The Tree Task: An incentivized, one-shot decision task to measure pro-environmental behavior

Andrea Essl[*], David Hauser[†], Manuel Suter[‡], Frauke von Bieberstein[§]

Abstract

To help mitigate climate change and its associated costs, behavioral economists need to better understand the determinants of pro-environmental behavior. How can this behavior be measured in the lab or online? This study presents the *Tree Task*, an incentivized, one-shot task used to measure pro-environmental behavior in the form of tree planting. In the *Tree Task*, individuals face a trade-off between individual immediate financial rewards and long-term environmental gains. In particular, participants have to decide between spending money to plant trees or keeping the money for themselves. We find that participants' decisions depend on the costs and environmental impact of a tree. As expected, higher costs lead to fewer planted trees, whereas higher carbon dioxide offsets foster tree planting. The number of trees planted correlates with established self-reports assessing environmental attitudes and intentions, belief in climate change, and values in line with pro-environmental behavior. The *Tree Task* extends the set of validated tasks measuring incentivized pro-environmental behavior in the lab as a short, vivid, and easy-to-explain task.

Keywords: Pro-environmental behavior, behavioral economics, incentivized behavioral task, carbon dioxide offset, climate change mitigation, Tree Task
JEL Codes: C91, D91, Q54, Q56

[*]Corresponding author: Andrea Essl: University of Bern, Institute for Organization and HRM, Engehaldenstrasse 4, 3012 Bern, Switzerland, E-mail: andrea.essl@unibe.ch
[†]David Hauser: University of Bern, Institute for Organization and HRM, Engehaldenstrasse 4, 3012 Bern, Switzerland, E-mail: david.hauser@unibe.ch
[‡]Manuel Suter: University of Bern, Institute for Organization and HRM, Engehaldenstrasse 4, 3012 Bern, Switzerland, E-mail: manuel.suter@unibe.ch
[§]Frauke von Bieberstein: University of Bern, Institute for Organization and HRM, Engehaldenstrasse 4, 3012 Bern, Switzerland, E-mail: frauke.vonbieberstein@unibe.ch

We benefited from valuable comments and suggestions from researchers at the Sustainable Development Lab led by Sebastian Berger at the University of Bern. We thank Adrian Gadient-Brügger, Claude Messner, Michael Schulte-Mecklenbeck, and all seminar participants in the research seminar at University of Bern for helpful suggestions. We also thank Daniel Frey, Anne von Niederhäusern, and Jolanda Thomann for their excellent research assistance. All errors are ours.

1 Introduction

Current climate conditions have imposed significant economic costs and social burdens on humanity, and the ongoing climate changes are substantially increasing these costs (Carleton & Hsiang, 2016). One way to mitigate climate change is through demand-side strategies, including behavioral changes. Demand-side strategies have considerable potential, as they may reduce global emissions between 40% and 70% by 2050 (IPCC, 2021) . To examine strategies that target individual behavior, scientists need a toolbox of various measures to assess pro-environmental behavior and its determinants. However, there is a lack of validated tasks that measure incentivized pro-environmental behavior (Homar & Cvelbar, 2021). Therefore, we present an incentivized, one-shot task to measure pro-environmental behavior in laboratory and online experiments: the *Tree Task*.

In the *Tree Task*, individuals decide whether to spend money on planting trees or to keep it for themselves. Participants face a trade-off between individual immediate financial rewards and long-term environmental gains. The degree of pro-environmental behavior is captured with a single outcome variable: the number of trees planted. To validate the *Tree Task*, we manipulated two independent variables in a within-subject design: high or low costs per tree and high or low carbon dioxide offset per tree. These manipulations are possible because the planting costs and the carbon dioxide absorption capacity of the trees differ. As hypothesized, we find that the number of trees planted increases with a higher carbon dioxide offset per tree and decreases with higher costs per tree. Correlational analyses show that the overall number of trees planted is correlated with environmental attitudes and intentions, belief in climate change, and values in line with pro-environmental behavior. Therefore, we confirm the validity of the *Tree Task* as a suitable measurement for capturing pro-environmental behavior in laboratory and online experiments.

The *Tree Task* makes several contributions to the measurement of pro-environmental behavior in laboratory and online experiments. First, the task has high external validity, because the trees are actually planted by a forest restoration organization. Second, the task is short, which allows it to be implemented at a relatively low cost and to be combined with other outcome measures. Third, due to its vividness and simplicity, the *Tree Task* can be compared cross-culturally and used with children. Finally, the *Tree Task* complements recent research that has provided validated measures for behavioral economists (see, e.g., Fallucchi et al., 2020; Henry & Sonntag, 2019; Ronayne et al., 2021).

Thus far, behavioral economists have mainly relied on donation tasks and self-reported intentions to measure pro-environmental behavior in laboratory experiments. In such donation tasks, participants can choose to donate a portion of their experimental earnings, an additional endowment, or their show-up fee to an environmental organization (see, e.g., Goff et al., 2017; Vesely et al., 2022). Some donation tasks give a choice of organizations to donate to, whereas others specify a single organization (see, e.g., Ibanez et al., 2017; Lasarov et al., 2022). In addition, most donation tasks provide a fixed amount of which all or part can be donated. Others vary the amount, for instance, depending on the real effort exerted to donate (e.g., the Work for Environmental Protection Task by Lange & Dewitte, 2022). The concern with most donation tasks is that participants do not know the concrete impact of their donations on the environment, and thus, they are unable to estimate the impact of different donation amounts. This lack of information may lead to different interpretations, complicate the choice of donation levels, and trigger skepticism; therefore, it may only partly reflect actual pro-environmental behavior.

To measure self-reported pro-environmental intentions, researchers use proxies, such as the intention to purchase green products (Yadav & Pathak, 2017) or the intention to purchase bio-based products (Wensing et al., 2021). An additional approach to measuring pro-environmental intentions assesses a hypothetical willingness to pay for environmental protection, for example, willingness to pay for water resource protection (Halkos & Matsiori, 2014) or for ecotourism (Meleddu & Pulina, 2016). Such self-reports offer important insights but entail the risk of different interpretations by individuals (Gifford, 2014). Furthermore, self-reports tend to overestimate actual behavior, for example, due to social desirability bias (Clements et al., 2015; Geller, 1981). Because of the limitations of current donation tasks and self-reports, there is a need to supplement these measures with other incentivized behavioral tasks that have potentially higher external validity (Homar & Cvelbar, 2021; Lades et al., 2021).

Apart from donations, several other behavioral paradigms for the laboratory measure pro-environmental behavior with actual environmental consequences (see also the review by Lange, 2023). Many have been introduced in the environmental psychology literature and consider different ad hoc paradigms, such as choosing between a cheaper conventional and a more expensive but more ecological product (Barber et al., 2014), signing up for a sustainability event like beach cleaning (L.-C. Ho et al., 2020), or signing a petition, for instance, against plastic waste (Rees et al., 2015). Most of these paradigms have in common that they depend on the particular products and events chosen and may be difficult to compare and transfer to other settings.

