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Abstract

This paper analyses if the media content of brief biodiversity conservation videos impact pro-social behaviour towards biodiversity conservation and experienced affect. In a series of lab experiments, we randomly assign subjects to videos featuring a non-charismatic species (Bats), a charismatic species (Lions) a composite habitat composed of both species (Bats and Lions in the Savanna), or the anthropogenic cause of endangerment. An incentive-compatible charitable giving game is used to measure donations in Study 1. Self-reports of experienced affective states are elicited in Study 2. We find that videos with charismatic Lions increase the likelihood of donating, but films with the anthropogenic cause of endangerment increase the amount donated, conditional on deciding to donate. Media content on the anthropogenic cause of endangerment causes 'outrage' and an increase in a range of mixed emotions including anger and sadness. We also find that videos with Lions increase happiness, and the biodiversity habitat videos on the Savanna (with Lions and Bats) increase interest.

Keywords: Altruism; Biodiversity Conservation; Information and Knowledge, Communication; Experiment; Non-profit Institutions, NGOs; Emotions, Affect

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1 Introduction

Drawing public attention to the rapid human-induced loss of biodiversity to boost support and funding for conservation is the need of the hour. 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 (Ceballos et al., 2017; Dirzo et al., 2014; Butchart et al., 2010): illustratively, one estimate is that only 12% of the estimated cost of reducing the extinction risk of threatened bird species is currently funded (McCarthy et al., 2012). Unfortunately, we know less about people's resource allocation choices towards biodiversity conservation. Our existing knowledge is derived primarily from the economic valuation literature and analysis of public expenditures under command and control mechanisms.[1]

A striking empirical pattern emerges: both the public willingness to pay (WTP) for biodiversity conservation and state and federal spending on conservation is higher for habitats with charismatic megafauna (Richardson and Loomis, 2009; Metrick and Weitzman, 1998).[2] However, this pattern, which has been called the 'charismatic megafauna effect' (Metrick and Weitzman, 1998), need not align with ecological criteria for biodiversity preservation which often includes other priorities like the number and type of species or the genetic variability in a given area. In seeking to understand why these patterns persist, researchers across disciplines like economics, psychology and geography have remarked that the feelings that people harbour towards species are essential psychological drivers of decisions to protect them (Metrick and Weitzman, 1998; Lorimer, 2007).

This empirical trend has also led conservation organisations to rely extensively on charismatic megafauna, especially big cats, in public outreach and funding appeals. The principal argument for this strategy is that they generate more public funding and support which can be deployed for the conservation of less charismatic species and the broader biodiversity habitat in which they live (Macdonald et al., 2015; Caro and Riggio, 2013; Sergio et al., 2008). Others are concerned about the unintended adverse effects of this approach, such as the 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; Lindenmayer et al., 2002; Sitas et al., 2009; Clucas et al., 2008; Kontoleon and Swanson, 2003; Bowen-Jones and Entwistle, 2002). Underlying this debate is the worrying

[1] Please refer to Helm and Hepburn (2012) for a comprehensive overview of the economic analysis of biodiversity.

[2] Charismatic megafauna or 'flagships' are commonly large, popular vertebrates associated with a particular habitat, like Lions from the African savanna (Clucas et al., 2008), Leader-Williams and Dublin (2000), and Verissimo et al. (2011).

dynamic of the continuing marginalisation of non-charismatic but ecologically relevant species from the conservation and research agenda, as observed from the allocation of public expenditures towards species conservation (Metrick and Weitzman, 1998; Dawson and Shogren, 2001).

How robust are these empirical patterns? Do these behavioural patterns reveal themselves in other contexts like charitable giving? These issues beg the broader question: what motivates people to act pro-socially through choices to protect threatened species and their habitats? How can we design interventions to increase pro-social behaviours, like charitable giving?

This paper aims to address these questions. It explores the causal effect of different types of audiovisual information or the narrative content in brief biodiversity conservation videos on charitable giving and affect, by using a series of lab experiments. Study 1 focuses on charitable donations behaviour. Subjects are exposed to videos featuring either a non-charismatic species (Bats) or a charismatic species (Lions) or a biodiversity habitat composed of both charismatic and non-charismatic species living in it (Bats and Lions in the Savanna habitat), after which they can choose to allocate money to a conservation charity. Thus, our first contribution is to extend empirical evidence on the charismatic megafauna effect, by examining its robustness in the donations context using video interventions.

Our second contribution is to verify the 'outrage effect' in this setting. The outrage effect refers to the classic albeit under-explored finding that people's WTP to undo the environmental harm caused by humans is higher than if the same harm was caused by nature (Kahneman et al., 1993; Bulte et al., 2005). Kahneman et al. (1993) coined the term to capture the underlying affective processes that potentially motivated this economic behaviour, on the basis that people reported feeling more upset upon hearing about the human action was the root cause of adverse environmental outcomes. To test the robustness of this finding, we augment each video with audiovisual information on the anthropogenic cause of endangerment and map changes in donations behaviour from exposure to this additional media content.

In addition to this, we also tested the behavioural impact of a non-pecuniary incentive through the offer to publicly recognise donors. This is a real-world strategy frequently used by conservation organisations to increase citizen engagement through combining informational strategies with non-pecuniary incentives (e.g. publishing their names in newsletters). Thus the third contribution of this study is to check if such incentives yield additional benefits through increased donations when used in conjunction with videos.

Study 2 builds on Study 1, and explores the role of affect as a possible motivational force in driving donations behaviour. Subjects reported affective responses to being exposed to the same videos used earlier. Hence, our fourth contribution is to disentangle the affective basis of the charismatic megafauna and outrage effects by looking at changes in a wider set of discrete positive and negative states of affect that are experienced by individuals. In doing so, we present new evidence about how audiovisual information about biodiversity conservation could elicit mixed emotional reactions in public audiences and flag some possible channels through which donations behaviour may be influenced.

Exploring the effects of videos is particularly expedient at this current moment. Conservation and news organisations increasingly rely on audio-visual mass media such as online videos, documentaries, and photographs to raise financial resources and garner policy support. This strategy harnesses the growing public proclivity to obtain information about environmental issues from digital platforms and social media (Stamm et al., 2000; Gavin and Marshall, 2011; Sakellari, 2015; Painter et al., 2018). To illustrate, YouTube has over a billion users amounting to almost one-third of all people on the Internet and over half the views come from mobile devices (YouTube, 2018). Many existing videos tend to give prominence to charismatic megafauna and sometimes include conservation relevant information, such as the ecological role of the species and its endangerment status. They often omit to mention the anthropogenic cause of endangerment and the role of humans in hastening the sixth mass extinction. While some feel such videos encourage conservation behaviour, others have expressed unease about these narratives because they may breed complacency about our destruction of the planet (Hughes-Games, 2017). Well-documented evidence on the behavioural responses to these videos can help further these debates.

Audiovisual media can change behaviour through different pathways like providing new information, changing preferences, and altering emotion states, and different types of narrative content can exert separate impacts on economic behaviour and experienced affect (Moyer-Gusé, 2008; La Ferrara, 2016; Nicholson-Cole, 2005). For example, La Ferrara (2016) notes media can provide new information or provide specific narratives about an issue, which in turn can induce individuals to update their beliefs, or revise their preferences over a given course of action. Nicholson-Cole (2005) observes that the use of emotive imagery and narratives are especially fruitful in attracting people's attention. Merchant et al. (2010) notes that charitable organisations use storytelling to provide a case for public support by taking individuals through different (mixed) emotional stages, to induce them to donate to reduce negative affect or to act on feelings of empathy. Going further, Kemp et al. (2012) observe that charitable fund-raising efforts aim to elicit mixed emotion states because they elicit more extensive behavioural intentions than appeals based only on the generation of negative emotions. Ruth et al. (2002) observe that advertisements generating high levels of positive and negative emotions, are processed more carefully by viewers and hence are regarded as more interesting, and 'prepares individuals for action'. These potential pathways of influence suggest that the effect of narrative content can work towards promoting biodiversity conservation. However, the impact of different types of media content used in biodiversity conservation videos on charitable donations and experienced affect is empirically unclear at present, and jointly eliciting its effects on behaviour and affect is the overarching focus and contribution of this paper.

Our findings show that the charismatic megafauna and the outrage effects persist when video interventions are used on charitable donations behaviour, but that they have distinct effects on decision-making. More precisely, videos of charismatic Lions increase the likelihood of donating, 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 likelihood of donating. We also found that the anthropogenic cause of endangerment causes 'outrage' and an increase in a range of mixed emotions including anger and sadness. The broader implication of this result is that innovative informational interventions like brief videos can positively impact conservation behaviour, so careful attention needs to be paid to the narratives and stories presented in them and the emotional and behavioural reactions they elicit in audiences.

The rest of the paper is organised as follows: the next section locates the current research in related literature, and section 3 outlines the experimental design and the procedures used. Section 4 presents the results and section 5 concludes with a discussion.

2 Related literature

Below, is a review of four strands of literature: on patterns of resource allocations to charismatic megafauna and biodiversity habitats primarily from economic valuation studies and public expenditure data, studies on the willing to pay to correct anthropogenic environmental problems problems, studies on social image motivations and public recognition in relation to charitable giving, and finally on affect towards charismatic megafauna and nature, as well as the outrage effect.

2.1 Charismatic megafauna, habitats and resource allocation

We make several contributions to the existing research on biodiversity conservation. First, we add to the literature on how species charisma impacts the allocation of financial resources towards protection (Metrick and Weitzman, 1996, 1998; Loomis and White, 1996; Bulte and Van Kooten, 1999; Dawson and Shogren, 2001; Kontoleon and Swanson, 2003; Christie et al., 2006; Martín-López et al., 2007; Marešová and Frynta, 2008; Richardson and Loomis, 2009; Morse-Jones et al., 2012; Tisdell et al., 2007, 2006). Metrick and Weitzman (1996) and Metrick and Weitzman (1998) are influential papers, which studied revealed behaviour towards charismatic and non-charismatic species through the allocation of federal expenditures under the Endangered Species Act in the United States of America. They found charismatic species (proxied by size and taxonomy) attracted more funding and policy support (also see Dawson and Shogren (2001) and Brown and Shogren (1998)). Stated preferences studies using contingent valuation (e.g. Kontoleon and Swanson (2003)) and choice experiments (e.g. Jacobsen et al. (2008), Morse-Jones et al. (2012) and Richardson and Loomis (2009)), also found charismatic flagships elicited a higher stated Willingness To Pay (WTP) or donate to conservation programs. We extend this literature by measuring individual's revealed pro-social behaviour using an charitable giving game with monetary stakes.

Currently, limited empirical evidence quantifies the relative benefits of using charismatic flagships in donation appeals, relative to non-charismatic species or habitats (Sitas et al., 2009; Clucas et al., 2008). To the best of our knowledge, only Thomas-Walters and J Raihani (2017) used a charitable giving game to quantify individual differences in giving from exposure to combined photo-cum-text appeals featuring charismatic (polar bear, tiger, Asian elephant) and non-charismatic species (dusky gopher frog, North Atlantic cod, Western glacier stonefly), across different habitats. They found average donations to charismatic species were marginally higher than to non-charismatic species amongst Amazon Mechanical Turk workers (USD 0.16 versus USD 0.13). Taking this insight further, we examine if differences in pro-sociality from exposure to various species persists when individuals are exposed to brief conservation videos in Study 1. Furthermore, we attempt to control for underlying differences in the habitat of charismatic and non-charismatic species by considering charismatic and non-charismatic species within the same habitat.[3]

Second, we investigate whether using a charismatic species alongside a non-charismatic species within the same biodiversity habitat influences pro-sociality. In related literature, 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. But Markowitz et al. (2013) reported that non-environmentalists stated lower hypothetical donation amounts when presented with many recipients of the same species although environmentalists do not. Keeping

[3]Differences in underlying habitats may affect donations if subjects are more likely to donate a higher amount to more favourable biomes or habitats. For example, 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). Similarly, individuals report feeling happier outdoors in all green or natural habitat types, especially coastal areas, than in urban environments (MacKerron and Mourato, 2013).

in mind these mixed results, we examine donations towards a habitat composed of different species (biological diversity) instead of many individuals of the same species (biological resource).[4] From the stated preference literature, Jacobsen et al. (2008) investigate some of these issues using a choice experiment to assess preferences over the preservation of the Danish heath and its endangered species. They found that the WTP to conserve this habitat was significantly higher when two (lesser known) species were 'iconised' by explicitly naming them, compared to a quantitative description of the habitat. We build on this work, by comparing whether naming one charismatic and non-charismatic species changes donations behaviour, compared to appeals featuring a single species.[5] By doing so, we hope to shed light on how the scale of biocomplexity may impact pro-social behaviour to ultimately feed into the behavioural design of conservation policies (Mainwaring, 2001).

