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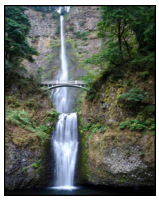

From cash to crickets: The non-monetary value of a resource can promote human cooperation☆

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ABSTRACT

Enhancing human cooperation in the use of limited and depletable resources is of central concern to environmental management and human welfare. Behavioral models of cooperation have, to date, focused on inter-party dynamics such as reciprocity, punishment, or reputation in distribution of resources generally indexed by points, money, or effort. We argue that these models fail to account for a key driver of cooperative behavior – the non-monetary value people attach to resources. Across two behavioral experiments we model the effect of attaching non-monetary value to a resource within a resource dilemma game. When players believed that exhausting a resource would lead to the immediate death of live crickets they reduced personal consumption, equating to increased cooperation and greater collective benefit, relative to players given the standard instructions. Our findings provide insight into a largely untapped avenue through which to leverage cooperative behavior; emphasizing the non-monetary and non-tradable value of a resource.

Resource management presents a variety of dilemmas in everyday life. Most valuable resources are scarce and decisions on how to allocate these amongst stakeholders are bound up with issues of fairness, cooperation, and trust. Human behavior within resource dilemma games has been modelled, providing insight into key drivers of consumption and cooperation (Balliet, Mulder, & Van Lange, 2011; Rand & Nowak, 2013; Van Lange, Joireman, Parks, & Van Dijk, 2013). Ubiquitous to these models is the use of money, points, time, or effort, as representative of scarce resources that need to be allocated to "players" in the game, providing an understanding of how fundamental dynamics, such as reciprocity, punishment and social reputation, guide human decision-making processes (Fehr & Gächter, 2002; Feinberg, Willer, & Schultz, 2014; Feinberg, Willer, Stellar, & Keltner, 2012; Yamagishi, 1986; Messick & Brewer, 1983; Romano, Balliet, Yamagishi, & Liu, 2017; Rapp, Engelman, Herrmann, & Tomasello, 2017; Wu, Balliet, & Van Lange, 2016a,b). These models have been drawn upon by researchers and policy makers to suggest ways to promote conservation of natural environments. We argue, however, that these classic models of human behavior are limited for this purpose as they fail to account for a key guide to behavior – the non-monetary value people attach to resources themselves. We propose that modelling this additional source of value has the potential to generate novel insight into key drivers of human cooperation: to illuminate how human behavior might be shaped by the value people may attach to aspects of the natural environment itself.

1. What is the non-monetary value of a resource?

A resource is commonly viewed as something from which benefit can be derived. In a market economy, this benefit is frequently understood within the framework of economic or monetary value; money is the medium through which resources are traded and consumed. This view of a resources value is, however, unnecessarily narrow and fails to account for other sources of value that people may attach to a resource. For instance, although minerals, trees, or animals are commonly traded based on their utility to satisfy human needs, people also have an innate tendency to seek connection with animals and nature (Wilson, 1984) and commonly develop a sense of solidarity with animals (Amiot & Bastian, 2017). This desire for connection with animals and nature represents a source of value that cannot be monetized and therefore cannot be traded.

One way in which this source of value manifests in resource decision making, is by increasing the value that people personally place on the resource. For instance, the well-known 'endowment effect'

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demonstrates that people tend to place increased value on an object simply because they own it (Kahneman, Knetsch, & Thaler, 1991). This type of personal or sentimental value has also been documented in what has been referred to as 'the effort paradox' (Inzlicht, Shenhay, & Olivola, 2018), which describes the phenomenon whereby expending effort to secure a resource increases its value to the individual who expended that effort (e.g., Aronson & Mills, 1959; Lewis, 1965; Loewenstein & Issacharoff, 1994; Norton, Mochon, & Ariely, 2012). Testing this within a public goods game, Muehlbacher and Kirchler (2009) found that when people had to expend greater effort to earn endowments, they were less likely to contribute those endowments to the public good. Conversely, unexpected and easily earnt windfalls tend to be spent more easily (Arkes et al., 1994). Critically, although effort exerted in the construction of a resource may increase its monetary value within the marketplace (e.g., artisan goods have greater monetary value than factory made goods; Kruger, Wirtz, Van Boven, & Altermatt, 2004), here we are focused on sources of personal or sentimental value that cannot be transferred to others and therefore cannot be traded (i.e., the effort I exert to earn a resource does not increase its value for someone else).

Beyond increasing the personal value of a resource, the non-monetary value of a resource may also lead people to want to protect or preserve it. For instance, research shows that people frequently attach sentimental value to objects, such as family heirlooms or gifts (Belk, 1991; Csikszentmihalyi & Rochberg-Halton, 1981). Sentimentality increases satisfaction with an object and reduces hedonic adaptation to its rewarding features (Yang & Galak, 2015). Critically, as with value derived from effort or ownership this value cannot be traded or transferred to others, but it also leads people to want to protect or preserve that resource. While the effort expended to secure a nice meal may increase its level of personal reward upon consumption, sentimental value arises when an object is associated with a cherished event or person (Yang & Galak, 2015). This source of value is lost when the object or resource is destroyed or consumed in the service of other ends.

Another source of non-monetary value that both increases a resource's personal value and the motivation to protect or preserve its integrity is its moral significance. For instance, research shows that although people frequently eat meat, raising awareness of an animal's mental capacity creates a moral conflict and reduces personal meat consumption (i.e., because highlighting an animals' ability to think and feel makes the act of harming it seem morally wrong; Bastian, Loughnan, Haslam, & Radke, 2012b; Ruby, 2012). The moral significance of an animal is, therefore, a source of value that people care about, but which cannot be traded and does not increase personal satisfaction through consumption.

Extending on this theme, other research shows that people report feeling a moral obligation to protect both animals and the environment from destruction and harm (Bratanova, Loughnan, & Gatersleben, 2012; Crimston, Bain, Hornsey, & Bastian, 2016) and that harm from human activities such as mining is considered a moral principle across countries (Bastian, Zhang, & Moffat, 2015). Furthermore, the desire to protect can be motivated by moral emotions such as guilt (Rees, Klug, & Bamberg, 2015) and goes beyond a wish to simply ensure ongoing access to resources for humans; people also want to preserve environmental entities for their own sake (Dunlap & Van Liere, 1978; Stern & Dietz, 1994; Stern, Dietz, & Guagnano, 1995; McCarthy, 2016, see also UNESCOs world heritage list).

Together the evidence indicates that people may value resources in ways that are not directly linked to their own consumption needs and cannot be transferred or traded. These sources of value cannot therefore be directly modelled using derivatives such as points or money. The non-monetary value that people attach to a resource – such as a sense of personal connection, feelings of empathy, or the felt moral obligation to protect it – can shape resource use and this shift in priorities may have implications for human cooperation.

2. Non-monetary value and resource consumption

Increasing cooperation is especially important in contexts where resources are finite, or replenish at a slow rate, meaning that overuse leads to environmental degradation and an inability to satisfy stakeholder needs. Cooperative behavior within these contexts is defined as limiting one's personal consumption for the benefit of the larger collective and is commonly modelled within resource dilemma games where players can take a variable amount of a common limited resource which replenishes at a given rate. Cooperation ensures that the resource "survives". Yet, defection frequently occurs (indexed by some players taking more for themselves) leading to erosion of trust and cooperative behavior (e.g., Rand & Nowak, 2013).

We suggest that highlighting the non-monetary value of a resource may alter this cooperation dilemma by cueing people to focus on an additional cost of personal consumption. Whereas traditional dilemmas pit the value of increased personal consumption against outcomes for other players, the non-monetary value of a resource may lead people to limit personal consumption because they want to protect the resource and would not like to see it destroyed.

There are several avenues through which people may become sensitive to this additional cost. First, people may be emotionally driven to protect a resource because they have developed a sentimental connection to it or feel a sense of *empathy* for it. This may be drive by our tendency to develop psychologically important relationships with animals (Amiot & Bastian, 2015) and our emotional sensitivity to animal harm (Westbury & Neumann, 2008). As noted above, people also frequently develop meaningful and sentimental connections to objects (Epley, Akalis, Watyz & Cacioppo, 2008; Yang & Galak, 2015). Thus, presenting the suggestion to people that something they personally care about could be 'harmed' is likely to increase their motivation to protect, thereby limiting consumption.

