informed that a high share of students previously donated. However, there was little impact on those who always or never donated to the same charity in the past (strong pro-social and selfish types). Relatedly, others show past donors show relatively stable pro-social behaviour across different contexts for; for example, De Oliveira et al., (2011) show individuals who give to one organization, give significantly more to other organizations than do non-donors (also Volk et al., 2012; Carlsson et al., 2014; Chuang and Schechter, 2015). We extend this line of research by exploring if responses to videos with and without public recognition are contingent on being a past donor to the charitable sector.

3. Summary of hypotheses

Based on a review of the theoretical and empirical literature, we tested the following hypotheses. First, we hypothesised that video content with charismatic animals would elicit more charitable donations relative to videos with non-charismatic species (Metrick and Weitzman, 1998; Tisdell et al., 2006; Morse-Jones et al., 2012; Thomas-Walters and J Raihani, 2017). In particular, donations elicited after exposure to Bats Control videos will be lower than donations elicited after exposure to Lions control videos. There is a lack of prior evidence about how complex habitats affect charitable giving compared to a single focal species, and existing evidence on the role of featuring one versus many animal recipients from same species in donation appeals is mixed (Hsee and Rottenstreich, 2004; Thomas-Walters and J Raihani, 2017). In addition, we frame the Savanna as a coherent habitat and name two species (Smith et al., 2012; Västfjäll et al., 2014), which may help to offset any potential identifiable victim effect. Thus, we tested the null hypothesis of no effect on charitable donations when subjects watch videos featuring complex habitats compared to a single species, i.e., donations elicited after exposure to Savanna Control videos are not significantly different from donations elicited after exposure to either Bats or Lions Control videos.

Next, we test that audio-visual media content on the human cause of endangerment will elicit higher charitable donations (Kahneman et al., 1993; Bulte et al., 2005), i.e., donations elicited after exposure to Cause videos are higher than donations elicited after exposure to Control videos. Given that public recognition can increase charitable giving (Andreoni and Petrie, 2004; Karlan and McConnell, 2014), we hypothesised that donations elicited after exposure to Cause videos would be lower than donations elicited after exposure to Cause videos + Public recognition. Finally, we checked for heterogeneity in treatment effects by pro-social subjects, which we define as the group of people who reported donating to charities in the past (Frey and Meier, 2004; De Oliveira et al., 2011). We hypothesised that treatment effects are contingent on being a pro-social type, i.e., offering past donors public recognition raises giving.

4. Experimental methods, materials and data

4.1. Experimental approach

We measured differences in individual-level donations behaviour as a result of being randomly assigned to watch a video featuring either a charismatic and non-charismatic species or a complex habitat, without and with additional information on the human cause of endangerment. In other words, we utilised a case-based comparative approach to look at the effect of media content about different focal species/habitats on donations. To measure the outcome behaviour of charitable donations, we used an incentivised Dictator game, which subjects played after watching the video in the lab.[7]

4.2. Species and habitat selection

To select the focal species and habitats that would feature in the videos, we used the International Union for the Conservation of Nature (IUCN) List of Threatened Species database and began our search by habitat, threat classification, and conservation status (IUCN, 2018). Our primary selection criteria were that both the non-charismatic and charismatic species (1) belonged to or could be found in the same biodiversity habitat, (2) their endangerment came from similar anthropogenic causes, (3) they had comparable and accessible high-quality photos, (4) both were relatively well-known, and (5) had a similar IUCN endangerment status. Other factors we considered were if they have an important role in ecosystem functioning, whether they belonged to the same phylogenetic group, and if they were well known. We finally chose Bats and Lions as the non-charismatic and charismatic animals respectively, because they both can be found in the African Savanna habitat and they face common threats from humans through habitat destruction, and illegal hunting and trade. More broadly, we treated species charisma as a black box composed of multiple constituent factors (such as size, taxonomy, popularity and fame) in line with extant economics literature but tried to control for differences across subjects by selecting relatively well-known species with forward-facing eyes, providing conservation-relevant information in the videos in a systematic narrative, and holding constant the Savanna habitat in a standardised format across all videos.[8]

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[7] Our approach builds on a conventional lab experiment, i.e., one which employs a standard subject pool, abstract framing and an imposed set of rules (Charness et al., 2013; Harrison and List, 2004), to define a 'framed' lab experiment by bringing in the field context through both the information available to subjects (videos) and the commodity task (giving to a charity). The between-subjects approach aligns with the standard method employed to study the impact of different focal species (or attributes of the conservation site) on the individual's WTP for conservation (Christie et al., 2006; Tisdell and Nantha, 2006) and the impact of the documentaries (Greitemeyer, 2013; Arendt and Matthes, 2016).

[8] Metrick and Weitzman (1996) chose "physical length of an average representative of the species" to identify charismatic species, with the only explanation that, "we have not obtained a satisfactory measure of 'charisma", although we have received many creative suggestions' (pp. 4). Morse-Jones et al. (2012) do not define charisma, but their choice of charismatic species is "relatively large and well-known mega-fauna such as the lion or gorilla, and non-charismatic as birds, reptiles, and amphibians". For discussions on defining species charisma, see Bowen-Jones and Entwistle (2002); Lorimer (2007) and Verissimo et al., (2011).

Bats are a well-known but less liked non-charismatic animal. Previous studies demonstrated that subjects reveal a low stated WTP to pay for bat conservation (Martín-López et al., 2007; Vincenot et al., 2015). They are also often associated with unfavourable symbolic values across cultures and have been noted to generate phobias and negative emotions such as disgust, fear (Voigt and Kingston, 2016). Some argue, that although bat populations have suffered a severe decline, this phenomenon has received less attention even in scientific circles (Fleming and Bateman, 2016). On the other hand, Lions are a popular, well-liked and charismatic flagship commonly used on donation appeals. Lion populations in West, Central, and East Africa are likely to suffer a projected 50% decline over the next two decades (Bauer et al., 2015; Riggio et al., 2016). Both Bats and Lions are found in the Savanna, which is a policy-relevant biodiversity habitat, which is also projected to experience a severe reduction in species richness (Newbold et al., 2015). Both animals face endangerment from common anthropogenic factors such as hunting, and illegal wildlife trade, which are unambiguous human threats (IUCN, 2018). From a behavioural standpoint, hunting and illegal wildlife trade invoke strong moral assessments of right and wrong, but the behavioural implications of this information are under-explored in the economics and psychology (St John et al., 2011). From a policy perspective, illegal wildlife trade has seen a spike in recent years and is one of the main reasons that many species are endangered (WWF, 2018).

4.3. Video design

We constructed a series of brief videos using a systematic sequence of photos and a scripted voice-over, as existing videos were not designed to suit the purposes of this experiment. To study the impact of media content on non-charismatic and charismatic animals, and habitats, we constructed three 'Control' videos, namely one for Bats, one for Lions, and one for Bats and Lions in the Savanna (henceforth 'Savanna') respectively.

All Control videos used an identical narrative structure and provided conservation-relevant information about the focal species/habitat. The voice-over introduced each species and located them within the Savanna habitat; then subjects were provided information about its ecological role in maintaining local ecosystem health (e.g. Bats maintain the equilibrium in the Savanna ecosystem by consuming insects, Lions consume herbivores). Then, information on their endangerment, trends of population decline and IUCN threat status was provided. We attempted to present Savanna as a biodiversity habitat and named both focal species. In the Savanna videos, Bats and Lions are first located within the Savanna habitat. Then, the voice-over states that "the diverse community of organisms that live here depend on each other to form a complex food web". While the first line emphasises that the habitat is a larger and more complex public good than a single species, and the second line emphasises that the habitat is one coherent unit, composed of interdependent parts. This introduction is followed by a sequence on the Bat and Lion, with their ecological role and conservation status.

To study the role of audio-visual information about the human cause of endangerment, we augmented each of the three Control videos with an additional line of voice-over script stating threats from hunting and illegal wildlife trade and an associated photograph (referred to as 'Cause videos'). Thus, there were six videos in total, namely Bats, Lions and Savanna Control videos and Bats, Lions and Savanna Cause videos. We attempted to maintain an identical framing of audio-visual information about each animal/habitat by following a similar sequence of photographs and script, but while retaining the key factual differences across each. To illustrate, the same pictures were used to introduce the Savanna or to illustrate habitat loss in all videos. However, pictures featuring Lions were often in the open grassland, and that of Bats were occasionally within caves, reflecting naturally occurring differences in their local use of the larger habitat. The average length of each video is 150 seconds, and each photo is displayed for around six to ten seconds (Gross and Levenson, 1995). Each subject was only exposed to one of the videos described above (not a subset of videos or all videos) to mitigate any priming or anchoring effects.

Before proceeding, we make a note of some hurdles and limitations in our experimental design. It was challenging to select non-charismatic and charismatic species from the same habitat, due to inadequate and up-to-date information about the former, different causes of the human threat compared to popular charismatic megafauna, and the limited availability of photographs for a single species. In the end, we featured the photos of different bat species, largely belonging to the *Hipposideros* family, since the Commerson's Leafnosed Bat (*Hipposideros vittatus*, Near Threatened) shares the largest range with Lions (*Panthera leo*, Vulnerable) and is also under threat from hunting.[9] We announced the status of Bats as 'Threatened' and Lions as 'Vulnerable' in the video. Therefore, if subjects are knowledgeable about the distinction between different IUCN conservation statuses, then the recorded difference in giving between Bats and Lions may be driven by endangerment status as well. Ex ante, we would expect the share of individuals knowledgeable about IUCN's conservation status to be equally distributed across groups, since the assignment into a treatment group was random. But we do not have information from the subjects on whether they knew this difference, so we cannot rule out potential effects of differences in endangerment status (and different species of bats photos) on our results. The script, photographs, video links and instructions are available in the Supplementary Materials.