2.2 Anthropogenic cause of endangerment and resource allocation

Third, we examine how media content on the anthropogenic cause of endangerment impacts pro-social behaviour towards conservation. Economic models of behaviour assume that individuals care only about outcomes and not their causes (Ashraf et al., 2005; Bulte et al., 2005). But in contingent valuation studies, individuals stated a higher WTP when information about the human-made causes of environmental problems is made available (Bulte et al., 2005; Brown et al., 2002; Kahneman and Ritov, 1994; Kahneman et al., 1993). For instance, 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) call this empirical finding the 'outrage effect' because individuals reported they would feel more 'upset' if they were to read a story or watch an item on television about man-made environmental problems rather those arising from natural causes (they also rated man-made problems as more 'important'; Kahneman et al. (1993).[6] We contribute to this literature by

[4]Curiously, the mixed results on the difference in giving to a single versus many non-human victims, contrasts with the well-established 'identifiable victim effect', i.e., an individual human recipient (e.g. one refugee child) elicits higher donations than many human recipients (Jenni and Loewenstein, 1997; Västfjäll et al., 2014). An implication of this, is that findings from experimental studies of pro-sociality towards human recipients need not carry over to non-human species and the natural world.

[5]Our work also potentially connects to discussions on embedding and scope effects in the contingent valuation (CV) literature. Kahneman and Knetsch (1992) and Desvousges et al. (1993) argue that respondents to CV surveys are willing to spend a particular amount of money on a good, regardless of it's scale, which is an important characteristic of the good being valued. While methodological innovations like split sample tests are one way to address this, scope insensitivity may persist in situations where an environmental program can provide multiple outputs - like protecting different endangered species in a biodiversity habitat. As noted by Carson (2012), it is difficult to obtain distinct WTP estimates for the individual species or outputs as opposed to the entire program in such cases. We do not address issues of scope sensitivity in the current study, as we consider charitable donations (often used as a payment vehicle in CV studies) rather than WTP for a particular conservation program. See Carson (2012) for a review of these issues.

[6]Bulte et al. (2005) critically differentiate between the outrage effect which is attributable to the human-made cause of environmental degradation, and responsibility effects which relates people's WTP to the degree of responsibility that they personally feel for the outcome. In the latter case, as noted by Brown et al. (2002) attributing the case to another entity (e.g. a corporation) will lower the general public's WTP, possibly even

considering if additional audio-visual media content on the anthropogenic cause of biodiversity depletion (through hunting and illegal wildlife trade) impacts revealed pro-sociality, controlling for background conservation-relevant information. This acts as a robustness check to examine whether increased pro-sociality persists in this new experimental set-up; i.e., a different human-cause of endangerment (hunting), informational medium (videos), and an incentive-compatible rather than stated behaviour (revealed charitable donations).

2.3 Social image motivations, public recognition and pro-sociality

We also build on the empirical finding that people behave more pro-socially in public rather than in private. This observation is supported by theoretical models of moral behaviour that propose that an individual's revealed pro-sociality is motivated by the need to maintain a moral image and identity, to signal to themselves and others that they adhere to the 'right' and 'good' norms prevalent in society (Bénabou and Tirole, 2006, 2011; Harbaugh, 1998). Lab and field experiments find that public visibility and recognition of donors is a non-pecuniary incentive to increase giving (Ariely et al., 2009; Karlan and McConnell, 2014; Cotterill et al., 2013; Lacetera and Macis, 2010). For example, Karlan and McConnell (2014) found that charitable giving is higher when donor names are published in funding circle newsletters.[7] Conversely, other studies show that incentives aiming to provide additional benefits to the individual from acting generously can 'crowd-out' pro-sociality and lead to either no effect or a reduction in giving instead (Bowles and Polania-Reyes, 2012; Irlenbusch and Ruchala, 2008; Cardenas et al., 2000; Gneezy and Rustichini, 2000). For example, in Irlenbusch and Ruchala (2008), low bonuses did not affect contributions in a public goods game. Although high bonuses increased contributions, the amounts contributed by subjects were not significantly different from the prediction for self-interested individuals. This result showed that in a social dilemma, both the offer and magnitude of an incentive that conferred personal benefit could exert an unexpected effect on behaviour (also see Bowles (2008)). We complement this work by examining whether the offer of public recognition as a non-pecuniary incentive increases pro-sociality towards biodiversity when used in conjunction with audio-visual informational strategies.

below WTP if the loss were caused by a natural process. In our experiment, we only test the outrage effect, not the responsibility effect.

[7] This is more broadly in keeping with studies which observe that giving in experimental games can be fragile, and contingent on the contextual and institutional features of the experimental task, such as public visibility. For example, Dana et al. (2007) and Dana et al. (2006) show that individuals act less generously when dictators are given the option to keep their decisions shielded from the receiver, even at a personal cost to themselves.

2.4 Affect towards charismatic megafauna and outrage

Lastly, we contribute to the literature on the relationship between affect, charisma, and conservation. Although numerous studies from ecological economics, psychology and conservation have noted that emotional responses to biodiversity (and wildlife more generally) matter for conservation choices, empirical and experimental evidence on the topic is scarce. For instance, Metrick and Weitzman (1998) noted that 'the utility of each species/library will be measured as a combination of commercial, recreational and, yes, emotional reactions to a given species.' Lorimer (2007) observed that 'affect' provided the vital motivating force that compels people to get involved in conservation, and that animals 'dramatically other to us humans' (less charismatic species) are far less likely to engender sympathetic affections, based on qualitative evidence. Other studies found that charismatic species are rated as more 'likeable' (Tisdell et al., 2005), more 'appealing' (Brambilla et al., 2013) and that they can inspire more fondness, emotional affinity and 'caring' attitudes (Brown and Shogren, 1998; Ballantyne et al., 2007; Skibins et al., 2013).[8]

Theoretically, the 'Biophilia' hypothesis proposes that emotional responses towards natural stimuli play a central role in explaining humankind's innate connection with the natural world (Kellert and Wilson, 1995). Kellert and Wilson (1995) proposed that individuals can have inherent emotionally laden negativistic attitudes, such as fear and aversion, towards species like snakes, spiders and bats, which in turn can determine broader wildlife attitudes and value orientations (also see Knight (2008). Subsequent research recognizes the evolutionary basis for such emotional reactions, but goes further by proposing that negative emotional responses towards specific species are a result of socio-cultural conditioning, knowledge, contextual features (e.g. if animals are in zoos versus the wild) and/or a combination of all these factors (Öhman and Mineka, 2003; Jacobs, 2009; Lorimer, 2007).[9] More broadly, there is growing experimental evidence that emotions or 'visceral factors' influence economic and moral decision-making (Loewenstein, 2000; Slovic et al., 2007; Keltner and Lerner, 2010). For instance, the 'affect heuristic' proposed by Slovic et al. (2007) propounds that emotional responses towards objects, which occur rapidly and automatically, can guide decision-making by substituting for systematic cognitive assessments. This corresponds to dual systems theories of decision-making, which differentiate between emotional and heuristics drive System 1 and deliberative processing in System 2 as mechanisms that motivate behaviour (Kahneman, 2003; Camerer et al., 2005).[10]

[8]Another strand of literature notes that differences in legal rights exist between non-charismatic species (e.g. rats are not considered 'animals' by animal welfare law) and familiar charismatic species (e.g. dogs are often treated like friends or family members) and proposes that 'moral heuristics' are crucial explanatory factors (e.g. 'Rats are pests: pests are bad' versus 'Don't betray friends and family') (Herzog and Burghardt, 2005; Sunstein and Nussbaum, 2004).

[9]These contextual factors may also include the nativity of species: for example, Lundhede et al. (2014) found Danish citizens had a higher WTP for the conservation of birds currently native to Denmark, than for bird species moving into the country.

[10]Related work explores the role of emotion-based moral satisfaction driving the willingness to pay to correct

We contribute to this literature by attempting to quantify the causal impact of content in biodiversity conservation videos on different types of affect. As a core aspect of experienced affect is valence (i.e., 'positive' or 'negative', and 'good' or 'bad'; Cornelius (1996); Slovic et al. (2007)), we attempt to isolate a range of positive and negative affective states from videos with charismatic and non-charismatic species, and a biodiversity habitat consisting of both in Study 2. We also aim to disentangle the affective basis of 'the outrage effect' discussed in Kahneman et al. (1993) who restrict their efforts to measuring ratings of 'upset' and 'importance'. Related work on the 'outrage heuristic' proposes that responses to perceived wrongdoing inculcate a sharp sense of outrage, which in turn influences people's judgements of punishment for the wrongdoing (Kahneman et al., 1998; Kahneman and Frederick, 2002; Sunstein et al., 2008). We extend this work by investigating the role of biodiversity conservation videos in increasing moral outrage, by providing information about the human causes of biodiversity loss in a salient and memorable manner. Specifically, we attempt to map potential changes to a series of positive and negative affective states to disentangle the emotional basis of the outrage effect, given that previous research has demonstrated it holds behavioural consequences.[11].

3 Experimental procedure and design

The overarching objective of Study 1 is to examine how audiovisual narrative content on charismatic and / or non-charismatic species and habitats, and the anthropogenic cause of endangerment drive charitable giving, to check for the 'charismatic megafauna' and 'outrage' effects. Study 2, builds on Study 1 to assess whether the same audiovisual content on charismatic and / or non-charismatic species and habitats, and the anthropogenic cause of endangerment, elicits particular emotion states. While we cannot conclude that the potential change in affective states in Study 2 drives empirical patterns of charitable giving in Study 1, a joint and systematic exploration of donations and emotions from the same audiovisual information allows us to flag changes in affective states as a possible driver of behaviour to explored in the future. The

environmental problems (Kahneman and Knetsch, 1992). Similarly, the 'warm glow' from charitable giving or the utility that one obtains from the act of giving without any concern about the interests of others (Andreoni, 1989, 1990) has also been investigated. We do not attempt to measure this construct in the present study, but see (Konow, 2010) for an novel effort to do so.

[11]In this paper, we focus on the role of 'integral emotions', i.e., the experience of emotions like anger or sadness, which occur at the moment of decision and are directly related to the decision at hand - in our case, these emotions are stimulated through the video appeal to donate. These are distinct from 'anticipated emotions' from the outcome of the decision itself (e.g. the expectation of happiness of seeing the Savanna preserved compared to the expected happiness of buying a book, both of which materialize at some future point), or 'incidental' emotions, which may occur at the moment of a choice decision, but are unrelated to the payoffs from the decision at hand (Rick and Loewenstein, 2008). These different categories of emotion (apart from the type of emotion experienced) can arguably impact revealed and stated choices in distinct ways: for example, Hanley et al. (2017) found incidental emotions did not affect willingness to pay for changes in coastal water quality and fish populations in New Zealand (discussed in greater detail in Chapter 3)

experimental procedure, interventions and study design are explained below.

3.1 Procedure

Experimental sessions for Study 1 on Donations and Study 2 on Affect were held from 16 November to 08 December 2016, at the London School of Economics Behavioural Research Lab (LSE BRL). Participation was open to all individuals registered at the LSE BRL, to ensure an adequate sample size for all treatments. A total of 564 subjects participated, where 377 subjects participated in Study 1 and 177 subjects in Study 2. Both Study 1 and 2 were conducted simultaneously on the same days. Each session lasted for 20 minutes on average, and could hold a maximum of 20 subjects (the number of subjects per session ranged from 5 to 20). Each subjects were randomly assigned to a computer terminal upon entering the lab, after which the computer program randomly assigned them to one of the treatments in either Study 1 or Study 2. Thus, the randomization was at the individual-level for each session. The experimental survey was hosted on Qualtrics.

The experimental procedure in Study 1 was as follows: after consenting to participate, subjects watched a video and made their donation decision. Next, they answered questions measuring affect followed by questions on pro-environmental and pro-social behaviour, socio-economic and demographic characteristics. After this, subjects could collect their payments. All subjects were paid £5 for participation and could earn a maximum of £25 from the charitable giving task. But only one subject from each session was selected at random to receive the pay-out from the charitable giving game. The experimental procedure was identical in Study 2, barring the absence of the donations task, and the payment was restricted to the £5 participation fee. The supplementary materials are available in the Appendix.

3.2 Biodiversity conservation videos

As existing videos were not designed to provide information in a controlled manner, we constructed conservation videos using a sequence of photos and a scripted voice-over. We used the International Union for the Conservation of Nature red list database and began our search by habitat, threat classification, and conservation status.[12] We chose the lion and the bat, both of which live in the Savanna habitat, as charismatic and non-charismatic species respectively., both of which live in the Savanna habitat. This case-based comparative approach, i.e., measuring individual's behavioural and attitudinal differences between charismatic and non-charismatic

[12] We were constrained in our choices, as many non-charismatic species had no or very dated information, and fewer still had comparable high-quality photos.

species, follows standard methods used previously in the ecological economics and psychology literature (e.g. in Christie et al. (2006) and Tisdell and Nantha (2006)).