Second, people may hold moral principles or form *moral judgements* about how a particular resource should be treated. Prohibitions against harming others are among the most widely and deeply held moral beliefs (Graham, Haidt, & Nosek, 2009; Gray, Waytz, & Young, 2012) and deliberately inflicted harm can evoke anger, disgust, and contempt, which are powerful, aversive, and action-oriented moral emotions (Haidt, Koller, & Dias, 1993). When people are cued to consider the capacity of a resource to suffer from its own destruction they may act in ways to preserve or protect it. Beyond perceptions of harm, moral judgements about preservation may also arise in response to a range of broader moral considerations, such the belief that a resource has sacred value (Frimer, Tell, & Haidt, 2015) or the belief that causing harm to the resource, even for financial gain, would transgress a sacred principle (Baron & Spranca, 1997; Graham et al., 2009; Fiske & Tetlock, 1997; Tetlock, Kristel, Elson, Green, & Lerner, 2000). For instance, when people see actions toward the environment as a matter of moral principle, they are also more resistant to commodification of natural assets, even when it could lead to environmental benefit (Sacchi, Riva, Brambilla, & Grasso, 2014).

Third, people may also rely on heuristic processing when considering the notion that something may be 'harmed' or 'destroyed'. There is indeed some evidence for *heuristic harm aversion*. For example, research shows that people have an aversion to 'harmful actions' (e.g., pointing a gun at a person when it is not loaded), even when those actions do not cause harm (Cushman, Gray, Gaffey, & Mendes, 2012). Other work shows that the impact of engaging in harmful actions against avatars within a virtual environment has similar implications for self-perception as when those actions have the potential to cause real interpersonal harm (Bastian et al., 2013; Bastian, Jetten, & Radke, 2012a). When people become aware that their consumption is associated with 'destruction' or 'harm' they may become sensitive to these negative associations irrespective of whether that harm is considered morally wrong or elicits an empathic reaction.

In the current research, we aimed to examine whether highlighting

the non-monetary value of a resource – specifically, the type of value that cannot be traded with points or money and which motivates a desire to protect rather than consume – has the potential to increase cooperative behavior via reduced personal consumption, even when faced with competition for that resource. We did not aim to test which specific pathway could account for any observed effects – empathy, moral judgement, or heuristic harm aversion. Instead, we aimed to conduct an initial investigation into an added factor influencing the extent of human cooperation that goes above and beyond a prior focus on reputational factors and individual social values that underlie cooperative decision making.

3. Study 1

To examine whether adding moral significance to the resource itself can increase cooperation through limiting personal consumption, we conducted two lab-based studies where participants, exposed to one of two experimental conditions, played a resource dilemma game. In the experimental condition, the resource consumed by the participants had non-monetary value attached to it. Specifically, participants were informed that if the resource became depleted, because players took too many points from a share resource pool, it could lead to the death of live crickets. We used this approach because it modelled the type of added value we are focused on. The value of keeping crickets alive, as opposed to letting them be destroyed, is not something that can be traded, and it does not increase the reward associated with personal consumption. To the extent that people do not like the idea of crickets being destroyed, it leads people to want to conserve the resource for reasons unrelated to their own outcomes or to the outcomes of other players in the game. Furthermore, it is a source of value attached (in this case indirectly) to the resource itself, as opposed to non-monetary interpersonal outcomes which have been the focus of previous research (e.g., Foa, 1971; Foa & Foa, 1980). We compared this to a control condition which used the standard approach to a resource dilemma, where participants are only made aware their behavior has implications for how a resource is distributed to themselves and the other players in the game. We predicted reduced consumption, therefore indicating a tendency towards increased cooperative behavior, in the experimental condition.

In addition to our main prediction, and to provide further nuance to our findings, we included several individual difference measures. This included a measure of empathy and a measure of moral expansiveness (i.e., the extent to which people tend to feel morally obligated to take account of the interests of others, including non-humans). Although we did not have strong predictions given the novelty of our paradigm, we expected that empathy and moral expansiveness might interact with condition, such that high scorers on these constructs would be more concerned about the destruction of crickets and therefore would limit their personal consumption, relative to low scorers. In addition to these more focused measures, we also included general measures of personality based on a recent review by Zhao and Smillie (2015) which found personality differences as predictive of behavior within economic games.

3.1. Method

3.1.1. Participants

Using G-Power it was determined that to detect a medium effect size of $d = 0.5$ at 80% probability, we would require a sample size of N = 102. To increase power, we aimed for N = 125. One hundred and twenty-seven first year male and female psychology students from the University of New South Wales participated in the study for course credit. Demographic data was collected on-line prior to the experiment, and due to a large proportion of missing responses we were not able to provide accurate descriptive for the sample.

3.1.2. Measures

In an initial online survey we administered the Davis's (1983) Interpersonal Reactivity Index (with subscales relating to empathic concern, seven items; $M = 3.90$, $SD = 0.57$, $\alpha = 0.77$, and perspective taking, seven items; $M = 3.67$, $SD = 0.60$, $\alpha = 0.80$) and the Moral Expansiveness Scale, which is designed to measure the felt moral obligation that a person feels towards a variety of entities (both human and non-human) with higher scores indicative of a more expansive sense of moral obligation ($M = 44.65$, $SD = 12.86$, $\alpha = 0.93$; for a full overview of the theory and measure see Crimston et al., 2016).[1] Prior to completing the experimental procedure participants also completed the HEXACO-PI personality questionnaire (Lee & Ashton, 2004) and the BFAS Extraversion subscale (DeYoung, Quilty, & Peterson, 2007) in line with suggestions by Zhao and Smillie (2015).

3.1.3. Procedure

After enrolling for the study online, participants were provided with a link and asked to complete some on-line questionnaires at least 24 h before the lab study (see Measures). This was designed to reduce any priming effects that answering these measures might have on behavior.

The experiment was run in groups of five participants per session. The participants were randomly assigned to an experimental (n = 65) or control (n = 62) condition within sessions, alternating between three experimental/two control participants, and two experimental/three control participants. Upon arriving for the experiment, the participants were seated in individual computer rooms, where they completed the personality questionnaires (see Measures). Each room was fully enclosed, and participants were unable to see each other. We wanted participants to know that others were present, so they would believe that they were playing with other people. But, to allow for individual-level analysis of the data, we ensured that participants in each game did not interact at any point during the experimental procedure in case it created a group dynamic. Therefore, the researcher explained the instructions to participants individually in separate computer rooms.

Participants were told that the study was exploring how people make decisions in a group context, and that they would be completing a collective decision-making task with four others (for detailed task explanation, see supplemental material). It was explained to them that they would be sharing a pool of 3000 points that would be converted to money and paid to them at the end of the game (each point worth two cents). They were informed that they could take up to 30 points on one round and that the amount in the pool would be recalculated at the end of each round and would then replenish by 1%. They were told that if people took too many points the pool would become depleted, and that there was a critical, although variable, threshold somewhere below 1500 points.

Participants in the control condition were given the usual instructions for this game; that if the threshold was reached the game would stop and further points could not be earned if this were to occur. Participants in the experimental condition were taken individually to another cubicle, where there was a computer connected to a coffee grinder that had a black funnel attached to the top of it. They were told that if the threshold was reached, two things could happen. First, the game would stop, and they would be unable to earn any more points (standard instructions), but that secondly, the computer in the room would be monitoring the number of points in the pool, and that it was also connected to the coffee grinder. Participants in the experimental condition were then shown how the computer could activate the grinder: The grinder was sitting on a desk, next to the computer monitor (see Fig. S1 in supplemental material). The computer screen

[1] We also included the Triple Dominance Measure (TDM; Van Lange, DeBruin, Otten, & Joireman, 1997), but did not analyse these data as many participants (Study 1, n = 40; Study 2, n = 52) could not be categorized according to scoring instructions.

had the same display that participants would see when completing the experiment. This consisted of an empty box in the center of a white screen, accompanied by black text which read "Please indicate how many points you would like to take from the pool (Note: you may take a maximum of 30 points)." We explained that, for the purpose of the demonstration, the pool had been reduced to a level just above the threshold, and that we would take the maximum number of points to show what could happen if that threshold was reached. The researcher then typed "30" into the box and clicked enter. A message appeared on the screen for 3 s, saying "Please wait: The computer is calculating the pool amount". A message then appeared in red font in the center of the screen, saying "THRESHOLD REACHED", at which point the coffee grinder switched on for 5 s.

