

Economics School of Louvain - ESL

Responsible for Our (*Climate*) Actions?

Climate *Signaling* in a Dictator Game
with Heterogeneous Preferences

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“A person’s abstinence from consumption often reduces his or her overall quality of life, yet betters the situation of others...”

- Kaiser and Shimoda (1999)

Abstract

What influences climate-friendly behavior? For this study, I focus on the idea of *climate signaling* and the role it plays for decisions regarding climate action. Previous investigations have been made surrounding the effect of visibility on socially-conscious actions. I adapt these frameworks to observe behavior with respect to climate action in a dictator game, in both public and private settings. Results show that climate signaling positively affects average donation amounts. However, the main driver behind pro-climate behavior remains to be an intrinsic value for climate action. A simple model of an individuals' *climate-behavior propensity* is then used to estimate values for moral and conventional responsibility with the results of our survey.

Keywords— Climate Signaling, Climate Action, Climate Responsibility, Charitable Giving, Dictator Game

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1 Introduction

Most have previously seen *The World Wide Fund for Nature (WWF)* giant panda logo. In the case one has not, the panda image has gradually become a widely recognized symbol of the **need** to adopt climate-friendly behaviors. Irresponsible human action has led to extinctions rates to increase from .1 per million per year¹ to 100 per million per year. [Raven (2020)]. Not only has our behavior led to the extinction of other species, but it can also lead to the the extinction of our own, with substantial negative impacts seen as soon as 2050, through **climate change** [Al-Delaimy et al. (2020) and Ramanathan (2020)]. With the immense influence humans have on the survival of all species, this great power we possess must come with a great *responsibility* to act sustainably.

In recent years, changes in climate have become increasingly evident, having idiosyncratic impacts on climates around the world. Overall, impacts are devastating, with the more notable changes being increases in heat waves, droughts, and rising sea levels to name a few.² These widespread climate transformations mean that generally *everyone* is affected to some degree, such as those in the United States, who are seeing a rapid increase in the rates of flooding and wildfires. The same can also be said for the other side the world in Australia, whose situation has also been in the spotlight in recent years from an increase in violent wildfires.³ With these changes becoming more dramatic, the more urgent question becomes – what can be done thwart drastic climate change? The answer lies in the realm of *climate action*.

Climate action comes in many forms. At the institutional level, carbon pricing is a well-known policy with great potential. [Boyce (2018)]. Tax breaks for purchasing greener vehicles is another popular way to promote climate-friendly behaviors. Although helpful, there is no avoiding what is necessary - much of the change must come from the individual level.⁴ Some examples of climate action at the individual level include: recycling, alternatives to driving such as public transport, purchasing a car the produces low emission, and reduction in air travel [Wynes & Nicholas (2017)].

Although climate action at the individual level mainly comes in the form of routine changes by adopting climate-friendly behaviors, a donation to a climate fighting organization (WWF, Greenpeace) can also be considered as an action taken to mitigating the effects of climate change. Unlike a donation to the *Red Cross* or *Doctors Without Borders*, in which an increase in the total provision of the public good has no effect on the donor themselves, we know that a donation to climate organizations is done in an effort to combat changes in climate. And so, I hereby propose to investigate the following using an experimental design – *The effect of climate signaling on individual climate action*.⁵ I define climate signaling here as any climate action

¹A rate long established for the past 65 million years, prior to human arrival.

²Al-Delaimy et al. (2020) and Ramanathan (2020). More information about significant negative impacts can also be found on <https://www.worldwildlife.org/threats/effects-of-climate-change>, *WWF* (2022).

³Risk of bushfires in Australia have risen by 30 percent because of climate change. Oldenborgh et al. (2021)

⁴Hiller (2011) argues this point, where our individual actions in the aggregate do matter.

⁵Donations to climate organizations being a substitute for “*individual climate action*” in our case.

taken as a result of appealing to others. In this case, climate signaling effects would then be any changes in donation amounts when going from a private setting to a public one.

As done in previous studies, this study has its focus around behavior of charitable giving. Where this study differs, however, is the recipient type – climate organizations. I emphasize this importance in the literature review section. Having established that the particular feature of this study is the recipient of donations, the goal of the experiment presented in this paper is to see how a climate signaling opportunity affects donation amounts among different agents. Do agents truly care about their individual impact when the donation receiver is a climate organization? Are they playing their part – do they believe in the power of the collective? Or is it just for show, in an effort to avoid social criticism or receive social praise?⁶ A combination of both?

The experiment takes the form of a Dictator Game placed within one of the questions of a survey. I also use the survey to observe the preferences and behaviors of undergraduate students. In the beginning of the survey, I categorize them as either intrinsic or non-intrinsic agents by inferring their preference type using a proxy question regarding their compensation choice: either a 5€ Amazon gift card or a 10€ donation to Greenpeace. They are then randomly assigned to treatment groups. In one of the final questions, participants are then placed in the setting of a dictator game, where the participant is the “dictator” and a climate organization is the “receiver”. By observing donation amounts and treatment effects for both types of agents, I aim to answer the following question. *Does climate signaling (making an individuals’ action visible to others) affect climate actions (donation amount to climate organizations) for both individuals that are intrinsically and non-intrinsically motivated in climate change?* Results generally show, yes.

Results also show some interesting findings about the innate sense of responsibility that intrinsically-motivated individuals hold compared to non-intrinsic agents. In our setting of a Dictator Game, a high percentage of participants opted to allocate a high and significant average of funds to the receiver (WWF) even when the setting is in private (donation amounts are kept anonymous). When accounting for heterogeneity among preferences however, one can see the effect is mainly driven by individuals who are considered to be intrinsically motivated in climate action. Furthermore, I find that agents considered to be non-intrinsically motivated tend to be more highly influenced by visibility of their actions, albeit slightly. Our results appear to be robust after performing some checks. Overall, it is clear that climate signaling does have an overall positive net effect on donations within the general sample. Finally, using the results, I attempt to model and estimate the propensity to engage in climate-friendly behavior for both agent types: ‘intrinsic’ and ‘non-intrinsic’.

I therefore begin this paper with a look at the previous literature in Section 2 that investigates charitable giving, pro-social behavior, and dictator games, referring to some results, theories, and ideas and using them as our foundation to investigate the effects of moral and conventional responsibility within a climate context. Section 3 then delves right into the design

⁶Andreoni (1990) uses these questions as the motivation behind entering ones individual contribution into the utility function.

of the experiment, a description of the dictator game, and the procedure. Section 4 establishes assumptions, describes the model, and defines hypotheses of what I want to test. Section 5 then lays out the obtained results, providing a brief review and some implications. Section 6 concludes with a brief recap and key takeaways of the study.

2 Previous Literature

In this section, I go through some examples of the ideas that motivate the research question - *How does climate signaling affect climate behavior*. I begin with a brief review of the literature surrounding charitable giving. What is particularly interesting is how preferences for charitable giving can be represented in a donors utility function. This is important, as I can use this to help illustrate ones propensity to engage in climate action for both intrinsic and non-intrinsic reasons. Next, I list some of the motivations behind charitable giving studied in literature. I then look at the literature regarding experimental social preference games, specifically *Dictator Games*. Finally, I attempt to piece all the literature together in a climate context, to provide a clear foundation for this paper and, consequently, the direction I intent to take.

2.1 Theories of Charitable Giving

Previous investigations on the reasons behind prosocial behavior are extensive. Such behaviors are ones classical theory finds difficult to explain. That was, until, the concept of *warm glow* was first formalized by [Andreoni \(1990\)](#). Although seemingly altruistic, the author posits charitable actions are fueled by “impure motives”, as individuals place high value on their own contribution to the public good (donations) - regardless of the actual impact of said contribution. To model this, an individuals’ own contribution was added directly to their utility function.⁷ By modeling one preferences as such, the author is able to explain seemingly selfless behavior - to obtain warm glow.