[9] Endangerment status may have an independent and positive effect on giving as per previous studies; for example, Tisdell and Wilson (2006) found WTP for conservation is positively correlated with the level of species endangerment when individuals participated in information campaign about the conservation status of different species (also see Tisdell, 2014; Macdonald et al., 2015). However, suggestively, 8/10 of the subjects did not know the rank difference between IUCNs 'threatened' and 'vulnerable' IUCN statuses in the pilot study. Please see Supplementary materials for details of species of bats used in each photo, and author's corrigendum regarding the video script (our thanks to our reviewer).

4.4. Charitable donations

After watching one of the videos described above, all subjects were taken to a donations appeal page where they participated in a dictator game. The subject (the 'dictator') is asked to determine the division of £25 (the 'endowment') between herself and the African Wildlife Foundation (AWF), a certified conservation charity working in Africa (the 'recipient').[10] Each subject could allocate any part of the £25 endowment (in increments of £1), or all, or none of it to the charity. At the end of each session, one subject was randomly selected to receive the actual payout from the dictator game[11] (in addition to a £5 show-up fee which was paid out to all subjects). The framing of the instructions is standard in the literature, and subjects are told that they can keep £25 minus whatever they choose to donate to AWF if they are selected to receive the pay-out. Alongside this, subjects are also informed that every participant in the room has an equal and fair chance of receiving the pay-out. We use a slider question to elicit the donation amount, and the default is £0 for all subjects. These design features are constant across all subjects participating in the experiment, barring the subset of subjects who saw one of the three Cause videos (and again selected at random) to receive the offer of public recognition. For these subjects, an additional paragraph on the donation appeals page stated, "To publicly acknowledge your donation, 'The Beaver', which is the newspaper of the LSE Student Union will run a short piece listing the names of the donors and the charity later this year. There will also be posters listing the names of the donors and the charity in the Saw Swee Hock Student Centre and the LSE Library. Please write your name in capital letters (e.g. *first-name last-name*), on the form to be mentioned".

We adopted several design features to make the dictator game more representative of charitable giving situations in the real world, to increase the policy relevance of findings relative to an abstract laboratory environment. Subjects are informed that AWF is a charity that "works to conserve vulnerable African species and their habitats". This general description resembled standard pleas commonly featured on donation webpages of many conservation charities (including the AWF) and was used to ensure that subjects choose to donate to the same conservation good irrespective the species or habitat they were exposed to in the video clip. Choosing a charity that specialised in the region to inform subjects that their donations would go towards species conservation in Africa and no other continent since species nativity and geographic distance from the conservation site affects WTP (Lundhede et al., 2014). In addition, the donation page featured a photo of a single, forward facing Bat or Lion for the individual species videos. In the Savanna treatment, the same Bat and Lion photos were both used, with one

[10] The dictator game is a widely used experimental paradigm to study charitable giving. The standard format is a one-shot game with students or those enrolled in an experimental lab, asking dictators to divide an endowment given to them between themselves and an anonymous recipient from the same subject pool. Subsequent studies, such as Eckel and Grossman (1996), changed the experimental protocol so that the recipient was a charity instead. Engel (2011) presents a meta-study summarising the evidence around dictator games.

[11] A subject was chosen at random to draw one ping pong ball labelled with the computer terminals at which each subject was seated from an enclosed bag to determine who would be paid-out.

additional picture of the Savanna grassland. This strategy is also commonly utilised on animal charity donation web pages, to make the focus species/habitat salient to donors. Apart from this, subjects could receive a mailed receipt of their donation amount if they were selected for the pay-out and had chosen to donate. They were asked to write down their lab identification code and postal address if they desired the receipt upon winning. The offer of the donation receipt served the additional purpose of increasing trust in the experiment and the charity.

To account for the differences in stakes across the lab and field setting, we chose £25 as the endowment since it is the commonly suggested middle-level amount used by conservation charities. This endowment is higher than the standard stakes used in laboratory dictator games of around $10 (= £7.6). It is also five times the participation fee of £5, which accrues to every subject that completes the experimental survey. As these are relatively high stakes, we expect that it may dampen charitable giving offers and serve to reduce any potential hypothetical bias.[12] However, we faced a potential trade-off between employing these 'higher' stakes and paying out all subjects for their donation decision, due to budget constraints. Available evidence from the prior literature suggests that paying only a randomly selected subset of subjects has little effect on giving behaviour in the dictator game (Engel, 2011; Charness et al., 2016). However, the choice to pay only a random subset of participants introduces some uncertainty about the subject's payoff. The less the dictator is certain that her intended generosity becomes realised, the less she is likely to give in the first place. In our setting the probability of receiving a pay-out depends on the number of people in each session. To address this, we control for the number of subjects per session to proxy the probability of payout, as explained in section 5 on Empirical strategy.

4.5. Control variables

After the Dictator game, all subjects faced a questionnaire to record individual-level attributes. The demographic questions included age, gender (male, female, other), job status (student, full-time or part-time work, other). We asked whether they had previously donated to any environmental (Past Donor-Charity, PD-C) and non-environmental charities (Past Donor-Environmental Charity or PD-EC). To measure past pro-environmental behaviour outside the lab, we asked three self-assessment questions how often individuals bought eco-friendly products, organic/local / seasonally grown food, and if they recycled. Each item is rated on a 5-point Likert scale from "Never" to "Always" and scores of these three questions are averaged to form an average pro-environmental behaviour (PEB) score. In addition, subjects who did not donate to the charity are asked to explain their decision using a multiple-choice

[12] On the other hand, it is possible that subjects are generous, because they have a windfall endowment (Carlsson et al., 2013).

question (discussed in section 6.4 on Robustness checks). We included filler questions to mitigate experimenter demand effects and randomised the order of all questions to reduce any order effects.

4.6. Treatments, experimental procedure and subject pool

In a nutshell, each subject could choose to donate to the conservation charity, after being exposed to one of the following six videos without the offer of public recognition: Bats / Lions / Savanna Control videos, or Bats / Lions / Savanna Cause videos, or either the Bats / Lions / Savanna Cause videos with public recognition. Specifically, we use a between-subjects build-on or 3 x 3 fractional factorial experimental design, which is presented in Table 1.

Table 1: Treatment group design

	Media content				Incentive
	Non-charismatic Bats	Charismatic Lions	Habitat Savanna	Human cause of endangerment	Public recognition
Bats - Control	✓				
Lions - Control		✓			
Savanna - Control			✓		
Bats - Cause	✓			✓	
Lions - Cause		✓		✓	
Savanna - Cause			✓	✓	
Bats - Cause + Public recognition	✓			✓	✓
Lions - Cause + Public recognition		✓		✓	✓
Savanna - Cause + Public recognition			✓	✓	✓

Notes: Control videos introduced the focal species within the Savanna habitat (or both Bats and Lions in the Savanna habitat in the Savanna treatment groups), their ecological role, and endangerment and conservation status. Cause videos add additional information about the human cause of endangerment from habitat destruction, hunting and illegal trade. Cause + Public recognition treatment group are exposed to Cause videos, but the dictator game is modified to include an additional line on the donation appeal page offering public recognition.

The experiment was conducted from 16 November to 08 December 2016, at the London School of Economics Behavioural Research Lab (LSE BRL). The experiment was hosted on the Qualtrics survey platform. Subjects were informed that the study was on economic decision making and social attitudes. Participation was open to all individuals registered at the LSE BRL to ensure an adequate sample size for all treatments and access non-student subjects. Each session could hold a maximum of 20 subjects, and the number of subjects attending each session ranged from 5 to 20. The experimental procedure was as follows: every subject was randomly assigned to a computer terminal upon entering the lab, after which the computer program randomly assigned each of them to one of the treatment groups. Thus, randomisation into treatment groups was at the individual level within each session. After consenting to participate, subjects watched one of the Control or Cause videos. Then, they made their charitable donation decision in the dictator game (where some subjects who saw the Cause video were also selected at random to receive the offer of public recognition). Next, they answered questions to measure individual-level attributes, including past donations behaviour. After each session concluded, subjects could collect their payments individually and leave the lab. As noted previously, everyone was paid £5 for participating and completing the experimental survey, and a subset of subjects was paid up to £25 depending on his or her donation decision and whether they were selected for the pay-out. On average, the sessions lasted for around 20 minutes.

In total, 377 subjects participated in the experiment, yielding an average sample of 42 per treatment group. The average age is 24.42 years (median age of 22 years), and 65.73% of the sample is female. Around 82.76% of the subjects were in full-time students, 8.46% were working full time, and the rest were either working part-time, or unemployed or preferred not to disclose their job status. As regards past pro-social behaviour, 71.88% of the sample reported that they had donated to charities in the past

and 38.46 % reported having donated to environmental or wildlife charities in the past (summary statistics by treatment group are presented in Table A1 in the Data Appendix).

5. Empirical strategy

We employed regression analyses to test our hypotheses due to our experimental format: a between-subjects design; exposure to Control videos featuring non-charismatic or charismatic species or a complex habitat composed of both; and additional audio-visual information on the human cause of endangerment in the Cause videos; and the offer of public recognition in conjunction with Cause videos; opening up the experiment to non-students to allow for more heterogeneity in behaviour and motivation than just student subjects; high stakes with random payment which affects the probability of pay-out; and random assignment into treatment groups at the individual level in each session. We addressed the last two aspects of our design by controlling for the number of subjects per session and session effects econometrically. We also controlled for heterogeneity in the subject pool by adding in control variables for individual attributes, and additionally examine if treatment effects are heterogeneous based on subject's past pro-sociality, and pro-environmental behaviour. Although we attempted to control for design effects to the best of our ability, we cannot exclude the possibility that our design affects behaviour differently than other designs.

