

Analysis

Moral intuitions predict pro-social behaviour in a climate commons game

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ABSTRACT

The climate crisis and appeals to tackle it are often framed in moral terms, but few studies tested whether individual variation in moral intuitions correlate with pro-environmental behaviours that may affect the climate commons. In the present study we ask whether moral intuitions regarding harm (care and compassion), fairness, in-group loyalty, stance towards authority, and purity, as quantified by the Moral Foundations Theory, correlate with pro-environmental behaviours. Participants played 10 rounds of a public goods game framed as extraction of a mineral that affects climate commons negatively. We found that participants' extraction in the first round of the game was positively related to loyalty and authority moral foundations. Average extraction over all ten rounds of the game was negatively related to harm and positively related to loyalty moral foundations with small to moderate effect sizes. The fairness dimension was only weakly related to extraction in the first round and not related to average extraction over the entire game. Purity dimension did not relate to extraction neither in the first round nor on average. These results suggest that intrinsic factors such as moral intuitions are likely to play an important role in fostering pro-environmental behaviours to address the climate crisis.

1. Introduction

Environmental policies typically emphasize use of economic incentives to make individuals behave in more environmentally-benign ways (Hahn and Stavins, 1992; Tietenberg, 1990). However, behavioural studies have shown that individuals are also predisposed with intrinsic motivations to protect the environment, which they often justify with moral arguments (Manner and Gowdy, 2010; Rode et al., 2015). Even though the level of such motivations may vary between persons and contexts, it has been argued that environmental policies need to pay attention to the presence of moral reasoning in order not to crowd them out via policies designed for purely self-regarding individuals (Bowles, 2008; Frey and Stutzer, 2008; Gneezy et al., 2011; Spash, 2010; Vatn, 2009).

Morality plays an important role in climate action as well. Political demands for systemic change to protect the climate commons rely on morally framed arguments such as fairness and harm (Adger et al., 2017; Gowdy, 2008), as recently exemplified by youth climate activists such as Vanessa Nakate and Greta Thunberg and their emphasis on moral responsibilities of political leaders to take stronger climate action (Tasoff, 2019). Moral arguments also motivate individual pro-environmental

behaviour (Axelrod and Lehman, 1993; Feinberg and Willer, 2013; Frey and Stutzer, 2008; Gifford and Nilsson, 2014), which can shape new social norms towards more climate-friendly action when they spill-over to other individuals (Kraft-Todd et al., 2018).

Much like other common-pool resources such as fisheries, forest products, water use, etc. (Aswani et al., 2013; Cardenas, 2004; Ostrom, 1999), climate change can be conceptualized as a commons problem and studied with public good games (PGG) (Barrett and Dannenberg, 2016; Tavoni et al., 2011; Tavoni and Levin, 2014). A common finding in studies using PGG is that individual heterogeneity with respect to gender, education, age, occupation, as well as wealth can impact pro-environmental behaviour (Aswani et al., 2013; Bouma and Ansink, 2013; Braaten, 2014; Cardenas, 2003; Gatiso et al., 2015). Individuals in economic games may also be categorized based on their (temporarily) stable types such as altruists/cooperators, free-riders and conditional cooperators (Camerer and Fehr, 2002; Fischbacher et al., 2001; Kurzban and Houser, 2005; Rodriguez-Sickert et al., 2008). This heterogeneity is conceptualized as other-regarding preferences such as inequity aversion and reciprocity (Bowles et al., 1997; Fehr and Schmidt, 1999), yet these notions generally refer to fairness in terms of outcomes (e.g. equity in earnings) rather than fairness in procedures. How other individual

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moral intuitions (such as harm, procedural justice, etc.) drive economic behaviour has not been studied extensively.

How morality should be conceptualized and measured has been a significant issue in social psychology (Ellemers et al., 2019; Haidt and Kesebir, 2010). Recently, Haidt and colleagues argued that moral intuitions regarding harm, fairness, loyalty to group members, stance to authority, and purity are foundations shared by all humans (Graham et al., 2013; Graham et al., 2009; Haidt, 2012; Haidt and Graham, 2007). According to this Moral Foundations Theory (MFT), these foundations have an evolutionary basis: they help solve challenges in social interactions such as whom to help, whom to punish etc. and thereby make cooperation at a large scale possible. Because there are multiple types of social challenges to navigate, moral intuitions that help in these social interactions also vary along multiple dimensions. In its original formulation, MFT posited the five foundations listed above (Haidt and Joseph, 2007). These foundations are sometimes grouped into two categories: individualizing (harm/care and fairness/reciprocity) and binding (in-group/loyalty, authority/respect, and purity/sanctity) foundations (Table 1). Cross-cultural studies have found evidence that the Moral Foundations Theory has explanatory power in accounting for variation in moral intuitions among people, and, within societies, explains variation in various other social behaviours such as political orientation (Day et al., 2014; Graham et al., 2013; Haidt and Graham, 2007; Nilsson and Erlandsson, 2015; Strimling et al., 2019; Yilmaz et al., 2016).