In contrast to warm glow, the proposed explanation by [Glazer & Konrad \(1996\)](#) focuses on the idea of *status signaling*. This also has its selfish foundations. Status signaling refers to how individuals donate in an effort to demonstrating ones wealth, reflecting the way they care about how they are perceived by others. This is because ones status (defined here as income) is not observable and so individuals need to resort to signaling methods in order to demonstrate their status. The impact of the donation itself however is not considered in the utility function. This is another proposed way of explaining charitable behavior by integrating private contribution to the public good into ones utility function.

2.2 Motivations Behind Pro-Social Behavior

Substantial research has also been done on potential drivers behind altruistic behavior, and their interactions.⁸ For instance, [Friedrichsen & Engelmann \(2018\)](#) investigate the relationship between image motivation and intrinsic motivation. They create an experiment where participants reveal their preference type by choosing between a “fair-trade” or “conventional”

⁷A “pure egoist”, for example, contains only personal consumption x and personal contribution to the public good $g(x)$ in the their utility function, whereas for a “pure altruist”, personal consumption x and total provision of the public good $G(x)$ are included in the utility function.

⁸[Ariely et al. \(2009\)](#) describes these as the 3 general categories of motivation behind pro-social behavior. Intrinsic motivation - motivation that comes from the pure value of the impact itself. Extrinsic motivation - any material or physical benefits associated to giving. Social Image Motivation - motivation that arises from visibility of an action.

chocolate bar in a pretrial question, and create two treatments groups, one private and one public. In the public treatment, participants share their willingness to pay for both types of chocolate bars with other participants at a later stage of the experiment, while participants of the private treatment keep their stated willingness to pay to themselves. The results show that fair-trade agents in the public treatment had a lower fair-trade premium than when in private. The result for conventional agents is the opposite, however, with their fair-trade premium being higher in public than in private. This leads the researchers to the conclusion that there must be an inverse relationship between intrinsic vs. image motivations.⁹

Ariely et al. (2009) explores the relationship between image motivation and monetary incentives. They create an experiment called “Clicks for Charity” to see if participants have a more significant reaction to monetary incentives in a private or public setting.¹⁰ Results show although donations increase with higher visibility of pro-social behavior (i.e. image motivation), monetary incentives “crowd out image motivation to behave socially”. However, the main idea to extract here is that in the absence of monetary incentives, image motivation should generally have a positive effect on prosocial behaviors.

So, how do incentives affect climate behavior? Research has been done on the reasons for why green consumption could be relatively high. Griskevicius et al. (2010) find evidence to support the idea of “conspicuous conservation”, a term used to reflect consumer willingness incur higher costs in an effort to signal pro-environmental behavior. This willingness disappears however in a private setting, suggesting visible incentives can increase ones propensity to engage in climate action.

Sexton & Sexton (2014) also investigate climate signaling in the context of consumer behavior - the signaling value associated with a Prius. They hypothesize the unique design of the Prius increases its value by allowing owners to signal their climate preferences; and find evidence in support of this. They then also suggest this signaling value could be negatively affected by monetary incentives, such as tax breaks. In essence, higher extrinsic incentives could reduce it’s *climate signaling value*.

2.3 Social Preference Experiments

The idea of a dictator game is for one party to be the “dictator” and the other be the “recipient” at the mercy of the dictator. And so with participants possessing all the allocation power, I infer any amount going to the other party arises from the presence of some other argument apart from personal consumption, X , in ones utility function.

Normally, observed pro-social behavior (i.e *Donations* > 0) has been attributed to warm glow, reciprocity, and sense of fairness to name a few. Andreoni & Bernheim (2009) for example

⁹Because I use a similar framework of intrinsic vs. non-intrinsic behavior in public and private treatments, this result is worth keeping in mind as a negative relationship between social image and intrinsic motivation could possibly be seen in our results as well.

¹⁰Two charities are chosen as the receivers of the donation. *NRA* as a “bad” organization, and the *Red Cross* as a “good” organization. In order to verify this characterization, they ask participants their opinion about the charities, hence confirming their status of “bad” or “good”. The same kind of check is done for the organizations in the experiment.

study the presence of social image in Dictator games. They find that in front of an audience, individuals tend to split the endowment more equally and conjecture this effect is a result of ones desire to be perceived as fair.

Eckel & Grossman (1996) also look at Dictator games, albeit with responses kept private (no audience). Particular about this study is that they attempt to observe the differences in amounts allocated to the recipient when the recipient is an *equal participant* vs. when the recipient is *well established charity*. The results show that charities increase allocations 3-fold.

Bekkers (2007) apply this experiment to a sample in the Netherlands to observe altruistic behavior in dictator games, however within a general population, not restricted to university students. The author finds that university students are equally unlikely to donate as those who are not in university. Because the sample contained a variety of participants and not just students, generalization are now possible “beyond the population of university students”. Unfortunately, for our experiment the sample is restricted to university students, and so such generalizations cannot be made.

Results for these games generally find around 30 percent of participants do not allocate anything to the receiver. Andreoni & Bernheim (2009) finds evidence for a high percentage of around 50-70 percent of equal division when the action is observable. However, given the nature of our chosen receiver, it will be interesting to see how outcomes differ from those seen in previous experiments.¹¹

2.4 Climate Responsibility

Finally, before I tie the literature groundwork together, I first introduce the two concepts of responsibility as motivators to engage in climate-friendly behaviors.

As described by Kaiser & Shimoda (1999), there are generally two senses of responsibility that influence climate behavior: moral and conventional responsibility. Kaiser & Shimoda (1999) suggest that a sense of moral responsibility is an innate desire to act in a certain morally responsible way with no regard for the opinions of others. Conventional responsibility on the other hand is a result of ones desire to behave in a way that is socially acceptable and is dependent on the opinion of others.

On a different note, the authors also argue that reduction in personal consumption benefits others. Simply put, “each person’s consumption of such resources affects other people because it diminishes those resources” Kaiser & Shimoda (1999). I emphasize this point to show why personal consumption in the public setting might be reduced, as some agents may be aware that increasing personal consumption comes at the cost of climate donations, a cause that positively impacts everyone, thus resulting in possible negative backlash for their action.

Overall, Kaiser & Shimoda (1999) focus on the responsibility of the individual. With these two concepts of responsibility, we can now see the objective of our experiment from the following perspective: donations done in the private setting reflects an individuals’ degree of *moral respon-*

¹¹Again, unlike a donation to the *Red Cross* or *Doctors Without Borders*, in which an increase in the total provision of the public good has no effect on the donor themselves, I know that a donation to climate organization is in an effort to combat changes in climate.

sibility, whereas donations done in the public setting reflect the presence of both an individuals' sense of *moral* and *conventional responsibility*.¹²

2.5 Bridging Our Literature Foundations in a Climate Context

I do not consider how people donate to either flaunt wealth, nor for warm glow. I posit individuals act because they feel a responsibility to do so as a member of society.

In contrast to the focus of [Glazer & Konrad \(1996\)](#), who both consider status to be a function of wealth, and [Griskevicius et al. \(2010\)](#), who consider “conspicuous conservation” to be motivated by ones desire to be seen as environmentally conscious, our investigation concerns an individuals' sense of *responsibility* to act against climate change, as described by [Kaiser & Shimoda \(1999\)](#).

This investigation is particular in the sense that individuals are most likely aware that their behavior and actions can have significant impacts to the environment, and through the environment, themselves. It is therefore apparent that donations to climate organization are unlike donations to other organizations – donations made to climate organizations positively impact the lives of society, including the donor themselves.

However, even if agents understand and recognize this responsibility, they still might decide to not engage in climate-friendly behaviors in private.¹³ This is more likely the case for non-intrinsic individuals. It could be the case that, in front of an audience, a sense of conventional responsibility could possibly dictate their actions to donate the maximum amount.

To help illustrate how responsibility and climate signaling affects an individuals' utility function, I adopt and adapt the utility function of an impure altruist used by [Andreoni \(1990\)](#) for this purpose. By doing so, it will help show how changes in preferences leads to observed behavior. Furthermore, integrating individual contribution is especially fitting in this case, as an impure altruist is one who cares about their individual contribution, and in our case, individual contribution (as a function of responsibility) is precisely our focus. However for simplicity, I will only highlight the decision between personal consumption and individual contribution, omitting total provision of the public good.