Bats are associated with unfavourable symbolic values and generate negative affective states such as disgust, fear, and phobias across cultures (Kingston, 2016; Knight, 2008; Kahn Jr et al., 2008). Although bat populations have also suffered a severe decline, this phenomenon has received less attention even in scientific circles (Fleming and Bateman, 2016). Furthermore, previous studies demonstrated that subjects have lower WTP to pay for bats (Martín-López et al., 2007). Lions are a popular, charismatic flagship commonly used on donation appeals, with populations in West, Central, and East Africa likely to suffer a projected 50% decline over the next two decades (Bauer et al., 2015; Macdonald et al., 2015). Both bats and lions are found in the Savanna, which is a policy-relevant biodiversity habitat projected to experience a severe reduction in species richness (Newbold et al., 2015). Both bats and lions in the Savanna face endangerment from common anthropogenic factors such as hunting, and illegal wildlife trade, which are unambiguous human threats (IUCN, 2016; Nielsen et al., 2018). More broadly, hunting and illegal wildlife trade can invoke strong moral assessments of right and wrong citepfischer2013 and are under-represented issues in the economics and psychology literature (St John et al., 2011).

Three 'Control videos' were constructed, one for Bats, one for Lions, and one for Bats and Lions in the Savanna (henceforth 'Savanna'). Each of these videos had conservation-relevant information, such as the ecological role and conservation status of Bats and Lions. To construct treatment videos with additional audio-visual content on the anthropogenic cause of endangerment, each of the three control videos was augmented by one photo and an additional line of voice-over script stating threats from hunting and illegal wildlife trade (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. Following Gross and Levenson (1995), the average length of each video is 150 seconds, and each photo is displayed for around 6-10 seconds. Details of each video, alongside the hypothesis and experimental design, are discussed in the experimental design subsection.

But before proceeding, we make a note of some caveats. First, the conservation status of Lions and Bats is not identical, given the IUCN classifies lions as 'vulnerable' and bats as 'threatened'. Previous work finds the degree of endangerment status impacts willingness to pay for conservation. For instance, Tisdell et al. (2007) found that WTP for conservation and the level of species endangerment are positively correlated (also see Macdonald et al. (2015). Thus, any difference in donations between Lions and Bats across movies will also capture this difference in endangerment status, if subjects know and act on the difference.[13] Second, we treat species charisma as a black box composed of multiple constituent factors (such as size, taxonomy, popularity), in line with extant economics literature.[14] As phylogenetic differences may exert independent effects on behaviour, we attempt to control for some attributes, by picking mammals with forward facing eyes. Another feature typifying species charisma is fame and popularity. However, we try to control for prior informational differences by providing conservation-relevant information and hold constant the Savanna habitat in a standardised format across all videos. As we are primarily interested in the impact of media content via videos, disentangling the relative effects of each factor constituting charisma, is left for future work.[15]

3.3 Experimental design

Each subject was randomly assigned to watch one of the six videos. This design follows experimental methods previously employed in the literature to examine the impact of the audio-visual message content on behaviour and attitudes (e.g. in Greitemeyer (2013); van der Linden (2015). More precisely, Study 1 uses a between-subjects 'build on' or 3 x 3 fractional factorial experimental design to examine if donations are affected by the type of media content from differences across (i) Bats, Lions, Savanna Control videos, (ii) Bats, Lions, Savanna Cause videos and (iii) three Cause videos with the incentive of public recognition. Study 2 on affect uses a between-subjects 3 x 2 factorial design and crosses (i) Bats, Lions, Savanna Control videos and (ii) Bats, Lions, Savanna Cause videos to map changes in affective states from Bats, Lions and Savanna and to disentangle the outrage effect.[16]

Control videos: In the Bats and Lion Control videos, each species is introduced and located within the African Savanna, followed by conservation-relevant information about its ecological role and conservation status. In the Savanna video that locates both Bats and Lions within a natural habitat, the voice-over first introduces the habitat and states 'The diverse community

[13] While 8 out of 12 subjects in the pilot study did not know the difference between threatened and vulnerable endangerment status, it is unclear whether the final sample knows the difference, as we did not collect this information.

[14] Metrick and Weitzman (1996) choose '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.'

[15] Five common elements are physical and phylogenetic features (large mammals, with forward facing eyes), ecological features, cultural and symbolic value, affect and fame (Macdonald et al. (2015); Bowen-Jones and Entwistle (2002); Lorimer (2007) examine non-human charisma in more detail). Other work investgates how particular physical attributes like eyes, are particularly important; Manesi et al. (2015) observed that participants wished to donate to save spotted butterflies (with eye-like dots) and expressed more concern over them, compared to spotless butterflies.

[16] We feel more comfortable with a between-subjects rather than within-subjects design because we are concerned that exposure to multiple videos will not yield clean treatment effects on donations or affect.

of organisms that live here depend on each other to form a complex food web'. 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, with the photos and script standardised so that it is similar to the previous single-species Control videos.

Cause videos: The Bats, Lions and Savanna Cause videos are identical to the Bats, Lions and Savanna Control videos respectively, barring a one-line voice-over in each video that states that the population of each species faces a threat from illegal hunting and poaching by humans, and contains one additional photo demonstrating illegal hunting. All other images and the script are indistinguishable from the Control videos.

Cause Videos + Public recognition: All subjects receiving this treatment are assigned to one of the three Cause videos. The only difference from the previous treatment group is an additional paragraph in the donation appeal page which states, "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."

3.4 Hypotheses

We formulate three hypotheses to study the impact of media content of biodiversity conservation videos on pro-sociality and affect, based on the literature reviewed in the previous section. Drawing from studies such as Metrick and Weitzman (1998); Christie et al. (2006); Tisdell et al. (2007) and Lorimer (2007), we propose that media content about different species have a 'charismatic megafauna effect' because they can change both pro-social behaviours towards biodiversity conservation and experienced affective states in the following hypothesis:

Hypothesis I: Videos with charismatic species elicit higher charitable donations relative to videos with non-charismatic species in Study 1 (i.e., Donations after exposure to Bats control videos < Donations after exposure to Lions control videos). Videos with charismatic species elicit higher positive affect, relative to videos with non-charismatic species in Study 2.

Next, following findings of the 'outrage effect' reported in Bulte et al. (2005) and Kahneman et al. (1993), we propose that media content anthropogenic cause of endangerment will also impact revealed pro-sociality and affect in the second hypothesis:

Hypothesis II: Videos with the anthropogenic cause of endangerment will elicit higher charitable donations in Study 1, i.e., Donations after exposure to Cause videos ¿ Donations after exposure to Control videos. Videos with the anthropogenic cause of endangerment will elicit higher negative affect (namely anger), relative to videos without audiovisual information on the anthropogenic cause of endangerment in Study 2.

Given that public visibility and social recognition can increase charitable giving in studies such as Ariely et al. (2009) and Karlan and McConnell (2014), we test the third and final hypothesis:

Hypothesis III: The offer of public recognition will increase charitable donations, i.e., Donations after exposure to Cause videos $<$ Donations after exposure to Cause videos + Public recognition.

Finally, we also consider if there are heterogeneous treatment effects, by examining the behavioural responses of 'pro-social' subjects, i.e., those who donated to charities outside the lab. On the one hand, it is likely that past donors may be more sensitive to the treatments, as they report having engaged in pro-social behaviour in the real world. Along these lines, there is evidence that pro-sociality in the lab predicts behaviour in the field (e.g. in Benz and Meier (2008)). Conversely, they may also be likely to donate less in a lab setting, because they already donate outside the lab. Other studies find no association or weak evidence on the congruence between giving in experimental games and in real life settings (Galizzi and Navarro-Martínez, 2018). Given this mixed evidence from previous work, we pay special attention to those who identify as 'Past donors' and their behaviour in the current setting.

3.5 Charitable donations

After subjects watched the video, they faced the charitable donations task. We adopted a modified dictator game used in other charitable giving experiments (Eckel and Grossman, 1996; Konow, 2010). Each subject could allocate any part of an endowment of £25 (in increments of £1), to the African Wildlife Foundation. The framing is standard in the literature, and all donations go to 'conserve vulnerable African species and their habitats' - not the species or habitat in the video clip. 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 used, with one additional picture of the Savanna grassland. We adopted several design features to make the decision setting more realistic. We choose £25 as the endowment because it is a commonly suggested middle-level amount used by conservation charities. Subjects could receive a mailed receipt of their donation amount if they were selected for the pay-out and were asked to write down their lab identification code and postal address if they so desired. The offer of the receipt served the additional purpose of increasing trust in the experiment and the charity.

Some of our experimental design choices can affect the observed results. Engel (2011)'s meta-analysis of giving, in dictator games, finds that high stakes can dampen offers, and we may observe the same pattern in this experiment as the endowment in this experiment is five times the participation fee. On the other hand, it is possible that subjects are generous, because they have a windfall endowment (Carlsson et al., 2013).[17] Finally, as we use a slider task, the default is set to £0 across all experimental interventions. All these design factors are constant across treatments groups, and we do not expect them to interact with the treatments themselves, but should be kept in mind while interpreting our results.

3.6 Affect

The affective states were selected from the PANAS-X affect schedule (Watson and Clark, 1999) and followed the elicitation procedure recommended in (Gross and Levenson, 1995) to measure experienced affect after watching videos. Subjects were asked to rate from a scale of 1 to 5 how much of each of the positive and negative affect they feel while watching the videos, namely, angry, sad, guilty, happy, calm and interest, that they felt while watching the videos. Previous research which links emotions to action tendencies supports our choices about affective states. For example, 'anger' has been associated with a tendency to restore justice or hold individuals responsible, and sadness with loss and the tendency to acquire new goods (Keltner and Lerner, 2010). 'Sympathy' has been associated with pro-sociality (e.g. Small et al. (2007). As clips of wildlife and natural landscapes are often used in experiments to elicit neutral affective states, we also included 'calm'.

Subjects answered the PANAS-X affect questions directly after watching the video clip, and

[17] Moreover, all subjects were video-recorded throughout the experiment, which is likely to have increased donations if they 'felt' observed (Haley and Fessler, 2005). Every subject has to make the donation decision, i.e., we do not give subjects the chance to opt out of the donation task, which has been found to reduce sharing in lab and field settings (Andreoni et al., 2017; Lazear et al., 2012; DellaVigna et al., 2012).

we randomised the order of the list of affect types to mitigate order effects.[18] Most studies rely on self-reports using multi-item scales, which are confirmed and validated by equivalent results from fMRI studies (Harbaugh et al., 2007; Genevsky et al., 2013). However, we also included an implicit word association exercise, as an additional robustness check-in Study 2. After reporting affect, subjects were asked to list the first three words that come to mind, while thinking about the video. The words are then grouped into positive and negative affect types based on the PANAS-X schedule, other conservation-related themes as applicable.

3.7 Individual-level control variables

Given the large pool of student and non-student subjects, we expected some heterogeneity in behaviour and motivation. We asked if subjects had previously donated to any environmental and non-environmental charities, and about their membership status to the same. Three questions were posed to measure pro-environmental behaviour, namely how often individuals bought (a) eco-friendly products (b) organic, local and seasonally grown food, and (c) 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 score. Lab experiments using dictator games find that women, non-students, and older participants make higher offers (Engel, 2011). Therefore, the experiment concludes with questions on socio-demographic attributes on age, gender and job status. We included filler questions to mitigate experimenter demand effects and randomised the order of all questions to reduce any order effects.[19]

3.8 Summary statistics for the pooled sample

The average age was 24.4 years (median age of 22 years), and 66.35% of the sample was female. Around 81% of the subjects were full-time students, and 76% of the sample reported that they had donated to a charity in the past.[20]. The average sample size for each treatment group was 42 in Study 1 and 36 in Study 2. Tables A.1 and A.2 present the individual-level characteristics for the pooled sample from both Study 1 and 2, and by intervention group respectively.

[18] In study 1, subjects were also asked questions on affect about the video clip, after making their donation decision. However, we prefer to disregard these responses in the analysis, as that donation decision can independently impact self-reports of affect.

[19] We also ask subjects willingness to pay for a green tax immediately after the affect questions, which we do not report in the current paper but discuss in greater detail in Chapter 3.

[20] This proportion is close to but marginally higher than, nationally representative U.K. survey estimates, where 67% reported making donations to a charity in 2015 (CAF, 2016)

4 Study 1 results

4.1 Media content on donations

The average donation is £8.51 or 34.04% of the endowment. This figure is close to offers in charitable giving experiments, such as 30% in Eckel and Grossman (1996), but higher than offers in anonymous dictator games (around 20% in Camerer (2003). The median donation at £5 was made by 28.91% of subjects, and 20.42% of the sample donated £10. While 6.63% of the sample donated their entire endowment of £25, 14.59% gave nothing.[21]

Figure 1 illustrates the average donations by treatment group (with error bars of 95% confidence interval). Three empirical tendencies emerge: first, 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). Secondly, for each type of video (i.e. across Bats, Lions, and Savanna), additional media content on the anthropogenic cause of endangerment elicited higher average donations, compared to the control group videos. Thirdly, the 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 fewer subjects choose not to donate when exposed to Lions videos, and this is illustrated in Figure 2 which displays the share of subjects choosing to donate an amount over £0 in the donation task by intervention group. On average, around 80% of subjects exposed to any of the Lion videos decided to donate, compared to 63.64% and 56.31% of the subjects shown any Bats or Savanna videos. Thus, the descriptive data provides tentative evidence for the charisma and outrage effect, but the impact of public recognition on donations is unclear.