We first conducted our analysis utilising Tobit regression models (Tobin, 1958), to account for the outcome variable ("Donations") being right-censored at £25. The two primary explanatory variables of interest are categorical variables on the type of media content. The first treatment variable ("Species / Habitat"), and was coded for three categories of Bats, Lions or Savanna. The second treatment variable ("Human Cause") also has three categories, one each for the Control video, Cause video or Cause video + Public recognition. Alternately, the donation choice can also be conceptualised as a two-stage decision process: the first stage is the choice to donate some positive amount or the probability of donating (the intensive margin of donating), and the second stage pertains to the decision of how much to donate conditional of having decided to donate (the extensive margin of donating) (List and Lucking-Reiley, 2002; Engel, 2011; Huck et al., 2015). We used Cragg-Hurdle regression models since it has the specific advantage of treating the lower boundary (£0) as 'observed' rather than censored so that the probability of donating is treated as another observed behaviour (Cragg, 1971).[13] The treatment effect on the probability of donating was estimated using a Probit regression model, and a Truncated-linear regression model was used to estimated effects on the amount donated, conditional on having decided to donate.[14] We use robust standard errors clustered at the subject-level for all regression models, and

[13] This is preferable to the Heckman selection model as we treat the boundary value of £0 donations as observed (rather than a sample selection problem with no missing data (Wooldridge, 2010).

[14] We conducted all the statistical analysis on Stata using the following commands: "Tobit" (with 25 specified as the upper limit), and "churdle" to fit a linear hurdle model. The "margins" command was used after both to

the omitted category is Bats Control video. We used session fixed effects to address any potential session-level factors and also added a control variable capturing the number of subjects who attended each session to control for the probability of receiving a pay-out. Individual-level control variables included whether subjects had donated to charities in the past (Past Donor-Charity (PD-C) or Past-Donor-Environmental Charity (PD-EC) and covariates on Pro-environmental behaviour (PEB), Age, Gender, Job status.

6. Results

6.1. Treatment effects

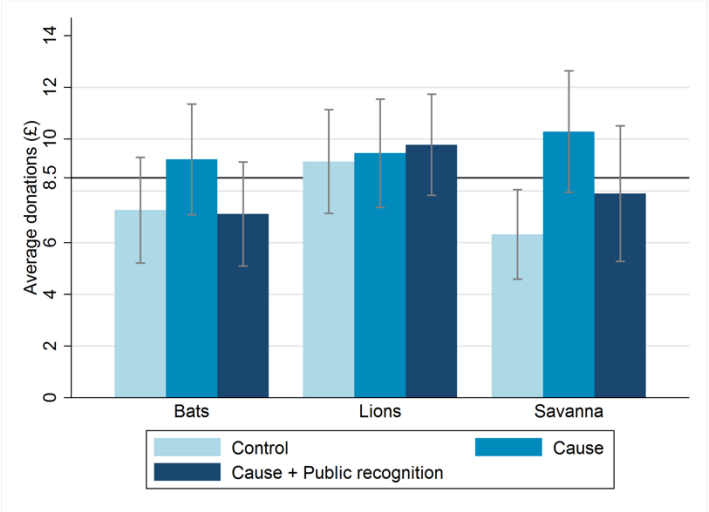
The average donation is £8.51 or 34.04% of the endowment. While 6.63% of the sample donated their entire endowment of £25, 14.59% chose to give nothing. The median donation was £5 was made by 28.91% of subjects, and 20.42% of the sample donated £10. This average amount is close to offers in charitable giving experiments, such as 30% in Eckel and Grossman (1996). As expected, donations in this experiment are higher than offers in dictator games with anonymous recipients where around 20% is offered, and over 60% of subjects pass a positive amount of money (List, 2009; C. F. Camerer, 2011).

Figure 1 illustrates the average donations by treatment group. Average contributions elicited after exposure to the Lions Control video (£9.46) was higher than the Bats (£7.25), and Savanna control videos (£6.32). Additional media content on the human cause of endangerment elicited higher average donations compared to the control group videos. On the other hand, Cause videos + Public recognition intervention evokes marginally lower average contributions than Bats and Savanna Cause videos (£7.10 and £7.89 for Bats and Savanna respectively). Probing further into the data, we see that more subjects choose to donate some amount (over £0) when exposed to Lions videos. Figure 2 displays the share of subjects choosing to donate an amount over £0 by treatment group. Around 93% of subjects exposed to the Lions Control videos decided to donate, compared to 80% and 79.54% of the subjects shown any Bats or Savanna Control videos. We also see that the share of donors across all Cause video treatment groups are very similar - 87.8% for Bats Cause videos, and 89.13% for Lions and 87.8% for Savanna Cause videos respectively. Thus, the descriptive data provides tentative evidence that making salient charismatic focal species and human-caused endangerment in videos increases donations, but the impact of public recognition is unclear.[15]

Figure 1: Average donations (£) by treatment groups

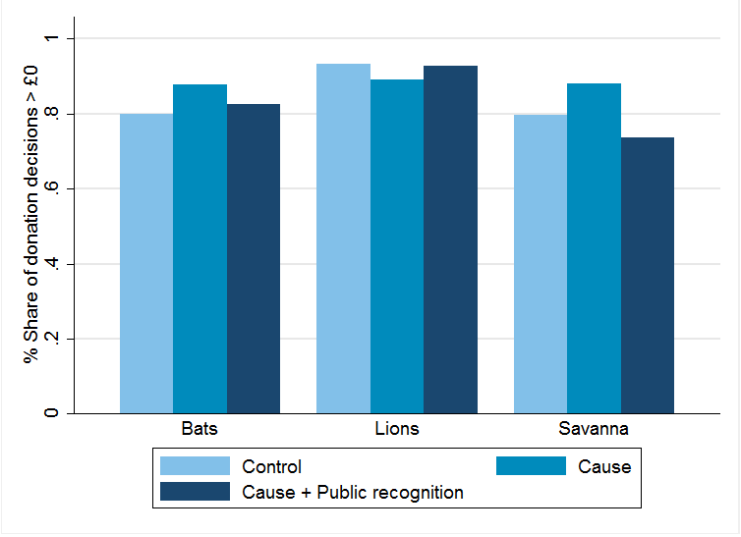
estimate the average marginal effect. Both the Tobit and Cragg-Hurdle regression models have also been commonly used to analyse dictator game experiments in the literature (Engel, 2011).

[15] Figures A1 and A2 present the distribution of donation amounts by treatment group and the pooled sample.



Notes: Average donation for pooled sample = £8.5; median = £5.
Error bars at 95% at confidence interval.

Figure 2: % Share of donation decisions > £0 by treatment groups



Results from the Tobit models revealed that media content on the focal species/habitat, and the human cause of endangerment increased donations, as seen from models (1) and (2) in Table 1. In model (1), the coefficient on Lions is positive and significant at 5%, suggesting that the predicted value of donations is £1.7 higher for subjects in the Lions group compared to those in the Bats group, holding all other covariates constant. The coefficient remains stable when we add individual controls in the

model (2). The coefficient on Cause is also positive and significant at 5%, suggesting that for those exposed to information on the anthropogenic cause of treat, their predicted donation was higher by around £2 compared to those who were exposed to the control group videos.

Evidence from the Cragg-Hurdle regressions models (3) to (6) also suggest both types of media content boosted donations, but that media content has different impacts on the intensive and extensive margins of giving. The positive coefficient on Lions in models (3) and (5) ("Probability") suggest that watching Lions videos increased the predicted probability of donating compared to the Bats control group (the difference is significant at 5%). But once subjects had cleared the hurdle, the difference in amount donated due to watching Lions videos is not significant ("Amount", models (4) and (6)). Instead, watching Cause videos had a positive effect on the amount donated relative to Control videos, and controlling for the focal species/habitats featured in the video (also at the 5% significance level). The predicted conditional mean estimates of donations or the predicted average marginal effect on contributions from the Cragg-Hurdle models are nearly identical to results from the Tobit models. For instance, in the model (3), the average effect of watching Lion videos relative to Bats, holding other covariates constant is an increase in average donations by £1.53 (significant at 5%). Similarly, the average marginal effect of exposure to the Cause videos compared to the Control videos amounts to an increase in average donations by £2.01 (significant at 5%). This amount is comparable to the suggested online donation amounts for animal charities, which start from £2 per month. Taken together, these results suggest that while media content on focal charismatic Lions affects the intensive margin of giving by increasing the probability of donating, and additional audio-visual information about the human cause of endangerment impacts the extensive margin of giving by increasing the amount donated, conditional on subjects having decided to donate.

Table 2: Treatment effects

Model #	(1)	(2)	(3)	(4)	(5)	(6)
Regression model	Tobit I	Tobit II	Cragg-Hurdle I		Cragg-Hurdle II	
			Probability	Amount	Probability	Amount
Species/Habitat = 1, Lions	1.734**	2.041**	0.422**	1.484	0.482**	1.584
	(0.875)	(0.861)	(0.205)	(1.386)	(0.214)	(1.349)
Species/Habitat = 2, Savanna	0.407	0.675	-0.127	0.873	-0.083	0.719
	(0.917)	(0.913)	(0.187)	(1.472)	(0.189)	(1.441)
Cause = 1, Yes	2.150**	1.883**	0.160	3.292**	0.144	2.886**
	(0.905)	(0.936)	(0.203)	(1.416)	(0.210)	(1.414)
Cause = 2, Yes + Public recognition	0.594	0.140	-0.065	1.644	-0.093	1.022
	(0.936)	(0.906)	(0.204)	(1.538)	(0.206)	(1.477)
PEB		1.253**			0.122	1.431*
		(0.519)			(0.126)	(0.766)
PD-EC		1.027			0.394**	0.672
		(0.778)			(0.187)	(1.175)
PD-C		-0.891			-0.119	-0.886
		(0.879)			(0.193)	(1.338)
Age		0.028			-0.007	0.083

		(0.056)			(0.014)	(0.093)
Gender = Female, Yes		1.160			0.285	0.935
		(0.850)			(0.189)	(1.381)
Status = Student, Yes		3.007**			0.118	5.615***
		(1.173)			(0.271)	(2.074)
Subjects/session	-0.472	-0.449	0.017	-0.850	0.046	-0.726
	(0.822)	(0.809)	(0.199)	(1.215)	(0.187)	(1.210)
Constant	15.408	8.463	0.713	19.886	-0.255	7.790
	(14.816)	(14.946)	(3.528)	(21.822)	(3.435)	(22.372)
/sigma	7.033***	6.856***	2.074***		2.039***	
	(0.331)	(0.317)	(0.064)		(0.060)	
Observations	377	377	377	377	377	377
Session controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	No	No	Yes	Yes

Notes: Dependent variable: donations (£0-25), robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1. PD-C = Past donor to charity, PD-EC = Past donor to environmental charity, PEB = Pro-environmental behaviour.