Using a Dictator Game setup, I strive to observe:

- How does moral responsibility for climate action differ between agents? (reflected by their average private donation amount)
- How does conventional responsibility (a responsibility that leads one to climate signal) for climate action differ between agents? (reflected by the difference between their average public and private donation amounts)

¹²Furthermore, [Liverani \(2009\)](#) looks at climate behavior, identifying reasons for hampered climate action. Of the recommendations she puts forward, social norms seem to have the highest potential in motivating climate-friendly behavior. If individuals are aware of this social norm to act for climate, they could be more likely to be to behave accordingly.

¹³Failure to act could simply arise from the belief in the *individual causal fallacy*, described in [Hiller \(2011\)](#).

I posit that because of the presence of *moral responsibility* in ones donation amount, I expect to observe generally higher donation amounts relative to amounts usually seen in standard Dictator Games.

In doing this investigation, I hope to add to literature concerning *responsibility* as a driver for adopting private climate-friendly behaviors, social preference games, and climate signal effects.

3 Experimental Design

The focus of this experiment is to observe two particular actions. The first observed action occurs in the beginning of the survey and allows us to determine a participant’s preference type. The final observed and important action is done at the end of the survey, and allows us to see how much particular agents donate to climate organizations. The setting in which of our action of interest takes place is also known as the *Dictator Game*.

3.1 Inferred Preferences

Through an email, students at the *Université Catholique de Louvain* are prompted to participate in a survey with the possibility of receiving a monetary reward. Participants are first notified that their responses (aside from the question about their donation amount, as it may or may not be shared) will be kept private. After consenting to participate, participants are identified as either an intrinsic “climate chooser”, or a non-intrinsic “Amazon chooser”, in accordance with their response to an initial compensation question.¹⁴

The participant has the choice of selecting either between:

- *5€ Amazon Gift Card.*
- *10€ Donation to Greenpeace.*

Since Greenpeace is a generally favored climate organization, whose goal is to “*ensure the ability of the Earth to nurture life in all its diversity*”,¹⁵ I use it as a proxy for climate preferences. If a donation to Greenpeace is chosen, then the participant is considered to be an intrinsically motivated agent. However, if the Amazon gift card is chosen, then the participant will be considered a non-intrinsically motivated agent. The response they give should reflect their preferences regarding climate change. Ideally, the share of agent types should be around 50/50. Agents will therefore be classified either *intrinsic* or “non-intrinsic”. To simplify notation, I denote our two types of agents by the following: $j \in \{c, a\}$.

¹⁴This proxy for intrinsic preference is adapted from the strategy used in [Friedrichsen & Engelmann \(2018\)](#)

¹⁵[Arcanjo \(2020\)](#) looks at what motivates individuals to engage in climate-action. He suggests that information conveyed should not be “doomsday-like” however, it should be conveyed in a way that could boost moods and “induce creativity to find solutions”. This recommendation helps us craft our message when asking participants if they would like to donate to the climate organizations.

- *c* - Climate choosers (*Intrinsically Motivated Participants*)
- *a* - Amazon choosers (*Non-intrinsically Motivated Participants*)

Some issues can arise from using this proxy to identify agents. For instance, participants may not use Amazon at all, or they could be actively against Amazon as a corporation. These issues could introduce noise in our categorization of preference types. I therefore pose a question in the survey inquiring about a participants Amazon usage. Regarding agents that do not use Amazon, if abstaining is done for ethical reasons, it is then reasonable to assume those agents would have intrinsic value for conservation of the planet anyway. Nevertheless, some noise could be present in this categorization.

3.2 Behaviors and Opinions

Continuing with the survey, participants are asked some questions regarding their climate preferences and behaviors, as well as questions that are not on the topic of climate so as to not give away the purpose of the experiment. They are also be asked about their opinion of the two climate organizations chosen for this experiment (as well as their opinion of other non-climate organizations - again, so as to not give away the purpose of the experiment). The purpose for this is to confirm the assumption being made that the climate organizations are considered “good organizations”.¹⁶ As we can see in Table 3.2, 65 percent of participants had a positive view of WWF, whereas 10 percent were not familiar. Similar perceptions are seen with Greenpeace. No negative perceptions of either WWF or Greenpeace were recorded. As a counter to this unfamiliarity, a brief description is given about the climate charity before they make their choice.¹⁷ Overall, it appears the majority of students do indeed find the climate organizations generally favorable.¹⁸

Table 1: Participant Opinions of Climate Organisations - *Shares*

	Greenpeace	World Wide Fund
Good	.65	.68
Neutral	.23	.16
Bad	.00	.00
Not Familiar	.1	.16

However, important characteristics that are asked in an effort to reduce possible sampling noise include the following: income, climate awareness, volunteering frequency, prior climate-

¹⁶In Ariely et al. (2009), a survey question is also used to confirm the climate organization is correctly well liked. Otherwise, if it is not, this could be the reason behind low donations.

¹⁷Description for WWF given is the following: “*Une organisation internationale engagée dans la conservation de l’environnement*” or “*An international organization committed to conservation of the environment*”.

¹⁸Furthermore, an additional survey question asks the participant to rank the worlds most pressing issues today. Results show that around 77 percent of participants find it to be the most pressing issue. 94 percent consider it to be in when for top three.

friendly practices (recycling), age, Amazon usage, and whether or not they know someone that is also taking the survey. Controlling for age and income might be helpful, as donation amount could be dependent on those individual characteristics. Account for Amazon usage could also be ideal, as declared intrinsic agent might only be considered intrinsic because they do not use Amazon. As for participants that know someone else, it is possible that the preferences and actions of the other people they know could influence their own decisions. Finally, by asking participants about their climate behaviors, I can use the responses when applying some checks for our results (i.e proxy-ing for climate preferences). Clustering for student academic majors could have also been nice to include for our standard errors, however this identification was not possible. The same goes for gender.

3.3 Treatment

The observations of interest are the outcomes within groups, between the two treatment groups: private vs. public. The private treatment is done for half of the “climate choosers”, and half of the participants of type “Amazon choosers”. The public treatment is done for the remaining of the “climate choosers”, and the remaining “Amazon choosers”. The assignment of a participant to a group is done at random. Participants are informed of whether their responses will be kept private or not at the time they make their choice. Specifically, participants of the public treatment are told their donation amount would be made public through an article posted on the website *incitingaltruism.org*. Their donation amount would also be emailed to the other participants. Participants of the private treatment are told their response would not be shared.

One of the questions included in the survey was in fact a random number generator that was hidden from the participants and executed automatically. If the number generated was 1, participants were shown the treatment version of question 10 (public). If the number generated was 2, participants were shown the controlled version of question 10 (private). In doing so, assumption 2 is satisfied.

By implementing a treatment and control group, one can see how “climate choosers” respond to knowing their responses will be kept private vs. knowing that their responses will be made public. The same observation is made for the “Amazon choosers”. These results can hopefully shed some light behind the motivations surrounding climate actions: whether or not behaviors regarding climate change are affected by the climate signaling - and if so - to what degree.

3.4 Dictator Game

The crucial part of our experiment comes at the end when the participants placed in a Dictator Game - like - setting. In question 10 of the survey, participants are asked to make a choice, Y_i , that will represent the Euro amount they would like to donate to a climate organization - the crisis climate fund of World Wide Fund for Nature (WWF) in this case. The climate organization was chosen so as to not have any possible integration with the proxy for intrinsic preferences question.

Y_i can be any amount from 0 to 10, increment of 0.01. X will then represent the remaining amount the participant will receive in the form of an Amazon gift card. I represent the game in the following way for all players and all treatments:

$$Y_i^T = 10 - X_i^T, \quad X_i^T \in [0, 10] \quad (1)$$

where

- Y - amount kept by participant
- X - amount donated to WWF
- $t \in T = \{1, 0\}$ - 1 for treatment; 0 for control
- j - agent type
- i - observation

Ultimately, the importance of this study is to observe how climate signaling can affect behaviors among agents. By placing students in a dictator game, I can observe their actions of increasing a donation at the expense of personal compensation. In doing so, I might be able to get an idea of how climate signaling can help agents sacrifice comfort or personal gain in an effort to adopt behaviors or practices that are sustainable and do not negatively impact the environment.