Next, participants were shown the crickets. They were kept in four vials, with three to four crickets in each vial (see Fig. S2; this was adapted from similar methods employed in a study by Martens, Kosloff, Greenberg, Landau, & Schmader, 2007). A plastic storage container that housed other crickets was also in the room, sitting to the right of the computer monitor. The researcher pointed this out to participants to convince them that we had a large enough supply to allow us to kill several crickets per session. The researcher then explained that before the task started they would be placing the crickets into the coffee grinder, reiterating that the computer would be monitoring the number of points in the pool, and that if the threshold was reached, the game would stop and the grinder could be switched on with the crickets inside. Participants were assured that ethics approval had been granted, and that previous studies had used similar paradigms. Participants were told that they would be unable to see how many points were left in the pool after the task had started, and that all of their responses would be anonymous. The participants then returned to their computer cubicles.

After every participant had received the instructions, the researcher walked around to each cubicle to log the participants into the experiment. For those in the experimental condition, the researcher carried four empty vials to create the impression that the crickets had been placed into the grinder. Participants were told that once the researcher had finished logging in all participants, a message would appear on the screen to inform them that everyone had been logged in, and that the task would then begin in 10 s. In reality, the computers were not linked together, and the participants did not commence the task at exactly the same time. Rather, after a participant had been logged in, there was always a 90 s wait before they were told that the task was ready to begin. We chose a 90 s interval so that participants would believe that the researcher had enough time to log in all of the participants before the task commenced. During this time, a message appeared on the screen which reminded participants of the task instructions. A second message then appeared, saying "All participants are now logged in. The task will begin in 10 s" The task then loaded automatically.

Once the task began, in each round the display would show a text, saying "Using the number pad, please indicate how many points you would like to take from the pool (Note: You may take a maximum of 30 points)." The participants responded by typing the points they wished to take with the number pad. If participants entered a number greater than 30, the computer would not let them proceed. If participants entered their points within 5 s of the round starting, a message appeared on the screen for 3 s, saying "Please wait: The other players are making their decisions". Another message then appeared on the screen for 2 s, saying "Please wait: The computer is calculating the pool amount". The screen then went blank for 2 s before the next round commenced. The round number was displayed in the top left corner of the screen, and the number of points that the participant had accumulated was displayed in the top right corner.

In actuality, the participants were not really playing with one another, and the task was programmed to last 20 rounds. At the end of the tenth round, a yellow warning sign (a triangle with an exclamation point in its center) appeared on the screen for 8 s, accompanied by the text "Warning: The pool is depleting." At the end of the fifteenth round, a red warning sign appeared on the screen for 8 s, accompanied by the text "Warning: The pool is in danger of reaching the threshold." The task finished after the twentieth round, and a message appeared on the screen saying "The task is now over. For the final part of the experiment, we'd like you to answer a few quick questions, beginning on the next page."

Participants then answered the following questions, which appeared one at a time in a random order: To what extent were your responses motivated by concerns about financial gain? To what extent were your responses motivated by concerns about what you thought the other players were doing? To what extent were your responses motivated by concerns for the crickets (experimental condition only)? Participants responded to each question by clicking on a nine-point Likert scale (1 = not at all, 5 = to some extent, 9 = very much).

Participants took approximately 45 min to complete the study. At the end of the study, participants were thoroughly debriefed. We used a funnel debriefing procedure first examining whether participants felt they had insight into the research question, with further probing used to determine if they had guessed the aims of the study. Specifically, the experimenter asked, "Does anyone have any idea what the study was about?". If a vague answer was provided (e.g., It was about cooperation), the experimenter encouraged them to elaborate ("Can you tell me more about that?"). None of the participants correctly guessed the aims. We also probed for suspicion into the two aspects of deception used in the study, a) that computers were not linked and therefore player responses were not linked, and b) that there was never any chance that the crickets would be harmed. Only two participants expressed having doubts that the computers were linked. Further, only three participants expressed doubts that the crickets would really be destroyed. As these doubts were only expressed after the sources of deception had been revealed to participants and given that removing these participants did not change the findings of the study, we opted to retain these data for analyses.

3.2. Results and discussion

We performed independent sample *t*-tests to explore differences between the two conditions. As predicted, participants in the experimental condition ($M = 198.46$, $SD = 127.60$) took significantly fewer points than participants in the control condition ($M = 276.10$, $SD = 162.32$), $t(115.77) = 2.99$, $p = .003$, $d = 0.53$ (see Fig. 1; for comparison of means for each individual trial, see Table S1 in supplemental material). This provided initial evidence that adding non-monetary value to a resource can reduce personal consumption, thereby increasing cooperation. Noteworthy is that this mean difference in condition was relatively stable across rounds, showing a similar pattern across time. When warnings were provided in rounds 10 and 15 consumption dropped in both conditions, but then slowly increased. This suggests that participants were sensitive to depleting the pool of resources in both cases, but that adding non-monetary value to the resource dampened consumption across all rounds.

There was no significant difference between conditions in the extent to which participants' responses were motivated by financial gain (experimental group: $M = 4.51$, $SD = 2.18$; control group: $M = 4.92$, $SD = 2.24$), $t(125) = 1.05$, $p = .30$) or by the behavior of other players (experimental group: $M = 6.28$, $SD = 2.04$; control group: $M = 5.97$, $SD = 2.19$), $t(125) = -0.83$, $p = .41$). This suggested that the difference between conditions was unrelated to concern for personal gain or concern for signals of cooperation or defection from other parties.

Concern expressed for the crickets in the experimental condition was at around the mid-point of the scale ($M = 5.35$, $SD = 2.85$). Paired samples t-tests (within the experimental condition only) revealed no significant differences between the reported level of motivation for financial gain relative to concern for the crickets ($t = 1.59$, $p = .116$). Motivation related to other player behavior was higher compared to both financial gain ($t = 2.43$, $p < .001$) and concern for the crickets