In line with the descriptive statistics, we find differences in the probability of donating (on the intensive margin) due to exposure to videos with Lions (relative to Bats) are not significantly different when content about the Human causes of endangerment are added. To test this econometrically, we restrict the sample to only those exposed to Cause videos and replicate the Cragg-Hurdle regression models. The results reveal that the difference in donations between the Bats, Lions and Savannas are not significantly different on both the intensive and extensive margins in the Cause videos (reported in Table A2 in the Appendix).

We also find that the offer of public recognition did not increase donations when used alongside Cause videos in both the Tobit and Cragg-Hurdle specifications.[16] For instance, from models (1) and (2) the coefficient on Cause + Public recognition is positive, but not statistically significant; similarly, models (4) and (6) also yield positive but statistically insignificant coefficients. Indeed models (3) and (5) reveal that the probability of donating when offered public recognition alongside Cause videos may even be lower than watching Control videos (and controlling for focal species/habitat), although the coefficient is not significant at conventional levels. To obtain the separate treatment effect of the Public recognition incentive, we restricted the sample to those subjects exposed to either the Cause video (which is the omitted category) or Cause + Public recognition and ran both the Tobit and Cragg-Hurdle regression models (reported in Table A3 in the Appendix). We found that the coefficient on public recognition was negative, but the difference was not statistically different in the models. This result suggests that offering public recognition had little effect (and if anything, a negative effect) on donations in this experiment.

Additionally, it appears that those who report undertaking more pro-environmental behaviours tended to donate more. For instance, an increase in the PEB score by one unit resulted in an increase in

[16] Around 17.6% of subjects exposed to the Cause + Public recognition treatment opted to mention their name.

donations by £1.25 (model (2), significant at 5%). According to the Cragg-Hurdle model, the effect is on the amount donated (model (6), significant at 10%). Those who donated to environmental charities in the past (PD-EC) were also more likely to donate to the charity (model (5), significant at 5%). If we assume that reporting higher PEBs reflects higher pro-environmental preferences and donating to environmental charities is indicated of have higher pro-social preferences towards the environment, then the last two results seem to imply that individuals with stronger pro-environmental preferences tend to donate more. Finally, turning to the socio-demographic variables, we found the coefficient on females was positive, but the difference was not significant (models (2), (5) and (6)). Similarly, the coefficient on age is positive (models (2) and (6)) but not significant. We find that full-time students are willing to donate more than those reporting themselves to be in full or part-time work or employed.[17] This result runs contrary to past literature, where often females, non-students, and older participants make higher offers in dictator and charitable giving games (Carpenter et al., 2008; Engel, 2011; Falk et al., 2013).

6.2. Heterogeneous treatment effects

We restricted the sample to pro-social subjects reporting to have donated to any charity in the past (PD-C), and replicated the analysis using Tobit and use Cragg-Hurdle models. The results on past donors are presented in Table 3.

Table 3: Heterogeneous treatment effects: Past donors to charity

Model number	(1)	(2)	(3)	(4)	(5)	(6)
Regression model	Tobit I	Tobit II	Cragg-Hurdle I		Cragg-Hurdle II	
			Probability	Amount	Probability	Amount
Species/Habitat = 1, Lions	1.402	1.723*	0.377	1.135	0.411	1.469
	(1.053)	(1.027)	(0.249)	(1.706)	(0.260)	(1.543)
Species/Habitat = 2, Savanna	0.440	0.828	-0.175	1.442	-0.133	1.372
	(1.066)	(1.050)	(0.228)	(1.656)	(0.234)	(1.561)
Human Cause = 1, Yes	3.035***	2.621**	0.129	5.388***	0.025	4.796***
	(1.047)	(1.029)	(0.244)	(1.642)	(0.253)	(1.462)
Human Cause = 2, Yes + Public recognition	1.894*	1.366	0.038	4.399**	-0.014	3.529**
	(1.055)	(0.985)	(0.242)	(1.812)	(0.246)	(1.602)
PEB		1.964***			0.083	2.698***
		(0.622)			(0.155)	(0.903)
PD-EC		1.424			0.423**	1.383
		(0.866)			(0.213)	(1.259)
Age		0.030			-0.016	0.085
		(0.069)			(0.016)	(0.119)
Gender = Female, Yes		1.152			0.217	0.935
		(1.039)			(0.232)	(1.600)

[17] This is not surprising given that those participants reporting working full or part-time and are enrolled in the lab experiment may have lower incomes than attendant students or possibly earn wages comparable to participation fee offered.

Status = Full-time student, Yes		3.532***			0.140	6.264***
		(1.337)			(0.303)	(2.374)
Subjects/session	-0.098	-0.008	0.003	0.107	0.042	0.197
	(0.906)	(0.919)	(0.245)	(1.344)	(0.230)	(1.363)
Constant	8.734	-2.361	1.233	1.612	0.346	-14.106
	(16.239)	(17.016)	(4.342)	(24.384)	(4.184)	(25.891)
/sigma	6.886***	6.568***	2.052***		1.975***	
	(0.380)	(0.356)	(0.079)		(0.073)	
Observations	271	271	271	271	271	271
Session controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	No	No	Yes	Yes

Notes: Dependent variable: donations (£0-25), robust standard errors in parentheses and *** p<0.01, ** p<0.05, * p<0.1. Sample restricted to Past donors to charity. PD-EC = Past donor to environmental charity, PEB = Pro-environmental behaviour.

Three key differences emerge. First, the coefficient on Lions is positive, but not significant, in most models (with and without individual controls), barring model (2) (significant at 10%). This highlights that Lions videos do not impact the intensive margin of giving amongst past donors. Second, the coefficient on Cause in the truncated linear regressions remains positive but increases in both economic and statistical significance (to the 1% significance level). Past donors, therefore, are more impacted on the extensive margin of giving. The average marginal effect of exposure to Control videos is £3.18, compared to the Control group videos (the difference is significant at 1%). Third, the treatment effect of the Cause + Public Recognition increased the amount donated, and the difference was significant at the 5% level (models (4) and (6), relative to the Control videos). The average marginal effect is also economically meaningful: subjects exposed to videos with the anthropogenic cause of endangerment and the offer of public recognition, have higher donations amounts of £2.16, conditional of having decided to donate, compared to subjects who were exposed to videos with the cause of endangerment. This indicates Cause + Public recognition, has a positive effect on the extensive margin for pro-social subjects. The result suggests pro-social subjects can respond differently to media content: they increased their donations when they watched media content on the human cause of endangerment raised donations – both with and without the offer public recognition (compared to Control videos and controlling for the focal species). Their donations, however, are no more responsive to charismatic Lions than non-charismatic Bats, suggesting media content with Lions has limited effect on marginal donors who have already donated to other charities in the past.

6.3. Robustness checks and limitations

Our results are robust to the addition of session, and individual controls, which yield coefficients of comparable economic magnitude in both the Tobit and Cragg-Hurdle models. We replicated our analysis using other specifications, namely Ordinary Least Squares and Logistic regression models, to find qualitatively similar results. We checked for heterogeneous treatment effects by crossing the dummy on past donor with the treatment dummies on video content about Cause to find qualitatively

similar results to the restricted sub-sample models. Apart from this, we interacted the focal species/habitat dummies with Control / Cause / Cause + Public recognition dummies. Lions positively predicted the probability of donating at 10% in the full sample, and the Cause variable positively predicts the amount donated in the restricted sample of past donors. These results are omitted for brevity, but available on request.

While our treatment effects are robust, this study is not without some limitations. As noted previously, given the unique characteristics of charismatic and non-charismatic species in the video, our stringent specification criteria and the limited availability of photographs, Bats and Lions had dissimilar local habitats within the Savanna, different endangerment status according to the IUCN, and the Bats videos featured different species of Bats. Moreover, prior knowledge about each famous focal species can influence what subjects learn from videos and impact donations. Unfortunately, we did not collect information about subject's prior knowledge about each focal species or habitat or measure the relative appeal of each species according to each subject. However, to shed some light on this prospect, we undertook a regression analysis on subsamples exposed to either Bats, or Lions, or the Savanna videos, to examine if there were differences in the effect of media content on the human cause of endangerment on donations. We found that additional Cause content has a positive and significant effect on donations in the Bats and Savanna samples, but not in the Lions subsample (Table A4 in Appendix).[18]

We also considered the possibility that subjects may choose not to donate any money because they mistrusted the charity since the AWF maybe an unknown entity for some subjects. Carpenter et al., (2008) show people are more likely to select and donate to their preferred charities if given a choice. Likewise, Vesterlund (2003) posits that donors may use others' contributions as a signal of the charity's quality; consequently, larger and more established charities may be perceived to attract more donations because they are more trustworthy and better quality. To address this possibility, subjects were asked to state their top two reasons for choosing not to donate and the responses are presented in Figure A3 in the Data Appendix. 'Rather keep the money' was the top reason chosen (25.5% and 27.3% of non-donors chose this as reason one and reason two respectively). 'Do not trust the charity' was chosen by 18.2% of the non-donors and came in as the third most popular first reason one (and was also chosen by four subjects as reason two). Overall only four subjects chose 'Do not trust the experiment' suggesting that the research design was successful to some extent in convincing subjects that the donations would indeed go to the charity. We attempted to check the robustness of our results by restricting the sample and dropping the observations of those who stated that they did not trust either the charity or the experiment as one of the reasons for not donating. The estimated treatment effects are

[18] We thank the referees for this excellent point.

qualitatively similar, but we cannot rule out the role of trust in driving donations behaviour for the subjects who chose to donate.