3.5 Methods

3.5.1 Sampling

Two sampling methods were used: sampling by convenience and systematic sampling. Sampling by convenience entailed approaching individuals and asking them personally if they would like to participate in a survey. From the student lists, systematic sampling was used to randomly select students by choosing every third person on the list. Recruitment from a variety of faculties, and systematically selecting participants were both methods used in an effort to obtain a representative sample of the *Université Catholique de Louvain* student population.¹⁹

3.5.2 Data collection

In order to conduct the survey, access was provided by the university to the statistical survey web application - LimeSurvey. The survey went live on May 10 and responses were accepted until June 11, 2022. Responses were solicited via flyers posted around the university, and email. In the email, a link was provided to the survey platform. The survey was composed of 13

¹⁹The majority of participants were obtained through mailing lists. Lists of students from the following departments were obtained: Faculté de droit et de criminologie [DRT], Faculté d'architecture, d'ingénierie architecturale, d'urbanisme [LOCI], Faculté des bioingénieurs [AGRO], École Polytechnique de Louvain [EPL], Faculté des sciences économiques, sociales, politiques et de communication [ESPO], and Faculté de philosophie, arts et lettres [FIAL].

Table 2: *Université Catholique de Louvain* - Participant Summary

	Type <i>C</i> Choosers		Type <i>A</i> Choosers	
Treatment	1	0	1	0
Observations	103	96	75	86
Avg. Don. (€)	9.43	8.99	3.61	2.58
St. Dev. (€)	1.85	2.44	3.14	2.90

questions total. After the survey, participants were thanked and told they would receive an update after the experiment was concluded.

A total of 360 French-speaking undergraduate students, ages 18-25, were selected to participate in the study, with an average of 90 participants contained in each group. Average donations resulted in of 9.21€ for climate choosers and 3.05€ for Amazon choosers, not accounting for treatment effects. These averages also do not take into account the initial proxy donations, but only the donation results from the dictator game.

4 Theoretical Background/Hypotheses

Before beginning, in order to identify the average treatment effect social image on donations it is necessary to make a couple of assumptions.

4.1 Assumptions

Definition 1 (No Dependence). *The assignment of the population does not depend of the potential outcomes:*

$$T_i \perp (D_i^1, D_i^0) \quad (2)$$

- $T = \{0, 1\}$
- D_i^1 - donation of those treated
- D_i^0 - donation those not treated

Here, it is assumed the placement of an agent into a treatment group is completely random and does not dependent on any possible actions of the participant.

The second assumption I make is the following.

Definition 2 (SUTVA). *One individuals' outcomes are unaffected by one individuals' treatment assignment*

SUTVA, otherwise known as the *Stable Unit Treatment Value Assumption* requires three conditions: no interaction, no externality affecting potential outcomes, and no general equilibrium effect. In other words, the treatment assignment of others does not affect ones potential outcomes. It is for this condition I obtain the following result:

$$D_{i,j}^\tau = D_{i,j}, \quad \forall \tau \in T, \quad (3)$$

Equation 3 allows us to categorize donation amounts within a treatment assignment, and then generalize this across all units (participants).

4.2 Estimating Climate Signaling Effects

With assumptions 3 and 2, it is possible to identify the average treatment effect (ATE) of our sample. In order to enforce these assumptions, I adopt a randomized controlled trial design for our experiment, where $Pr[\tau = 1] = Pr[\tau = 0]$. Individuals are randomly assigned to the treatment and control group, and as a result selectivity bias is (in theory) neutralized.

$$\Delta_j^D = \mathbb{E}[D_j^1|T = 1] - \mathbb{E}[D_j^0|T = 0] \quad (4)$$

Equation 4 represents a change in donation amount D for agent j .

When looking at the case of university students, it would be ideal to account for some of the heterogeneity since preferences are most likely to differ. Again, as done by Friedrichsen and Engelmann (2018), I consider two types of agents, c and a . When looking at the treatment effect, I estimate equation 4 with respect to agent type j . To reiterate, this comparison is only possible because of assumptions 2 and 3. However, as mention in the previous section, data was also collected regarding personal beliefs, income, etc. Although I implement a RCT structure to this study, this does not eliminate all possible sampling noise in practice. In an effort to lower the sampling noise, I estimate the following model:

$$D_i = \alpha + \beta T_i + \gamma' X_i + e_i \quad (5)$$

Equation 5 shows how I can include controls to account for potential imbalances between both treatment and control groups. The controls I am interested in are income and age.²⁰

4.3 Illustration of Individual Preferences

Finally, I study an individuals' consumption problem, in an effort to briefly illustrate the preferences of an individual. This is useful in our case, especially since the decision of the dictator is to decide how much of each good to consume (Amazon gift card, Donation to WWF), given a budget set of 10€. I therefore propose the following standard agent utility maximization problem.²¹ I assume the following Cobb-Douglas utility function for each agent, where $\psi \in [0, 1]$:

$$\begin{aligned} \underset{X, D}{Max} \quad & U_i(X_i, D_i) = D_i^\psi X_i^{1-\psi} \\ \text{s.t.} \quad & D_i + X_i = 10 \end{aligned} \quad (6)$$

By maximizing, I obtain

$$X_i = D_i \left(\frac{1-\psi}{\psi} \right) \quad (7)$$

Substituting 7 into our budget constraint and solving I get

$$\begin{aligned} D_i &= 10 - D_i \left(\frac{1-\psi}{\psi} \right) \\ &= \psi 10 \end{aligned} \quad (8)$$

As $\psi \rightarrow 1$, the higher the intrinsic concern an individual has for climate, and therefore, a higher share they give to the climate organization.

²⁰Income can possibly influence outcomes, as participants with lower incomes could possibly be more likely to choose an Amazon gift card (higher value for self). Age could also have an impact. Bekkers (2007) notes that participants that have completed university tended to offer higher amounts on average than less educated individuals tended to donate. Because of the age difference implied with this result, it would be interesting to see if age itself can have an effect on donations. Climate awareness and Amazon usage are also characteristics that could affect an individuals' donation amount, and so I observe those relationships as well.

²¹This is the standard utility maximization problem seen in Mas-Colell et al. (1995).

With this now established, I move my focus towards donation share (ψ_i) and define it as ones *propensity to engage in climate behavior*. The idea comes from the relationship between moral and conventional responsibility ($m + s$), and climate behavior, as described in [Kaiser & Shimoda \(1999\)](#). As a reminder, the paper states that ones climate behaviors depend on both moral and conventional responsibility. In other words, climate behavior propensity (or donation share) is a *function* of ones moral and conventional responsibility. This is what the following equation attempts to capture.

$$\psi_i(m, s, e) = [m + \lambda s](1 - e) \quad (9)$$

$$\begin{aligned} m &\in [0, 1], & \frac{\partial \psi_i}{\partial m} &> 0 \\ s &\in [0, 1], & \frac{\partial \psi_i}{\partial s} &> 0 \\ e &\in [0, 1], & \frac{\partial \psi_i}{\partial e} &< 0 \end{aligned} \quad (10)$$

Equation 9 shows us that *climate propensity* (ψ_i) is a function of moral responsibility (m), conventional responsibility (s), and effort (e). Lambda (λ) represents a dummy variable equal to one when in a public setting, and zero otherwise. We also can see climate propensity (ψ_i) is increasing in both (m) and (s), however decreasing in (e); values are between zero and one.

And finally, with 11 below, I emphasize that Equation 9 has an upper limit of one, representing a total preference for climate action within a given situation.

$$\psi_i(m, s, e) = \begin{cases} (m + \lambda s)(1 - e) & \text{if } [m + \lambda s](1 - e) < 1, \\ 1 & \text{if } [m + \lambda s](1 - e) \geq 1. \end{cases} \quad (11)$$

In section 5.4, I use observed donation amounts as a proxy for climate behavior propensity (ψ).