Only a few behavioral paradigms are more generally applicable and measure incentivized pro-environmental behavior. An example is the Pro-Environmental Behavior Task (Lange et al., 2018), in which participants are given the choice between an environmentally friendly option, which prolongs the time participants have to wait in the laboratory, and an environmentally harmful option that wastes energy by turning on lights but ends the experiment earlier. However, this task cannot be administered online. The Carbon Emission Task by Berger and Wyss (2021) is most closely related to the *Tree Task*, as both tasks are based on monetary incentives and indicate the concrete monetary and environmental impacts of the decision options. In the Carbon Emission Task, participants have to make 25 decisions, always choosing between two options. One option pays a monetary bonus of varying amounts and results in varying amounts of carbon dioxide emissions. The other option pays no bonus and is carbon neutral.[1] The task has real environmental consequences, as the researchers retire carbon dioxide certificates from the European Emission Trading System, lowering the total amount of emissions that can be produced in the future. This task is widely applicable and has been successfully validated (Berger & Wyss, 2021). However, 25 decisions can take up a substantial amount of time, there is a risk of inconsistent decisions, and some participants might find it hard to envision the concept of carbon dioxide emission certificates. Therefore, we believe it is important to use a broader set of experimental tasks to meet the different needs of experimental set-ups. The *Tree Task* complements existing tasks by being a monetary incentivized, vivid, and one-shot task for assessing pro-environmental behavior.

The remainder of this paper is organized as follows: In Section 2, we explain the *Tree Task* and its validation. In Section 3, we describe the results, and in Section 4, we discuss and conclude.

2 Methodology

2.1 The *Tree Task*

The *Tree Task* consists of four parts: the task explanation, comprehension questions, the actual decision, and a question about the perceived effectiveness of planting trees to mitigate climate change.[2] Participants receive an endowment and have to decide whether they want to

[1] The following is an example of such a choice (see Berger & Wyss, 2021): Option A: You will receive a bonus of 40 cents and produce a carbon emission of 4.46 lbs. (which is equivalent to driving 4.97 miles). Option B: You will not receive a bonus, and there will not be any carbon emissions.

[2] See Supplementary Material for full survey instructions. Furthermore, we provide ready-to-use templates for the *Tree Task* for otree and Qualtrics on OSF (https://osf.io/va9nh).

keep the money for themselves or spend part or all of it as a contribution to mitigate climate change. Trees are planted with the help of an international forest restoration organization—in this case, the non-profit organization tree-nation.[3] This international forest restoration organization plants the trees within a few weeks after the experiment (participants are aware of this information). Thus, a participant's decision has real-world environmental consequences.

Participants have to choose one of 11 options to be implemented, that is, plant 0 to 10 trees. All decision options are summarized in a table (see Figure 1 for an example), and participants see the consequences for each tree planted in terms of the money invested, the money kept for themselves, the amount of carbon dioxide offset in kilograms, and the carbon dioxide compensation translated into car kilometers driven by an average passenger vehicle. To ensure that participants understand the impact of their decisions, they are asked to answer comprehension questions. Afterward, participants make their actual decision about how many trees they want to plant. Participants can also submit their email address to receive a confirmation certificate once the trees are planted. As a control variable, participants are asked to rate how effective they consider tree planting as a climate change mitigation strategy measured on a 4-point Likert scale ranging from "very effective" to "not effective at all". Participants who consider tree planting not effective at all to mitigate climate change are excluded from the main analysis but are added for a robustness check.

Figure 1

Exemplary presentation of the Tree Task options and their consequences

Choice	Your investment to mitigate climate change	Your remaining balance	Number of planted trees	Lifetime CO_2 offset	Lifetime CO_2 offset in car kilo-meters
Choice 0 trees	£ 0	£ 2.00	0	0 kg	0 km
Choice 1 tree	£ 0.20	£ 1.80	1	30 kg	120 km
Choice 2 trees	£ 0.40	£ 1.60	2	60 kg	240 km
Choice 3 trees	£ 0.60	£ 1.40	3	90 kg	360 km
Choice 4 trees	£ 0.80	£ 1.20	4	120 kg	480 km
Choice 5 trees	£ 1.00	£ 1.00	5	150 kg	600 km
Choice 6 trees	£ 1.20	£ 0.80	6	180 kg	720 km
Choice 7 trees	£ 1.40	£ 0.60	7	210 kg	840 km
Choice 8 trees	£ 1.60	£ 0.40	8	240 kg	960 km
Choice 9 trees	£ 1.80	£ 0.20	9	270 kg	1080 km
Choice 10 trees	£ 2.00	£ 0.00	10	300 kg	1200 km

[3] We bought the trees on tree-nation.com. This organization provides various information about the trees they offer for planting, such as carbon dioxide compensation in a lifetime, the annual carbon dioxide compensation, or the average natural lifetime of the trees.

2.2 Hypotheses

The *Tree Task* aims to be a trade-off between individual immediate financial rewards and long-term environmental gains. Therefore, decision-makers should respond to the different financial costs and carbon dioxide offset levels of a tree. In general, the price of a tree depends on factors such as the type of project, location, maintenance costs, and planting method (tree-nation, 2022). The carbon dioxide offset of a tree depends on factors such as mass and wood density (Taverna et al., 2007). The pre-registered hypotheses address the influence of different prices and carbon dioxide offset levels per tree on the number trees planted.[4] In terms of financial costs, we expect that ceteris paribus, the higher the cost of planting a tree, the lower the number of trees planted.

Hypothesis 1: Participants plant more trees if the costs per tree are lower.

Furthermore, individuals should react to environmental benefits. Thus, we expect that the number of trees planted will increase with a higher positive environmental impact of the tree, that is, a higher carbon dioxide offset per tree.

Hypothesis 2: Participants plant more trees if the carbon dioxide offset per tree is higher.

In addition, the *Tree Task* should be associated with self-reported measures that are used to examine pro-environmental behavior. Therefore, we test whether the number of trees planted positively correlates with self-reports that have been associated with pro-environmental motivation and behavior.

Hypothesis 3: The number of trees planted correlates positively with pro-environmental intentions (Mancha & Yoder, 2015), environmental attitudes (Dunlap et al., 2000), belief in climate change (Berger et al., 2023), and biospheric values (de Groot & Steg, 2010).

Finally, we assess whether the number of trees planted positively correlates with individual characteristics that have been identified in previous research as positively associated with higher pro-environmental intentions or behavior.

Hypothesis 4: The number of trees planted correlates positively with higher education (Mobley et al., 2010), a liberal political ideology (Hine & Gifford, 1991), and being female (Tikka et al., 2000).