Finally, a key concern is the external validity of our results given the nature of the subject pool and controlled lab setting (Levitt and List, 2007). We try to increase the validity of our results by bringing in various features of the field context into the lab, widening our subject pool to include non-subjects, and paying special attention to pro-social subjects as who select into giving to the charitable sector outside the lab. But cognizant of the challenges in generalizing from the lab to the field, we follow Kessler and Vesterlund (2015) in advocating lab experiments are particularly useful to isolate qualitative relationships between variables which are difficult or costly to randomly assign in the field (e.g. randomly assigning media content as discussed in La Ferrara (2016)). Moreover, there is mixed evidence on how pro-social preferences and behaviour measured in the lab predicts decision-making in the field (Camerer, 2011; Galizzi and Navarro-Martínez, 2018). For example, while some studies suggest that students are less generous than more representative samples of the population in charitable giving and dictator games (Carpenter et al., 2008; Engel, 2011; Falk et al., 2013), others find that their behaviour is similar (Exadaktylos et al., 2013). If indeed students are likely to give less, then our results could be considered as a lower bound effect for the implications of media content on pro-social behaviour, and replications in different settings could verify the robustness of our results, as discussed below. That said, we believe that understanding the students' behaviour is of direct relevance to charities because they often focus their campaigns on universities and colleges for fundraising and recruiting volunteers. Moreover, students represent key demographic which consumes online video content.[19]

7. Discussion and conclusion

In this article, we examined how brief biodiversity conservation videos featuring charismatic and non-charismatic focal species, complex biodiversity habitats, and the human cause of endangerment impacted charitable donations using a lab experiment. We also examined additional benefits of using a non-pecuniary incentive of public recognition alongside these videos. In this way, we attempted to push the frontier of experimental evidence on the impact of audio-visual media content influences pro-social behaviour towards protecting natural habitats. The results provide experimental support that different types of audio-visual media content influences pro-social behaviour on both the intensive and extensive margins of giving: videos with charismatic Lions increased the probability of donating (intensive margin of giving), but content about human cause of endangerment, increased the amount donated conditional on having decided to donate (extensive margin of giving). Moreover, there is heterogeneity in treatment effects: pro-social types (past donors) are more likely to raise their giving when offered

[19] Illustratively, surveys from the Pew Research Centre found around two-thirds of social media news users (including YouTube) have at least some college education (Shearer and Gotfried, 2017).

public recognition. Effects are sizeable and range from £1.5 to £3; to put this into perspective, £2 is the suggested lower limit on donations on many conservation and animal charity websites.

Our results have some implications for academic research and practitioners. They support findings of how charismatic species increase donations when used conservation outreach (Macdonald et al., 2015; Thomas-Walters and J Raihani, 2017). But we found effects on the intensive margin, suggesting that marginal donors are more likely to donate when exposed to Lions videos. Theories of species charisma and behaviour suggest different constituent elements: physical and phylogenetic features (body and eye size, mammals, eye-like spots), cultural and symbolic value, positive affect, fame and ecological factors may be driving behaviour (Metrick and Weitzman, 1998; Lorimer, 2007; Verissimo et al., 2011; Manesi et al., 2015). While we try to control for some of these aspects in our experimental design, disentangling the causal effects of these different factors is left for future work.

We found the anthropogenic cause of endangerment raises giving to non-charismatic Bats and Savanna to levels similar to charismatic Lions. However, additional information about the anthropogenic cause of endangerment did not seem to raise giving for those exposed to Lions. This media content reduced differences in donations between focal species and habitats, as there was no difference in donations (on both the intensive and extensive margins) between Bats, Lions and Savanna Cause videos. One reason why anthropogenic cause of endangerment affected those exposed to Bats and Savanna more than Lions, may be that subjects know more about Lions in the first place, leaving little room for additional content to have an impact. If this is the case, these results suggest that individuals are more responsive to information when they are more ignorant of the good being conserved (Tisdell and Wilson, 2006).[20] It aligns with arguments made in Tisdell (2014), that providing particular informational interventions, like educating individuals about species' endangerment and conservation needs, raises individual's willingness to donate and can serve to reduce differences in giving between charismatic and non-charismatic species. Along these lines, Veríssimo et al. (2017) found marketing had limited impact when well-known flagship species were used in WWF-USA's online charitable giving web pages.

More broadly, our finding on the role of information about anthropogenic threats falls in line with existing studies about how human-caused environmental degradation elicits a greater willingness to pay for and support conservation because it generates feelings of outrage (Bulte et al., 2005; Kahneman et al., 1993). Apart from emotional outrage, another possible reason is that this content engenders greater problem awareness wherein responsibility is ascribed to human action, thus activating moral norms and

[20] Importantly, Tisdell and Wilson (2006) also find that the average WTP for the conservation of the poorer known species rose and that of the better known (mostly charismatic species) fell when more information was supplied, and the variance in WTP increased as more information was provided. This result suggests that people may become more discriminating in allocating funds to support conservation programs for individual species upon having more knowledge about them.

increasing pro-social behaviour as proposed by the Norm-Activation Model (Thøgersen, 2006; Steg and De Groot, 2010). In this regard, hunting is a human activity that often provokes immediate and strong moral judgements of 'right' or 'wrong', especially in the context of illegal trade and poaching (Fischer et al., 2013). It's also possible that video content on human cause triggers or increases beliefs about human-caused environmental degradation in a more salient way, which in turn is positively associated with intentions to undertake ameliorative action in other environmental contexts like climate change (Heath and Gifford, 2006; Myers et al., 2013; van der Linden et al., 2015).

While unpacking these explanations lies beyond the scope of the current paper, we briefly note the potential role of emotional outrage proposed by Kahneman et al. (1993). We elicited stated emotions after subjects watched the video and made their donation decision, and found that subjected reported feeling more angry, sad and interested after being exposed to Cause videos; but they also reported feeling happier after viewing Lions videos (Shreedhar and Mourato, 2018). While we cannot conclude changes in emotion states had a positive causal effect on donations, there could nonetheless be a plausible link between the two. The Appraisal Tendency Framework proposes that emotion states elicit particular types of behavioural tendencies (Han et al., 2007; Lerner et al., 2015). Notably, feelings of anger are linked to the tendency to take ameliorative righteous action, and happiness is positively associated with pro-sociality (Lerner and Keltner, 2001; Dunn et al., 2008; Aknin et al., 2012; van Doorn et al., 2014). Related research suggests emotional reactions are more likely to drive decisions when moral judgements are involved (Horberg et al., 2011). This provides a basis for future research to explore how pro-social behaviour and emotions are linked, both from an instrumental and welfare perspective.

From a practical perspective, our results indicate conservation organisations could diversify the content of video appeals by making the anthropogenic cause of species endangerment explicit when featuring habitats and non-charismatic species since differences in giving to different focal species/habitats fell when this information was included. If this information cannot be included for some reason, they could continue using charismatic species as a parallel strategy to raise donations by attracting the attention of new donors (since charismatic Lions raised giving on the intensive margin for the entire subject pool but had little effect on past donors). This two-pronged approach simultaneously addresses previously voiced concerns about the marginalisation of non-charismatic species and ignorance of the anthropogenic drivers of the mass extinction while capitalising on the benefits of using charismatic species. In this regard, replicating these results by using different narratives about human threats (e.g. climate change versus poaching), conservation information (e.g. degrees of endangerment, purposes for which the funding is used), species and habitats, alongside field testing in different contexts and samples is an exciting prospect for future research to ensure a robust evidence base for policy. In addition, charity videos often have significant production value with carefully filmed sequences in natural settings and

music in order to make messages more salient, relevant and memorable. While these components (like music or particular images) are likely to raise donations due to increased salience (Nicholson-Cole, 2005), this is ultimately an empirical question for future research.

We also found that offering a non-pecuniary incentive of public recognition alongside Cause videos has a positive effect on donations for 'pro-social types'; but that the offer by itself did not provide any additional benefit over Cause videos relative to control, even for pro-social types. Some possible explanations are that subjects have different preferences regarding advertising their pro-sociality due to differences in socio-cultural norms or prefer not to be perceived as a braggart (Jones and Linardi, 2014; Berman et al., 2015). Another possibility is that external incentives reduce the intrinsic motivation to donate and 'crowds out' pro-social behaviour, an issue largely explored in the context of pecuniary incentives thus far (Lacetera and Macis, 2010b; Gneezy et al., 2011; Bowles and Polania-Reyes, 2012). Consequently, organisations need to pay careful attention to designing and testing both non-pecuniary and pecuniary incentives by paying attention to individual heterogeneity based on past pro-social behaviour, so messages do not backfire.