4.4 Hypothesised Outcomes

Given that there are two types of agents, hypotheses will be made regarding behaviors of both agent types: intrinsic (*climate choosers*) and non-intrinsic (*Amazon choosers*). Here, I begin with a simple assumption.

Assumption 1-A. *By choosing to donate to Greenpeace instead of receiving the Amazon gift card in the private setting, I can infer intrinsic agents have a high sense of moral responsibility, m . Since donations are increasing in climate propensity (ψ_i), I can assume their donations will be relatively high.*

And so I propose our first two hypotheses:

Hypothesis 1 (H1). *Among participants whom are told their responses **will not be shared**, average donation to climate organization is higher for intrinsic individuals as opposed to those who are not.*

Hypothesis 2 (H2). *Among participants whom are told their responses **will be shared**, average donation to climate organization is higher for intrinsic individuals as opposed to those who are not.*

These two hypotheses arise from the idea that intrinsically motivated individuals will choose an allocation that is in line with their preferences - concern for the climate. Referring to equation 6, this would reflect a higher sense of responsibility for *climate choosers* relative to *Amazon choosers*: $\psi_c(m, s, e) > \psi_a(m, s, e)$.

Having established intrinsically motivated agents make choices consistent with their preferences for climate in both the public and private setting, I now consider the nature of the game, in which the maximum amount agents are able to donate is 10€. One can image treatment effects for climate choosers would be less than treatment effects for Amazon choosers. The reason for this is simply the following - with an already high donation amount in the private setting, this leaves less room for increases in donations in the public setting for climate choosers compared to Amazon choosers, resulting in a lower treatment effect.

I also consider the result obtained in [Friedrichsen & Engelmann \(2018\)](#), where treatment effects were positive for non-intrinsically motivated individuals but non-existent for those who expressed intrinsic concern. The authors explain this by suggesting higher treatment effects occur when one perceives themselves to be far from the “social ideal”. If the results in the fair-trade study can be applied to the climate context, it would mean donation amounts of intrinsic agents are not as affected by the public treatment as donations from non-intrinsic agents, emphasizing a negative correlation between climate signaling and intrinsic concern.

Furthermore, results of the dictator game in front of an audience by [Andreoni & Bernheim \(2009\)](#) suggest that agents might want to be considered as “fair”. If this holds for some intrinsic agents as well, given that intrinsic agents have already chosen to donate 10€ in the initial compensation question, splitting the total by donating nothing in the second question could be interpreted as *fair*. If such behavior is observed, we could possibly see a negative and or insignificant effect on donations for our intrinsic agent results.

With this in mind, I consider the following hypothesis.

Hypothesis 3 (H3). *Treatment effects for those considered “intrinsic” agents are small and insignificant; potentially negative.²²*

²²It is also worth noting, because the receiver is a well-known climate organization, the total amount allocated to the receiver could potentially differ dramatically to the results of other dictator games. As noted by [Eckel & Grossman \(1996\)](#), anonymous donations increase significantly when the other party is an established charity as opposed to a regular individual. Since that is the case for our experiment, it is possible to observe similar behavior. [Eckel & Grossman \(1996\)](#) were not able to get an idea of which agent types were mainly responsible for this increase, as the study was done anonymously. If we are to see similar results, it seems likely that such an increase in outcomes could be attributed to intrinsic agents. This could be a reason for why H3 would not hold.

I now propose the following assumption

Assumption 2-A. *“Non-intrinsic” individuals are aware of the importance of climate change, but this awareness has little influence over their behaviors/actions in private. However, donation amounts increase in public in an effort to signal eco-friendly preferences.*

This change in donation amount, Δ_c^D , reflects the presence of social opinions in the utility function of an *Amazon chooser*, where $\psi_{nonp} < \psi_{nons}$.

In the private setting, Amazon choosers may act very little according to this acknowledged responsibility, otherwise suggesting a low sense of moral responsibility and/or higher relative degree of effort, e . However, when placed in a public setting, not only do individuals have the desire to be considered climate aware, but they could also want to avoid any possible backlash for not donating (Bernheim (1994)). This is represented by conventional responsibility, s . In addition, when an individual chooses a higher personal amount, X , it comes at the expense of support to fight combat climate. This could further amplify the effect climate signaling has on donation amounts.²³

Overall, in both private and public settings, each agent has at least some sense of responsibility to act against climate change.²⁴ And so I present the following hypothesis.

Hypothesis 4 (H4). *Treatment effects will be higher for “Amazon choosers” relative to the effect on “climate choosers”.*

H4 takes into consideration the first assumption I make (as.1), where intrinsic responsibility is responsible for the most significant portion of the donations to WWF in any setting (public or private) - an amount in line with their climate preferences. Furthermore, I also consider our second assumption (as.2), where I posit that behaviors for non-intrinsic individuals are dramatically different depending on the setting. Non-intrinsic individuals are likely to keep a bigger amount to themselves in private, however decide to keep a significantly less amount in public.

However, previous suggestions have also emphasized the desire of an individual to be considered as “fair” by others.²⁵ Whether it be an increase to 5€ (to be seen as fair) or 10€ (signaling complete ecological responsibility), I can nevertheless expect to see a significant increase in the amount non-intrinsic participants donate.

As a final note on this idea, referring to previous literature on the effects of image motivation on altruistic behaviors, I can expect donations of every agent to be positively affected by image

²³We can see this in the context of the model proposed by Andreoni (1990). Under this framework, individuals that intrinsically value climate action most likely include the total provision to the public good is part of their utility function. By having the all agents understand this, we can see how a visible increase in a participant’s personal consumption would lead to a decrease of the utility of others (i.e. $\Delta_a^X > 0 \rightarrow \Delta_c^U < 0$). In an effort to not displease others, individuals increase the amount they donate. This is simply a way to explain why agents are affected by the public treatment. In order to avoid the scorn of others, they increase the provision of their own contribution to combat climate change.

²⁴I check for this by including a rank of the most pressing global issues, confirming the importance of climate change among our sample.

²⁵Andreoni & Bernheim (2009) demonstrate that individuals like to be perceived as fair, referring to the “50/50 norm”.

motivation, irrespective of the preference type. However, results from [Friedrichsen & Engelmann \(2018\)](#) suggest that *most of the increases from the public treatment came from participants considered to be non-intrinsically motivated*. This means individuals who did not possess a high intrinsic value for donating are the individuals whose actions were most affected by the public treatment.

5 Experimental Results

5.1 Results

Now, a brief presentation of summary statistics of the responses I obtained. First, as a result of the primary compensation question used to infer preferences regarding climate change, we see that the distribution of agent types seems to be fairly even, however slightly skewed in favor of donations to Greenpeace at 55 percent.

As mentioned previously, to check for the presences of responsibility, I pose question 7 - *Rank what you believe are the most pressing global issues today*. Results show that around 72 percent of participants consider *Climate Change* to be the most pressing issue (out of the 6). This number increases to 95 percent when considering the top 3, confirming our suspicions that climate change concern and awareness is prevalent in our Belgian student sample.

Disregarding heterogeneous preferences among agents for a moment, the left graph in Figure 1 shows an overall signaling effect among all participants. In Panel A of Table 3, we are able to see that the climate signaling effect is seen in our sample totals to: $\Delta_{gen}^D = +1,02\text{€}$, significant at the 1 percent level.

Now, to address our first two hypotheses, H1 and H2, we must observe donations amounts of individuals in the public setting. Results here in Table 3 show that in the private setting, intrinsic participants donate more than their non-intrinsic counterparts on average: $D_c^1 - D_a^1 = +6,41\text{€}$. In public however, that difference between donations decreases to: $D_c^0 - D_a^0 = +5,82\text{€}$ (Two-sample t test, $p=0.000$ and $p=0.000$ respectively). Both results are significant at the 1 percent level, indicating a true significant difference between agent donation amounts within a particular setting, thereby confirming H1 and H2. This can also be seen on the left hand side of Figure 2.