There have been only a few studies on whether pro-social environmental behaviours or intentions are related to variation in moral foundations. In one study, Dickinson et al. (2016) found that in a sample from the United States, only harm/care and fairness/reciprocity foundations were predictive of willingness to make changes in lifestyle to

Table 1
Items of MFT questionnaire used in the study.

2-factor MFT	5-factor MFT	Items
Individualizing	Harm/care	Whether or not someone suffered emotionally Whether or not someone cared for someone weak or vulnerable Compassion for those who are suffering is the most crucial virtue. One of the worst things a person could do is hurt a defenseless animal.
	Fairness	Whether or not some people were treated differently than others Whether or not someone acted unfairly When the government makes laws, the number one principle should be ensuring that everyone is treated fairly. Justice is the most important requirement for a society.
Binding	Loyalty	Whether or not someone's action showed love for his or her country Whether or not someone did something to betray his or her group I am proud of my country's history. People should be loyal to their family members, even when they have done something wrong
	Authority	Whether or not someone showed a lack of respect for authority Whether or not someone conformed to the traditions of society Respect for authority is something all children need to learn. Men and women each have different roles to play in society.
	Purity	Whether or not someone violated standards of purity and decency Whether or not someone did something disgusting People should not do things that are disgusting, even if no one is harmed. I would call some acts wrong on the grounds that they are unnatural.

avert climate change. Likewise, in a Swedish sample, Jansson and Dorrepaal (2015) found that harm/care and fairness/reciprocity foundations were positively associated with pro-environmental personal norms about climate change. In addition, appeals to authority was associated with reduced response to climate change. Similarly, in a study with an Australian sample, Dawson and Tyson (2012) found that harm and fairness intuitions predict preferences in favour of stronger climate action. Yet, loyalty to in-group members was associated negatively with stronger responses. Finally, in a Finnish sample studied by Vainio and Makiniemi (2016) individualizing foundations were related positively with self-reported climate-friendly consumption choices such as taking the public transport. Binding foundations, however, were associated negatively with climate-friendly choices. Although these studies consistently show a positive relationship between individualizing (harm and fairness) foundations and pro-environmental attitudes and intentions, they solely rely on self-reported attitudes and behaviour and do not test participants' actual potentially costly pro-environmental behaviours directly.

In the present study, we investigate whether variation in moral foundations are linked to cooperation and selfish extractive behaviour in a resource use conflict via laboratory experiments conducted with undergraduate students in Istanbul, Turkey. The moral foundations that we adopt from the MFT include opinions on concepts that are usually not considered in economic experiments (such as authority, loyalty or generalized concern about harm). Moreover, fairness in economic games often refers to the outcome, but not so much to the process, whereas in MFT fairness dimension is closely related with procedural justice. Thus, considering intrinsic moral variation is an expansion of the classical behavioural economic approach.

We framed the resource use conflict in the game specifically as one of climate change, where extraction of certain minerals gives strictly higher individual payoffs but total extraction diminishes the group's earnings overall as it has negative impacts on the climate. To the best of our knowledge, this is the first experimental examination of how variation in endorsement of different moral foundations may affect cooperative behaviour in a social and environmental dilemma game. We also investigate the links between extraction in the climate commons game and individual attitudes towards climate change such as concern for climate change, attitude to technology, general risk appetite, trust to other individuals, and perceptions regarding economic development-environment nexus.

2. Material and methods

2.1. Participants

Participants ($n = 205$) were undergraduate students from Boğaziçi University, Istanbul, Turkey, who took part in the experiment between September 2018 and May 2019 (106 male and 97 female students; two participants did not prefer to state their gender). The age of the participants ranged from 18 to 29, and their mean age was 21.77. The study was approved by the Institutional Review Board (INAREK SBB Ethics Sub-Committee) of Boğaziçi University. Informed consent was obtained from all participants via a consent form prior to each session.

2.2. Experimental design and procedures

The participants completed the experiment in groups of 5 individuals (41 groups). Each participant sat in a cubicle in the laboratory. Communication between participants was not allowed. At the start of each session we provided verbal and written instructions, and checked with a short test to ensure the participants understood the rules of the game and payoff structure. The study (experiments and survey) took about 30 min to complete.

The economic model employed in this study is based on a linear public goods game, the only difference being that subjects extract from a

common-pool resource base, instead of contributing to a common project. As such, the model is also very similar to the “Take Game” designed by Dufwenberg et al. (2011). This linear model is suitable for the purposes of the study, because it makes it easier for the subjects to understand the best responses of the game. In particular, the two corner solutions of the game, “do not over-extract” or “over-extract fully” (the social optimum and the Nash best response, respectively), are realistic and easy to comprehend with regard to the climate change problem. Overall, the model represents an open-access regime in which extracting as much as possible gives strictly higher individual payoff regardless of what the other subjects are extracting.