Finally, a related concern is the need to consider unintended long-run effects of using specific types of media content and videos. Careful attention must be paid to selecting flagships for media campaigns, as excessive reliance on particular popular species may result in increasing inattention over time, a phenomenon called flagship fatigue (Bowen-Jones and Entwistle, 2002; Verissimo et al., 2011). On the other hand, multiple flagships representing identical or similar issues may lead to competing-flagship fatigue if they conflict. Similarly, if subjects feel carefully crafted videos were designed to manipulate their emotions to increase giving, some may disengage. In this regard, fear-based environmental messages may grab attention but are an ineffective tool for motivating personal engagement because they can lead to the issue being perceived as psychologically distant, overwhelming and stimulate feelings of helplessness (O'Neill and Nicholson-Cole, 2009; Johns and Jacquet, 2018). Lastly, excessive reliance on media outreach may compound emerging trends about the falling time spent outdoors in nature and rising time spent online and on multimedia (Pergams and Zaradic, 2008). Falling time spent on nature-based recreation can have both wellbeing and behavioural implications, time spent in nature benefits health and well-being (MacKerron and Mourato, 2013; Shanahan et al., 2016), and increases emotional affinity with and connectedness to nature which is linked to higher pro-environmental attitudes and pro-social behaviour towards nature (Kals et al., 1999; Mayer and Frantz, 2004). Thus, interventions aiming to get individuals to spend more time in nature are complementary policy strategy alongside videos.

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Supplementary Materials

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References

Aknin, L.B., Dunn, E.W., Norton, M.I., 2012. Happiness runs in a circular motion: Evidence for a positive feedback loop between prosocial spending and happiness. Journal of Happiness Studies 13, 347–355.

Alpizar, F., Carlsson, F., Johansson-Stenman, O., 2008. Anonymity, reciprocity, and conformity: Evidence from voluntary contributions to a national park in Costa Rica. Journal of Public Economics 92, 1047–1060.

Andreoni, J., 1990. Impure altruism and donations to public goods: A theory of warm-glow giving. The economic journal 100, 464–477.

Andreoni, J., 1989. Giving with impure altruism: Applications to charity and Ricardian equivalence. Journal of political Economy 97, 1447–1458.

Andreoni, J., Petrie, R., 2004. Public goods experiments without confidentiality: a glimpse into fund-raising. Journal of public Economics 88, 1605–1623.

Arendt, F., Matthes, J., 2016. Nature Documentaries, Connectedness to Nature, and Pro-environmental Behavior. Environmental Communication 10, 453–472. https://doi.org/10.1080/17524032.2014.993415

Ashraf, N., Camerer, C.F., Loewenstein, G., 2005. Adam Smith, behavioral economist. Journal of Economic Perspectives 19, 131–145.

Balmford, A., Whitten, T., 2003. Who should pay for tropical conservation, and how could the costs be met? Oryx 37, 238–250.

Bauer, H., Chapron, G., Nowell, K., Henschel, P., Funston, P., Hunter, L.T., Macdonald, D.W., Packer, C., 2015. Lion (Panthera leo) populations are declining rapidly across Africa, except in intensively managed areas. Proceedings of the National Academy of Sciences 112, 14894–14899.

Becker, G.S., 1976. Altruism, egoism, and genetic fitness: Economics and sociobiology. Journal of economic Literature 14, 817–826.
Bénabou, R., Tirole, J., 2006. Incentives and prosocial behavior. American economic review 96, 1652–1678.
Berman, J.Z., Levine, E.E., Barasch, A., Small, D.A., 2015. The braggart's dilemma: On the social rewards and penalties of advertising prosocial behavior. Journal of Marketing Research 52, 90–104.
Bowen-Jones, E., Entwistle, A., 2002. Identifying appropriate flagship species: the importance of culture and local contexts. Oryx 36, 189–195.
Bowles, S., Polania-Reyes, S., 2012. Economic incentives and social preferences: substitutes or complements? Journal of Economic Literature 50, 368–425.
Brown, G.M., Shogren, J.F., 1998. Economics of the endangered species act. Journal of Economic Perspectives 12, 3–20.
Brown, T.C., Peterson, G.L., Brodersen, R.M., Ford, V., Bell, P.A., 2005. The judged seriousness of an environmental loss is a matter of what caused it. Journal of Environmental Psychology 25, 13–21.
Bulte, E., Gerking, S., List, J.A., De Zeeuw, A., 2005. The effect of varying the causes of environmental problems on stated WTP values: evidence from a field study. Journal of Environmental Economics and Management 49, 330–342.
Bulte, E.H., Van Kooten, G.C., 1999. Marginal valuation of charismatic species: implications for conservation. Environmental and Resource Economics 14, 119–130.
Butchart, S.H., Walpole, M., Collen, B., Van Strien, A., Scharlemann, J.P., Almond, R.E., Baillie, J.E., Bomhard, B., Brown, C., Bruno, J., 2010. Global biodiversity: indicators of recent declines. Science 1187512.
Camerer, C., 2011. The promise and success of lab-field generalizability in experimental economics: A critical reply to Levitt and List.
Camerer, C.F., 2011. Behavioral game theory: Experiments in strategic interaction. Princeton University Press.
Carlsson, F., He, H., Martinsson, P., 2013. Easy come, easy go. Experimental Economics 16, 190–207.
Caro, T., Riggio, J., 2013. The B ig 5 and conservation. Animal Conservation 16, 261–262.
Carpenter, J., Connolly, C., Myers, C.K., 2008. Altruistic behavior in a representative dictator experiment. Experimental Economics 11, 282–298.
Carson, R.T., 2012. Contingent valuation: A practical alternative when prices aren't available. Journal of economic perspectives 26, 27–42.
Ceballos, G., Ehrlich, P.R., Barnosky, A.D., García, A., Pringle, R.M., Palmer, T.M., 2015. Accelerated modern human–induced species losses: Entering the sixth mass extinction. Science advances 1, e1400253.
Ceballos, G., Ehrlich, P.R., Dirzo, R., 2017. Biological annihilation via the ongoing sixth mass extinction signaled by vertebrate population losses and declines. Proceedings of the National Academy of Sciences 114, E6089–E6096.
Charness, G., Gneezy, U., Halladay, B., 2016. Experimental methods: Pay one or pay all. Journal of Economic Behavior & Organization 131, 141–150.
Charness, G., Gneezy, U., Kuhn, M.A., 2013. Experimental methods: Extra-laboratory experiments-extending the reach of experimental economics. Journal of Economic Behavior & Organization 91, 93–100.
Christie, M., Hanley, N., Warren, J., Murphy, K., Wright, R., Hyde, T., 2006. Valuing the diversity of biodiversity. Ecological economics 58, 304–317.
Chuang, Y., Schechter, L., 2015. Stability of experimental and survey measures of risk, time, and social preferences: A review and some new results. Journal of Development Economics 117, 151–170.
Clucas, B., McHugh, K., Caro, T., 2008. Flagship species on covers of US conservation and nature magazines. Biodiversity and Conservation 17, 1517.
Cotterill, S., 2017. The influence of population characteristics on household response to a charity book collection based on pledges and social pressure. International Journal of Nonprofit and Voluntary Sector Marketing 22, e1572.

Cotterill, S., John, P., Richardson, L., 2013. The impact of a pledge request and the promise of publicity: a randomized controlled trial of charitable donations. Social Science Quarterly 94, 200–216.
Cragg, J.G., 1971. Some statistical models for limited dependent variables with application to the demand for durable goods. Econometrica: Journal of the Econometric Society 829–844.
Dawson, D., Shogren, J.F., 2001. An update on priorities and expenditures under the Endangered Species Act. Land Economics 77, 527–532.
De Oliveira, A.C., Croson, R.T., Eckel, C., 2011. The giving type: Identifying donors. Journal of Public Economics 95, 428–435.
Desvousges, W.H., Reed Johnson, F., Dunford, R.W., NICOLE WILSON, K., Boyle, K.J., 1993. Measuring natural resource damages with contingent valuation, in: Contingent Valuation: A Critical Assessment. Emerald Group Publishing Limited, pp. 91–164.
Dickert, S., Västfjäll, D., Kleber, J., Slovic, P., 2015. Scope insensitivity: The limits of intuitive valuation of human lives in public policy. Journal of Applied Research in Memory and Cognition 4, 248–255.
Dirzo, R., Young, H.S., Galetti, M., Ceballos, G., Isaac, N.J., Collen, B., 2014. Defaunation in the Anthropocene. science 345, 401–406.
Douglas, L.R., Winkel, G., 2014. The flipside of the flagship. Biodiversity and conservation 23, 979–997.
Dufwenberg, M., Muren, A., 2006. Generosity, anonymity, gender. Journal of Economic Behavior & Organization 61, 42–49.
Dunn, E.W., Aknin, L.B., Norton, M.I., 2008. Spending money on others promotes happiness. Science 319, 1687–1688.
Ebstein, R.P., Israel, S., Chew, S.H., Zhong, S., Knafo, A., 2010. Genetics of human social behavior. Neuron 65, 831–844.
Eckel, C.C., Grossman, P.J., 1996. Altruism in anonymous dictator games. Games and economic behavior 16, 181–191.
Engel, C., 2011. Dictator games: A meta study. Experimental Economics 14, 583–610.
Exadaktylos, F., Espín, A.M., Brañas-Garza, P., 2013. Experimental subjects are not different. Scientific reports 3, 1213.
Falk, A., Meier, S., Zehnder, C., 2013. Do lab experiments misrepresent social preferences? The case of self-selected student samples. Journal of the European Economic Association 11, 839–852.
Falk, J.H., Balling, J.D., 2010. Evolutionary influence on human landscape preference. Environment and Behavior 42, 479–493.
Fehr, E., Schmidt, K., 2001. Theories of fairness and reciprocity-evidence and economic applications.
Fischer, A., Kereži, V., Arroyo, B., Mateos-Delibes, M., Tadie, D., Lowassa, A., Krange, O., Skogen, K., 2013. (De) legitimising hunting–Discourses over the morality of hunting in Europe and eastern Africa. Land Use Policy 32, 261–270.
Fleming, P.A., Bateman, P.W., 2016. The good, the bad, and the ugly: which Australian terrestrial mammal species attract most research? Mammal Review 46, 241–254.
Frey, B.S., Meier, S., 2004. Social comparisons and pro-social behavior: Testing" conditional cooperation" in a field experiment. American Economic Review 94, 1717–1722.
Galizzi, M.M., Navarro-Martínez, D., 2018. On the external validity of social preference games: a systematic lab-field study. Management Science.
Glasman, L.R., Albarracín, D., 2006. Forming attitudes that predict future behavior: A meta-analysis of the attitude-behavior relation. Psychological bulletin 132, 778.
Gneezy, U., Meier, S., Rey-Biel, P., 2011. When and why incentives (don't) work to modify behavior. Journal of Economic Perspectives 25, 191–210.
Greitemeyer, T., 2013. Beware of climate change skeptic films. Journal of environmental Psychology 35, 105–109.
Gross, J.J., Levenson, R.W., 1995. Emotion elicitation using films. Cognition & emotion 9, 87–108.
Han, K.-T., 2007. Responses to six major terrestrial biomes in terms of scenic beauty, preference, and restorativeness. Environment and Behavior 39, 529–556.
Han, S., Lerner, J.S., Keltner, D., 2007. Feelings and consumer decision making: The appraisal-tendency framework. Journal of consumer psychology 17, 158–168.
Harrison, G.W., List, J.A., 2004. Field experiments. Journal of Economic literature 42, 1009–1055.