[Figures 1 and 2]

Table 1 presents results from the regression models on donations. The outcome variable is the donation, and the two primary explanatory variables of interest are the treatment dummies on the type of media content. The first treatment dummy called the 'Species' variable has three categories of Bats, Lions or Savanna. The second treatment dummy called 'Cause' also has three categories for the Control video, Cause video or Cause video + Public recognition. We present results from both Tobit (Tobin, 1958) and Cragg-Hurdle regression models (Cragg, 1971), following econometric approaches used in previous dictator game experiments (Engel, 2011). As the upper boundary is the donation limit £25, models (1) and (2) present the Tobit

[21] Figure A.1 shows the distribution of donations for the pooled sample. Skewness and kurtosis tests and Shapiro-Wilk tests for normality rejects that donations are normally distributed (both for the pooled sample and by treatment group).

regression models right-censored at £25. However, the donation choice can be conceptualised as a two-stage decision process instead: first, the probability of donating any non-zero amount, versus donating nothing; and second, the decision of how much to donate conditional of having decided to donate. In this case, we treat the lower boundary as 'observed' rather than censored, i.e., the probability of donating is treated as another observed behaviour (Wooldridge, 2010; Cragg, 1971). The specific advantage of this approach was that it allowed us to estimate if the treatments had separate impacts on both the probability of donating (Probability) and the amount donated conditional of having to donate (Amount).[22]

Thus, Models (3) to (10) in Table 1 present results from the Cragg-Hurdle models, such that 'Probability' reports coefficients from a Probit regression model and 'Amount' reports coefficients from a Truncated-linear regression model. The higher proportion of subjects choosing to donate when exposed to Lions videos suggests the Cragg-Hurdle model is appropriate. We use robust standard errors clustered at the subject-level for all regression models, and the omitted category is the Bats control video. To control for potential session-level factors, we added session dummies, and an additional control variable for the number of subjects who attended each session, to control for the variation in the probability of the payoff from the charitable giving game. Individual controls included a dummy for whether the subject donated in the past (Past donor) and covariates on Pro-environmental behaviour, Age, Gender, Job status (Table A.3 presents the results of the full model).

[Table 1]

First, consider results from the Tobit regression models. From model (1) in Table 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 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. Note that the coefficient on Cause + Public recognition is positive, but not statistically significant.

Now we turn to the results of the Cragg-Hurdle regression models (models (3) to (10), Table 1). The positive coefficient on Lions in models (3) and (5) suggest that subjects are more likely to donate when exposed to Lions videos, compared to Bats (the difference is significant

[22] The appendix has a note on the Cragg-Hurdle model and estimation strategy used in the paper.

at 5%). While there is a positive coefficient on the amount donated by subjects, conditional on having decided to contribute, i.e., once they had cleared the hurdle (model (4) and (6)), it is not significant. Conversely, the treatment variable on Cause is positive and significant at 5% on the amount donated, conditional on having decided to donate. 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 model (4), 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. Note that the coefficient on Cause + Public recognition is negative in models (3) and (5), suggesting that the offer of public recognition reduces the likelihood of donating, but this difference is not statistically significant. The coefficient is however positive when considering the amount donated in models (4) and (6), but is again not statistically significant.

To summarise, our first set of results find there is a positive charisma effect on charitable donations. This result is consistent with previous findings that charismatic species elicit higher contributions, as in Thomas-Walters and J Raihani (2017) and other stated preference studies. However, our results extend the literature to show that the probability of donating is affected, rather than the amount, i.e., videos with charismatic species (Lions), increases the probability of making a charitable donation, relative to those with non-charismatic species (Bats), holding other variables constant. Secondly, audio-visual content on the anthropogenic source of conservation threat increases the charitable donation amount, conditional on having decided to donate, providing empirical support for the positive outrage effect on charitable donations, but we find no impact on the probability of donating. The positive relationship between information on the human-made cause of endangerment and donations is also consistent with previous work, such as (Bulte et al., 2005).

4.2 Pro-social subjects (Past donors)

We now restrict the sample to pro-social subjects, i.e., those who reported making donations to charities outside the lab (past donors) and use Cragg-Hurdle model to examine potential treatment effects. Models (7) to (10) in Table 1 show the results. Three important differences emerge. First, the coefficient on Lions is positive, but weakly significant, in models (7) and (9) (Probability, with and without individual controls). 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). For past donors, the average marginal effect of exposure to Control videos is £3.18, compared to the control group videos (significant at 1%).

Third, for donors, the treatment effect of the Cause + Public Recognition increases the amount donated in a statistically significant way (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 gives us the following result: Pro-social subjects (past donors) show a positive effect of Cause + Public recognition, i.e., the offer of public recognition increases the charitable donation amount, conditional on having decided to donate, relative to the control, videos.

4.3 Public recognition incentive on donations

Models (7) to (10) in Table 1 show an increase in donations for pro-social subjects exposed to Cause videos + Public recognition (relative to control videos), but the increase is of lower magnitude than being exposed to Cause videos without Public recognition. To obtain the separate treatment effect of the Public recognition incentive, we restrict the sample to those subjects exposed to either the Cause video (omitted category) or Cause + Public recognition (treatment dummy).

Table 2 reports the results of the Tobit and Cragg-Hurdle models. The coefficient on Public recognition is negative in all models, and weakly significant (at 10%) in (Tobit) model (2) when individual controls are added. The Probability of donating in model (3) is also faintly significant at 10% (translating into an average negative effect of £1.5). When we consider pro-social subjects (models (7) to (10)), the coefficient stays negative, but the difference is not statistically significant. This negative relationship is suggestive of the crowding-out effect of weak incentives on pro-social behaviour. While it is difficult to conclude why this is the case from the data available it is likely that the incentive is too weak to have a substantial positive effect on behaviour. Instead, it could have reminded subjects about what personal benefit they could derive from the donation or may have signalled to players that those who donate do so for self-interested motivations, i.e., to 'look good' rather than actually 'be good' (Gneezy and Rustichini, 2000; Bowles, 2008; Bowles and Polania-Reyes, 2012).[23]

[23] There is some support for the possibility that the incentive is weak, as only 17.6% subjects exposed to the Cause videos + Public recognition treatment opted to have their name mentioned on the receipts.

[Table 2]

4.4 Limitations and robustness

Our results are robust to the addition of session and individual controls, which yield coefficients of comparable economic magnitude. For instance, a one-unit increase in the average pro-environmental behaviour score was associated with an increase in predicted donations by around £1.70 (Table A.3 in the Appendix). We also 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 in the restricted sub-sample models. We also interacted the dummies on the types of video, i.e. Bats/Lions/Savanna, with control videos/Cause/Cause + Public recognition dummies. Lions positively predict the likelihood of donating at 10% in the full sample, and the Cause variable positively predicts the amount donated in the restricted sample of past donors. We also replicated our analysis using other specifications, to find qualitatively similar results (such as Ordinary Least Squares, Logistic regression models). These results are omitted for brevity, but available on request.[24]

We then considered the possibility that subjects may choose not to donate £0 because they mistrust the experiment or charity. If subjects decided to give £0, they were asked to state their top two reasons for choosing not to donate after they completed affect questions. '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 (10 subjects) and came in as the third most popular reason (and was also chosen by four subjects as reason 2). Overall only four subjects chose 'Do not trust the experiment' suggesting that the research design was successful in convincing subjects that the donations would indeed go to the charity.[25] We restricted the sample by dropping the 17 observations of the non-donors that 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 qualitatively similar and are available on request. Finally, we cannot fully control for the context subjects bring with them into the lab or the numerous differences that exist between the lab and field setting, which threaten external validity. Instead, we attempt to estimate the impact of these factors on our results, through the collection of observable subject attributes and past donations behaviour.

[24]We follow Humphreys (2010) and Wooldridge (2010) to treat the boundary value of £0 donations as observed, rather than a sample selection problem with no missing data, so we do not use a Heckman selection model.

[25]For more detail, please refer to Figure A.2 in the Appendix.

5 Study 2 results

5.1 Media content on Experienced Affect

We now turn to the impact of the biodiversity conservation videos on self-reported affect. Figures 3 to 9 illustrate the average scores of experienced affective states (angry, sad, guilty, sympathy, happy, calm and interest), for subjects exposed to the control group videos and videos with additional content on the anthropogenic cause of endangerment. Results from ordinal logistic regression models are presented in Table 3 (with standard errors clustered at the subject level, with session dummies and individual controls).

Several findings emerge. First, we consider the effects of species habitat videos. Exposure to Lions videos elicited higher scores of experienced happiness (significant at 5%, model (5) in Table 3). This result implies an increase in the odds of reporting the highest happiness scores by 2.42 times, holding other variables constant, relative to the Bats Control videos. The increase in self-reported affect is in line with previous studies that link species charisma to positive affect and likeability (Lorimer, 2007; Tisdell et al., 2007; Brambilla et al., 2013; Martín-López et al., 2007). Exposure to Savanna videos, on the other hand, elicited higher reported interest, where the odds of reporting highest Interest scores were also around 2.16 times higher, relative to Bats videos. There was also a positive effect on experienced calm (significant at 10%).

Secondly, there was an increase in the intensity of most types of affect between subjects exposed to Control and Cause videos. Cause videos increase the intensity of anger, and interest (significant at 1%), and sadness and sympathy (at 5%). From model (1) in Table 3, the odds of highest angry affect score versus the low categories were 2.85 times higher, for 'Cause videos, when holding other variables constant. The odds of reported sadness at the highest score are were 1.84 times higher for Cause videos compared to control group videos. Model (4) considers sympathy, where the odds of subjects reporting the highest sympathy and interest scores are 1.70 and 2.10 times higher for Cause videos, respectively. This finding is consistent with the outrage effect, as well as other studies linking sadness and sympathy to giving (Kahneman et al., 1993; Kahneman and Knetsch, 1992; Small et al., 2007). But cause videos also elicited weakly higher reported happiness (at 10%). While it is unclear why this may be the case, one explanation could be that individuals experience greater emotional arousal across all types of affective when the human-made cause of harm is made salient or when they experience greater 'outrage'. However, further investigation is needed to examine this idea.

[Table 3]

[Figures 3 to 9]

In summary, audio-visual media content about different species and habitats, elicit different affective responses: videos with charismatic species (Lions), increases self-reported happiness, and those with composite habitats (Savanna) evoke greater interest, relative to videos with non-charismatic species (Bats). Finally, media content on the anthropogenic cause of threat in conservation videos causes an increase a range of self-reported affect types, including anger, sadness, sympathy, happiness and interest. This extends previous experimental evidence in Kahneman et al. (1993), who measure an increase in one type of negative affect, as subjects report feeling more 'upset'. More broadly, these results are in line with studies that find individuals experience mixed emotional states, which are separable by experience, and linked to the narratives told by charitable organizations (Ruth et al., 2002; Kemp et al., 2012; Merchant et al., 2010; Bennett, 2015). From an alternate theoretical perspective, citetkonow2009 also found that dictators experienced more of a 'good mood' when the recipients are charities, and 'bad mood' when they are fellow students, highlighting that the target recipient (and perceived need) can also influence the donor's experienced affect.

5.2 Limitations and Robustness

Our results are robust to the addition of session fixed effects and individual controls. Notably, when we look at the individual's attributes, pro-environmental behaviour scores are significantly and positively related to anger, sadness, and interest (at 1% significance level), and sympathy (at 5%). We also replicate the analysis with the interaction between treatment dummies on the types of video (i.e. Bats/Lions/Savanna) with Control videos/Cause dummies, with qualitatively similar results. Finally, we consider results of the implicit word association test, to examine the frequency of positive and negative affect words across different treatments. We find that Lions elicit a higher count of positive affect words (mainly related to happiness/joviality), and this is congruent with our experimental results on self-reported affect (Table A.5 in the Appendix). That said, it is beyond the scope of the both studies to unpack the causal effect of different types of affect or the intensity of experienced affect on donations behaviour.

6 Discussion and conclusion

The ongoing sixth mass extinction event mandates urgent public attention and support for conservation work. There is a dearth of empirical evidence about what motivates people to give to conservation and how to design effective interventions to this end. This paper aims to fill the gap by exploring how different types of audiovisual media content impacts charitable donations and experienced affect, by using a series of lab experiments. The novelty of this effort is to disentangle the behavioural and emotional basis of the charismatic megafauna effect and outrage effect. We attempt this task by exposing individuals to brief biodiversity conservation videos with narrative content about charismatic Lions, non-charismatic Bats and a complex Savanna habitat composed of both species, both with and without the anthropogenic cause of endangerment. We also examine if a non-pecuniary incentive of public recognition impacts charitable donations. In this way, we attempt to push the frontier of existing evidence of how resources are allocated towards biodiversity by considering a new context and potential psychological processes that can underpin decision-making therein.