[4] See pre-registration on OSF (https://osf.io/va9nh)

2.3 Treatments

To validate the *Tree Task*, we examined whether people's choices in the *Tree Task* are sensitive to variations in financial costs and environmental benefits. We varied the trees with respect to the price per tree (high vs. low price) and the environmental impact per tree (high vs. low amount of carbon dioxide offset per tree). These variations in the cost and carbon dioxide offset level per tree led us to three different treatments. First, a baseline (BASE) treatment presents a tree with a relatively high cost per tree and a relatively low carbon dioxide offset per tree. Second, the Low Price (LP) treatment has the same carbon dioxide offset but a lower price per tree compared to the baseline treatment. Third, the High Offset (HO) treatment has the same price as the BASE treatment, but a higher carbon dioxide offset per tree. Table 1 presents an overview of the treatment variations, which were based on real tree planting projects offered by tree-nation.

Table 1

Overview of the treatment variations

	BASE	**LP (Low Price)**	**HO (High Offset)**
Costs per tree [GBP]	0.25	0.13	0.25
CO_2 offset per tree [kg CO_2]	20	20	40

2.4 Procedure

We conducted a within-subject experiment and designed the *Tree Task* validation study as follows. After giving informed consent, the participants received information about the *Tree Task*. They were informed that they had to make three different decisions and that one of their three decisions would be randomly drawn and paid out. The participants received the same amount for each of the three treatments, independent of the cost and carbon emissions offset of a tree. Then, participants received a short text about the benefits of planting trees to mitigate climate change and answered comprehension questions. A table displayed a preview of the costs and the carbon dioxide offset per tree for each of the three decisions. This was followed by the three treatments in randomized order, in which the BASE treatment was always the second decision.

Furthermore, we administered established self-reports in the same fixed order to measure participants' pro-environmental intentions (Mancha & Yoder, 2015), environmental attitudes

(Dunlap et al., 2000), biospheric values (de Groot & Steg, 2010), belief in climate change *(Berger et al., 2023)*, and demographics. In detail, pro-environmental intentions were measured with three different items previously used by Mancha and Yoder (2015) (e.g., "I will try to reduce my carbon footprint in the forthcoming month"). The participants were asked to rate the items on a 7-point Likert scale ranging from 1 ("extremely unlikely") to 7 ("extremely likely"; Cronbach's alpha = 0.91). Environmental attitudes were assessed using the New Ecological Paradigm (Dunlap et al., 2000; Cronbach's alpha = 0.87). Participants indicated for 15 statements about the relationship between humans and the environment how much they agreed with the statement (e.g., "We are approaching the limit of the number of people the Earth can support"). The answers were given on a 5-point Likert scale ranging from 1 ("strongly disagree") to 5 ("totally agree"). Biospheric (Cronbach's alpha = 0.91), altruistic (Cronbach's alpha = 0.79), egoistic (Cronbach's alpha = 0.78), and hedonistic (Cronbach's alpha = 0.84) values were measured with 16 items from de Groot and Steg (2010). Participants rated how important each value was to them as a guiding principle in their life (–1 = "opposed to my principles," 0 = "not important," 7 = "extremely important"). Belief in climate change was measured with a single item from Berger et al. (2023). On an 11-point Likert scale ranging from –5 ("strongly disagree") to 5 ("strongly agree"), participants were asked to what extent they agreed with the statement that the occurrence of climate change is caused by human activities and will bring largely negative consequences. In a control question, participants indicated how effective they considered tree planting as a climate change mitigation measure (4-point Likert scale ranging from "very effective" to "not effective at all"). Finally, we assessed the demographic variables gender, age, education, political ideology, and household income.

2.5 Sample

The study was pre-registered on the Open Science Framework (OSF) (https://osf.io/va9nh) and received ethical approval from the Faculty of Business Administration, Economics and Social Sciences of the University of Bern (serial number: 202022). We based our power analysis (G*Power 3.1.9.2; Faul et al., 2009) on hypothesis 3, as this hypothesis was likely to be the least powerful. In a similar validation study (Lange & Dewitte, 2022), the mean correlation between the task measuring pro-environmental behavior (WEPT) and self-report scales assessing pro-environmental behavior was 0.24. To account for the testing of multiple hypotheses, we adjusted the alpha level to 1.25%. This adjustment resulted in a sample size of 289 participants that allowed for detecting Pearson correlations of r = 0.24 with high statistical power (corrected alpha level of 1.25%, power of 95%, two-tailed test). However, to be more

robust against potential outliers, we used a non-parametric Spearman correlation analysis instead of calculating parametric Pearson correlation coefficients. The non-parametric Spearman correlation analysis is less efficient (relative efficiency = 0.91) in detecting significant relationships compared to the parametric Pearson correlation analysis (Hotelling & Pabst, 1936). Therefore, we increased the sample size with (1.00 – 0.91) / 0.91 × 100 = 10% to a total sample size of 318 participants. Given this sample size, we could detect a minimum effect size of d = 0.2 for hypotheses 1 and 2, given the Wilcoxon signed-rank test (matched pairs). Using an attrition rate of 20%, we aimed to recruit 382 participants.

Participants were recruited on the crowdsourcing platform Prolific on September 29, 2022. Prolific is an established crowd-working online platform (Palan & Schitter, 2018). We collected 379 completed surveys. The participants were from the United Kingdom. The experimental sessions lasted, on average, 12 minutes. Participants received a flat payment of GBP 1.50. The mean of the additional payment from the *Tree Task* was GBP 1.54 (range: GBP 0 to 2.5, SD = 0.79). In accordance with the pre-registered protocol, we excluded participants who did not complete the study within 45 minutes of starting (n = 2), were faster than two standard deviations from the average completion time (n = 0), were not approved for any other reason (e.g., did not have a valid Prolific ID; n = 0), failed crucial attention checks (n = 7), and did not consider tree planting to be an effective climate protection measure (n = 7).[5] The sample for the main analysis consisted of 365 participants (48% female; mean age 39 years, SD = 13).

3 Results

The descriptive statistics are reported in Table 2. We found that decision-makers reacted to the financial costs of a tree, as well as to the environmental impact; thus, hypotheses 1 and 2 were supported. Participants planted significantly fewer trees in the BASE treatment compared to the LP and HO treatments ($p < 0.001$ for both LP and HO compared to BASE, Wilcoxon rank-sum test).[6] Furthermore, the highest number of trees was planted in the LP treatment.

[5] There were overlaps regarding participants who failed a crucial attention check and did not believe in the positive impact of planting trees (n = 4) and who failed both attention checks (n = 2).
[6] All tests are two-sided.