I now would like to address H3, which proposes treatment effects could potentially be negative, suggesting the presence of a negative relationship between signaling and intrinsic motivations.²⁶ I therefore perform an application of the two-sample test and recover a difference of $\Delta_a^D = +0.44\text{€}$, as seen in column (4). Though significant at the 10 percent level (Two-sample t test, $p=0.075$), with confidence intervals at $-0,16\text{€}$ to $+1,04\text{€}$, I cannot entirely eliminate the possibility of the null hypothesis, H3₀. Somewhat in line with H3 and the results obtained in Friedrichsen & Engelmann (2018), the treatment effect on intrinsic donations is our least significant and smallest result, yet nevertheless still positive.

Our fourth hypothesis, H4, considers how treatment effects for non-intrinsic participants can be larger than effects seen by those whom are considered intrinsic. This effects could also be seen as a result of an individuals' sense of conventional responsibility. If those individuals know their preferences are not aligned with the social norm, this could lead to an increase in the amount those agents give.²⁷ Having already performed a test to estimate climate signaling effects on intrinsic individuals, I now perform one on non-intrinsic individuals, as seen on Table

²⁶As seen in Friedrichsen & Engelmann (2018)

²⁷Kaiser & Shimoda (1999), Friedrichsen & Engelmann (2018), and Bernheim (1994) all provide supporting evidence on this idea.

Figure 1: General Donations and ATE

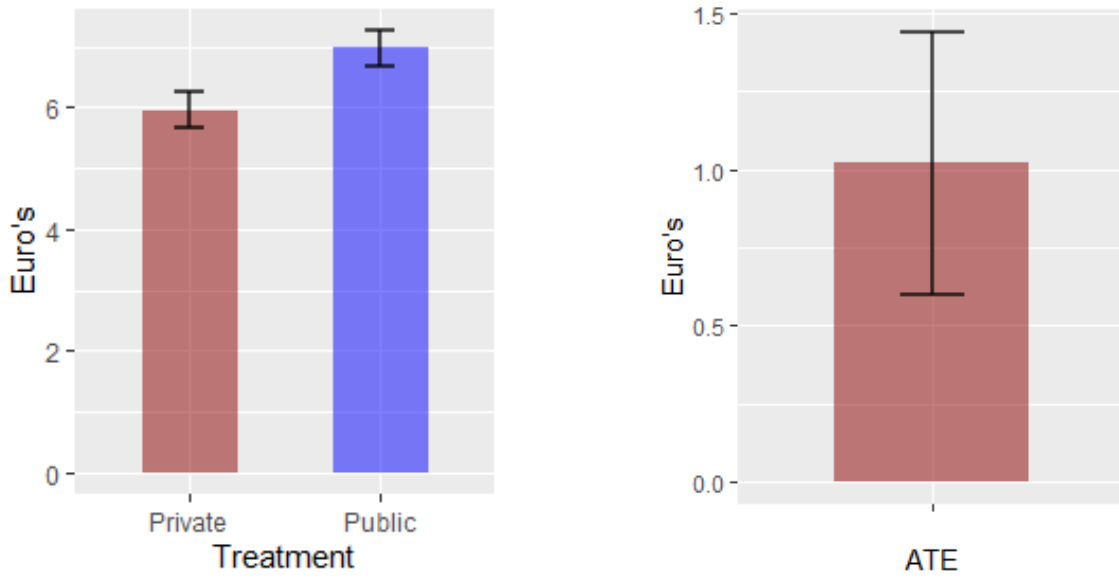
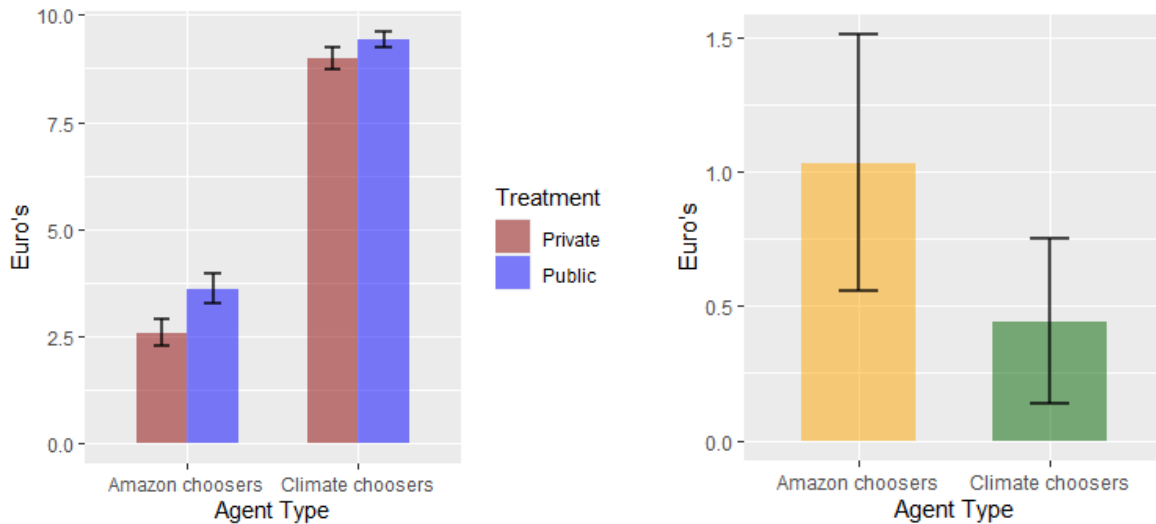


Figure 2: Average Donations and Treatment Effects Among Heterogeneous Agents



3 in columns (2) and (3), and find a climate signaling (treatment) effect of +1,03€, with a higher significance at the 5 percent level (Two-sample t test, $p=0.016$). This is also shown on the right hand side of Figure 2. These two results allow us to say that climate signaling effects are indeed higher for non-intrinsic agents compared to their intrinsic counterparts. It should be emphasized, this result should be acknowledged in the context of a dictator game, where there is a limit to donation amounts, as donation amounts are within a specified interval.

Table 3: Treatment Effects and Results (€)

	Total Donations (1)	Intrinsic Donations (2)	Non-Int. Donations (3)	Private Donations (4)	Public Donations (5)
Panel A					
Treated (Δ_j^D)	1.02*** (.420)	.44* (.306)	1.03** (.478)		
Intrinsic				6.41*** (.376)	5.82*** (.396)
Observations	360	199	161	182	178
Constant	5.96	8.98	2.58	2.58	3.61
Panel B					
Treated (β_j)	.67 (.472)	.52 (.334)	.86 (.537)		
Intrinsic				5.94*** (.493)	5.75*** (.455)
Observations	283	155	128	143	140
Constant	7.82	10.09	1.31	3.99	3.62

Panel A: treatment effects obtained with a standard t test. (Equation 4)

Panel B: treatment effects through regression including controls - age and income. (Equation 5)

Panel B: Observations that did not respond for income are omitted - less observations.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Robust standard errors in parentheses.

5.2 Checks

To account for some potential sampling noise, I run Equation 5, controlling for income and age effects. However, including these variables in our regression does not increase significance, nor dramatically change, our treatment coefficient, β . Results of this are shown on Panel B in Table 3.

Now, for some robustness checks, I begin by attempting to use a different proxy for climate preferences. Specifically, I use responses regarding recycling behavior:

- *Do you recycle?*

Those who respond “yes” are classified as intrinsic agents. Those who respond “no” are classified as agents with non-intrinsic climate preferences. I find that results obtained using this proxy are more or less in line with results obtained with our original proxy. For these results, we see:

1. Intrinsic individuals have higher donations than non-intrinsic individuals in both settings (public and private)
2. Treatment effects for both groups are positive and significant at the 5 percent level (Two-sample t test, intrinsic $p = 0.027$; non-intrinsic $p = 0.045$).

This further supports climate signaling effects on eco-friendly behavior. Results can be found in the Appendix - Panel A of Table 4.