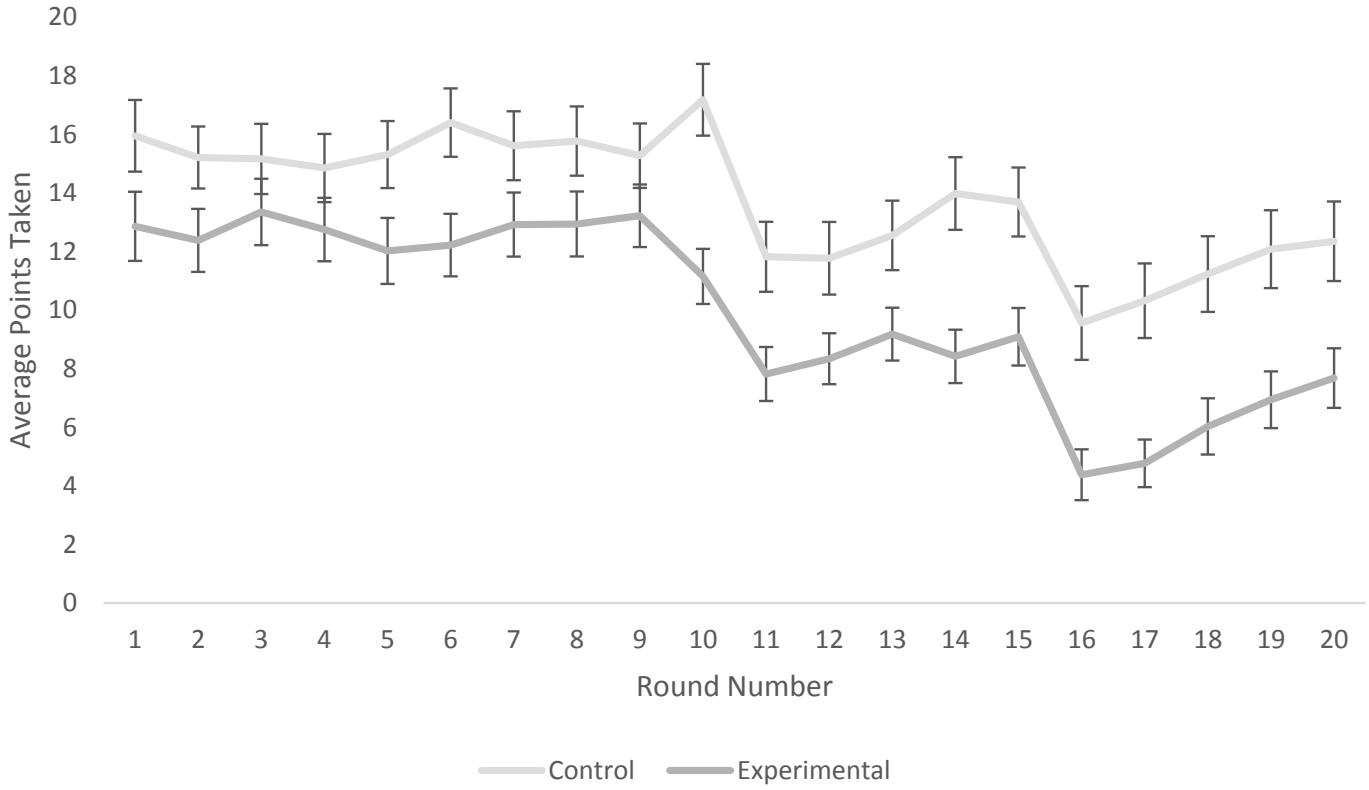

Fig. 1. Mean number of points taken by participants in the experimental and control conditions over the 20 rounds (error bars equal one S.E.M). The first warning message appeared at the end of round 10; the second warning message appeared at the end of round 15.

($t = 1.75$, $p = .030$). To investigate how these different motivations were related to behavior within the experimental condition we inspected correlations with total points taken. This revealed that concern for financial gain was associated with taking more points ($r = 0.33$, $p = .008$) and concern for crickets was associated with taking fewer points ($r = -0.25$, $p = .043$). Concern regarding other player behavior was unrelated to points taken ($r = -0.09$, $p = .488$). Also noteworthy is the negative correlation between concern for financial gain and concern for the crickets ($r = -0.44$, $p < 001$) and the absence of any correlation between concern for other player behavior and either financial gain ($r = 0.19$, $p = .123$) or concern for the crickets ($r = 0.09$, $p = .460$).

Overall, we take these responses to indicate that people were concerned regarding the destruction of crickets and this motivated them to restrict their personal consumption. This contrasts with the effect of financial concern increasing personal consumption. Interestingly, although expressed concern for the behavior of other players was higher relative to concern for finances or crickets, this motivation was unrelated to behavior, perhaps because the influence of this motive would depend on what the player assumed about others' behavior.

Analysis of the individual difference variables (see Table 1) revealed overall limited associations with behavior and no significant interaction with condition (after applying a correction for family-wise error). This suggests that although people were concerned for the lives of crickets in the experimental context, this did not interact with broader individual differences in empathy or moral expansiveness. We also examined the relationship between our individual difference variables and motivations (after applying a correction for family-wise error, see Table S4). This revealed only one significant relationship across all variables. Overall, adding a condition in which the resource had moral significance led to a new source of motivation that departed from previous studies in which individual differences have been found to reliably predict behavior.

4. Study 2

The behavioral data from Study 1 demonstrated that attaching moral significance to a resource enhanced cooperation in a standard resource dilemma game. In Study 2, to investigate how perceived defection from other players would influence cooperation, participants were provided with fictitious information about a player who was taking the most points. Also, participants were given the opportunity to punish the greediest player. We predicted that moral concern for the resource would prompt participants in the experimental condition to treat overconsumption as a more severe defection than in the control condition, and thus exert greater punishments.

4.1. Method

4.1.1. Participants

We used the same recruitment strategy as in Study 1. One-hundred and twenty-six students from the University of New South Wales participated in the study (59% females, mean age = 20.24 years[2]). We excluded two participants' data (both in the experimental condition); one because they expressed significant doubt over the study protocol throughout the study and the other because they had participated in Study 1. This left n = 62 in the experimental condition and n = 62 in the control condition. Participants received either course credit or $15 in exchange for their time.

4.1.2. Measures

We used the same individual difference measures as in study 1

[2] Gender and age data were collected in the pre-survey which had a low response rate. There were 47 cases missing and for this reason we report gender as a relative percentage.

Table 1
Study 1 regression analyses main effect and interactions predicting total amount taken.

Scale (Reference)	Individual Trait	*N*	Condition (β)	Individual Trait Centered (β)	Interaction Term (β)
Interpersonal Reactivity Index (Davis, 1983)	Perspective Taking	97	−0.31(26.86)	−0.29(33.30)	0.09(45.29)
	Empathic Concern	97	−0.31(26.89)	−0.31(30.83)	0.31(48.15)
HEXACO Personality Inventory (Lee & Ashton, 2004)	Honesty Humility	118	−0.31(25.09)*	−0.41(35.54)*	0.18(51.84)
	Sincerity	118	−0.29(26.89)	0.10(28.92)	−0.08(37.87)
	Fairness	118	−0.27(25.03)	−0.43(22.31)*	0.17(33.17)
	Greed Avoidance	118	−0.30(25.53)*	−0.27(18.35)	0.02(31.52)
	Modesty	118	−0.31(25.71)*	−0.33(25.63)	0.23(37.02)
	Emotionality	118	−0.30(26.94)*	−0.01(31.76)	0.01(44.79)
	Fearfulness	118	−0.30(26.74)*	−0.04(23.07)	0.02(31.79)
	Anxiety	118	−0.30(26.56)*	−0.02(25.84)	−0.02(36.18)
	Dependence	118	−0.31(26.89)*	0.08(21.21)	−0.04(29.52)
	Sentimentality	118	−0.30(26.80)*	−0.06(24.06)	0.07(36.15)
	Extraversion	118	−0.30(26.63)*	−0.04(29.21)	0.10(42.11)
	Social Self-Esteem	118	−0.30(26.69)*	−0.09(28.85)	0.07(40.67)
	Social Boldness	118	−0.29(26.59)	0.04(23.21)	0.07(31.70)
	Sociability	118	−0.30(26.51)*	−0.12(23.44)	0.17(34.73)
	Liveliness	118	−0.30(26.51)*	0.03(21.15)	0.03(32.79)
	Agreeableness	118	−0.31(26.09)*	−0.23(31.00)	0.10(45.94)
	Forgiveness	118	−0.29(26.35)*	−0.12(25.68)	−0.01(37.96)
	Gentleness	118	−0.30(25.96)*	−0.25(26.40)	0.09(37.87)
	Flexibility	118	−0.30(26.17)*	−0.22(25.70)	0.15(38.35)
	Patience	118	−0.31(26.48)*	−0.16(22.18)	0.10(32.37)
	Conscientiousness	118	−0.30(26.47)*	−0.04(34.17)	−0.03(55.21)
	Organization	118	−0.30(26.53)*	0.02(23.70)	−0.07(33.78)
	Diligence	118	−0.30(26.40)*	−0.01(24.08)	−0.09(41.67)
	Perfectionism	118	−0.30(26.61)*	−0.02(26.11)	0.02(37.66)
	Prudence	118	−0.31(26.85)*	−0.13(25.49)	0.07(42.24)
	Openness	118	−0.31(26.76)*	−0.04(33.67)	−0.03(48.06)
	Aesthetic Appreciation	118	−0.31(26.81)*	−0.09(21.13)	0.02(31.91)
	Inquisitiveness	118	−0.30(26.25)*	0.07(22.00)	−0.19(32.21)
	Creativity	118	−0.30(26.52)*	−0.04(23.47)	0.08(32.65)
	Unconventionality	118	−0.31(27.00)*	−0.07(30.47)	0.01(44.76)
	Altruism	118	−0.28(25.27)*	−0.33(29.73)	0.05(47.68)
BFAS Personality Questionnaire (De Young et al., 2007)	Extraversion	118	−0.30(26.51)*	−0.04(34.84)	0.08(51.13)
	Enthusiasm	118	−0.29(26.27)*	−0.21(30.44)	0.18(46.66)
	Assertiveness	118	−0.30(26.37)*	0.13(28.20)	−0.04(42.79)
Moral Expansiveness Scale (Crimston et al., 2016)	Moral Circle	97	−0.33(27.56)*	0.14 (1.32)	−0.04 (2.28)

Note. Each individual trait was mean-centered and entered into a regression equation with condition (0 = Control, 1 = Experimental) and their interaction term.
*$p < .00135$ (Bonferroni correction).