Table 2

Descriptive statistics: Number of trees planted per treatment

	BASE	LP	HO
Mean	4.08	5.76	4.72
SD	3.46	3.89	3.56

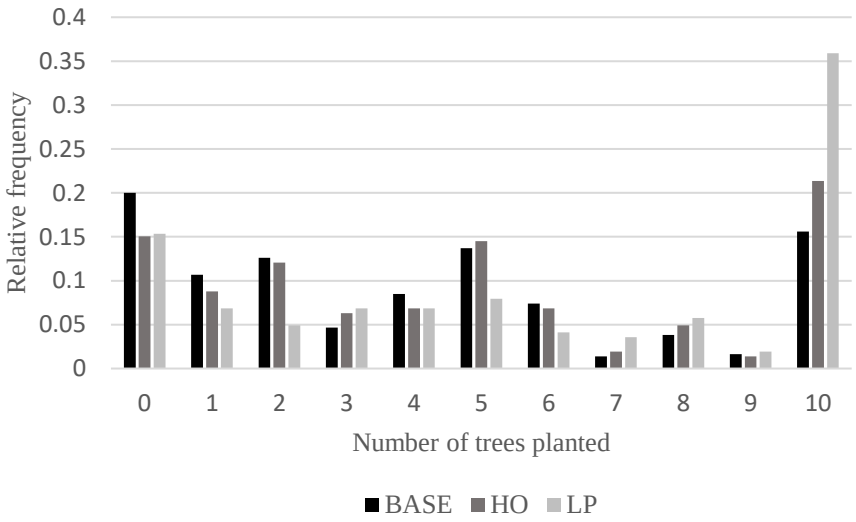
	BASE vs. LP	BASE vs. HO	LP vs. HO
z score	–12.61	5.81	10.20
p value	p<0.001	p<0.001	p<0.001

Notes: BASE = High Price/Low Offset treatment, LP = Low Price treatment, HO = High Offset treatment. P values were obtained from Wilcoxon rank-sum tests.

Figure 2 shows the distribution of the trees planted by treatment. The mode in the HO and LP treatments is to plant 10 trees, while the mode in the BASE treatment is to plant 0 trees. The choices in the different treatments are highly correlated (BASE vs. LP: r = .0.79, 95% CI [0.76, 0.83], p<0.01; BASE vs. HO: r = .83, 95% CI [0.80, 0.86], p<0.01; LP vs. HO: r = .85, 95% CI [0.82, 0.88], p<0.01). This suggests that participants who chose many trees in one treatment tended to choose many trees in the other treatments as well.

Figure 2

Relative frequency of trees planted



We used the following random-effects model to check the robustness of the descriptive results:

$$y_{i,k} = \beta_0 + \beta'_1 \boldsymbol{T_{i,k}} + \beta_2 O_i + \beta'_3 \boldsymbol{E_i} + \beta'_4 \boldsymbol{X_i} + \varepsilon_{i,k},$$

where $y_{i,k}$ denotes the number of trees planted by individual i in treatment k, and $\boldsymbol{T_{i,k}}$ is the vector of the treatments. In addition, O_i is a dummy variable to control for the order of treatments, which takes a value of 1 if the HO treatment is presented first and 0 if the LP treatment is presented first. The BASE treatment was always presented in the middle. The vector of the control variables, $\boldsymbol{E_i}$, encompasses pro-environmental intentions, environmental attitudes, and beliefs about climate change, and $\boldsymbol{X_i}$ captures the sociodemographic variables. β_0 is the intercept, and $\varepsilon_{i,k}$ is the idiosyncratic random error term.

The estimated coefficients of the random-effects regressions are displayed in Table 3. Specification 1 shows that the differences in the number of trees planted in the LP and HO treatments are highly statistically significant and of remarkable magnitude compared to the BASE treatment. This effect remains stable when we control for the order in which the treatments were presented (specification 2) and environmental-related variables, including pro-environmental intentions, attitudes, belief in climate change, and individual values (specification 3). The magnitude and statistical significance level of the treatment effects also remain robust when we control for demographic variables (specification 4). In summary, hypothesis 1 (the number of trees planted increases when the cost of planting a tree decreases) and hypothesis 2 (the number of trees planted increases when there are higher environmental benefits, i.e., a higher carbon emissions offset per tree) are supported.[7] The exclusion of participants who do not believe in the effectiveness of tree planting does not alter the treatment effects (see Table A1 in the Appendix for the robustness checks).

Regarding extensive margin effects, we find that lower costs (LP) and higher carbon emissions offsets (HO) have a positive effect on the likelihood of planting at least one tree compared to the BASE treatment (see specifications 1 and 2 of Table A3 in the Appendix). On the intensive margin, specifications 4 and 5 of Table 7 A3 indicate a statistically significant increase in the number of trees planted, conditional on planting at least one tree, for the LP treatment and the HO treatment compared to the BASE treatment. These findings suggest that the significant positive impact of low financial costs and high environmental benefits on the number of trees planted can be explained by a combination of extensive and intensive margin effects.

[7] The results remain robust when a panel Poisson model with random effects or a pooled OLS regression model is used (see Table A2 in the Appendix).

Table 3

Effects of cost and carbon emissions offset on the number of trees planted: Random-effects regression model

	No. of trees planted (1)	No. of trees planted (2)	No. of trees planted (3)	No. of trees planted (4)
LP	1.682***	1.682***	1.694***	1.703***
	(0.126)	(0.126)	(0.128)	(0.129)
HO	0.638***	0.638***	0.643***	0.647***
	(0.106)	(0.106)	(0.108)	(0.109)
Order		0.257	0.151	0.206
		(0.359)	(0.346)	(0.337)
Pro-environmental intentions			0.606***	0.605***
			(0.151)	(0.151)
Pro-environmental attitudes			0.393	0.274
			(0.413)	(0.403)
Belief in climate change			0.077	0.083
			(0.107)	(0.110)
Biospheric values			0.026	–0.000
			(0.172)	(0.172)
Altruistic values			0.130	–0.030
			(0.169)	(0.173)
Egoistic values			–0.165	–0.078
			(0.145)	(0.157)
Hedonistic values			0.006	0.037
			(0.135)	(0.135)
Female				0.897**
				(0.349)
Age in years				0.033**
				(0.015)
Education				0.576
				(0.366)
Conservative ideology				–0.129
				(0.095)
Income (> GBP 50,000)				0.226
				(0.372)
Constant	4.079***	3.946***	–1.362	–1.95
	(0.181)	(0.267)	(1.561)	(1.774)
Sigma u	3.301	3.304	3.099	3.043
Rho	0.822	0.822	0.801	0.794
Wald chi-square	183.09	183.37	270.04	326.17
R-squared overall	0.035	0.036	0.141	0.175
No. of observations	1,095	1,095	1,077	1,071
No. of participants	365	365	359	357

Notes: The table presents estimates from random-effects regressions. Robust standard errors are clustered at the individual level and are shown in parentheses. The dependent variable is the number of trees planted. LP and HO are the treatment dummies, and BASE is the reference category. Order is a binary variable indicating the order in which the treatments were presented, either HO, BASE, and LP (= 1) or LP, BASE, and HO (= 0). Pro-environmental intentions are measured on a 7-point Likert scale. Pro-environmental attitudes are measured on a 5-point Likert scale. Belief in climate change is measured on a scale ranging from –5 ("extremely bad") to +5 ("extremely good"). Biospheric, altruistic, egoistic, and hedonistic values range from –1 ("opposed my principles") to 7 ("extremely important"). Age and conservative ideology are continuous variables. The remaining demographic variables are included as dummy variables: Female indicates being female (= 1) or not (= 0), Education indicates whether participants had a bachelor's, master's, or doctorate degree (= 1) or not (= 0), and Income indicates whether participants have a higher annual income than GBP 50,000 (= 1) or not (= 0). *, **, and *** document significance at the 10%, 5%, and 1% levels, respectively.