I also consider some potential SUTVA violation in Equation 3, affecting the average outcomes we see. Consider an individual that intrinsically values climate action. After completing the survey, that same agent might consider recruiting friends to take the survey and donate as well. Though participants friends might not necessarily be intrinsic agents themselves, their actions could be bias towards donating more by communicating with the original intrinsic agent. This is not an issue for *Amazon choosers*, as recruiting more people would lessen their chances at personal consumption, the Amazon gift card. To address this possibility, I implement a check in the last question of the survey to see if the participant is familiar with anyone else taking the survey.

As previously mentioned, another possible issue is if an agent does not necessarily have intrinsic climate preferences, however, because they do not do not use Amazon, they opt for donating to Greenpeace as their initially compensation response. This could then lead us to miscategorize this agent, and a result their, their behavior.²⁸

To address these possible impact on our results, I drop observations that are familiar with someone else taking the survey, as well as observations that state they never use Amazon. I then rerun our analysis to see if results differ. A review of these results shows that both intrinsic and non-intrinsic results are significant at the 5 percent level (Two-sample t test, intrinsic $p = 0.019$; non-intrinsic $p = 0.012$). Excluding those results seems to have strengthened average climate signaling effects for intrinsic agents in particular. Results of this are shown in the Appendix, Panel C of Table 4.

Finally, as a check to further support evidence that intrinsic concern arises from an innate sense of moral responsibility for climate and not just general altruistic preferences, I proxy altruism with the response to the question in the survey, *How often do you volunteer?* I consider those who respond less than once a year to have non-altruistic preferences, and the ones who respond more than once a year to have altruistic preferences. Although not a perfect proxy, as volunteering is an altruistic action that takes significant effort, it could still help us see if this effect arises from altruistic preferences or a real sense of climate responsibility. After running these regressions using the volunteer response to check for effects coming from altruistic preference, we see that all results lose their significance (aside from altruistic treatment effects, which were significant). By observing this, we can further support the idea that our results come from individuals' climate preferences and not altruistic ones. Results of this are shown in the Appendix, Panel B of Table 4.

²⁸This problem also further justifies our previous decision of using recycling for our proxy as a robustness check.

5.3 Discussion Concerning Results

Results show that *climate signaling* does indeed positively affect donation amounts, however, even in the absence of visibility (the essential component of *conventional responsibility*), climate choosers remain relatively consistent in donation amounts. Most striking is how climate choosers generally opt to allocate most-to-all the funds to our chosen climate organization, *WWF*.

Another interesting outcome is that our Dictator Game results are similar in some aspects with results obtained in other studies. To be specific, [Andreoni & Bernheim \(2009\)](#) observe about 30 percent of the participants keep all of the endowment.²⁹ Although I observe only 15 percent of participants keep everything for all of our sample of university students, once I only consider the donations of non-intrinsic agents, this percentage goes up to 32 percent. Again, this is a result that is exactly in line with observed outcomes in standard Dictator Games, hopefully providing some degree of validity to our Dictator Game setup.

In addition, [Andreoni & Bernheim \(2009\)](#) also see evidence of a desire for individuals to be considered as “fair”, where around 50-70 percent of “dictators” decide to split the endowment equally in front of an audience, however for this sample, although there is a spike in donations of 5€, this effect is seen in both public and private setting with a share of 15 percent of participants choosing this donation amount.

5.4 Estimating Moral and Conventional Responsibility

By referring to our climate behavior propensity (ψ_i) in equation (9), we can consider our results as general estimates of agent climate behaviors. As a reminder, equation (9) is the following:

$$\psi_i(m, s, e) = [m + \lambda s](1 - e)$$

If I consider how relationship 7 shows us that donations are a function of our climate behavior propensity. Having this be the case, I can do the following:

$$\psi_i(m, s, e) = \frac{D_i^T}{10}. \tag{12}$$

Given equation 12 and using our results in Table 3, I can now estimate an individuals’ climate behavior coefficient, ψ_i .

For an intrinsically motivated agent in the private setting, we have:

$$\psi_{int}^0 = 8.98$$

For an intrinsically motivated agent in the public setting, we have:

$$\psi_{int}^1 = 9.42$$

²⁹A result that he notes is generally in line with similar studies such as [Bohnet & Frey \(1999\)](#) and [Forsythe et al. \(1994\)](#)

For an non-intrinsically motivated agent in the private setting, we have:

$$\psi_{int}^0 = 2.58$$

For an non-intrinsically motivated agent in the public setting, we have:

$$\psi_{int}^1 = 3.61$$

Given that the action of donating to the climate organization in our setting is simply to input a donation amount, I assume effort (e) for this climate behavior is: $e = 0$. This leaves us with the following:

$$\psi_i(m, s) = [m + \lambda s] \tag{13}$$

To obtain an estimate of moral responsibility (m) for a given agent type (j), I consider behavior in the private setting ($\tau = 0$):

$$\psi_j^0 = m$$

To obtain an estimate of conventional responsibility (s) for a given agent type (j), I consider behavior in the public and private setting:

$$\psi_j^1 - \psi_j^0 = s$$

This difference between the two climate propensities for a given agent type results in their estimate for conventional responsibility. I present the obtained decomposed coefficients in Table 4

Table 4: Climate Behavior Prop. Decomposed - $\psi_i(m, s)$

	Private	Public	m	s
Int.	.89	.94	.89	.05
Non-Int.	.25	.36	.25	.11

Given the estimates of climate propensities in Table 4, they support the idea in which intrinsic individuals possess a high degree of moral responsibility relative to non-intrinsically motivated individuals. The degree of moral responsibility varies highly between agents. However, when examining conventional responsibility, we see the effect remains relatively unchanged.

I therefore conclude with the observation that the presence of intrinsic moral responsibility varies highly between agents (as expected), while conventional responsibility (or *climate signaling*) has a more or less a positive fixed effect.

5.5 Further Research

Further research could be done to investigate different incentive amounts. For example, having a dictator game where a “dictator” told to split 10€, the endowment could be increased

to 20€, as a higher amount might incentives intrinsic agents to rearrange their preference, as a complete allocation of funds to the climate organization would result in a bigger potential loss for the dictator.³⁰

One reason for why we do not see strong treatment effects for a particular agent at the 1 percent level is because the public treatment itself is not strong enough, as it was all done online.³¹ We can imagine a situation where a participant is placed in a face-to-face setting, and as a result, has an increased concerned of going against the social norm. And so that participant goes against their own preferences and conforms and allocates a higher donation amount, potentially even the total amount if strong norms are present. Future studies can execute a similar experiment to the one done here, however increase the visibility of actions and therefore the potential effect of climate signaling.

³⁰Carpenter et al. (2005) study the size of stakes in standard bargaining games and do not find any evidence that suggests variability of stakes affect average outcomes. It would interesting to see if outcomes differ in our setup.

³¹As a reminder, participants of the treatment group were told their amounts would be shared with other participants, as well as shared in an article posted on the website *incitingaltruism.org*

6 Conclusion

Motivated by the existential threat to our planet, I investigate in this paper the influences behind eco-friendly behaviors. Specifically, I am interested in investigating the effect climate signaling has on individual climate actions.

To do this, I create an experiment involving undergraduate students from a Belgian University, and place them in a dictator game - like setting. By dividing participants into treatment groups and observing their actions, I am able to see how climate signaling can influence their decisions.

Results from our general sample differ from other dictator games, simply because of the identity of our chosen receiver - *WWF*. Results of this experiment show that climate signaling does have an overall positive effect on climate actions, regardless of one's preference type. Strongest effects of climate signaling are seen with individuals considered to have a low intrinsic sense of moral responsibility to act against climate change. However, the same cannot be said with high certainty for participants with a high sense of moral responsibility. This lower (but still positive) effect, however, is most likely due to moral responsibility being the biggest driver behind the actions of individuals that have intrinsic concern for climate change.

These results support previous research that suggest making donations as visible as possible have positive effects on donation amounts. However, our results also show, if looking to maximize donations, focus should be made on targeting individuals that identify with the cause. Though this is generally already known, results of this study suggest this is especially true for university students when concerning climate organizations, potentially because of the high emphasis put on the topic of climate change in university settings - an established norm.