4.1.3. Procedure

The method was identical to Study 1, except for the following: Participants were told that at the beginning of the task each player would be assigned a unique player number (in fact, each participant was assigned to be Player 5). They were also told that at the end of each round, they would be able to see which of the other players took the most on that round, and how many points that player took. Participants were told that if they were to take the most on a given round, they would not see their own player number displayed; rather, they would see which player *other than themselves* took the most on that round.

Again, participants were not in actuality playing with one another, and all of the feedback was bogus. We based this feedback on the results from Study 1: for the first seven rounds, the greediest players took the equivalent of the grand mean for each round (14–18 points). During these rounds, each of the other players took the most points at least once. On the eighth round, the greediest players began taking a full standard deviation above the grand mean on each round (25–30 points). Participants saw that "Player 4" took the most points on 10 out of 13 of these rounds (see Table S2 in supplemental material for details).

The task finished at the end of the twentieth round, and the following message appeared on the screen: "The task is now over. For the next part of the experiment, we'd like you to answer a few quick questions, beginning on the next page." Participants then answered the same questions about their motivations as in Study 1. This time we also added an additional question to more generally assess how concerned people were about exhausting the resource across both conditions: How concerned were you about reaching the threshold? (1 = not at all, 5 = to some extent, 9 = very much).

After answering these questions, the following message appeared on the screen: "For the final part of the experiment, we are going to give you the opportunity to fine a player of your choosing. However, you will need to pay to do so. If you choose to pay one dollar, it will cost the selected player three dollars; if you choose to pay two dollars, it will cost the selected player six dollars; if you choose to pay three dollars, it will cost the selected player nine dollars. If you don't want to fine anyone, please select 0 dollars." We told participants that if more than one participant chose to punish the same player, that player would be fined the average of what the players selected. Participants responded by clicking on a dropdown tab and selecting one of the four options: 0 dollars, 1 dollar, 2 dollars, 3 dollars.

Participants took approximately 45 min to complete the study. The debriefing procedure was the same as in Study 1. Again, no participants accurately guessed the aims of the study. After revealing the deception used in the study only one participant expressed doubts that the crickets would in fact be destroyed and that the defecting player (Player #4) was real and we removed them from analyses (as described above).

4.2. Results and discussion

We then performed independent *t*-tests to explore differences between the two conditions. As predicted, and replicating Study 1, participants in the experimental condition ($M = 325.63$, $SD = 123.78$) took significantly fewer points than participants in the control condition ($M = 378.95$, $SD = 120.68$), $t(122) = 2.43$, $p = .017$, $d = 0.43$ (see Fig. 2; for comparison of means for each individual trial, see Table

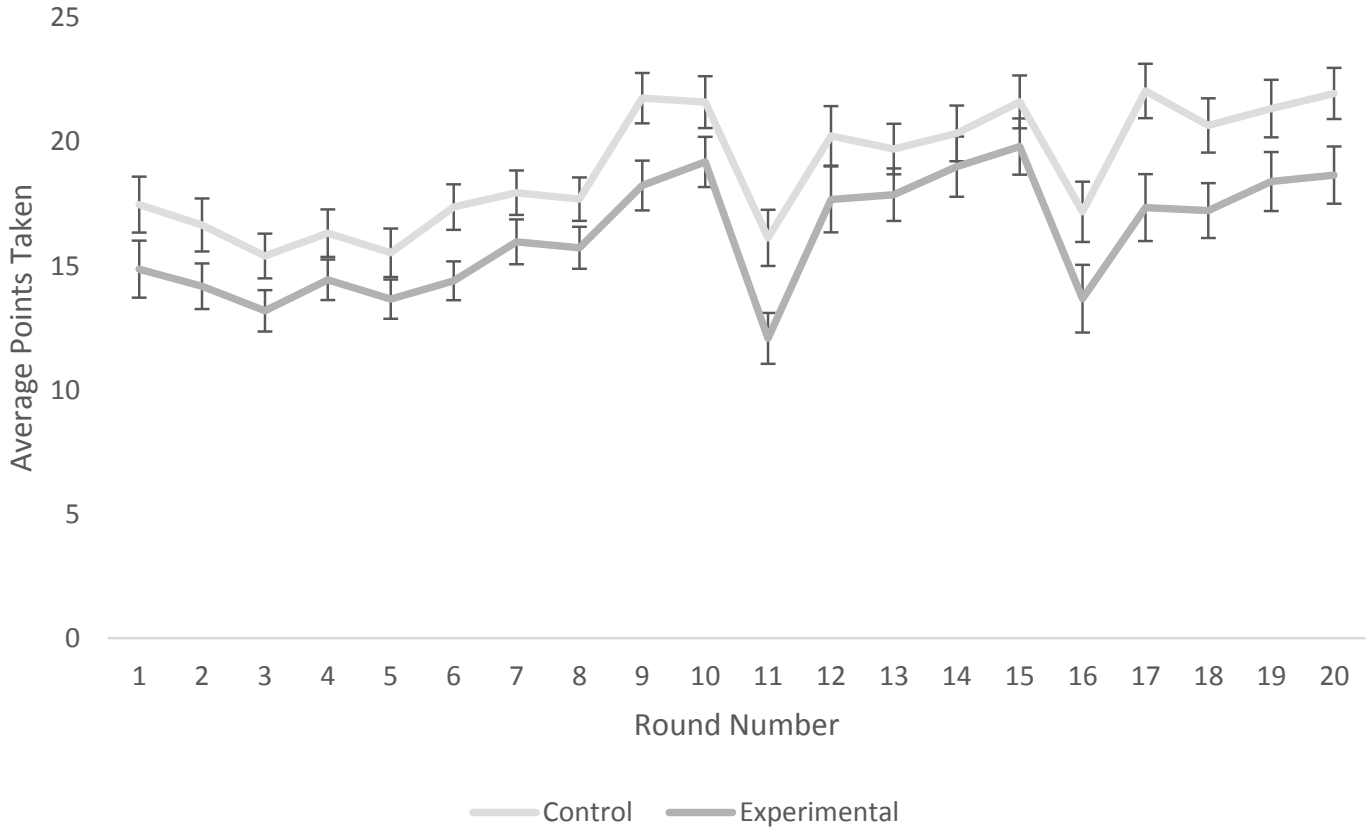

Fig. 2. Mean number of points taken by participants in the experimental and control conditions over the 20 rounds (error bars equal one S.E.M). The greedy player appeared after round 8; the first warning appeared after round 10; and the second warning appeared after round 15.

S3 in supplemental material). Again, this provided initial evidence that adding non-monetary value to a resource can reduce personal consumption, thereby increasing cooperation. A similar consistent mean difference and pattern of responding across conditions over each of the trials was observed, as in Study 1. Noteworthy was the influence of a defector on behavior across both conditions. As defection increased after round 8, the number of points taken by other players also increased, indicating a reduction in cooperative behavior. This increase occurred across both conditions.

Contrary to our predictions, participants in both conditions paid similar amounts to fine the greedy player (experimental group: $M = 0.48$, $SD = 0.76$; control group: $M = 0.47$, $SD = 0.78$) $t(122) = -0.12$, $p = .91$. Means indicated overall punishment motivation was low, with a mean of around fifty cents nominated towards punishing the greedy player, out of a possible total amount of three dollars.

As in Study 1, there was no significant difference between conditions in the extent to which participants' responses were motivated by financial gain (experimental group: $M = 5.53$, $SD = 2.07$; control group: $M = 5.23$, $SD = 2.23$) $t(122) = -0.79$, $p = .43$) or other player behavior (experimental group: $M = 6.26$, $SD = 1.80$; control group: $M = 5.73$, $SD = 2.61$) $t(108.44) = -1.32$, $p = .19$. However, participants in the experimental condition ($M = 6.48$, $SD = 1.60$) reported greater concern about reaching the threshold than participants in the control condition ($M = 5.39$, $SD = 2.51$), $t(103.38) = -2.90$, $p = .005$.