We explained the game to the participants using the climate change frame as follows: Each player extracts minerals increasing his/her payoff in the game. Yet, at the same time, total extraction poses a negative externality on all players by accelerating climate change. That is, the more the group’s total extraction, the more is subtracted from each individual’s payoff at the end of each round. This game is therefore reflecting a typical Prisoner’s Dilemma (involving an open-access climate regime), where over-using the resource is the selfish best response, while social optimum is reached only if all subjects in the group cooperate and refrain from over-extracting the mineral.

The following payoff function applies to all subjects:

$$\pi_i = bx_i + bq - \frac{\alpha}{n} \sum_i x_i$$

where

$$n = 5; q = 40; x_i \in [0, 20]; b = 10; \alpha = 20, MPCR = \frac{\alpha}{b} = 0.4$$

This slight modification to the standard public goods game payoff function was made in order to address the climate change scenario, in which each subject has a certain level of quota q , which can be exceeded by $x_i \in [0, 20]$. That is, x_i represent the level of individual over-extraction, which brings private benefits of b for each unit of over-extraction, but subtracts from the payoff of all subjects by an amount $\frac{\alpha}{n}$ per unit of over-extraction, and π_i denotes the individual payoff per period for an individual i and there are n individuals in each group.

In each session, the show-up compensation for each participant was 8 Turkish Liras (TL) (US\$ 1.52),¹ and each participant could earn up to 26 TL (US\$ 4.94) based on their decisions in these 10 rounds. The mean earning for the 10 rounds was 12.70 TL (US\$ 2.41).

Once the experiment was over, a follow-up questionnaire collected information on demographic factors, attitudes and knowledge regarding environment, climate change and economic priorities and on moral attitudes of participants based on the 20-item MFT questionnaire. We used the 20-item (short) version of the Moral Foundations Questionnaire (instead of the longer 30-item questionnaire) as participants had already spent about 20 min in the first experimental part of the study. The Turkish translation that we used for the study was adopted (and back-translated to English to ensure correct translation of the scale) from the website, www.moralfoundations.org, maintained by Haidt and colleagues.

The moral foundations questionnaire was initially designed to measure five moral foundations, although it has also been conceptualized as either two (individualizing and binding) or three-foundations (individualizing, authority/loyalty and purity) (Graham et al., 2009; Shweder et al., 1997). The list of items and summary statistics for moral foundations are provided in Table S1 in supplementary materials. In order to identify the factor structure in our data, we carried out a confirmatory factor analysis (CFA) on the MFT questionnaire (Table S2). We report below analyses separating out all five factors. The internal reliability

scores are reported in Table S3. The attitudes and knowledge on environment and climate change of the participants are summarized in Table S4.

3. Results

3.1. Cooperation in the climate commons game

Average extraction in each round of the game started at slightly higher than 10 units and increased steadily over successive rounds to reach about 18 units in the last round of the game (Fig. 1). This gradual increase in average extraction was in line with previous PGGs conducted in laboratory settings with undergraduate students (Ostrom, 2006). Only 27 individuals (out of 205, 13%) extracted the full 20 units in each round which stands in contrast with the prediction that purely self-interested subjects will extract the highest possible amount in open-access resource use contexts. Twenty-nine percent of all observations were close to the selfish best response (between 17 and 20 units) considering all ten rounds of the game, whereas 9% of all observations were between 0 and 5 units.

3.2. Moral foundation scores and extraction in the climate commons game

In order to determine whether moral foundations scores were correlated with extraction in the climate commons game, we first analyzed the extraction amounts of each participant in the first round of the experiment. The extraction decisions in the first round are made independently and without knowledge of the extraction from the other players in the group. Therefore, they may reflect the intrinsic strategy of the participants and their expectations about other participants in the group. The extraction amounts in the first round were distributed with 27% of participants extracting zero, 39% extracting the full amount (20 units) and the rest extracting somewhere in between (Fig. 2). We therefore classified participants into three categories: extracted zero, extracted some, and extracted all, and compared the MFT scores of participants (dependent variable) based on their extraction in the first round using a one-way ANOVA with extraction level as an independent variable. We also added gender (male/female) as another independent variable in these analyses.