Next, we tested whether the number of trees planted correlates with self-reports assessing environmental attitudes and intentions, belief in climate change, values in line with pro-

environmental behavior, and demographic variables. To test hypotheses 3 and 4, we ran Spearman correlation analyses, and the results are displayed in Table 4. For hypothesis 3, the total number of trees planted was correlated with pro-environmental intentions (r = .30, 95% CI [0.21, 0.41], p<0.01), pro-environmental attitudes (r = .23, 95% CI [0.13, 0.33], p<0.01), belief in climate change (r = .21, 95% CI [0.12, 0.31], p<0.01), biospheric values (r = .24, 95% CI [0.15, 0.34], p<0.01), altruistic values (r = .21, 95% CI [0.11, 0.31], p<0.01), egoistic values (r = –.08, 95% CI [–0.18, 0.02], p = 0.17), and hedonistic values (r = .02, 95% CI [–0.08, 0.13], p = 0.76). All correlations, apart from the egoistic and hedonistic values, had medium-sized effects and were highly statistically significant in the expected direction. In line with other research (Lange & Dewitte, 2022), egoistic and hedonistic values were negatively correlated or do not correlate with the number of trees planted. Thus, hypothesis 3 is supported. Regarding hypothesis 4, we find highly significant correlations between being female (r = .19, 95% CI [0.08, 0.28], p<0.01), a liberal political ideology (r = –.17, 95% CI [–0.29, –0.09], p<0.01), and the number of trees planted. Furthermore, age (r = .12, 95% CI [0.01, 0.22], p<0.05) and education (r = 0.11, 95% CI [0.01, 0.22], p<0.05) are weakly correlated with the number of trees planted. Altogether, hypothesis 4 is supported.

Table 4

Spearman correlations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	Mean	SD
(1) Trees	1.000													4.85	3.42
(2) PE intentions	0.303***	1.000												5.14	1.38
(3) PE attitudes	0.230***	0.356***	1.000											3.80	0.60
(4) Belief in CC	0.208***	0.367***	0.629***	1.000										3.20	2.15
(5) Biospheric	0.235***	0.541***	0.541***	0.491***	1.000									5.23	1.43
(6) Altruistic	0.206***	0.390***	0.344***	0.430***	0.618***	1.000								5.38	1.28
(7) Egoistic	–0.083	0.029	–0.320***	–0.119**	–0.059	0.022	1.000							2.43	1.44
(8) Hedonistic	0.016	0.068	–0.000	0.126**	0.115**	0.266***	0.325***	1.000						4.72	1.45
(9) Female	0.191***	0.117**	0.143***	0.085	0.060	0.164***	–0.039	0.098	1.000					0.49	0.50
(10) Age in years	0.118**	-0.118	0.118**	0.025	0.146***	0.081***	–0.283***	–0.229***	0.042	1.000				39.33	12.40
(11) Education	0.116**	0.076	0.147***	0.136***	0.105**	0.071	0.024	–0.058	–0.004	–0.006	1.000			0.66	0.48
(12) Conservative Ideology	–0.166***	–0.158***	–0.223***	–0.362***	–0.191***	–0.345***	0.209***	–0.108**	–0.108**	0.059	0.068	1.000		4.49	0.48
(13) Income (> GBP 50,000)	0.028	0.049	–0.049	–0.008	0.001	–0.009	0.196***	0.083***	–0.014	–0.090	–0.074	0.003	1.000	0.35	0.48

Notes: Trees reflects the mean of the number of trees planted from the three treatments BASE, LP, and HO. PE = Pro-environmental. CC = Climate change. Con = Conservative. Pro-environmental intentions are measured on a 7-point Likert scale, and pro-environmental attitudes are measured on a 5-point Likert scale. Belief in climate change is measured on a scale ranging from –5 (“extremely bad”) to +5 (“extremely good”). Biospheric, altruistic, egoistic, and hedonistic values range from –1 (“opposed my principles”) to 7 (“extremely important”). In addition to age, which is a continuous variable, we included the remaining demographic variables as dummy variables. Female indicates gender, being female (= 1) or not being female (= 0), Education indicates whether participants had a bachelor’s, master’s, or doctorate degree (= 1) or not (= 0), Conservative ideology is measured on a scale ranging from 1 (“completely left/progressive”) to 10 (“completely right/conservative”). Income shows whether the participant’s annual income is higher than GBP 50,000 (= 1) or not (= 0). *** and ** documents significance at the 1% and 5% levels, respectively.

4 Discussion and conclusion

This study presents the *Tree Task*, an incentivized, one-shot task measuring pro-environmental behavior. The *Tree Task* can be used for laboratory and online studies and may also complement field studies to investigate psychological mechanisms (e.g., Binder & Blankenberg, 2017; T. Q. Ho et al., 2022). The *Tree Task* builds on a trade-off between real environmental benefits and individual costs: Participants decide whether they want to plant trees or keep the provided money for themselves. We validated the *Tree Task* by conducting a pre-registered, highly powered online study. The results show that the *Tree Task* is a valid measure for assessing pro-environmental behavior. We showed that decision-makers react to a tree's financial costs and to its environmental impact. Furthermore, the number of trees planted correlated positively with self-reports that have been associated with pro-environmental motivation and behavior. The *Tree Task* has already been applied twice as a dependent variable in between-subject designs. The first study showed that participants primed on future events planted significantly more trees than participants primed unrelated to the future (Essl, Hauser, et al., 2022). In the second study examining the linguistic savings hypothesis (Chen, 2013) in the environmental domain, participants who read a text about the impact of climate change in the future tense planted significantly more trees than participants who read the same text in the present tense (Essl, Suter, et al., 2022).