Inspection of concern for the crickets in the experimental condition ($M = 5.08$, $SD = 2.66$) revealed responses at around the mid-point of the scale, as in Study 1. Paired samples t-tests (within the experimental condition only) revealed no significant differences between the reported level of motivation for financial gain relative to concern for the crickets ($t = 1.04$, $p = .301$), as in Study 1. Motivation related to other player behavior was higher compared to both financial gain ($t = 2.92$, $p = .005$) and concern for crickets ($t = 2.91$, $p = .005$), as in Study 1. The new question in Study 2, regarding concern about reaching the threshold was endorsed to a similar extent as concern for other player behavior ($t = 0.89$, $p = .378$), but more so compared to concern for financial gain ($t = 3.15$, $p = .003$) and concern for crickets ($t = 4.26$, $p < .001$). As in Study 1, we investigated how these different motivations were related to behavior within the experimental condition. This revealed that whereas concern for financial gain was associated with taking more points ($r = 0.36$, $p = .005$) concern for crickets was associated with taking fewer points ($r = -0.40$, $p = .001$), as in Study 1. Differently to Study 1, concern for other player behavior was related to taking more points ($r = 0.35$, $p = .005$). The new question, concern for reaching the threshold, was marginally associated with taking fewer points ($r = -0.23$, $p = .074$).

Distinct from Study 1, concern for financial gain was not associated with concern for the crickets ($r = -0.18$, $p = .163$) and concern for other player behavior was positively associated with concern over financial gain ($r = 0.50$, $p < .001$) and concern for reaching the threshold ($r = 0.31$, $p < .014$). Concern for reaching the threshold was also positively associated with concern for crickets ($r = 0.35$, $p = .005$) and for other player behavior ($r = 0.35$, $p = .005$), but not with concern for financial gain ($r = 0.18$, $p = .165$).

Finally, correlations between motivations and punishment (within the experimental condition) revealed none of the motivations were associated with the amount committed to punishment (other player behavior: $r = -0.10$, $p = .420$; threshold: $r = -0.01$, $p = .957$; financial: $r = -0.23$, $p = .005$; crickets: $r = -0.05$, $p = .733$).

Overall, analysis of motivations provided a similar picture to Study 1, but with some important differences. People were again concerned regarding the destruction of crickets and this motivated them to restrict their personal consumption. This contrasts with the effect of financial concerns increasing personal consumption. Again, mean levels of expressed concern for the behavior of other players were higher than

Table 2
Study 2 regression analyses main effect and interactions predicting total amount taken.

Scale (Reference)	Individual Trait	*N*	Condition (β)	Individual Trait Centered (β)	Interaction Term (β)
Interpersonal Reactivity Index (Davis, 1983)	Perspective Taking	75	−0.22(27.82)	0.09(33.23)	−0.09(50.49)
	Empathic Concern	75	−0.24(27.79)	−0.08(27.15)	−0.01(49.74)
HEXACO Personality Inventory (Lee & Ashton, 2004)	Honesty Humility	105	−0.25(23.27)	−0.34(28.69)	0.11(39.52)
	Sincerity	105	−0.24(24.01)	−0.10(22.39)	−0.04(33.39)
	Fairness	105	−0.26(23.50)	−0.29(17.23)	0.06(24.10)
	Greed Avoidance	105	−0.22(23.57)	−0.27(19.63)	0.13(27.22)
	Modesty	105	−0.23(23.63)	−0.23(22.99)	0.06(34.29)
	Emotionality	105	−0.22(23.10)	−0.34(25.57)	0.16(41.24)
	Fearfulness	105	−0.21(23.80)	−0.17(20.23)	0.02(30.07)
	Anxiety	105	−0.23(23.31)	−0.34(20.94)	0.23(32.77)
	Dependence	105	−0.21(23.51)	−0.28(17.35)	0.16(26.44)
	Sentimentality	105	−0.23(23.48)	−0.28(20.04)	0.15(31.45)
	Extraversion	105	−0.22(24.26)	0.06(31.28)	−0.06(47.99)
	Social Self-Esteem	105	−0.22(23.96)	0.12(25.81)	−0.06(36.24)
	Social Boldness	105	−0.23(24.37)	0.06(23.57)	−0.18(34.34)
	Liveliness	105	−0.22(24.05)	−0.01(20.74)	0.04(32.94)
	Sociability	105	−0.22(24.25)	0.02(19.86)	0.01(34.91)
	Agreeableness	105	−0.23(24.38)	−0.06(36.58)	0.01(47.73)
	Forgiveness	105	−0.25(24.31)	−0.17(22.09)	0.03(31.56)
	Gentleness	105	−0.22(24.07)	0.08(25.17)	−0.09(36.46)
	Flexibility	105	−0.23(24.12)	−0.07(25.27)	0.03(36.63)
	Patience	105	−0.22(24.15)	0.04(22.05)	−0.01(29.47)
	Conscientiousness	105	−0.23(24.49)	−0.10(32.87)	0.05(45.35)
	Diligence	105	−0.21(24.26)	0.09(27.30)	−0.01(37.31)
	Perfectionism	105	−0.24(24.86)	−0.13(30.97)	0.06(40.74)
	Prudence	105	−0.23(24.09)	−0.16(24.74)	0.09(34.91)
	Organization	105	−0.23(24.05)	−0.09(18.67)	0.00(26.70)
	Openness	105	−0.24(24.25)	−0.16(31.93)	0.09(47.71)
	Aesthetic Appreciation	105	−0.22(23.90)	−0.13(21.39)	0.03(30.81)
	Inquisitiveness	105	−0.22(24.44)	−0.09(21.99)	0.12(32.75)
	Creativity	105	−0.24(24.04)	−0.22(19.83)	0.16(28.31)
	Unconventionality	105	−0.22(24.26)	0.02(31.95)	−0.05(43.17)
	Altruism	105	−0.26(23.70)	−0.32(24.06)	0.15(38.89)
BFAS Personality Questionnaire (De Young et al., 2007)	Extraversion	103	−0.24(24.29)	0.08(31.66)	−0.18(54.02)
	Enthusiasm	103	−0.24(24.14)	−0.11(28.83)	−0.02(48.40)
	Assertiveness	103	−0.23(24.08)	0.22(24.14)	−0.27(40.73)
Moral Expansiveness Scale (Crimston et al., 2016)	Moral Circle	75	−0.24(27.46)	0.06(1.70)	0.08(2.27)

Note. Each individual trait was mean-centered and entered into a regression equation with condition (0 = Control, 1 = Experimental) and their interaction term.
*$p < .00135$ (Bonferroni correction).

financial or cricket related concerns, however, unlike Study 1, this was strongly correlated with financial concerns and unrelated to cricket concerns. Combined with no evidence of an increased motivation towards punishment it appears that the defector was relevant to the extent that they threatened one's own personal gains. It appears people are more concerned about the harmfulness of their own actions, rather than the actions of others.

We next turn to an analysis of our individual difference variables (see Table 2). As in Study 1, this revealed overall a limited influence of individual differences in predicting behavior and none of these individual differences significantly interacted with condition to predict behavior (after applying a correction for family-wise error). Again, we also examined the relationship between our individual difference variables and motivation questions (after applying a correction for family-wise error, see Table S5). This revealed several correlations between our individual difference measures and financial concern or concern for others, but critically there were no correlations with concern for the crickets.

5. Discussion

Advancing insight into human cooperation is important for the effective management of environmental resources and human welfare. Behavioral games have been widely employed in developing models of cooperation and to explore factors that might enhance or diminish cooperative behavior within collectives. Across two behavioral game experiments we examined a novel variable in predicting the extent of cooperative behavior – the non-monetary value attached to a resource. We observed that players who had been led to believe that exhausting a common resource would not only limit collective outcomes but would also lead to the immediate death of live crickets, reduced their personal consumption. Across both studies this change in behavior was unrelated to financial concerns, to considerations of other player's behavior, and was not influenced by a range of individual differences linked to cooperative behavior. Furthermore, when faced with objective evidence of defection by others in the game, players primed to see their resource consumption as having moral or harm-related implications (i.e., the death of crickets) continued to limit their consumption relative to those who were solely focused on the collective outcomes of the group. For those in the experimental condition, across both studies, their increased levels of cooperation (indexed by reduced personal consumption) were positively associated with their expressed concern for the lives of the crickets.