There was no significant difference in the harm/care scores ($F(2,199) = 2.33, p = 0.10$) and fairness ($F(2,199) = 2.843, p = 0.062$) of participants depending on their level of extraction in the first round. Participants did differ in their authority scores depending on their extraction levels ($F(2,199) = 4.78, p = 0.0094$). Post-hoc comparisons showed that participants who extracted nothing in the first round had lower authority scores than those who extracted the full amount (Tukey’s HSD: $p = 0.019$) and those who extracted some (Tukey’s HSD;

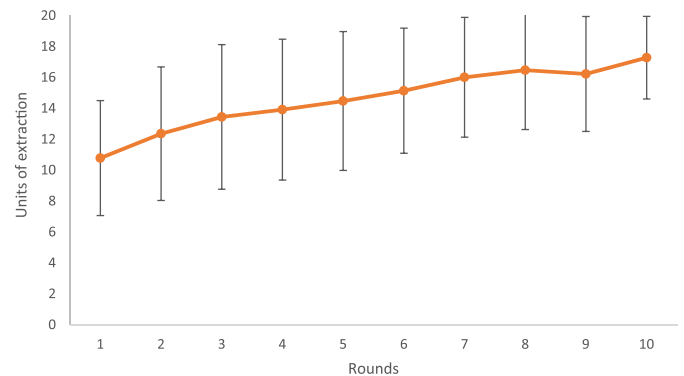


Fig. 1. Average extraction (averaged over 41 groups). Error bars indicate standard deviation in each round.

¹ Central Bank of the Republic of Turkey USD/TRY exchange rates as of 12 February 2019.

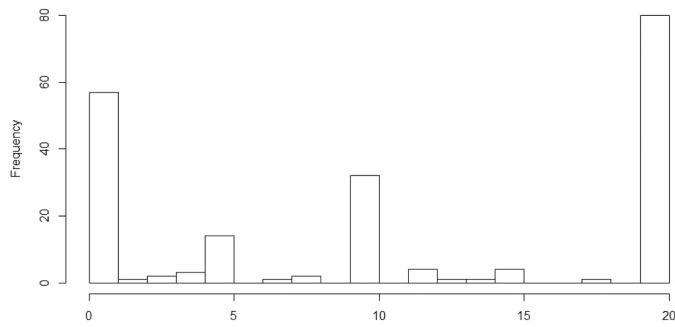


Fig. 2. Distribution of first round extraction decisions (from 0 to 20 units).

$p = 0.01$). These latter two groups did not differ from each other in their authority scores ($p = 0.98$) (Table 2, Fig. 3). Loyalty scores also differed depending on the extraction in first round ($F(2,199) = 3.80, p = 0.024$): participants who extracted nothing differed significantly from participants who extracted all in the first round (Tukey's HSD, $p = 0.017$), while none of the other post-hoc comparisons were significant. Purity scores did not differ between the participants depending on their extraction in the first round ($F(2,202) = 1.27, p = 0.28$). Gender had a reliable effect only in harm/care foundations ($F(1,199) = 5.26; p = 0.02$) and purity foundation ($F(1,199) = 8.55, p = 0.0039$) with women having higher scores on both foundations compared to men.

Next, we analyzed participants' average extraction levels over the entire game (all 10 rounds) as the dependent variable using a linear mixed model. Because extraction levels of participants may depend on past action of other group members, we included group as a random variable in this analysis. We used all five moral foundation scores as well as gender as independent variables and average extraction amount of each participant as the dependent variable (Table 3, Fig. 4). Only two variables had coefficients whose 95% confidence intervals that did not overlap zero; harm/care and loyalty. Gender had a potentially large but unreliable effect (95% confidence intervals ranged from -2.21 to 0.44).

Participants' concern for climate change predicted their average extraction levels in the game. Compared to participants who indicated little or no concern for climate change (we collapsed these two categories to one category due to small numbers of people in these categories; see Table S4), those who were somewhat concerned and very concerned extracted lesser amounts (Table 4, Fig. 5).

Moreover, participants who indicated that they were very concerned for climate change had higher harm/care scores (one-way ANOVA, $F(2,199) = 4.18, p = 0.0177$, Fig. 6a) and higher fairness scores (one-way ANOVA, $F(2,199) = 3.67, p = 0.027$; Fig. 6b) than participants who were either somewhat concerned or who indicated little or no concern. The

Table 2

First-round extraction: Mean differences (95% confidence intervals) in authority and loyalty scores between participants who extracted all, some and zero in the first round of the public game.

	Comparison	Difference [95% CI]	Adjusted p-values
Authority	extracted some-extracted all	-0.023 [-0.34, 0.39]	0.98
	extracted zero-extracted all	-0.44 [-0.83, -0.058]	0.019
	extracted zero-extracted some	-0.46 [-0.86, -0.066]	0.018
Loyalty	extracted some-extracted all	-0.19 [-0.55, 0.17]	0.42
	extracted zero-extracted all	-0.44 [-0.82, -0.06]	0.017
	extracted zero-extracted some	-0.25 [-0.64, 0.14]	0.29

The p -values (adjusted for a family-wise error rate of 0.05) are derived from a Tukey post-hoc test.