Measuring pro-environmental behavior with the *Tree Task* has three main strengths. First, the decisions in the task have a real impact, because the trees are actually planted by an international forest restoration organization. The participants are informed transparently about the concrete environmental impact of the selected number of trees and are invited to receive confirmation after the trees have been planted. Altogether, this leads to a high external validity of the task. Importantly, the costs and carbon dioxide offsets of the trees offered in the *Tree Task* can vary. This provides researchers with flexibility in designing their studies according to their research budget. Second, the *Tree Task* is vivid and easy to understand. Trees are an entity that is easily understood across cultural and age boundaries, which allows the task to be tested on a wide target audience, and the results can be compared across different audiences. For example, the task could be used with children and compared cross-culturally. Third, due to the brevity of the *Tree Task*, it can be easily combined with measurements of other relevant types of pro-environmental behavior, such as the acceptance of environmental policies (see Heinz & Koessler, 2021).

The *Tree Task* can be used to conduct externally and internally valid experiments on a specific type of pro-environmental behavior, that is, investing in planting trees. However, the task's results may not be generalizable to all kinds of pro-environmental behaviors. The situation of interest, the conditions that govern behavior in this situation, and the experimental manipulation determine the suitability of a behavioral paradigm (Lange, 2023). The *Tree Task* consists of a trade-off between immediate individual monetary gains and long-term environmental benefits. In certain real-life situations, other dilemmas may exist. For example, there might be a trade-off between time savings and pro-environmental behavior, as in the case when deciding between driving a car or riding a bicycle (Lange et al., 2018). In another trade-off situation people may decide against the environmentally harmful consumption of a product. Thus, they refrain from doing something bad for the environment but do not actively do something good for the environment, such as planting trees. To investigate these types of trade-offs, the *Tree Task* might be less applicable. Furthermore, there might not be a trade-off at all when choosing a pro-environmental action, as there can be various benefits for the individual resulting from pro-environmental behavior (Chancellor & Lyubomirsky, 2011; Prinzing, 2023). For example, a voluntary reduction in consumption may help individuals perceive a stronger sense of authenticity (Zavestoski, 2002), may reduce the risk of falling into debt (Nepomuceno & Laroche, 2015), and may lead to higher life satisfaction (Hüttel et al., 2020).

The *Tree Task* complements existing approaches to measuring pro-environmental behavior. Researchers are encouraged to use the *Tree Task* to measure consequential pro-environmental behavior in the lab or online. Detailed instructions and oTree and Qualtrics templates for the task are available on OSF: osf.io/f5zpc/?view_only=bd3048f6188e4724a31e61772e10ed6c

References

Barber, N. A., Bishop, M., & Gruen, T. (2014). Who pays more (or less) for pro-environmental consumer goods? Using the auction method to assess actual willingness-to-pay. *Journal of Environmental Psychology*, *40*, 218–227. https://doi.org/10.1016/j.jenvp.2014.06.010

Berger, S., Hauser, D., Lange, A., & Linden, S. van der. (2023). Measuring belief in climate change with a single-item. *Working Paper*.

Berger, S., & Wyss, A. M. (2021). Measuring pro-environmental behavior using the carbon emission task. *Journal of Environmental Psychology*, *75*, 101613. https://doi.org/10.1016/j.jenvp.2021.101613

Binder, M., & Blankenberg, A.-K. (2017). Green lifestyles and subjective well-being: More about self-image than actual behavior? *Journal of Economic Behavior & Organization*, *137*, 304–323. https://doi.org/10.1016/j.jebo.2017.03.009

Carleton, T. A., & Hsiang, S. M. (2016). Social and economic impacts of climate. *Science*, *353*(6304). https://doi.org/10.1126/science.aad9837

Chancellor, J., & Lyubomirsky, S. (2011). Happiness and thrift: When (spending) less is (hedonically) more. *Journal of Consumer Psychology*, *21*(2), 131–138. https://doi.org/10.1016/j.jcps.2011.02.004

Chen, K. (2013). The effect of language on economic behavior: Evidence from savings rates, health behaviors, and retirement assets. *American Economic Review*, *103*(2), 690–731. https://doi.org/10.1257/aer.103.2.690

Clements, J. M., McCright, A. M., Dietz, T., & Marquart-Pyatt, S. T. (2015). A behavioural measure of environmental decision-making for social surveys. *Environmental Sociology*, *1*(1), 27–37. https://doi.org/10.1080/23251042.2015.1020466

de Groot, J. I. M., & Steg, L. (2010). Relationships between value orientations, self-determined motivational types and pro-environmental behavioural intentions. *Journal of*

Environmental Psychology, *30*(4), 368–378. https://doi.org/10.1016/j.jenvp.2010.04.002

Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: Measuring endorsement of the new ecological paradigm: a revised nep scale. *Journal of Social Issues*, *56*(3), 425–442. https://doi.org/10.1111/0022-4537.00176

Essl, A., Hauser, D., & von Bieberstein, F. (2022). Let's think about the future: The effect of positive and negative future primes on pro-environmental behavior. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4159522

Essl, A., Suter, M., & von Bieberstein, F. (2022). The effect of future-tense referencing on pro-environmental behavior. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4216625

Fallucchi, F., Nosenzo, D., & Reuben, E. (2020). Measuring preferences for competition with experimentally-validated survey questions. *Journal of Economic Behavior & Organization*, *178*, 402–423. https://doi.org/10.1016/j.jebo.2020.07.028

Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using g*power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149–1160. https://doi.org/10.3758/BRM.41.4.1149

Geller, E. S. (1981). Evaluating energy conservation programs: Is verbal report enough? *Journal of Consumer Research*, *8*(3), 331. https://doi.org/10.1086/208872

Gifford, R. (2014). Environmental psychology matters. *Annual Review of Psychology*, *65*(1), 541–579. https://doi.org/10.1146/annurev-psych-010213-115048

Goff, S. H., Waring, T. M., & Noblet, C. L. (2017). Does pricing nature reduce monetary support for conservation?: Evidence from donation behavior in an online experiment. *Ecological Economics*, *141*, 119–126. https://doi.org/10.1016/j.ecolecon.2017.05.027

Halkos, G., & Matsiori, S. (2014). Exploring social attitude and willingness to pay for water resources conservation. *Journal of Behavioral and Experimental Economics*, *49*, 54–62. https://doi.org/10.1016/j.socec.2014.02.006

Heinz, N., & Koessler, A.-K. (2021). Other-regarding preferences and pro-environmental behaviour: An interdisciplinary review of experimental studies. *Ecological Economics*, *184*, 106987. https://doi.org/10.1016/j.ecolecon.2021.106987

Henry, E., & Sonntag, J. (2019). Measuring image concern. *Journal of Economic Behavior & Organization*, *160*, 19–39. https://doi.org/10.1016/j.jebo.2019.02.018

Hine, D. W., & Gifford, R. (1991). Fear appeals, individual differences, and environmental concern. *The Journal of Environmental Education*, *23*(1), 36–41. https://doi.org/10.1080/00958964.1991.9943068