Findings also indicated that individual differences did not moderate the effect of experimental condition on points taken. We had predicted that empathy and moral expansiveness might have increased concern for crickets' lives in the experimental condition and therefore increased cooperation. Although expressed concern for the crickets' lives was indeed associated with increased cooperation, the study may have been underpowered to detect the influence of these more distal measures.

In everyday resource management, people are faced with a range of moral dilemmas. Primary amongst these is whether resource allocation is fair for other consumers. Concerns over fairness are amplified when players are aware that they can be punished for unfair behavior or when they are concerned about their personal reputation across multiple interactions (amongst other factors; Balliet et al., 2011; Fehr &

Gächter, 2002; Feinberg et al., 2014; Van Lange et al., 2014; Wu et al., 2016a,b; Barclay & Raihani, 2016). Yet, research in the field of behavioral ethics has demonstrated that people are also concerned about the potential harm brought to animals, forests, or historical artifacts, and that these non-human or ecocentric factors have the capacity to shape resource decision-making (Bastian et al., 2012a, 2012b; Crimston et al., 2016). Our findings bring together research within the fields of behavioral economics, behavioral ethics, and environmental science, suggesting that the non-monetary value attached to a resource, and in turn people's desire to protect or preserve it, shapes behavior in ways that are unrelated to consumer outcomes. We leveraged this type of value in our study by introducing the threat of killing crickets, an insect that is at most considered of minimal moral relevance, thus providing a relatively conservative test of our reasoning that moral significance can promote self-constraint or cooperation. This suggests that consumer behavior, and in turn cooperative behavior, is influenced by these minimal factors and may also be shaped by highlighting the moral significance of plants or trees. Unlike crickets, these entities are not generally considered to be sentient, and therefore may not be viewed as even minimally morally significant. Yet, it is possible that that other factors such as sentimentality, beauty, or rarity may shape behavior in similar ways. In short, properties that cultivate a desire to protect or conserve a resource have the capacity to also enhance the equity of outcomes for consumers.

Given the preponderance of studies that model human cooperation and trust using points or money to model resources, the possibility of varying the significance or moral implications attached to resources themselves opens several novel avenues for research. Our findings suggest that reputation concerns or expectations of cooperative behavior may be tied, not only to treatment of other players, but also to a consideration for the value of resources themselves. This also raises the question of whether people are punished differently when acting against the interests of other consumers to protect a resource vs. when seeking to maximize their own outcomes, and whether people knowingly use resource protection to send cooperative signals to others. Indeed, those who destroy the natural environment are viewed as morally questionable (Feinberg & Willer, 2013; Markowitz, 2012; Markowitz & Shariff, 2012), demonstrating that such actions are understood as having reputational consequences.

We see our findings as providing an initial demonstration of concept which, in addition to the reputational and punishment considerations mentioned above, opens a range of novel and important future research directions. As we noted, there may be several factors that increase the non-monetary value or moral significance of a resource. These may include the moral qualities of a resource (e.g., its sentience) triggering a felt obligation to protect against harm or empathic responses to harm but may also extend to its sentimental value (e.g., one's home), or perhaps its beauty or rarity (e.g., natural environments). How these various qualities are presented, such as whether they are concrete or abstract, or whether resource-related outcomes are psychological or temporally close vs. distant (see Trope & Liberman, 2010; Van Lange, Joireman, & Milinski, 2018) relative to one's own needs or the needs of other consumers may determine their relative impact on human cooperation. Anticipated emotional outcomes, such as feelings of regret or guilt, or even reputation-relevant emotions such as shame may also play an important role. Research addressing these underlying mechanisms would provide insight into ways in which sources of resource-centric value or moral significance could be exploited in applied and scalable ways. Finally, our demonstration shows that the non-monetary value of a resource increased cooperation across the board and was not moderated by individual differences, thus providing some tentative evidence for the generality of the present findings.

5.1. Limitations and future directions

There were several limitations of our studies that are worth noting. First, we did not find any effects on implementing punishment, which is surprising and may be related to aspects of our experimental design or measures. Yet, it may be that costly punishment is most responsive to perceived fairness in resource distribution, and resource-centric concerns add little motivation. Second, we note that the use of live crickets in our experimental method is certainly less than subtle, and it would be important to show that subtler and perhaps more adaptable and scalable interventions which seek to vary the non-monetary value of a resource have the potential to change behavior. Third, it was impossible for the experimenter to be blind to condition leaving open the possibility of demand characteristics. This was, however, mitigated by having each session split across conditions and the participants having no visible contact with the experimenter during the resource dilemma game (i.e., they were in separate fully enclosed cubicles). Fourth, it could be that the participants were more motivated to please the experimenter in the experimental condition, by keeping the crickets alive. That said, we would note that the experimenter did not indicate any preference for keeping the crickets alive. Furthermore, to the extent that participants might have been concerned about their own reputation we see this as part of the effect. The possibility that adding moral significance to a resource may change behavior via reputational concerns is an aspect of what we are focused on here.

5.2. Concluding remarks

Over the past three decades, scientists working in different disciplines have come to acknowledge that human behavior is shaped by self-centered concerns as well as concerns for equality and the satisfaction of other's interests. The current research extends this picture by proposing that human behavior may also be affected by vivid information regarding self-imposed harm to aspects of the natural environment. Going beyond cash and bringing crickets to the forefront as a case in point, the findings provide critical theoretical insight for modelling human behavior. They also open a new window of opportunity for behavior change. This is anything but trivial in era of climate change, where the relationship between humans and the natural environment needs serious attention.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2018.11.002.

References

Amiot, C. E., & Bastian, B. (2015). Toward a psychology of human–animal relations. *Psychological Bulletin, 141*, 6–47.
Amiot, C. E., & Bastian, B. (2017). Solidarity with animals: Assessing a relevant dimension of social identification with animals. *PloS One, 12*(1), e0168184.
Arkes, H. R., Joyner, C. A., Pezzo, M. V., Nash, J. G., Siegel-Jacobs, K., & Stone, E. (1994). The psychology of windfall gains. *Organizational Behavior and Human Decision Processes, 59*, 331–347.
Aronson, E., & Mills, J. (1959). The effect of severity of initiation on liking for a group. *Journal of Abnormal and Social Psychology, 59*, 177–181.
Balliet, D., Mulder, L. B., & Van Lange, P. A. M. (2011). Reward, punishment, and cooperation: A meta-analysis. *Psychological Bulletin, 137*, 594–615.
Barclay, P., & Raihani, N. (2016). Partner choice versus punishment in human prisoner's dilemmas. *Evolution and Human Behavior, 37*(4), 263–271.
Baron, J., & Spranca, M. (1997). Protected values. *Organizational Behavior and Human Decision Processes, 70*, 1–16.
Bastian, B., Jetten, J., Chen, H., Radke, H. R., Harding, J. F., & Fasoli, F. (2013). Losing our humanity: The self-dehumanizing consequences of social ostracism. *Personality and Social Psychology Bulletin, 39*, 156–169.
Bastian, B., Jetten, J., & Radke, H. R. (2012a). Cyber-dehumanization: Violent video game play diminishes our humanity. *Journal of Experimental Social Psychology, 48*, 486–491.