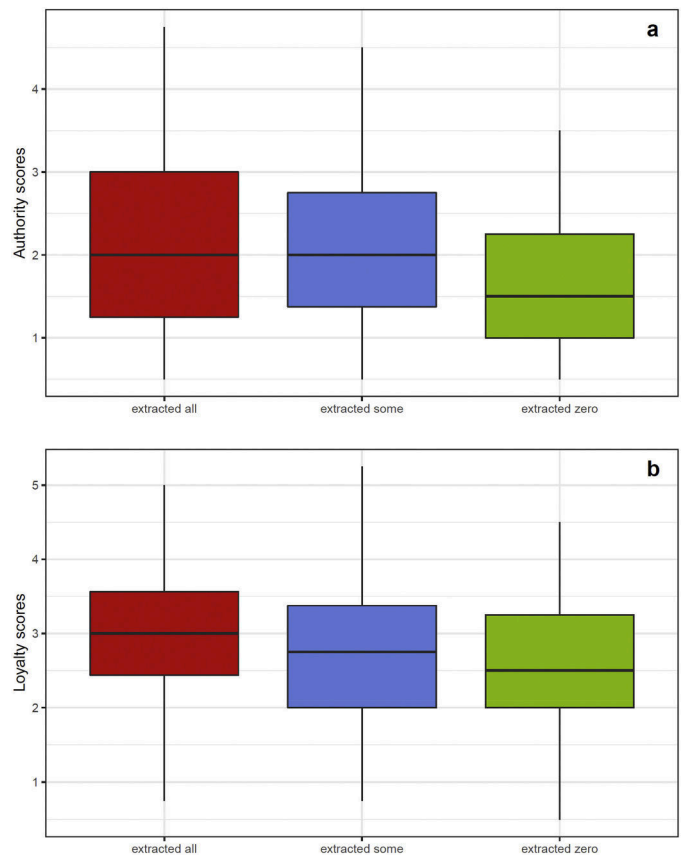


Fig. 3. Authority (a) and Loyalty (b) scores of participants that extracted all, some, or zero in the first round of the game. Boxplots indicate inter-quartile ranges, the middle line indicates median values, and the whiskers indicate 95% confidence intervals.

Table 3

Average extraction: Linear mixed model on average extraction in the 10 rounds of the game as dependent variable and participants' MFT scores (five factors) and gender (baseline: female) as predictors. Group was included as a random factor. The (non-standardized) coefficients and their 95% confidence intervals are given. We also provide t -values are from the Wald test ($df = 156$) for coefficients.

	Coefficient	%95 CI	t	p-value
Intercept	18.76	13.49; 25.59	7.51	<0.0001
Fairness	-0.45	-1.73; 0.82	-0.69	0.49
Harm/Care	-1.11	-2.16; -0.05	-2.03	0.044
Loyalty	1.01	0.08; 1.95	2.11	0.036
Authority	-0.57	-1.49; 0.35	-1.19	0.24
Purity	0.34	-0.46; 1.15	0.82	0.41
Gender	-0.87	-2.21; 0.44	-1.28	0.20

post-hoc contrasts on harm/care scores indicated that participants that were very concerned had marginally higher harm/care scores compared to those who indicated little or no concern about climate change (mean difference- confidence intervals: 0.38 ; CI: -0.008 — 0.77 ; $p = 0.056$) and higher scores than those who were somewhat concerned (0.26 ; CI: 0.013 — 0.51 ; $p = 0.036$). Post-hoc comparisons for fairness scores showed that participants who were very concerned about climate change had higher fairness scores than those who were only somewhat concerned (0.20 , CI: 0.00 – 0.40 , $p = 0.050$) but the other comparisons were not significantly different from each other. No other moral foundation score had a significant relationship to concern for climate change ($p > 0.28$ for all). Once again, gender only had a significant effect on harm/care scores and purity scores as in the above analyses.