Ho, L.-C., Sung, Y.-H., Wu, C.-C., Lee, P.-S., & Chiou, W.-B. (2020). Envisaging mitigation action can induce lower discounting toward future environmental gains and promote pro-environmental behavior. *Sustainability*, *12*(21), 9289. https://doi.org/10.3390/su12219289

Ho, T. Q., Nie, Z., Alpizar, F., Carlsson, F., & Nam, P. K. (2022). Celebrity endorsement in promoting pro-environmental behavior. *Journal of Economic Behavior & Organization*, *198*, 68–86. https://doi.org/10.1016/j.jebo.2022.03.027

Homar, A. R., & Cvelbar, L. K. (2021). The effects of framing on environmental decisions: A systematic literature review. *Ecological Economics*, *183*, 106950. https://doi.org/10.1016/j.ecolecon.2021.106950

Hotelling, H., & Pabst, M. R. (1936). Rank correlation and tests of significance involving no assumption of normality. *The Annals of Mathematical Statistics*, *7*(1), 29–43. https://doi.org/10.1214/aoms/1177732543

Hüttel, A., Balderjahn, I., & Hoffmann, S. (2020). Welfare beyond consumption: The benefits of having less. *Ecological Economics*, *176*, 106719. https://doi.org/10.1016/j.ecolecon.2020.106719

Ibanez, L., Moureau, N., & Roussel, S. (2017). How do incidental emotions impact pro-environmental behavior? Evidence from the dictator game. *Journal of Behavioral and Experimental Economics*, *66*, 150–155. https://doi.org/10.1016/j.socec.2016.04.003

IPCC. (2021). Climate Change 2021: The physical science basis. Contribution of working group I to the sixth assessment report of the Intergovernmental Panel on Climate Change. *Cambridge University Press*. https://doi.org/10.1017/9781009157896

Lades, L. K., Laffan, K., & Weber, T. O. (2021). Do economic preferences predict pro-environmental behaviour? *Ecological Economics*, *183*, 106977. https://doi.org/10.1016/j.ecolecon.2021.106977

Lange, F. (2023). Behavioral paradigms for studying pro-environmental behavior: A systematic review. *Behavior Research Methods*, *55*(2), 600–622. https://doi.org/10.3758/s13428-022-01825-4

Lange, F., & Dewitte, S. (2022). The work for environmental protection task: A consequential web-based procedure for studying pro-environmental behavior. *Behavior Research Methods*, *54*(1), 133–145. https://doi.org/10.3758/s13428-021-01617-2

Lange, F., Steinke, A., & Dewitte, S. (2018). The pro-environmental behavior task: A laboratory measure of actual pro-environmental behavior. *Journal of Environmental Psychology*, *56*, 46–54. https://doi.org/10.1016/j.jenvp.2018.02.007

Lasarov, W., Mai, R., & Hoffmann, S. (2022). The backfire effect of sustainable social cues. New evidence on social moral licensing. *Ecological Economics*, *195*, 107376. https://doi.org/10.1016/j.ecolecon.2022.107376

Mancha, R. M., & Yoder, C. Y. (2015). Cultural antecedents of green behavioral intent: An environmental theory of planned behavior. *Journal of Environmental Psychology*, *43*, 145–154. https://doi.org/10.1016/j.jenvp.2015.06.005

Meleddu, M., & Pulina, M. (2016). Evaluation of individuals' intention to pay a premium price for ecotourism: An exploratory study. *Journal of Behavioral and Experimental Economics*, *65*, 67–78. https://doi.org/10.1016/j.socec.2016.08.006

Mobley, C., Vagias, W. M., & DeWard, S. L. (2010). Exploring additional determinants of environmentally responsible behavior: The influence of environmental literature and environmental attitudes. *Environment and Behavior*, *42*(4), 420–447. https://doi.org/10.1177/0013916508325002

Nepomuceno, M. V., & Laroche, M. (2015). The impact of materialism and anti-consumption lifestyles on personal debt and account balances. *Journal of Business Research*, *68*(3), 654–664. https://doi.org/10.1016/j.jbusres.2014.08.006

Palan, S., & Schitter, C. (2018). Prolific.ac—A subject pool for online experiments. *Journal of Behavioral and Experimental Finance*, *17*, 22–27. https://doi.org/10.1016/j.jbef.2017.12.004

Prinzing, M. (2023). Going green is good for you: Why we need to change the way we think about pro-environmental behavior. *Ethics, Policy & Environment*, *26*(1), 1–18. https://doi.org/10.1080/21550085.2020.1848192

Rees, J. H., Klug, S., & Bamberg, S. (2015). Guilty conscience: Motivating pro-environmental behavior by inducing negative moral emotions. *Climatic Change*, *130*(3), 439–452. https://doi.org/10.1007/s10584-014-1278-x

Ronayne, D., Sgroi, D., & Tuckwell, A. (2021). Evaluating the sunk cost effect. *Journal of Economic Behavior & Organization*, *186*, 318–327. https://doi.org/10.1016/j.jebo.2021.03.029

Taverna, R., Hofer, P., Werner, F., Kaufmann, E., & Thürig, E. (2007). *CO2-Effekte der Schweizer Wald- und Holzwirtschaft*. Bundesamt für Umwelt BAFU. https://www.bafu.admin.ch/dam/bafu/de/dokumente/wald-holz/uw-umwelt-wissen/co2-effekte_der_schweizerwald-undholzwirtschaft.pdf.download.pdf/co2-effekte_der_schweizerwald-undholzwirtschaft.pdf

Tikka, P. M., Kuitunen, M. T., & Tynys, S. M. (2000). Effects of educational background on students' attitudes, activity levels, and knowledge concerning the environment. *The Journal of Environmental Education*, *31*(3), 12–19. https://doi.org/10.1080/00958960009598640

tree-nation. (2022). *How can trees be as cheap as 0,25€ /tree?* https://kb.tree-nation.com/knowledge/varying-prices-for-trees

Vesely, S., Klöckner, C. A., Carrus, G., Chokrai, P., Fritsche, I., Masson, T., Panno, A., Tiberio, L., & Udall, A. M. (2022). Donations to renewable energy projects: The role of social norms and donor anonymity. *Ecological Economics*, *193*, 107277. https://doi.org/10.1016/j.ecolecon.2021.107277

Wensing, J., Baum, C., Carraresi, L., & Bröring, S. (2021). What if consumers saw the bigger picture? Systems thinking and the adoption of bio-based consumer products. *Journal of Behavioral and Experimental Economics*, *94*, 101752. https://doi.org/10.1016/j.socec.2021.101752

Yadav, R., & Pathak, G. S. (2017). Determinants of consumers' green purchase behavior in a developing nation: Applying and extending the theory of planned behavior. *Ecological Economics*, *134*, 114–122. https://doi.org/10.1016/j.ecolecon.2016.12.019

Zavestoski, S. (2002). The social-psychological bases of anticonsumption attitudes. *Psychology and Marketing*, *19*(2), 149–165. https://doi.org/10.1002/mar.10007