The results from both Study 1 and 2 yield evidence for the charismatic megafauna and outrage effect, but extend the previous literature by isolating distinct channels of behavioural impact. Specifically, videos with charismatic Lions increased the likelihood of donating, but not the amount donated. Conversely, videos with the human cause of endangerment, increased the amount donated conditional on having decided to donate, but not the likelihood of donating. We also noted that treatment effects are heterogeneous: the offer of public recognition increased donations for past donors or those who have selected into altruistic giving environments outside the lab, albeit to a lower extent than exposure to Cause videos, with no incentive. Effects were sizeable and ranged from £1.5 to £3. To put this into perspective, £2 is the suggested lower limit on donations on many conservation charity websites. Study 2 reveals videos elicit complex and mixed emotional reactions in subjects: for instance, videos with the anthropogenic cause of threat caused an increase in self-reported anger, sadness and interest, and charismatic Lions increased self-reported happiness.

Our results hold some potential implications for those in academia, conservation, and policy. One implication is that conservation organisations could diversify the type of species used in video appeals by featuring more non-charismatic species and complex habitats, and by making explicit the anthropogenic cause of species endangerment. They could continue to use charismatic species to widen their donor base as a complementary strategy. This approach simultaneously addresses previously voiced concerns about the marginalisation of non-charismatic species and ignorance of the anthropogenic drivers of the mass extinction event. It also capitalises on the benefits of using charismatic species. Replicating these results in different contexts and samples, and by using different narratives, alongside field testing is an exciting prospect for future research to ensure a robust evidence base for policy.

Finally, we suggest that mixed emotional reactions can have short-term effects on pro-sociality towards biodiversity if subjects see ‘red’ but act ‘green’. While we cannot shed light on the causal effects of emotions on donations, this is another promising avenue for future work. Using alternative bio-physical measures of affect like fMRI scanning or skin conductance technologies may be particularly fruitful methods to uncover these causal relationships.

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7 Tables and Figures

Figure 1: Average donations made by individuals (Study 1, N=377)

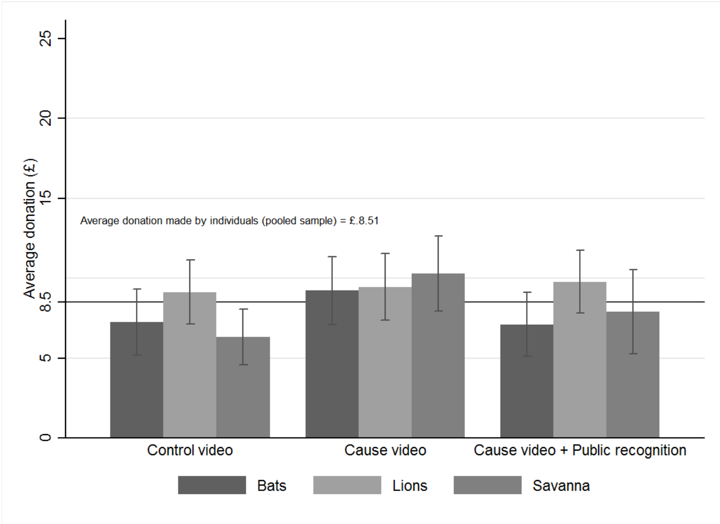


Figure 2: Share of individual donations over £0 (Study 1, N=377)

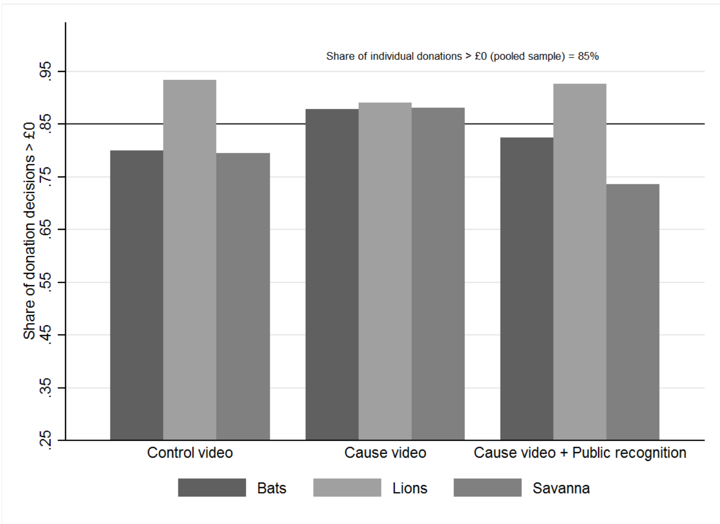


Table 1: Impact of Media Content on Donations in Study 1

Estimation method:	Tobit models		Cragg-Hurdle models							
Sample:			All				Past Donors			
Hurdle:			Probability	Amount	Probability	Amount	Probability	Amount	Probability	Amount
Regression models:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Species = 1, Lions	1.734**	1.903**	0.422**	1.484	0.428**	1.465	0.429*	1.082	0.425*	1.506
	(0.875)	(0.870)	(0.205)	(1.386)	(0.210)	(1.365)	(0.243)	(1.577)	(0.252)	(1.473)
Species = 2, Savanna	0.407	0.600	-0.127	0.873	-0.102	0.660	-0.138	1.025	-0.044	1.140
	(0.917)	(0.924)	(0.187)	(1.472)	(0.189)	(1.455)	(0.218)	(1.547)	(0.227)	(1.529)
Cause = 1, Human	2.150**	1.970**	0.160	3.292**	0.165	2.953**	0.241	5.412***	0.170	4.999***
	(0.905)	(0.929)	(0.203)	(1.416)	(0.205)	(1.392)	(0.235)	(1.535)	(0.237)	(1.411)
Cause = 2, Human + Recognition	0.594	0.208	-0.065	1.644	-0.085	1.084	0.104	4.116**	0.111	3.822**
	(0.936)	(0.915)	(0.204)	(1.538)	(0.206)	(1.489)	(0.237)	(1.719)	(0.239)	(1.579)
Constant	15.408	12.778	0.713	19.886	0.658	14.377	0.951	4.698	0.946	-2.988
	(14.816)	(14.875)	(3.528)	(21.822)	(3.405)	(21.882)	(4.314)	(23.873)	(4.054)	(24.912)
Observations	377	377	377	377	377	377	289	289	289	289
Session controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Notes: Dependent variable: donations (£0-25), all models use robust standard errors clustered at the subject-level, with *** p<0.01, ** p<0.05, * p<0.1. The omitted group is Bats control video.

Table 2: Impact of Public Recognition on Donations in Study 1

Estimation method:	Tobit models		Cragg-Hurdle models							
Sample:			All				Past Donors			
Hurdle:			Probability	Amount	Probability	Amount	Probability	Amount	Probability	Amount
Regression models:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Public Recognition = 1, Public recognition	-1.569	-1.741*	-0.367	-1.465	-0.407*	-1.571	-0.233	-0.864	-0.176	-0.796
	(0.976)	(0.989)	(0.228)	(1.481)	(0.238)	(1.377)	(0.271)	(1.698)	(0.271)	(1.462)
Species = 1, Lions	1.627	1.929*	0.328	1.580	0.352	1.742	0.394	0.302	0.360	0.496
	(1.068)	(1.032)	(0.265)	(1.649)	(0.274)	(1.529)	(0.344)	(1.939)	(0.362)	(1.700)
Species = 2, Savanna	0.916	1.187	-0.208	1.951	-0.192	2.061	-0.242	1.517	-0.212	1.875
	(1.183)	(1.192)	(0.248)	(1.741)	(0.248)	(1.657)	(0.288)	(1.910)	(0.293)	(1.790)
Constant	12.618	6.053	5.037	-3.175	4.265	-13.512	30.048***	-14.891	29.147***	-28.605
	(24.916)	(24.768)	(4.912)	(31.968)	(4.729)	(31.241)	(3.653)	(32.548)	(3.345)	(33.315)
Observations	248	248	248	248	248	248	186	186	186	186
Session controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	No	Yes	No	No	Yes	Yes	No	No	Yes	Yes

Notes: Dependent variable: donations (£0-25), all models use robust standard errors clustered at the subject-level, with *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The omitted group is Bats control video.

Figure 3: Angry (Study 2, N = 177)

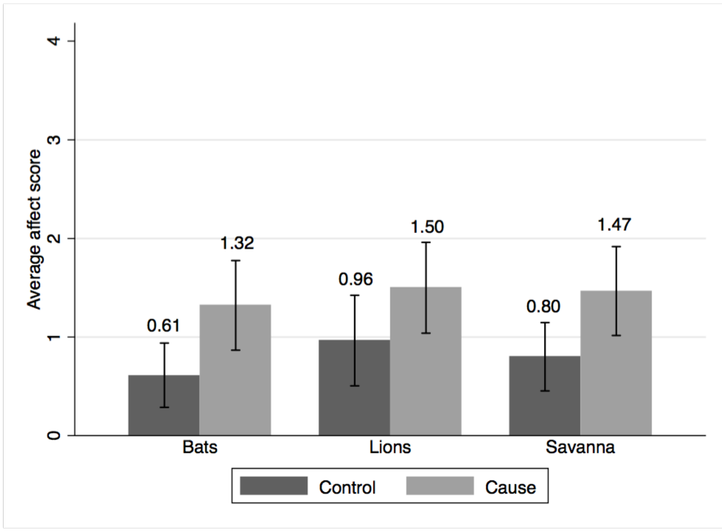


Figure 4: Sad (Study 2, N = 177)

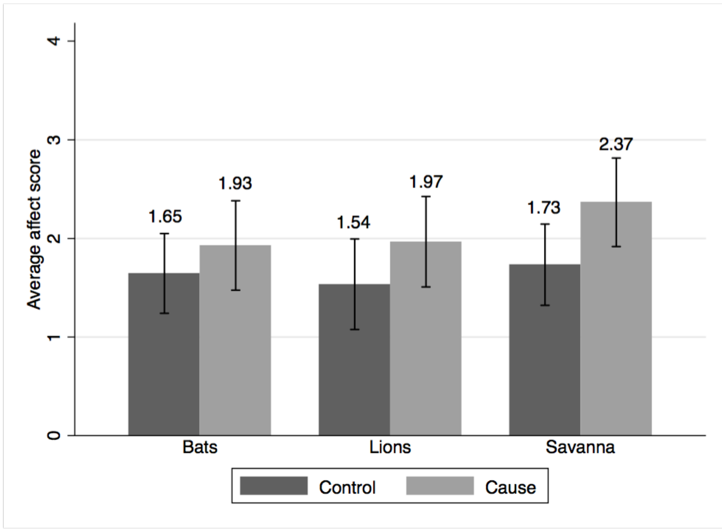


Figure 5: Guilty (Study 2, N = 177)

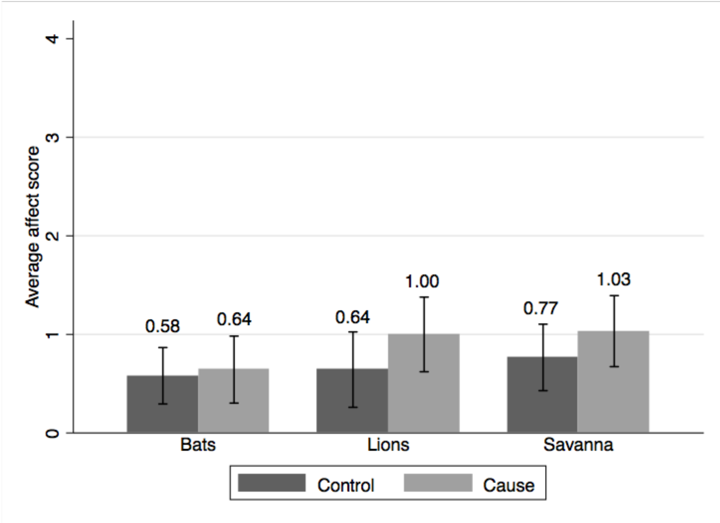


Figure 6: Sympathy (Study 2, N = 177)

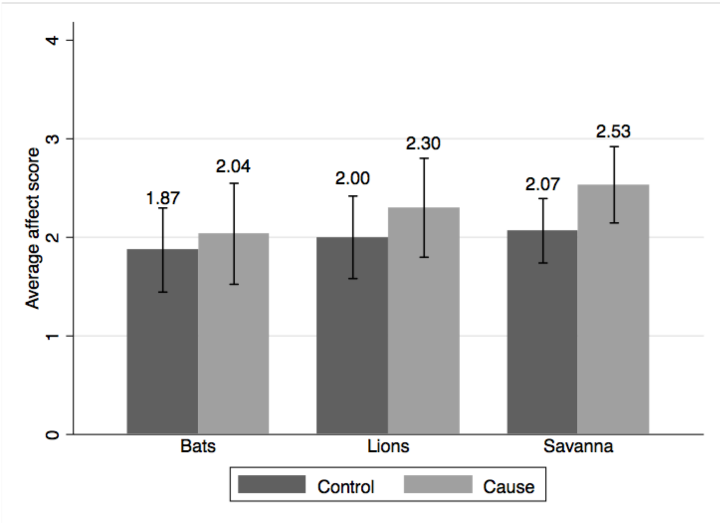


Figure 7: Happy (Study 2, N = 177)