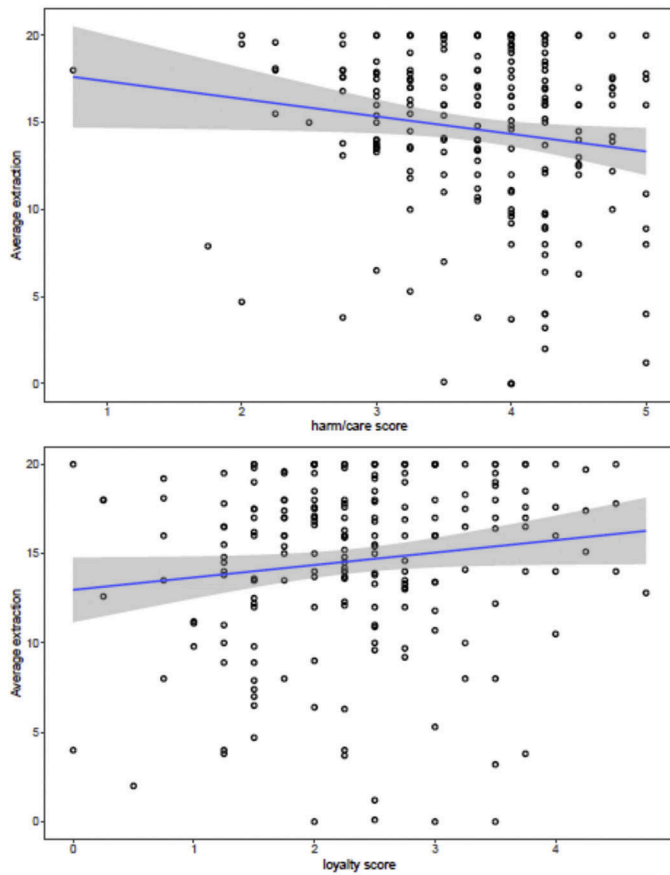


Fig. 4. Average extraction in the 10 rounds of the game and (a) harm/care and loyalty (b) scores of participants. The line indicates best-fit line from a linear regression and the shaded area indicates the 95% confidence intervals. The results remain significant if two extreme harm/care scores that are lower than 2 are removed.

Table 4

Linear mixed model on average extraction in the game as dependent variable and concern for climate change (“little or no concern” is taken as baseline) and gender (female taken as baseline) as predictor variables. Group was included as a random factor. The (non-standardized) coefficients and their 95% confidence intervals are given. We also provide t-values are from the Wald test (df = 159) for coefficients.

		Value	%95 CI	t	p
	Intercept	17.46	15.37; 19.54	16.54	<0.0001
Concern for climate change	somewhat concerned	-2.25	-4.23; -0.27	-2.25	0.026
	very concerned	-3.20	-5.29; -1.11	-3.02	0.0029
Gender		-1.03	-2.33; 0.26	-1.57	0.12

Finally, we asked whether the two foundations identified earlier (harm/care and loyalty) were predictive of average extraction above and beyond concern for climate change by adding to the linear mixed model in Table 4 the harm/care and loyalty scores as predictor variables. The results showed that the effect of harm/care and loyalty remained statistically meaningful when controlling for concern for climate change (Table 5). In this model, the 95% confidence interval of the coefficient for gender just overlapped zero (-2.54 to 0.04); and thus showed a trend towards a statistically meaningful effect of gender on extraction, with women extracting slightly more on average than men (Fig. S2).

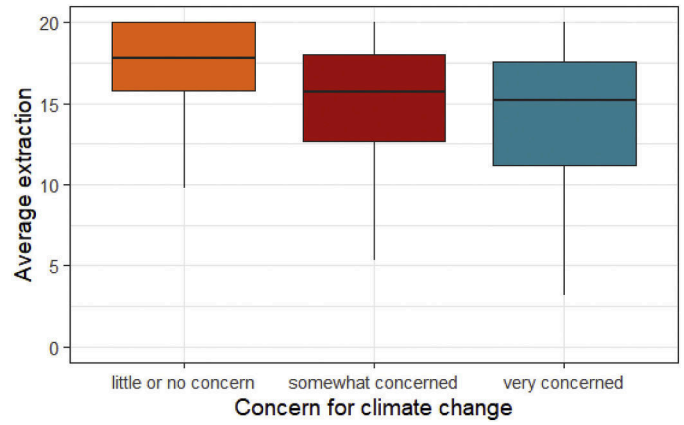


Fig. 5. Concern for climate change and average extraction levels. Boxplots indicate inter-quartile ranges, the middle line indicates median values, and the whiskers indicate 95% confidence intervals. Sample sizes: little or no concern, n = 24; somewhat concerned, n = 106; very concerned, n = 75.

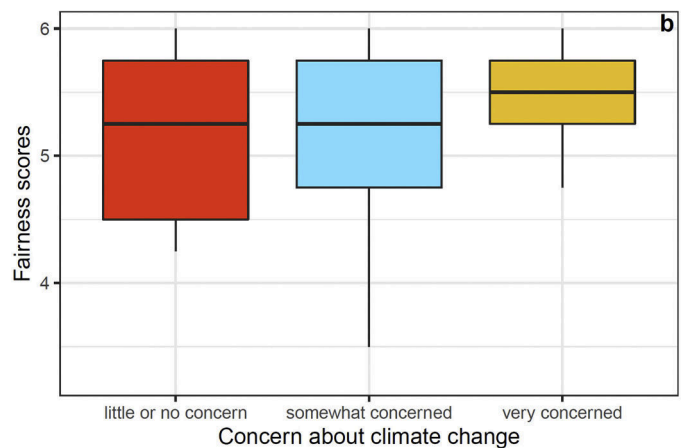
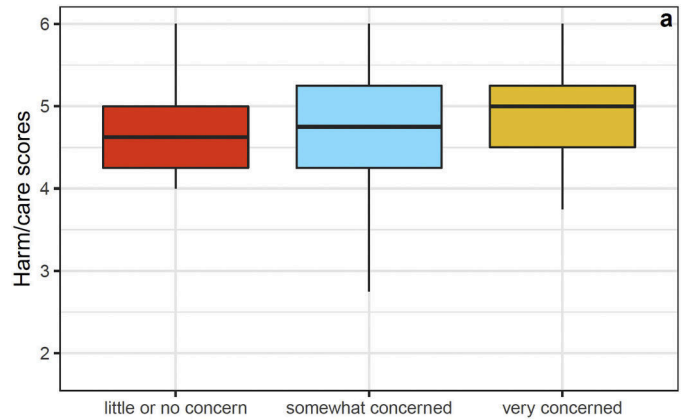