Heath, Y., Gifford, R., 2006. Free-market ideology and environmental degradation: The case of belief in global climate change. Environment and behavior 38, 48–71.
Horberg, E.J., Oveis, C., Keltner, D., 2011. Emotions as moral amplifiers: An appraisal tendency approach to the influences of distinct emotions upon moral judgment. Emotion Review 3, 237–244.
Hsee, C.K., Rottenstreich, Y., 2004. Music, pandas, and muggers: on the affective psychology of value. Journal of Experimental Psychology: General 133, 23.
Huck, S., Rasul, I., Shephard, A., 2015. Comparing Charitable Fundraising Schemes: Evidence from a Natural Field Experiment and a Structural Model. American Economic Journal: Economic Policy 7, 326–369. https://doi.org/10.1257/pol.20120312
Hughes-Games, M., 2017. The BBC's Planet Earth II did not help the natural world | Martin Hughes-Games | Opinion | The Guardian.
IUCN, 2018. The IUCN Red List of Threatened Species [WWW Document]. URL http://www.iucnredlist.org/ (accessed 9.30.18).
Jacobsen, J.B., Boiesen, J.H., Thorsen, B.J., Strange, N., 2008. What's in a name? The use of quantitative measures versus 'Iconised'species when valuing biodiversity. Environmental and resource economics 39, 247–263.
Jenni, K., Loewenstein, G., 1997. Explaining the identifiable victim effect. Journal of Risk and Uncertainty 14, 235–257.
Johns, L.N., Jacquet, J., 2018. Doom and gloom versus optimism: An assessment of ocean-related US science journalism (2001-2015). Global Environmental Change 50, 142–148.
Jones, D., Linardi, S., 2014. Wallflowers: Experimental evidence of an aversion to standing out. Management Science 60, 1757–1771.
Kahneman, D., Knetsch, J.L., 1992. Valuing public goods: the purchase of moral satisfaction. Journal of environmental economics and management 22, 57–70.
Kahneman, D., Ritov, I., 1994. Determinants of stated willingness to pay for public goods: A study in the headline method. Journal of Risk and Uncertainty 9, 5–37.
Kahneman, D., Ritov, I., Jacowitz, K.E., Grant, P., 1993. Stated willingness to pay for public goods: A psychological perspective. Psychological science 4, 310–315.
Kahneman, D., Schkade, D., Sunstein, C., 1998. Shared outrage and erratic awards: The psychology of punitive damages. Journal of Risk and Uncertainty 16, 49–86.
Kals, E., Schumacher, D., Montada, L., 1999. Emotional Affinity toward Nature as a Motivational Basis to Protect Nature. Environment and Behavior 31, 178–202. https://doi.org/10.1177/00139169921972056
Kareiva, P., 2008. Ominous trends in nature recreation. Proceedings of the National Academy of Sciences 105, 2757–2758.
Karlan, D., McConnell, M.A., 2014. Hey look at me: The effect of giving circles on giving. Journal of Economic Behavior & Organization 106, 402–412.
Kessler, J., Vesterlund, L., 2015. The external validity of laboratory experiments: The misleading emphasis on quantitative effects. Citeseer.
Kogut, T., Ritov, I., 2005a. The "identified victim" effect: An identified group, or just a single individual? Journal of Behavioral Decision Making 18, 157–167.
Kogut, T., Ritov, I., 2005b. The singularity effect of identified victims in separate and joint evaluations. Organizational behavior and human decision processes 97, 106–116.
Kontoleon, A., Swanson, T., 2003. The willingness to pay for property rights for the giant panda: can a charismatic species be an instrument for nature conservation? Land economics 79, 483–499.
La Ferrara, E., 2016. Mass Media and Social Change: Can We Use Television to Fight Poverty? Journal of the European Economic Association 14, 791–827. https://doi.org/10.1111/jeea.12181
Lacetera, N., Macis, M., 2010a. Social image concerns and prosocial behavior: Field evidence from a nonlinear incentive scheme. Journal of Economic Behavior & Organization 76, 225–237.
Lacetera, N., Macis, M., 2010b. Do all material incentives for pro-social activities backfire? The response to cash and non-cash incentives for blood donations. Journal of Economic Psychology 31, 738–748.
Lambarraa, F., Riener, G., 2012. On the Norms of Charitable Giving in Islam: A Field Experiment. International Association of Agricultural Economists.

Lerner, J.S., Keltner, D., 2001. Fear, anger, and risk. Journal of personality and social psychology 81, 146.
Lerner, J.S., Li, Y., Valdesolo, P., Kassam, K.S., 2015. Emotion and decision making. Annual review of psychology 66.
Levitt, S.D., List, J.A., 2007. What do laboratory experiments measuring social preferences reveal about the real world? Journal of Economic perspectives 21, 153–174.
Lewis, S.L., Maslin, M.A., 2015. Defining the anthropocene. Nature 519, 171.
Lindenmayer, D.B., Manning, A.D., Smith, P.L., Possingham, H.P., Fischer, J., Oliver, I., McCarthy, M.A., 2002. The Focal-Species Approach and Landscape Restoration: a Critique. Conservation Biology 16, 338–345. https://doi.org/10.1046/j.1523-1739.2002.00450.x
List, J.A., 2009. Social preferences: Some thoughts from the field. Annu. Rev. Econ. 1, 563–579.
List, J.A., Gallet, C.A., 2001. What Experimental Protocol Influence Disparities Between Actual and Hypothetical Stated Values? Environmental and Resource Economics 20, 241–254. https://doi.org/10.1023/A:1012791822804
List, J.A., Lucking-Reiley, D., 2002. The effects of seed money and refunds on charitable giving: Experimental evidence from a university capital campaign. Journal of political Economy 110, 215–233.
Loomis, J.B., White, D.S., 1996. Economic benefits of rare and endangered species: summary and meta-analysis. Ecological Economics 18, 197–206.
Lorimer, J., 2007. Nonhuman charisma. Environment and Planning D: Society and Space 25, 911–932.
Lundhede, T.H., Jacobsen, J.B., Hanley, N., Fjelds\a a, J., Rahbek, C., Strange, N., Thorsen, B.J., 2014. Public support for conserving bird species runs counter to climate change impacts on their distributions. PloS one 9, e101281.
Macdonald, E.A., Burnham, D., Hinks, A.E., Dickman, A.J., Malhi, Y., Macdonald, D.W., 2015. Conservation inequality and the charismatic cat: Felis felicis. Global Ecology and Conservation 3, 851–866.
MacKerron, G., Mourato, S., 2013. Happiness is greater in natural environments. Global Environmental Change 23, 992–1000.
Manesi, Z., Van Lange, P.A., Pollet, T.V., 2015. Butterfly eyespots: Their potential influence on aesthetic preferences and conservation attitudes. PloS one 10, e0141433.
Marešová, J., Frynta, D., 2008. Noah's Ark is full of common species attractive to humans: The case of boid snakes in zoos. Ecological Economics 64, 554–558.
Markowitz, E., Slovic, P., Vastfjall, D., Hodges, S., 2013. Compassion fade and the challenge of environmental conservation.
Martín-López, B., Montes, C., Benayas, J., 2007. The non-economic motives behind the willingness to pay for biodiversity conservation. Biological conservation 139, 67–82.
Mason, D.P., 2016. Recognition and cross-cultural communications as motivators for charitable giving: A field experiment. Nonprofit and voluntary sector quarterly 45, 192–204.
Mayer, F.S., Frantz, C.M., 2004. The connectedness to nature scale: A measure of individuals' feeling in community with nature. Journal of Environmental Psychology 24, 503–515. https://doi.org/10.1016/j.jenvp.2004.10.001
McCarthy, D.P., Donald, P.F., Scharlemann, J.P., Buchanan, G.M., Balmford, A., Green, J.M., Bennun, L.A., Burgess, N.D., Fishpool, L.D., Garnett, S.T., 2012. Financial costs of meeting global biodiversity conservation targets: current spending and unmet needs. Science 1229803.
Metrick, A., Weitzman, M.L., 1998. Conflicts and choices in biodiversity preservation. Journal of Economic Perspectives 12, 21–34.
Metrick, A., Weitzman, M.L., 1996. Patterns of behavior in endangered species preservation. Land Economics 1–16.
Miller, D.C., 2014. Explaining global patterns of international aid for linked biodiversity conservation and development. World Development 59, 341–359.
Morse-Jones, S., Bateman, I.J., Kontoleon, A., Ferrini, S., Burgess, N.D., Turner, R.K., 2012. Stated preferences for tropical wildlife conservation amongst distant beneficiaries: charisma, endemism, scope and substitution effects. Ecological Economics 78, 9–18.
Moyer-Gusé, E., 2008. Toward a theory of entertainment persuasion: Explaining the persuasive effects of entertainment-education messages. Communication Theory 18, 407–425.