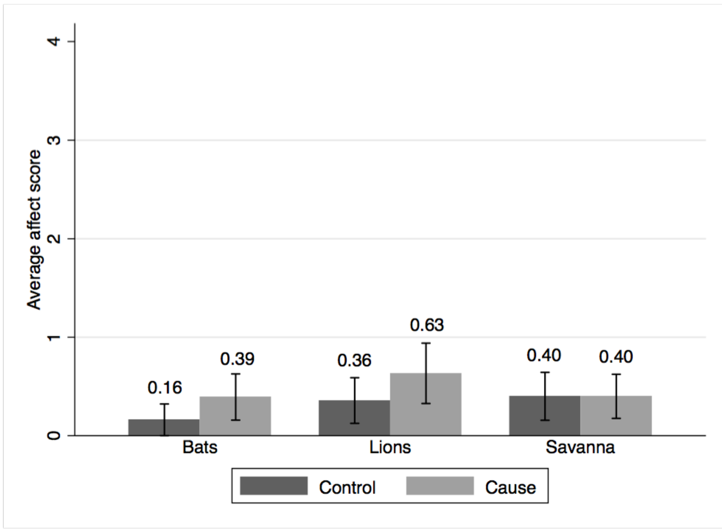


Figure 8: Calm (Study 2, N = 177)

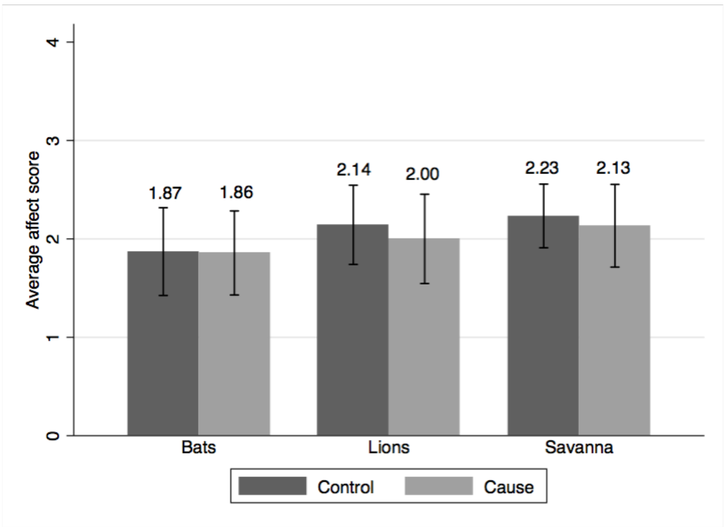


Figure 9: Interest (Study 2, N = 177)

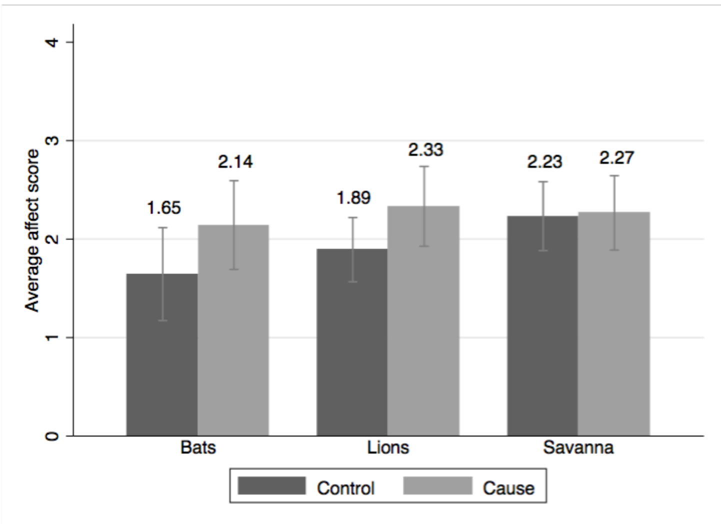


Table 3: Impact of videos on affect in Study 2

Dependent variables: Ordinal regression models:	Angry (1)	Sad (2)	Guilty (3)	Sympathy (4)	Happy (5)	Calm (6)	Interest (7)
Species = 1, Lions	0.347	-0.138	0.265	0.309	0.941**	0.471	0.470
	(0.398)	(0.377)	(0.392)	(0.376)	(0.439)	(0.388)	(0.376)
Species = 2, Savanna	0.498	0.464	0.709*	0.483	0.549	0.625*	0.791**
	(0.364)	(0.333)	(0.400)	(0.348)	(0.422)	(0.374)	(0.376)
Cause = 1, Human	1.050***	0.610**	0.433	0.656**	0.756*	-0.005	0.833***
	(0.330)	(0.293)	(0.311)	(0.310)	(0.398)	(0.295)	(0.313)
Observations	177	177	177	177	177	177	177
Session dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variable: self-reported affect (None at all (0) to Extremely (4)); all models use robust standard errors clustered at the subject-level, with *** p<0.01, ** p<0.05, * p<0.1. The omitted group is Bats control video.

8 Appendix

8.1 Estimation strategy: Cragg-Hurdle model

We assume that all subjects are faced with a two-step decision problem i.e. the first step is to decide whether to make a positive contribution, and the second step is then the decision of how much to give, conditional on the willingness to give at all. This can be estimated using a Cragg-Hurdle model, which treats the boundary value of £0 donations as a variable of analytical interest (Cragg 1971, Woolridge 2010). We can conceptualize donations as $y_i = d_i * h_i$, where y_i is the quasi-continuous observed value of the dependent variable, which are the donations made by subjects. The selection variable is d_i and takes the value of 1 if subjects choose a positive donation amount (given the set of explanatory variables) and 0 otherwise (which act as a lower limit that binds the dependent variable). Thus;

$$d_i = \left\{ \begin{matrix} 0 : c_i\gamma + r_i\delta + x_i\beta + \epsilon_i > 0 \\ 1 : otherwise, \end{matrix} \right\} \tag{1}$$

From (A.1), c_i and r_i are the treatment dummies for species-habitat and cause-pubic recognition treatment groups, and γ and δ are their coefficients respectively. x_i and $beta$ are the vector of other explanatory variables and their coefficients, and ϵ_i is the associated standard normal error term. Once the subject has decided to donate, the second step of the decision problem is;

$$h_i^* = c_i\alpha + r_i\theta + x_i\rho + \upsilon_i \tag{2}$$

From (A.2), is the quasi-continuous latent dependent variable which is observed when $d_i = 1$. The explanatory variables remain the same i.e. c_i and r_i are the treatment dummies for species-habitat and Cause-Pubic Recognition treatment groups, x_i is the vector of other explanatory variables. α and θ are the coefficients on the treatment dummies and is the vector of coefficients on the explanatory variables, and is the error term. Importantly the parameters of the treatment dummies in for both the selection and latent dependent variables (i.e., d_i and h_i^*) may differ. This allows us to account for the fact that the decision to give may be influenced by different factors than the decision on the amount to give. The analysis was carried out in Stata using the *churdle* command in conjunction with the *margins* command to estimate the average marginal effect.

References:

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*, pages 829–844.

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data. MIT press.

8.2 Additional tables and figures

Figure A.1: Distribution of donation for all observations (N=377)

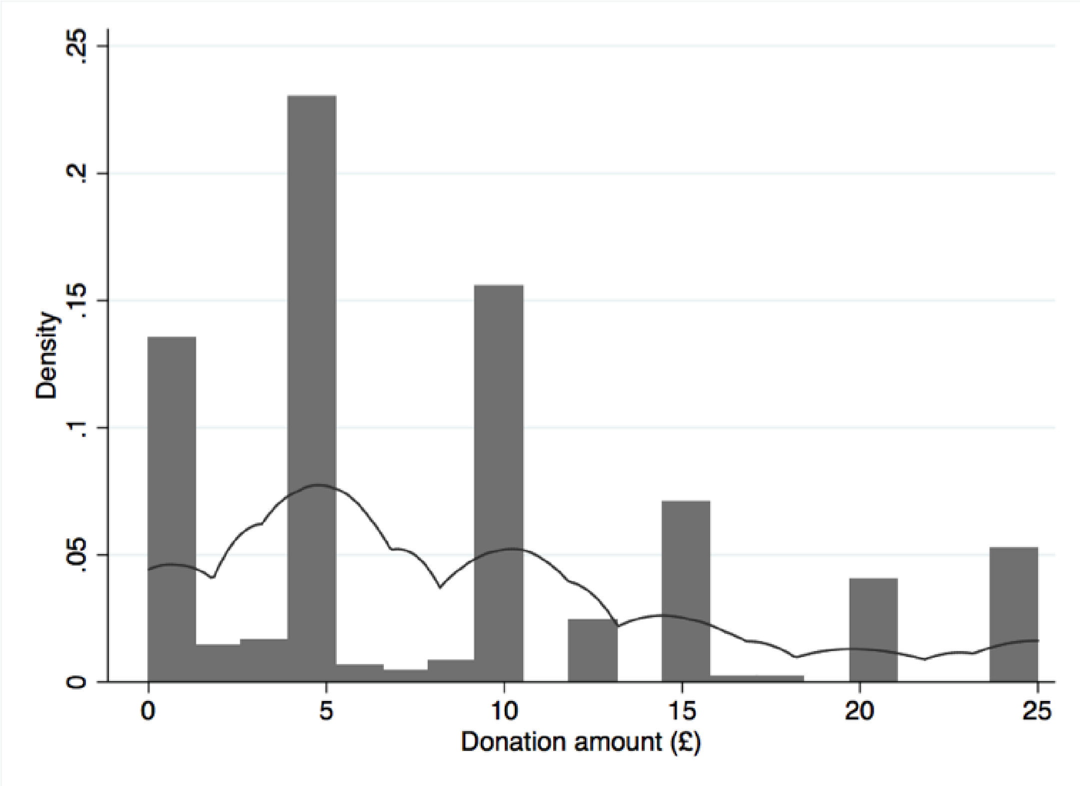


Table A.1: Description of variables

Variables	Description	N	Observed values Mean	Std. Dev.	Min	Max
Study 1.- Donations						
Donations	Charitable donation decision from £0 to £25	377	8.51	6.99	0	25
Study 2.- Affect						
Happy	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	0.39	0.66	0	2
Angry	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	1.11	1.18	0	4
Sad	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	1.86	1.22	0	4
Guilty	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	0.78	0.96	0	4
Sympathy	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	2.13	1.19	0	4
Calm	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	2.03	1.13	0	4
Interest	Self-report from PANAS-X affect schedule (Very slightly or none at all (0) to Extremely (4))	177	2.08	1.12	0	4
Study 1 and 2: Pooled sample						
Donor	Previously made donations to charity (No (0), Yes (1))	554	0.76	0.43	0	1
Pro-environmental behaviour (PEB)	Average PEB score (Minimum (0) to Maximum (4))	554	2.28	1.02	0	4
Age	Continuous, in years	554	24.41	7.51	17	66
Gender	Categorical, Male (0), Female (1)	554	0.66	0.47	0	1
Job status	Categorical, Full time student (FTS, 0), Working full time (WFT, 1), Working part time (WPT, 2), Other (3)	554	0.36	0.86	0	3
Subjects/session	Number of subjects per session	554	16.11	3.77	1	20

Notes: The experiment was held during 16 November to 8 December 2016. The number of subjects per session ranged from 5 to 20 (maximum capacity).

Table A.2: Pre-treatment behaviour and socio-demographic characteristics by treatment group: Mean and standard deviation (S.D.)