Appendix

Table A1

Robustness checks for different samples: Random-effects regression model

Sample		No. of trees planted	No. of trees planted
Main sample			
	LP	1.682***	1.703***
		(0.126)	(0.129)
	HO	0.638***	0.647***
		(0.106)	(0.109)
	No. of observations	1095	1071
	No. of participants	365	357
Incl. tree planting skeptics			
	LP	1.661***	1.686***
		(0.124)	(0.127)
	HO	0.626***	0.636***
		(0.105)	(0.108)
	No. of observations	1116	1089
	No. of participants	372	363
Total sample			
	LP	1.642***	1.676***
		(0.121)	(0.124)
	HO	0.600***	0.627***
		(0.102)	(0.105)
	No. of observations	1155	1119
	No. of participants	385	373
	Additional controls		
	Order of treatments	NO	YES
	Environmental variables	NO	YES
	Demographic variables	NO	YES

Notes: The table presents the coefficients of the treatment dummy variables (LP and HO) of specifications 1 and 4 of Model 1 for the main sample, the sample including tree skeptics, and the total sample. The dependent variable is the number of trees planted. LP and HO are the treatment dummies, with BASE as the reference category. Robust standard errors are clustered at the individual level and are shown in parentheses. The estimates for the main sample are equal to those of specifications 1 and 4 in Table 3. Order of treatments is a binary variable indicating the order in which the treatments were presented, either HO, BASE, and LP (= 1) or LP, BASE, and HO (= 0). Environmental variables include pro-environmental intentions, environmental attitudes, belief in climate change, and biospheric, hedonistic, egoistic, and altruistic values. Demographic variables include gender, age, education, political ideology, and income. The step-by-step inclusion of control variables shows that these results are robust. Regression results are available upon request. *, **, and *** document significance at the 10%, 5%, and 1% levels, respectively.

Table A2

Robustness checks using different regression models: Panel Poisson regression and pooled OLS regression model

	Panel Poisson regression model		Pooled OLS regression model	
	No. of trees planted	No. of trees planted	No. of trees planted	No. of trees planted
LP	0.345***	0.353***	1.682***	1.703***
	(0.027)	(0.028)	(0.126)	(0.129)
HO	0.145***	0.149***	0.638***	0.647***
	(0.025)	(0.025)	(0.106)	(0.109)
Order of treatments		0.028		0.206
		(0.079)		(0.337)
Pro-environmental intentions		0.152***		0.605***
		(0.047)		(0.151)
Pro-environmental attitudes		0.111		0.274
		(0.102)		(0.403)
Belief in climate change		0.024		0.083
		(0.033)		(0.110)
Biospheric values		–0.018		–0.000
		(0.048)		(0.172)
Altruistic values		–0.001		–0.030
		(0.046)		(0.173)
Egoistic values		–0.008		–0.078
		(0.036)		(0.157)
Hedonistic values		–.001		0.037
		(0.030)		(0.135)
Female		0.204**		0.897**
		(0.083)		(0.349)
Age in years		0.007*		0.033**
		(0.003)		(0.015)
Education		0.108		0.576
		(0.090)		(0.366)
Conservative ideology		–0.014		–0.129
		(0.023)		(0.095)
Income (> GBP 50,000)		0.058		0.226
		(0.088)		(0.372)
Constant	1.406***	–0.233	4.079***	–1.950
	(0.0443)	(0.504)	(0.181)	(1.774)
Ln alpha	–0.121	–0.239		
	(0.348)	(0.364)		
Wald chi-square (2)	4803.28	4915.57		
R-squared			0.035	0.175
No. of observations	1095	1071	1095	1071
No. of participants	365	357	365	357

Notes: The table presents estimates from the panel Poisson regression model with random effects and a pooled OLS regression model. Robust standard errors clustered at the individual level are shown in parentheses. The dependent variable is the number of trees planted. LP and HO are the treatment dummies, with BASE as the reference category. All other variables are explained in Table 3. The step-by-step inclusion of control variables shows that these results are robust. Regression results are available upon request *, **, and *** document significance at the 10%, 5%, and 1% levels, respectively.

Table A3

Extensive and intensive margin analysis

	Pooled logit regression model		Pooled OLS regression model	
	Prob. of planting trees	Prob. of planting trees	No. of trees planted cond.	No. of trees planted cond.
LP	0.322***	0.362***	1.707***	1.720***
	(0.081)	(0.091)	(0.133)	(0.137)
HO	0.343***	0.386***	0.456***	0.423***
	(0.084)	(0.092)	(0.110)	(0.115)
Order of treatments		0.142		0.121
		(0.284)		(0.334)
Pro-environmental intentions		0.203		0.575***
		(0.126)		(0.163)
Pro-environmental attitudes		0.456		0.016
		(0.324)		(0.420)
Belief in climate change		0.105		–0.022
		(0.086)		(0.114)
Biospheric values		0.002		0.009
		(0.132)		(0.181)
Altruistic values		–0.059		–0.032
		(0.145)		(0.175)
Egoistic values		0.094		–0.170
		(0.129)		(0.153)
Hedonistic values		0.064		–0.002
		(0.112)		(0.128)
Female		0.867***		0.371
		(0.309)		(0.338)
Age in years		0.016		0.027*
		(0.012)		(0.015)
Education		0.186		0.548
		(0.300)		(0.366)
Conservative ideology		0.009		–0.146
		(0.080)		(0.094)
Income (> GBP 50,000)		–0.139		0.365
		(0.313)		(0.365)
Constant	1.386***	–3.048**	5.099***	1.417
	(0.131)	(1.447)	(0.183)	(1.952)
Wald chi-square (2)	18.38	66.55		
Pseudo-R-squared/R-squared	0.004	0.107	0.048	0.151
No. of observations	1,095	1,071	911	887
No. of participants	365	357	314	306

Notes: Specifications 1 and 2 present estimates from a pooled logit regression model on the probability of planting at least one tree. Specifications 3 and 4 present estimates from a pooled OLS regression model with the number of trees planted conditional on planting at least one tree as the dependent variable. Robust standard errors clustered at the individual level are shown in parentheses. LP and HO are the treatment dummies, and BASE is the reference category. All other variables are explained in Table 3. The step-by-step inclusion of control variables shows that these results are robust. Regression results are available upon request. *, **, and *** document significance at the 10%, 5%, and 1% levels, respectively.

Access to all materials, templates, data, and statistical cods

Access to all materials, templates, data, and statistical cods for the manuscript "The Tree Task: An incentivized, one-shot decision task to measure pro-environmental behavior" by Andrea Essl, David Hauser, Manuel Suter, and Frauke von Bieberstein can be found at the following link:
https://osf.io/f5zpc/?view_only=bd3048f6188e4724a31e61772e10ed6c