Bastian, B., Loughnan, S., Haslam, N., & Radke, H. R. (2012b). Don't mind meat? The denial of mind to animals used for human consumption. *Personality and Social Psychology Bulletin, 38*(2), 247–256.
Bastian, B., Zhang, A., & Moffat, K. (2015). The interaction of economic rewards and moral convictions in predicting attitudes toward resource use. *PloS One, 10*(8), e0134863.
Belk, R. W. (1991). The ineluctable mysteries of possessions. *Journal of Social Behavior & Personality, 6*, 17–55.
Bratanova, B., Loughnan, S., & Gatersleben, B. (2012). The moral circle as a common motivational cause of cross-situational pro-environmentalism. *European Journal of Social Psychology, 42*(5), 539–545. https://doi.org/10.1002/ejsp.1871.
Crimston, D., Bain, P. G., Hornsey, M. J., & Bastian, B. (2016). Moral expansiveness: Examining variability in the extension of the moral world. *Journal of Personality and Social Psychology, 111*(4), 636–653.
Csikszentmihalyi, M., & Rochberg-Halton, E. (1981). *The meaning of things: Domestic symbols and the self*. New York, NY: Cambridge University Press.
Cushman, F., Gray, K., Gaffey, A., & Mendes, W. B. (2012). Simulating murder: The aversion to harmful action. *Emotion, 12*, 2–7.
Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology, 44*(1), 113–126.
DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the big five. *Journal of Personality and Social Psychology, 93*, 880–896.
Dunlap, R. E., & Van Liere, K. D. (1978). The "new environmental paradigm": A proposed measuring instrument and preliminary results. *The Journal of Environmental Education, 9*, 10–19.
Epley, N., Akalis, S., Waytz, A., & Cacioppo, J. T. (2008). Creating social connection through inferential reproduction: Loneliness and perceived agency in gadgets, gods, and greyhounds. *Psychological Science, 19*, 114–120.
Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature, 415*, 137–140. https://doi.org/10.1038/415137a.
Feinberg, M., & Willer, R. (2013). The moral roots of environmental attitudes. *Psychological Science, 24*(1), 56–62. https://doi.org/10.1177/0956797612449177.
Feinberg, M., Willer, R., & Schultz, M. (2014). Gossip and ostracism promote cooperation in groups. *Psychological Science, 25*(3), 656–664. https://doi.org/10.1177/0956797613510184.
Feinberg, M., Willer, R., Stellar, J., & Keltner, D. (2012). The virtues of gossip: Reputational information sharing as prosocial behavior. *Journal of Personality and Social Psychology, 102*(5), 1015–1030. https://doi.org/10.1037/a0026650.
Fiske, A. P., & Tetlock, P. E. (1997). Taboo trade-offs: Reactions to transactions that transgress the spheres of justice. *Political Psychology, 18*, 255–297.
Foa, U. G. (1971). Interpersonal and economic resources. *Science, 171*(3969), 345–351.
Foa, E. B., & Foa, U. G. (1980). Resource theory. *Social exchange* (pp. 77–94). Boston, MA: Springer.
Frimer, J. A., Tell, C. E., & Haidt, J. (2015). Liberals condemn sacrilege too: The harmless desecration of Cerro Torre. *Social Psychological and Personality Science, 6*, 878–886.
Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology, 96*, 1029–1046.
Gray, K., Young, L., & Waytz, A. (2012). Mind perception is the essence of morality. *Psychological Inquiry, 23*, 101–124.
Haidt, J., Koller, S. H., & Dias, M. G. (1993). Affect, culture, and morality, or is it wrong to eat your dog? *Journal of Personality and Social Psychology, 65*, 613–628.
Inzlicht, M., Shenhav, A., & Olivola, C. Y. (2018). The effort paradox: Effort is both costly and valued. *Trends in Cognitive Sciences, 22*, 337–349.
Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *The Journal of Economic Perspectives, 5*, 193–206.
Kruger, J., Wirtz, D., Van Boven, L., & Altermatt, T. W. (2004). The effort heuristic. *Journal of Experimental Social Psychology, 40*, 91–98.
Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39*(2), 329–358.
Lewis, M. (1965). Psychological effect of effort. *Psychological Bulletin, 64*, 183–190.
Loewenstein, G., & Issacharoff, S. (1994). Source dependence in the valuation of objects. *Journal of Behavioral Decision Making, 7*, 157–168.
Markowitz, E. M. (2012). Is climate change an ethical issue? Examining young adults' beliefs about climate and morality. *Climatic Change, 114*(3–4), 479–495. https://doi.org/10.1007/s10584-012-0422-8.
Markowitz, E. M., & Shariff, A. F. (2012). Climate change and moral judgement. *Nature Climate Change, 2*(4), 243–247. https://doi.org/10.1038/NCLIMATE1378.
Martens, A., Kosloff, S., Greenberg, J., Landau, M. J., & Schmader, T. (2007). Killing begets killing: Evidence from a bug-killing paradigm that initial killing fuels subsequent killing. *Personality and Social Psychology Bulletin, 33*(9), 1251–1264.
McCarthy, J. (2016). River, national park in New Zealand are now legally people. Available at: https://www.globalcitizen.org/en/content/new-zealand-nature-personhood-climate-change/, Accessed date: 16 July 2016.
Messick, D. M., & Brewer, M. B. (1983). Solving social dilemmas: A review. *Review of Personality & Social Psychology, 4*(1), 11–44.
Muehlbacher, S., & Kirchler, E. (2009). Origin of endowments in public good games: The impact of effort on contributions. *Journal of Neuroscience, Psychology, and Economics, 2*, 59–67.
Norton, M. I., Mochon, D., & Ariely, D. (2012). The IKEA effect: When labor leads to love. *Journal of Consumer Psychology, 22*, 453–460.
Rand, D. G., & Nowak, M. A. (2013). Human cooperation. *Trends in Cognitive Sciences, 17*, 413–425.
Rapp, D. J., Engelmann, J. M., Herrmann, E., & Tomasello, M. (2017). The impact of choice on young children's prosocial motivation. *Journal of Experimental Child Psychology, 158*, 112–121.
Rees, J. H., Klug, S., & Bamberg, S. (2015). Guilty conscience: Motivating pro-environmental behavior by inducing negative moral emotions. *Climatic Change, 130*, 439–452.
Romano, A., Balliet, D., Yamagishi, T., & Liu, J. H. (2017). Parochial trust and cooperation across 17 societies. *Proceedings of the National Academy of Sciences, 114*(48), 12702–12707.
Ruby, M. B. (2012). Vegetarianism. A blossoming field of study. *Appetite, 58*(1), 141–150.
Sacchi, S., Riva, P., Brambilla, M., & Grasso, M. (2014). Moral reasoning and climate change mitigation: The deontological reaction toward the market-based approach. *Journal of Environmental Psychology, 38*, 252–261.
Stern, P. C., & Dietz, T. (1994). The value basis of environmental concern. *Journal of Social Issues, 50*(3), 65–84. https://doi.org/10.1111/j.1540-4560.1994.tb02420.x.
Stern, P. C., Dietz, T., & Guagnano, G. A. (1995). The new ecological paradigm in social-psychological context. *Environment and Behavior, 27*(6), 723–743.
Tetlock, P. E., Kristel, O. V., Elson, S. B., Green, M. C., & Lerner, J. S. (2000). The psychology of the unthinkable: Taboo trade-offs, forbidden base rates, and heretical counterfactuals. *Journal of Personality and Social Psychology, 78*, 853–870.
Trope, Y., & Liberman, N. (2010). Construal-level theory of psychological distance. *Psychological Review, 117*(2), 440–463.
Van Lange, P. A., De Bruin, E., Otten, W., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology, 73*, 733–746.
Van Lange, P. A. M., Joireman, J. A., & Milinski, M. (2018). Climate change: What psychology can offer in terms of insights and solutions. *Current Directions in Psychological Science, 27*, 269–274.
Van Lange, P. A., Joireman, J., Parks, C. D., & Van Dijk, E. (2013). The psychology of social dilemmas: A review. *Organizational Behavior and Human Decision Processes, 120*(2), 125–141.
Van Lange, P. A. M., Rockenbach, B., & Yamagishi, T. (Eds.). (2014). *Reward and punishment in social dilemmas*. New York, NY: Oxford University Press.
Westbury, H. R., & Neumann, D. L. (2008). Empathy-related responses to moving film stimuli depicting human and non-human animal targets in negative circumstances. *Biological Psychology, 78*, 66–74.
Wilson, E. O. (1984). *Biophilia.* Cambridge, MA: Harvard University Press.
Wu, J., Balliet, D., & Van Lange, P. A. M. (2016a). Reputation, gossip, and human cooperation. *Social and Personality Psychology Compass, 10*(6), 350–364. https://doi.org/10.1111/spc3.12255.
Wu, J., Balliet, D., & Van Lange, P. A. M. (2016b). Gossip versus punishment: The efficiency of reputation to promote and maintain cooperation. *Scientific Reports, 6*, 23919. https://doi.org/10.1038/srep23919.
Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology, 51*, 110–116.
Yang, Y., & Galak, J. (2015). Sentimental value and its influence on hedonic adaptation. *Journal of Personality and Social Psychology, 109*, 767–790.
Zhao, K., & Smillie, L. D. (2015). The role of interpersonal traits in social decision making: Exploring sources of behavioral heterogeneity in economic games. *Personality and Social Psychology Review, 19*, 277–302.