Fig. 6. Harm/care scores (a) and fairness scores (b) of participants depending on their level of concern about climate change. Boxplots indicate inter-quartile ranges, the middle line indicates median values, and the whiskers indicate 95% confidence intervals. Sample sizes: little or no concern, n = 24; somewhat concerned, n = 106; very concerned, n = 75.

4. Discussion

Our main finding is that moral intuitions were correlated with participants’ extraction behaviour in the climate commons game: participants who extracted nothing as their initial strategy had lower scores on

Table 5

Linear mixed model on average extraction in the game as dependent variable and concern for climate change (“little or no concern” is taken as baseline), gender (female taken as baseline), harm/care and loyalty scores as predictor variables. Group was included as a random factor. Group was included as a random factor. The (non-standardized) coefficients and their 95% confidence intervals are given. We also provide t-values are from the Wald test ($df = 157$) for coefficients. This model had an AIC value of 1195.6 (compared to the AIC value of 1199.2 for the model in Table 4).

		Value	%95 CI	t	p
	Intercept	19.53	14.71; 24.36	7.99	<0.0001
Concern for climate change	somewhat concerned	-2.08	-4.03; -0.12	-2.10	0.037
	very concerned	-2.72	-4.82; -0.62	-2.55	0.011
Harm/care		-0.97	-1.87; -0.09	-2.17	0.031
Loyalty		0.72	0.05; 1.40	2.13	0.034
Gender		-1.25	-2.54; 0.04	-1.90	0.058

authority and loyalty foundations. Furthermore, the average extraction of participants over the entire 10 rounds was correlated with harm/care and loyalty foundations but not the other foundations. We also found that the stated concern of the participants was correlated with their extraction in the game as well as with the moral foundations of harm/care and fairness, despite the latter not being significantly predictive of the extraction in the game. Concern for climate change was not correlated with loyalty foundation, even though this foundation was significantly associated with extraction in the game. Overall, these results suggest that individual variation in moral intuitions are important in pro-environmental behaviours in addressing climate change while underscoring the need to measure actual economic behaviour in addition to stated preferences or attitudes.

4.1. Moral intuitions and pro-environmental behaviour in the climate commons game

Previous literature on MFT has mostly relied on self-reported behaviour or intentions instead of actual behaviour to make the point that moral intuitions are related with pro-environmental or climate-friendly behaviour (e.g. Dawson and Tyson, 2012; Dickinson et al., 2016; Jansson and Dorrepaal, 2015). Our results extend these findings, although they also reveal some differences between stated concern for climate change and economic behaviour in the game: while concern for climate change was not associated with loyalty, this foundation was a significant predictor of average extraction in the climate commons game. Additionally, concern for climate change was significantly related to fairness foundation but this foundation did not predict extraction in the game neither in the first round nor on average. These findings underscore the need to measure economic behaviour in addition to stated preferences or attitudes in studies of pro-environmental behaviour.

Interestingly, in the first round, participants who extracted nothing tended to have lower authority and loyalty scores than the participants that extracted all, while only the loyalty foundation was associated with average extraction over the entire course of the game. This may be because people with low authority scores may expect other people to do the “right” thing and extract nothing perhaps due to a personal norm (Jansson and Dorrepaal, 2015). This would be an instance of the assurance problem identified by Sen (Sen, 1967). These participants, upon seeing that this is largely not the case, may then abandon this position. This possibility warrants further research. Loyalty foundation, however, may be associated with national economic concerns at the expense of environmental concerns. Climate change debates at national scales often revolve around the economic cost of action on climate change relative to other nations, so endorsement of loyalty foundation

(which includes items such as “I’m proud of my country’s history”) may reflect such an economic concern for one’s country (Dawson and Tyson, 2012). In fact, Turkish public policy has a long history of prioritizing national economy over the environment; this may have resonated here with our sample (Adaman and Arsel, 2005).

Previous studies found both fairness and harm foundations to be associated with pro-environmental behaviours (e.g. Dawson and Tyson, 2012; Dickinson et al., 2016; Jansson and Dorrepaal, 2015). Our study, however, found only the harm foundation to significantly correlate with extraction (even though both of these foundations were correlated with concern for climate change as noted above). If the fairness foundation does not correlate with pro-environmental behaviours, framing climate change action as addressing an injustice towards future generations may not necessarily be an effective approach. Consistent with this finding, an analysis of newspaper op-eds in the US found that these op-eds used the harm/care framing significantly more frequently than the other four moral foundations, including fairness foundation (Feinberg and Willer, 2013).