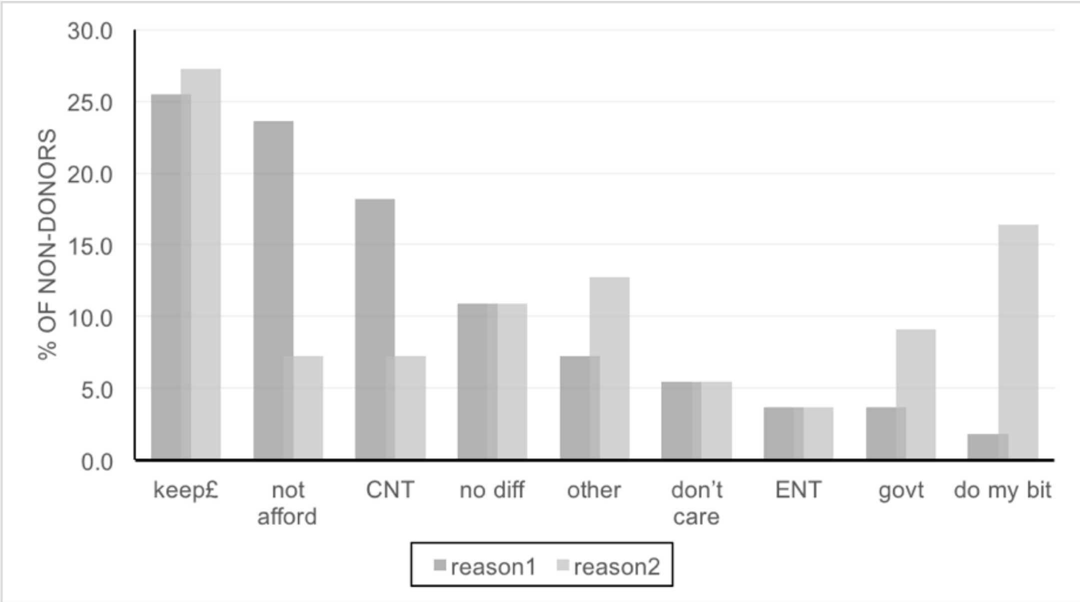
Treatment groups	Donors		PEB		Age		Gender		Job		N
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Study 1: Donations											
Bats Control videos	0.9	0.3	1.95	0.68	26.98	8.41	0.65	0.48	0.35	0.74	40
Bats Cause videos	0.78	0.42	1.78	0.78	22.76	4.94	0.66	0.48	0.15	0.53	41
Bats Cause videos + Public recognition	0.78	0.42	1.77	0.7	24.25	5.33	0.8	0.41	0.18	0.55	40
Lions Control videos	0.71	0.46	1.7	0.74	24	7.21	0.69	0.47	0.62	1.13	45
Lions Cause videos	0.67	0.47	1.72	0.81	23.89	7.78	0.52	0.51	0.33	0.9	46
Lions Cause videos + Public recognition	0.78	0.42	1.94	0.74	26.56	10.31	0.78	0.42	0.32	0.69	41
Savanna Control videos	0.8	0.41	1.83	0.76	23.68	5.75	0.66	0.48	0.39	0.92	44
Savanna Cause videos	0.76	0.43	1.67	0.68	23.88	8.55	0.64	0.48	0.29	0.81	42
Savanna Cause videos + Public recognition	0.74	0.45	1.7	0.72	24.03	6.31	0.53	0.51	0.34	0.94	38
Study 2: Affect											
Bats Control videos	0.74	0.44	2.03	0.62	24.19	8.26	0.74	0.44	0.45	0.85	31
Bats Cause videos	0.79	0.42	1.95	0.69	26.25	11.81	0.64	0.49	0.57	1.07	28
Lions Control videos	0.71	0.46	1.86	0.7	25.04	8.54	0.61	0.5	0.64	1.19	28
Lions Cause videos	0.77	0.43	1.88	0.69	22.47	3.71	0.77	0.43	0.13	0.57	30
Savanna Control videos	0.73	0.45	1.76	0.77	24.1	6.57	0.63	0.49	0.47	1.04	30
Savanna Cause videos	0.8	0.41	1.94	0.67	24.43	5.56	0.63	0.49	0.37	0.67	30
All	0.76	0.43	1.82	0.72	24.41	7.51	0.66	0.47	0.36	0.86	554

Table A.3: Donation with covariates: Study 1

Sample		All		Past Donors	
Estimation method	Tobit	CH, Probability	CH, Amount	CH, Probability	CH, Amount
Models	(1)	(2)	(3)	(4)	(5)
Species = 1, Lions	1.903**	0.428**	1.465	0.425*	1.506
	(0.87)	(0.21)	(1.37)	(0.25)	(1.47)
Species = 2, Savanna	0.6	-0.102	0.66	-0.044	1.14
	(0.92)	(0.19)	(1.46)	(0.23)	(1.53)
Cause = 1, Human	1.970**	0.165	2.953**	0.17	4.999***
	(0.93)	(0.21)	(1.39)	(0.24)	(1.41)
Cause = 2, Human + Recognition	0.208	-0.085	1.084	0.111	3.822**
	(0.92)	(0.21)	(1.49)	(0.24)	(1.58)
Past donor = 1, Yes	-0.847	0.03	-1.31		
	(0.95)	(0.20)	(1.41)		
Pro-environmental behaviour	1.380***	0.164	1.529**	0.141	2.581***
	(0.51)	(0.13)	(0.75)	(0.15)	(0.76)
Age	0.028	-0.006	0.074	-0.012	0.104
	(0.06)	(0.01)	(0.09)	(0.02)	(0.11)
Gender = 1, Female	1.219	0.278	1.109	0.366	0.779
	(0.86)	(0.19)	(1.40)	(0.23)	(1.50)
Job status = 1, WFT	-3.113**	-0.303	-5.731**	-0.151	-5.637**
	(1.37)	(0.33)	(2.62)	(0.37)	(2.61)
Job status = 2, WPT	-3.26	4.329***	-7.539	4.249***	-10.475**
	(2.27)	(0.47)	(4.69)	(0.40)	(5.21)
Job status = 3, Other	-2.822*	-0.14	-4.629*	-0.373	-5.679**
	(1.53)	(0.37)	(2.56)	(0.43)	(2.87)
Constant	12.78	0.658	14.377	0.946	-2.988
	(14.87)	(3.41)	(21.88)	(4.05)	(24.91)
Observations	377	377	377	289	289
Session controls	Yes	Yes	Yes	Yes	Yes

Notes: Dependent variable: donations (£0-25), all models use robust standard errors, with *** p¡0.01, ** p¡0.05, * p¡0.1. The Cragg-hurdle model (CH) treats the hurdle (£0 donations) as probit (Probability, models 1 and 3) and the amount (£1-25) spent as a truncated linear regression (Amount, models 2 and 4). For a one unit change in the predictor, the probit regression coefficients give the change in the z-score or probit index, and the truncated regression coefficients give the predicted change in the dependent variable. The omitted groups are Bats treatment group (control video without anthropogenic cause of endangerment and public recognition), Gender = 0-Male, Job = 0-Full time student (FTS; WFT: Working full time, WPT: Working part time).

Figure A.2: Reasons for not donating: Share of responses



Notes: Subjects could select their top two reasons for choosing to not donate from the drop down list of options which included (in a randomized order): (a) Rather keep the money (keep£) (b) I can't afford to (c) I don't trust the charity (CNT) (d) I don't believe that my donation will make a difference (no diff) (e) Other reason (other) (f) I already do my bit to help the planet (do my bit) (g) I don't trust this experiment (ENT) (h) The government should ensure that wildlife and their habitats are protected (govt).

8.3 Supplementary materials

8.3.1 Video scripts

Non-charismatic species script: Giant Leaf-nosed Bat

Introduction: This is the Giant Leaf-nosed Bat. The Giant Leaf-nosed Bat lives in the Savanna, in sub-Saharan Africa. Bats live in groups, called colonies, in cave habitats but also roost in tree canopies, hollow trees and dense vegetation.
Ecological role: Bats have an important role in maintaining the health of the local ecosystem. Bats maintain the equilibrium in the Savanna ecosystem by consuming a large number of insects. They also feed on fruit and nectar, and in the process, they pollinate numerous plants and disperse seeds.
Endangerment: Although the Giant Leaf-nosed Bat was once a widespread species, the population is now in significant decline. It is classified as a Threatened species, but it has disappeared in the majority of its range. Habitat loss and conversion has led to a number of Bat populations becoming small, isolated or extinct.
Information on anthropogenic threat: *But the main threats to Bats are indiscriminate mining in limestone caves and disturbance of their roosting spots by local populations. Illegal hunting for their pelts and their meat has also lead to a population decline in some areas.*
End: The Giant Leaf-nosed Bat is one of Africa's greatest treasures, but needs protection to survive.

Charismatic species script: African Lions

Introduction: This is the African Lion. The African Lion lives in the Savanna, in sub-Saharan Africa. Lions live in groups, called prides, in open grasslands or woodlands.

Table A.4: Affect with covariates: Study 2

Ordinal logistic regressions	Angry	Sad	Guilty	Sympathy	Happy	Calm	Interest
Models	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Species = 1, Lions	0.347	-0.138	0.265	0.309	0.941**	0.471	0.47
	(0.40)	(0.38)	(0.39)	(0.38)	(0.44)	(0.39)	(0.38)
Species = 2, Savanna	0.498	0.464	0.709*	0.483	0.549	0.625*	0.791**
	(0.36)	(0.33)	(0.40)	(0.35)	(0.42)	(0.37)	(0.38)
Cause = 1, Human	1.050***	0.610**	0.433	0.656**	0.756*	-0.005	0.833***
	(0.33)	(0.29)	(0.31)	(0.31)	(0.40)	(0.30)	(0.31)
Past donor = 1, Yes	0.458	-0.308	0.284	-0.077	0.654	-0.517	-0.012
	(0.39)	(0.36)	(0.42)	(0.37)	(0.50)	(0.35)	(0.37)
Pro-environmental behaviour	0.496**	0.542**	0.291	0.402	0.193	-0.178	0.525**
	(0.25)	(0.23)	(0.25)	(0.26)	(0.25)	(0.21)	(0.23)
Age	-0.018	-0.003	-0.027	-0.03	0.003	0.025	0.054**
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Gender = 1, Female	0.461	0.257	0.555	0.16	-0.612	-0.407	0.097
	(0.31)	(0.33)	(0.37)	(0.30)	(0.39)	(0.34)	(0.32)
Job status = 1, WFT	-0.556	-0.868*	-0.189	-0.052	1.216**	0.428	0.177
	(0.75)	(0.51)	(0.53)	(0.71)	(0.58)	(0.77)	(0.75)
Job status = 2, WPT	-0.387	-1.072	-0.133	0.15	-0.41	0.525	-1.979**
	(0.72)	(0.97)	(0.74)	(0.90)	(0.92)	(1.06)	(0.84)
Job status = 3, Other	0.154	-0.972	-0.402	0.606	-0.207	1.407***	0.99
	(0.84)	(0.78)	(0.73)	(0.65)	(0.68)	(0.44)	(0.70)
Session dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	177	177	177	177	177	177	177

Notes: Dependent variable: self-reported affect (None at all (0) to Extremely (4)); all models use robust standard errors, with *** p¡0.01, ** p¡0.05, * p¡0.1. The ordinal logistical regression coefficients give the ordered log-odds. The omitted groups are Bats treatment group (B-D i.e., control video without anthropogenic cause of endangerment and public recognition), Gender = 0-Male, Job = 0-Full time student (FTS; WFT: Working full time, WPT: Working part time).

Table A.5: Implicit word associations

Type of word	Bats-Control video	Bats- Cause video	Lions-Control video	Lions-Cause video	Savanna-Control video	Savanna-Cause video	All
Negative Affect	23.66	12.64	16.67	13.98	10	6.45	13.9
Positive Affect	7.53	3.45	9.52	15.05	2.22	0	6.3
Other Affect	7.53	4.6	5.95	2.15	1.11	1.08	3.74
Ecological-related	24.73	34.48	39.29	37.63	35.56	39.78	35.25
Conservation-related	10.75	6.9	8.33	1.08	8.89	4.3	6.71
Destruction-related	12.9	20.69	8.33	21.51	16.67	24.73	17.47
Other	12.9	17.24	11.9	8.6	25.56	23.66	16.64
All categories	87.1	82.76	88.1	91.4	74.44	76.34	83.36

Notes: The five categories of words that emerged from the word association test are positive and negative affect, and words related to ecology (e.g. ecosystem, animal, lion, bats), conservation (e.g. protect, preserve, help) and destruction (e.g. hunting, endangerment, destruction). Affect-based words (positive, negative and other) are classified by the PANAS-X affect schedule (Watson and Clark, 1999). Patterns are similar across treatment groups, and words associated with the ecology were the largest category (averaging 35% of all words across all groups), followed by those related to destruction (around 17.5%) and negative affect (around 14%). Notably, Bats elicit more negative affect words associated with disgust, compared to Lions, who elicit more words associated with anger.

Ecological role: Lions have an important role in maintaining the health of the local ecosystem. Lions maintain the predator-prey equilibrium in the Savanna. By hunting medium and large herbivores, lions keep their populations in check to prevent over-grazing and habitat destruction.
Endangerment: Although the African Lion was once a widespread species, the population is now in significant decline. It is classified as a Vulnerable species, but it has disappeared in the majority of its range. Habitat loss and conversion has led to a number of Lion populations becoming small, isolated or extinct.
Information on anthropogenic source of threat: *But the main threat to Lions comes from local populations that kill them to protect themselves and their livestock. Illegal hunting for trophies and meat has also led to a population decline in some areas.*
End: The African Lion is one of Africa's greatest treasures, but needs protection to survive.