Myers, T.A., Maibach, E.W., Roser-Renouf, C., Akerlof, K., Leiserowitz, A.A., 2013. The relationship between personal experience and belief in the reality of global warming. Nature Climate Change 3, 343.
Newbold, T., Hudson, L.N., Hill, S.L., Contu, S., Lysenko, I., Senior, R.A., Börger, L., Bennett, D.J., Choimes, A., Collen, B., 2015. Global effects of land use on local terrestrial biodiversity. Nature 520, 45.
Nicholson-Cole, S.A., 2005. Representing climate change futures: a critique on the use of images for visual communication. Computers, environment and urban systems 29, 255–273.
O'Neill, S., Nicholson-Cole, S., 2009. "Fear won't do it" promoting positive engagement with climate change through visual and iconic representations. Science Communication 30, 355–379.
Oreskes, N., 2004. The scientific consensus on climate change. Science 306, 1686–1686.
Ouellette, J.A., Wood, W., 1998. Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. Psychological Bulletin 124, 54–74. https://doi.org/10.1037/0033-2909.124.1.54
Painter, J., Kristiansen, S., Schäfer, M.S., 2018. How 'Digital-born'media cover climate change in comparison to legacy media: A case study of the COP 21 summit in Paris. Global Environmental Change 48, 1–10.
Pergams, O.R., Zaradic, P.A., 2008. Evidence for a fundamental and pervasive shift away from nature-based recreation. Proceedings of the National Academy of Sciences 105, 2295–2300.
Pergams, O.R., Zaradic, P.A., 2006. Is love of nature in the US becoming love of electronic media? 16-year downtrend in national park visits explained by watching movies, playing video games, internet use, and oil prices. Journal of environmental Management 80, 387–393.
Read, D., 2005. Monetary incentives, what are they good for? Journal of Economic Methodology 12, 265–276. https://doi.org/10.1080/13501780500086180
Rege, M., Telle, K., 2004. The impact of social approval and framing on cooperation in public good situations. Journal of public Economics 88, 1625–1644.
Riggio, J., Caro, T., Dollar, L., Durant, S.M., Jacobson, A.P., Kiffner, C., Pimm, S.L., Van Aarde, R.J., 2016. Lion populations may be declining in Africa but not as Bauer et al. suggest. Proceedings of the National Academy of Sciences 113, E107–E108.
Ryan, R.M., Deci, E.L., 2000. Intrinsic and extrinsic motivations: Classic definitions and new directions. Contemporary educational psychology 25, 54–67.
Sachs, J.D., Baillie, J.E., Sutherland, W.J., Armsworth, P.R., Ash, N., Beddington, J., Blackburn, T.M., Collen, B., Gardiner, B., Gaston, K.J., 2009. Biodiversity conservation and the millennium development goals. Science 325, 1502–1503.
Sakellari, M., 2015. Cinematic climate change, a promising perspective on climate change communication. Public Understanding of Science 24, 827–841.
Sergio, F., Caro, T., Brown, D., Clucas, B., Hunter, J., Ketchum, J., McHugh, K., Hiraldo, F., 2008. Top predators as conservation tools: ecological rationale, assumptions, and efficacy. Annual review of ecology, evolution, and systematics 39, 1–19.
Shanahan, D.F., Bush, R., Gaston, K.J., Lin, B.B., Dean, J., Barber, E., Fuller, R.A., 2016. Health benefits from nature experiences depend on dose. Scientific reports 6, 28551.
Shearer, E., Gotfried, J., 2017. News Use Across Social Media Platforms 2017 | Pew Research Center.
Shreedhar, G., Mourato, S., 2018. Seeing red, but acting green? Experimental evidence on charitable giving and affect towards biodiversity.
Silverman, W.K., Robertson, S.J., Middlebrook, J.L., Drabman, R.S., 1984. An investigation of pledging behavior to a national charitable telethon. Behavior Therapy 15, 304–311.
Sitas, N., Baillie, J.E.M., Isaac, N.J.B., 2009. What are we saving? Developing a standardized approach for conservation action. Animal Conservation 12, 231–237.
Small, D.A., Loewenstein, G., 2003. Helping a victim or helping the victim: Altruism and identifiability. Journal of Risk and uncertainty 26, 5–16.
Small, D.A., Loewenstein, G., Slovic, P., 2007. Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims. Organizational Behavior and Human Decision Processes 102, 143–153.
Smith, R.W., Faro, D., Burson, K.A., 2012. More for the many: The influence of entitativity on charitable giving. Journal of Consumer Research 39, 961–976.

Soga, M., Gaston, K.J., 2016. Extinction of experience: the loss of human–nature interactions. Frontiers in Ecology and the Environment 14, 94–101.
Steffen, W., Grinevald, J., Crutzen, P., McNeill, J., 2011. The Anthropocene: conceptual and historical perspectives. Philosophical Transactions of the Royal Society of London A: Mathematical, Physical and Engineering Sciences 369, 842–867.
Steg, L., De Groot, J., 2010. Explaining prosocial intentions: Testing causal relationships in the norm activation model. British journal of social psychology 49, 725–743.
Tankersley, D., Stowe, C.J., Huettel, S.A., 2007. Altruism is associated with an increased neural response to agency. Nature neuroscience 10, 150.
Thøgersen, J., 2006. Norms for environmentally responsible behaviour: An extended taxonomy. Journal of environmental Psychology 26, 247–261.
Thomas-Walters, L., J Raihani, N., 2017. Supporting Conservation: The Roles of Flagship Species and Identifiable Victims. Conservation Letters 10, 581–587.
Tisdell, C., Nantha, H.S., 2006. Comparison of funding and demand for the conservation of the charismatic koala with those for the critically endangered wombat Lasiorhinus krefftii, in: Vertebrate Conservation and Biodiversity. Springer, pp. 435–455.
Tisdell, C., Nantha, H.S., Wilson, C., 2007. Endangerment and likeability of wildlife species: How important are they for payments proposed for conservation? Ecological Economics 60, 627–633.
Tisdell, C., Wilson, C., 2006. Information, wildlife valuation, conservation: experiments and policy. Contemporary Economic Policy 24, 144–159.
Tisdell, C., Wilson, C., Nantha, H.S., 2006. Public choice of species for the 'Ark': phylogenetic similarity and preferred wildlife species for survival. Journal for Nature Conservation 14, 97–105.
Tisdell, C.A., 2014. Human values and biodiversity conservation: The survival of wild species. Edward Elgar Publishing.
Titmuss, R., 1970. The gift relationship: From human blood to social. Policy, London.
Tobin, J., 1958. Estimation of relationships for limited dependent variables. Econometrica: journal of the Econometric Society 24–36.
van der Linden, S.L., Leiserowitz, A.A., Feinberg, G.D., Maibach, E.W., 2015. The scientific consensus on climate change as a gateway belief: Experimental evidence. PloS one 10, e0118489.
van Doorn, J., Zeelenberg, M., Breugelmans, S.M., 2014. Anger and Prosocial Behavior. Emotion Review 6, 261–268. https://doi.org/10.1177/1754073914523794
Västfjäll, D., Slovic, P., Mayorga, M., Peters, E., 2014. Compassion fade: Affect and charity are greatest for a single child in need. PloS one 9, e100115.
Verissimo, D., MacMillan, D.C., Smith, R.J., 2011. Toward a systematic approach for identifying conservation flagships. Conservation Letters 4, 1–8.
Veríssimo, D., Vaughan, G., Ridout, M., Waterman, C., MacMillan, D., Smith, R.J., 2017. Increased conservation marketing effort has major fundraising benefits for even the least popular species. Biological Conservation 211, 95–101.
Vesterlund, L., 2003. The informational value of sequential fundraising. Journal of public Economics 87, 627–657.
Vincenot, C.E., Collazo, A.M., Wallmo, K., Koyama, L., 2015. Public awareness and perceptual factors in the conservation of elusive species: The case of the endangered Ryukyu flying fox. Global Ecology and Conservation 3, 526–540.
Voigt, C.C., Kingston, T., 2016. Bats in the Anthropocene: conservation of bats in a changing world. Springer.
Volk, S., Thöni, C., Ruigrok, W., 2012. Temporal stability and psychological foundations of cooperation preferences. Journal of Economic Behavior & Organization 81, 664–676.
Walker, M.E., Morera, O.F., Vining, J., Orland, B., 1999. Disparate WTA–WTP disparities: the influence of human versus natural causes. Journal of Behavioral Decision Making 12, 219–232.
White, M., Smith, A., Humphryes, K., Pahl, S., Snelling, D., Depledge, M., 2010. Blue space: The importance of water for preference, affect, and restorativeness ratings of natural and built scenes. Journal of Environmental Psychology 30, 482–493.
Wooldridge, J.M., 2010. Econometric analysis of cross section and panel data. MIT press.

WWF, 2018. Illegal Wildlife Trade | Threats | WWF [WWW Document]. World Wildlife Fund. URL https://www.worldwildlife.org/threats/illegal-wildlife-trade (accessed 9.30.18).

YouTube, 2018. Press - YouTube [WWW Document]. URL https://www.youtube.com/intl/en-GB/yt/about/press/ (accessed 9.29.18).

Zaki, J., Ochsner, K.N., 2012. The neuroscience of empathy: progress, pitfalls and promise. Nature neuroscience 15, 675.

Zalasiewicz, J., Williams, M., Smith, A., Barry, T.L., Coe, A.L., Bown, P.R., Brenchley, P., Cantrill, D., Gale, A., Gibbard, P., 2008. Are we now living in the Anthropocene? Gsa Today 18, 4.