One limitation of our study is that we did not ask participants to quantify their political orientation. In the US, variation in endorsement of different moral foundations vary with political orientation (Graham et al., 2009) and opinion on political issues such as abortion and climate change. For instance, Koleva et al. (2012) examined the correlation between political orientation and endorsement of moral foundations, on one hand, and several politically important issues including global warming, on the other. They found that political orientation was the most important predictor and only authority and purity dimensions were related to views on global warming after ideology was taken into account. It is worth noting, however, Koleva et al.’s question on global warming was an explicitly political question that asked whether the government regulations to restrict emissions were enough (or whether they were warranted at all). Given this choice of framing of the global warming question as a question of government regulation, it is perhaps not surprising that political orientation is the most important predictor for this question.

We believe that while the lack of information on political ideology in our sample is a limitation, it does not affect the validity of our conclusions for several reasons. First, unlike in the US, acceptance of climate change as a human-caused phenomenon is very high in Turkey. A recent international survey put it at 90% for Turkey (WIN, 2020). Second, acceptance of climate change does not strongly co-vary with political orientation or party affiliation in Turkey. A recent opinion poll of a nationally representative sample in Turkey (Doğru et al., 2019) demonstrated that while the share of concerned or very concerned individuals is slightly higher for the respondents supporting relatively left-wing political parties, currently there is not a significant political polarization in Turkey with respect to climate change. Indeed, the supporters of a right-wing opposition party voiced the highest concern for climate change in this survey. This is in stark contrast to the political division in the US between liberals and conservatives in this respect (Pew Research Center, 2016), although recent surveys seem to indicate that it may also be changing (Pew Research Center, 2019). In any case, the US seems rather an extreme case, as many countries surveyed show weaker or non-existent relationship between political orientation and views on climate change (Hornsey et al., 2018; Ziegler, 2017).

Finally, the relationship between moral foundations and political ideology in Turkey is not the same as in the US. While in the US all five dimensions co-vary strongly with political ideology (as measured on a 1 to 7 scale of left vs. right-wing orientation (Graham et al., 2009)), in Turkey political ideology measured in the same way is correlated only with fairness, authority and purity. Crucially, harm/care and loyalty foundations—the two foundations that were associated with average extraction in the game – did not correlate with political ideology (Yilmaz et al., 2016). These three factors, i.e. the high acceptance of human-caused climate change, the lack of strong political polarization around this issue and the lack of correlation between the harm and loyalty

foundations and political ideology in Turkey, suggest that our results are unlikely to be due to the effect of political ideology per se.

4.2. Morality beyond moral foundations theory

Another possible limitation of our study comes from the moral foundations theory itself. How to define and measure morality among different human populations has been a source of debate for a long time in social psychology. While the moral foundation theory has been a very influential theoretical framework, it has also been criticized as not adequately capturing all the dimensions of morality (Curry et al., 2019b). The moral foundation questionnaire has also been criticized as having low measurement invariance and internal reliability (Iurino and Saucier, 2020; Tamul et al., 2020). Indeed, in our dataset, too, internal reliability of the subscales for the various foundations were quite close to the mean reliabilities in the recent meta-analysis by Tamul et al. (2020). The low internal reliability might lead to attenuation of effect sizes. While correction for such attenuation is possible, these corrections do not appear to be applied widely in the MFT literature. Finally, corrections do not necessarily make up for flaws in the measure (Nimon et al., 2012).

We chose the moral foundations framework in the present experiment as it is the main theoretical framework that conceptualized morality as a psychological tool to enable cooperation. It also extends the concept of morality beyond fairness and reciprocity in economic games. We note, however, that other recent frameworks such as Curry's morality-as-cooperation framework (Curry et al., 2019b) also take a similar approach and may be more reliable in measuring variation in moral intuitions among individuals (Curry et al., 2019a). We believe that economic games may provide a useful tool to evaluate various theoretical constructs of morality as they shape pro-social behaviour.

5. Conclusion

Individual heterogeneity in terms of moral opinions has been largely overlooked by economists as a negligible trait of individuals. Hence, economic models have been developed for purely-selfish individuals who were assumed to be representing the society in aggregate. Yet, our findings show that these individual moral opinions as they relate to harm to other beings and loyalty to members of one's group are related to pro-climate behaviour in economic games. Taking such individual variation into account is important for designing environmental policies, and in particular, climate policies (Gowdy, 2008; Manner and Gowdy, 2010), if we consider that changing social norms is one of the most effective ways to achieve more climate-friendly consumption and production decisions to address climate crisis. Therefore, understanding the relationship between variation in moral opinions and behaviour in economic games can be a fruitful way to further policy discussions to motivate change in individual behaviour and through that systemic change in tackling the climate crisis.

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Declaration of Competing Interest

None.

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