Complex habitat script: Bats and Lions in the African Savanna

Introduction: This is the Savanna, in sub-Saharan Africa. The African Savanna is the largest grassland and woodland ecosystem in the world and supports a wide variety of plant and animal life.
Ecological role: The diverse community of organisms that live here depend on each other to form a complex food web. The African Lion for instance has an important ecological role in the savanna. By hunting medium and large herbivores, lions keep their populations in check to prevent over-grazing and habitat destruction. The Giant Leaf-nosed Bat is another species that has an important role in maintaining local ecosystem health. By consuming large numbers of insects, bats keep their population in check. They also pollinate numerous plants and disperse seeds.
Endangerment: Although the Savanna - and its wildlife - was once widespread, this ecological habitat is now in significant decline. The African Lion, for example, is classified as Vulnerable, and has disappeared in the majority of its range. The Giant Leaf-nosed Bat is also Threatened, and missing in its native range.
Information on anthropogenic source of threat: *Intensive farming, deforestation and over-grazing have led to the removal of naturally occurring Savanna vegetation and habitats. Other threats from humans to both lions and bats are killings by local populations as well as illegal hunting for meat and body parts.*
End: The Savanna grassland and its endangered animals - such as the Lion and the Bat - are some of Africa's greatest treasures, but need protection to survive.

8.3.2 Video links

Bats – Control: https://youtu.be/hg28VbhLbAA
Bats – Cause: https://youtu.be/cQVT7wJ0hoQ
Lions – Control: https://youtu.be/k-KVGQSizgE
Lions – Cause: https://youtu.be/2nF_mrfsdwU
Savanna – Control: https://youtu.be/yKA60PevI9w
Savanna – Cause: https://youtu.be/AErTDRa0XaU

8.3.3 Sequence of photos with links

The videos are intended only for education/research purposes as in this paper. All photos were taken from Wikipedia, Wikimedia, Flickr, Google images., Search terms included Africa, Savanna, Lion, Leaf nosed bat. Images used were available under the creative commons license and/or for reuse for non-commercial purposes.

Hyper-links are provided by the source name and date wherever available. No copyright infringement is intended.

Bats and Lions

1 Intro: "Please clear your mind of all thoughts and feelings." (20 seconds)

2 Single individual in habitat 1

   2a Bats: Frank Vassen, 2010:https://www.flickr.com/photos/42244964@N03/4315234399

   2b Lions: Kevin Pluck, 2004: https://upload.wikimedia.org/wikipedia/commons/7/73/Lion_waiting_in_Namibia.jpg

3 Savanna landscape 1: Ikiwaner, 2008: https://commons.wikimedia.org/wiki/File:Kiang_West_savanna.jpg;

4 Savanna landscape 2: CT Cooper, 2011:https://commons.wikimedia.org/wiki/File:Savanna_towards_the_north_from_Lion_Rock_in_the_LUMO_Community_Wildlife_Sanctuary,_Kenya.jpg

5 Pair of individuals

   5a Bats: Charlesjsharp, 2013: https://commons.wikimedia.org/wiki/File:Commerson%27s_leaf-nosed_bats_hipposideros_commersoni.jpg

   5b Lions: Robek, 2006: https://commons.wikimedia.org/wiki/File:Pair_of_lions.jpg

6 Single individual in habitat 2

   6a Bats: David Dennis, 2007:https://commons.wikimedia.org/wiki/File:Bat_in_a_Cave.jpg

   6b Lions: Anette Mossbacher:https://anettemossbacher.photoshelter.com/image/I0000sRSnFv.8ONg

7 Group/family in habitat 1

   7a Bats: US Geological survey 2014:https://www.flickr.com/photos/usgeologicalsurvey/14539308013/in/photolist-o9MKJn-eouGhy-87sHDx-enV1oH-8YbKC7-nw2uSV-dfZFyX-6iTy5p-dnfyQT-ba2uwz-qi3uK3-ndK8gJ-6R

   7b Lions: Benh LIEU SONG 2012:https://commons.wikimedia.org/wiki/File:Lions_Family_Portrait_Masai_Mara.jpg

8 Group/family in habitat 2

   8a Bats: BBC 2014: http://www.bbc.co.uk/nature/life/Horseshoe_bat

   8b Lions: amanderson2: https://www.flickr.com/photos/amanderson/4685708477/in/photolist-894tTc-kV2z8f-7D

9 Single individual

   9a Bats: Micheal Pennay 2009: a.%09https://commons.wikimedia.org/wiki/File:Hipposideros_diadema_(3933426171).jpg

   9b Lions: Corinata 2008: https://commons.wikimedia.org/wiki/File:Lions_hunting_Africa.jpg

10 Ecological role photo

   10a Bats with pollen: Merlin D Tuttle 2015: https://www.flickr.com/photos/usdagov/15472782607

   10b Lions eating: Samuele Cavadini, 2010: https://www.flickr.com/photos/fusion68k/2385374947

11 Single individual in habitat 3

   11a Bats: Coke and Som Smith photography and travel: http://www.cokesmithphototravel.com/wildlife-of-sri-lanka.html

   11b Lions: Drew Avery 2009: https://www.flickr.com/photos/33590535@N06/3527041123

12 Single individual in habitat 4

12a Bats: Coke and Som Smith photography and travel: http://www.cokesmithphototravel.com/wildlife-of-sri-lanka.html

12b Lions: freestock.ca, 2008: https://commons.wikimedia.org/wiki/File:Lion_Female_Kruger_National_Park.jpg

13 Habitat loss: deforestation/tree burning: Frank Vassen 2010: https://commons.wikimedia.org/wiki/File:Slash_and_Burn_Agriculture,_Morondava,_Madagascar.jpg

14 Deceased individual

14a Bats: Patricia Litton, 2012: https://www.flickr.com/photos/plitton/8001828633/in/photolist-Cfx41m-o3FWsj-

14b Lions: Africa Geographic blog, 2014: https://africageographic.com/blog/damaraland-lion-dead/

15 Cause treatment: Illegal hunting

15a Bats: Stan Dalone 2007:https://commons.wikimedia.org/wiki/File:Bats_for_eating_in_Laos.jpg

15b Lion: accessed from Flickr, creative common license, but removed

16 Single individual in habitat 7

16a Bats: Frank Vassen 2010: Phttps://commons.wikimedia.org/wiki/File:Commerson%E2%80%99s_Leaf-nosed_Bat,_Tsimamampetsotsa,_Madagascar.jpg

16b Lions: rcrhee, 2013: https://commons.wikimedia.org/wiki/File:Amboseli_Lion_(Kenya,_Day_2).jpg

Savanna

1 Intro: "Please clear your mind of all thoughts and feelings." (20 seconds)

2 Savanna opening: Gossipguy 2008: https://commons.wikimedia.org/wiki/File:Upland_South_Africa_Savanna.jpg

3 Savanna landscape 1: Ikiwaner, 2008: https://commons.wikimedia.org/wiki/File:Kiang_West_savanna.jpg;

4 Savanna landscape 2: CT Cooper, 2011: https://commons.wikimedia.org/wiki/File:Savanna_towards_the_north_from_Lion_Rock_in_the_LUMO_Community_Wildlife_Sanctuary,_Kenya.jpg

5 Single individual lion in habitat

5a Lions: Kevin Pluck, 2004: https://upload.wikimedia.org/wikipedia/commons/7/73/Lion_waiting_in_Namibia.jpg

5b Lion's ecological role photo: Samuele Cavadini, 2010: https://www.flickr.com/photos/fusion68k/2385374947

6 Single individual bat in habitat

6a Lions: Frank Vassen, 2010: https://www.flickr.com/photos/42244964@N03/4315234399

6b Bat's ecological role photo: Merlin D Tuttle 2015: https://www.flickr.com/photos/usdagov/15472782607

7 Habitat loss, deforestation/tree burning:

7a Individual Lions: freestock.ca, 2008: https://commons.wikimedia.org/wiki/File:Lion_Female_Kruger_National_Park.jpg

7b Individual Bats: Coke and Som Smith photography and travel: http://www.cokesmithphototravel.com/wildlife-of-sri-lanka.html

8 Cause: Intensive farming, overgrazing: Hobgood, 1987 – 1991: https://commons.wikimedia.org/wiki/File:Typical_Bandundu_savanna_village.jpg

8a Deceased Lions: Africa Geographic blog, 2014: https://africageographic.com/blog/damaraland-lion-dead/

8b IDeceased Bats: Patricia Litton, 2012: https://www.flickr.com/photos/plitton/8001828633/in/photolist-Cfx41m-o3FWsj-AmSpoN-qSP1DT-bY57F3-xzbkL5-rKQhNp-Bkkwj9-qDeUbH-QGTawe-r2QwPH-BJjZ9F-rHXo5

9 Lion/Bat/Savanna collage:

9a Lions: dutchbaby 2009: http://www.cokesmithphototravel.com/wildlife-of-sri-lanka.html

9b Bats: Coke and Som Smith photography and travel: https://www.flickr.com/photos/godutchbaby/4081148859

9c Savanna: CT Cooper, 2011: https://commons.wikimedia.org/wiki/File:Savanna_towards_the_north_from_Lion_Rock_in_the_LUMO_Community_Wildlife_Sanctuary,_Kenya.jpg

8.3.4 Snapshots of Experimental interface

Figure A.3: Instructions for watching film

Please sit directly facing the screen. Make sure that your shoulders and head are in line with the box on either side of the walls of your cubicle. Do not put your hands on your face or lean forward into the computer.

Remain seated in this position for the rest of the session. Please put on the headphones that are on your cubicle.

Please click on the **play** button. Proceed to the next page by clicking the **'next'** button only after you have watched the entire video. Please note that some pictures maybe disturbing to some viewers.

Do not press any other button on this screen.

Figure A.4: Donation page

Notes: Films with Bats and Lions films only have a single picture of the individual embedded in this donation appeal photo, and the size of each photo image is held constant across groups. Note that all groups have a default donation on the slider of 0. Interventions without the offer of public recognition lack the following paragraph starting with, "To publicly acknowledge your donation 'The Beaver'. . . "

Figure A.5: Donations receipt and further payment instructions

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

You decided to donate £ ${q://QID141/TotalSum}.

Please write down your lab ID code and postal address on the paper form on your table. Your address will be used only to send you a receipt from the charity to acknowledge any donation amount that you may have decided to make. Do not write your name or anything else. A lab volunteer will come around to collect this shortly.

One person will be picked at random from the participants in the lab. You and every other person in the room have an equal and fair chance of being selected. The selected person will receive the £25 minus any donation amount that they may have decided to make.

Figure A.6: Affect questions

THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE

This scale consists of a number of words and phrases that describe different feelings and emotions.

Please indicate to what extent you have felt this way while watching the film clip. Read each item and then select the appropriate answer .

	None at all	A little	A moderate amount	A lot	A great deal
Angry	○	○	○	○	○
Guilty	○	○	○	○	○
Sad	○	○	○	○	○
Calm	○	○	○	○	○
Sympathetic	○	○	○	○	○
Happy	○	○	○	○	○
Interested	○	○	○	○	○

Figure A.7: Willingness to Pay a green fee (WTP)

Imagine that the LSE is considering different options to raise funds for environmental sustainability projects on campus.

One proposal is to levy an additional fee on disposable cups for hot beverages (that are made of styrofoam, plastic and paper) sold by LSE Catering on campus. The total revenue raised from this additional fee every year would be earmarked for environmental sustainability projects on the LSE campus. Currently, the average price of a hot takeaway beverage sold by LSE catering on campus is £1.50.

How much would you be willing to pay, if anything, as an additional fee per disposable cup of hot beverage on the LSE campus? Use the slider below to indicate your answer (the money value is in pence). When answering, please consider how many hot drinks you buy at LSE in disposal cups and how much that extra charge will affect you. Please provide your honest answer, as this will be used to inform LSE's sustainability policy.

0 100

Additional fee per disposable beverage cup in Pence

Figure A.8: Willingness to Donate time (WTD)

Thank you for participating in this experiment.

Before you go, we would like to ask you one last question. LSE is looking into the possibility of organizing events to raise awareness of environmental issues on campus in the Lent Term. How much time would you be willing to volunteer?

0 1 1 2 3 4 4 5 6 6 7

Please indicate your volunteering time in hours

8.3.5 Debrief sheet

Study on economic decision making and social issues Thank you for participating in this experiment. This study aims to uncover how participants respond to different types of media content of biodiversity conservation films. Specifically, the study examines if different types of species or information about the conservation issue impacts [economic decision making, through the donation] or how people feel after watching the film. First all participants watch a short movie. *[They can then decide to donate some or any part of their endowment to an organization working on wildlife conservation, if they so wish (Africa Wildlife Foundation).]* Then, they state the amount of affect (i.e. emotional states) they feel after watching the movie.
All the data from the experiment is anonymised, private and confidential. Please note that some of the photographs of the bats included photographs of different bat species, other than the Giant leaf nosed bat. This was due to the scarcity of photos for the focus species.
If subjects would like more information about the study, please contact the researcher at *email*.

Notes: Text in italics for was used in debrief form for Study 1 only.