These results could also be generalized to different types of climate actions and support the idea of making sustainable practices (such as recycling) more visible, as individuals would be willing to make sacrifices to climate-signal their preferences.

Another implication of this study is that although climate signaling is a helpful tool in combating climate change, communication and education of climate impacts should be the most important investment made by institutions around the world. By increasing the amount of information about climate change and its' effects, the amount of individuals that possess intrinsic concern for climate change is most likely to go up.

On a final note, it would be worth it to again emphasize the need for not only institutions to adopt climate-friendly policies, but also individuals to adopt climate-friendly behaviors. Though consequences of our actions are not entirely visible at the moment, its presence *is* becoming increasingly noticeable, and by the time we realize individual change needs to be taken seriously, it could already be too late.

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A Appendix

A.1 Table 5 - Checks

A.2 Kernel Density Plots - Donations

Figure 3: Participant Donation Densities

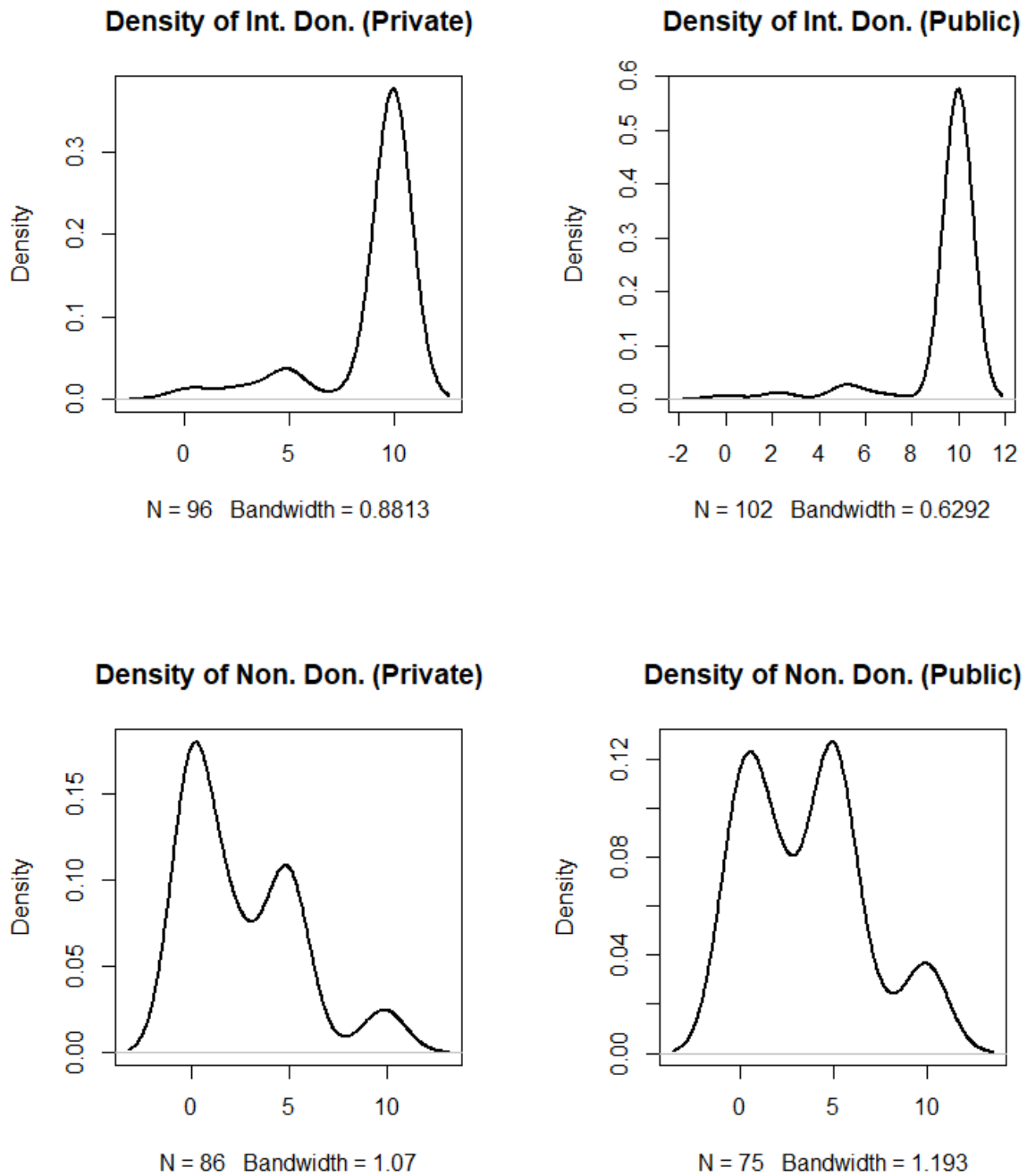


Table 5: Checks - Treatment Effects and Results (€)

	Total Donations (1)	Intrinsic Donations (2)	Non-Int. Donations (3)	Private Donations (4)	Public Donations (5)
Panel A					
Treated (Δ_j^D)	1.02*** (.420)	.97** (.500)	1.24** (.724)		
Intrinsic				1.80*** (.635)	1.54*** (.576)
Observations	360	228	132	182	178
Constant	5.96	6.59	4.79	4.79	6.03
Panel B					
Treated (Δ_j^D)	1.02*** (.420)	1.53*** (.533)	2.80 (.679)		
Intrinsic				.58 (.629)	.67 (.578)
Observations	360	213	147	182	178
Constant	5.96	5.72	6.30	6.30	6.58
Panel C					
Treated (Δ_j^D)	1.27*** (.497)	.818** (.392)	1.19** (.519)		
Intrinsic				6.18*** (.485)	5.81*** (.439)
Observations	255	126	129	121	134
Constant	5.36	8.63	2.45	2.45	3.64

Panel A shows treatment estimates using recycle as a proxy for climate intrinsic preferences.

Panel B shows treatment estimates using volunteering as a proxy for climate intrinsic preferences.

Panel C shows treatment estimates after dropping observations.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note: Robust standard errors in parentheses.

All results are obtained using differences in means. Equation 4.

A.3 Survey Questions in French

Enquête - Étudiants UCLouvain

Petite enquête pour les étudiants de premier cycle de l'UCLouvain.

Récompense possible jusqu'à **20€** en répondant au sondage.

Veuillez répondre honnêtement pour aider à améliorer les résultats de nos recherches !

Le temps estimé pour répondre est de 2 à 4 minutes.

Il y a 14 questions dans ce questionnaire.

Consentement

1ère question

Je comprends que toutes mes réponses (à l'exception de la question 10, car ma réponse à la question 10 peut ou non être partagée) resteront confidentielles et je souhaite participer à cette recherche/sondage.

*

Veuillez sélectionner une seule des propositions suivantes :

- Oui
 Non

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/fr>

{rand(1,2)} *

Introduction

2e question

En participant à cette étude, vous avez la possibilité de recevoir une rémunération. Veuillez indiquer la récompense que vous préférez.

A. Une carte-cadeau Amazon de **5 euros**. (Pour usage personnel)

B. **10 euros** de don à l'association Greenpeace. (Une organisation qui lutte contre le changement climatique).

* Votre réponse à cette question ne sera pas partagée.

* Si sélectionné, la confirmation de don et les cartes-cadeaux Amazon seront envoyées par e-mail.

*

● Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- A. Carte-Cadeau Amazon
 A. Don à Greenpeace

Informations

1/10 <https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/fr>

2/10

6/22/22, 3:14 AM Limesurvey - UCLouvain - Enquête - Étudiants UCLouvain

3e question

Veuillez saisir votre email UCLouvain

*

Veuillez écrire votre réponse ici :

4e question

Veuillez entrer votre âge.

*

Veuillez écrire votre réponse ici :

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/fr>

3/10

6/22/22, 3:14 AM Limesurvey - UCLouvain - Enquête - Étudiants UCLouvain

5e question

Veuillez partager le revenu de votre ménage familial.
(RAPPEL : ces informations resteront confidentielles et ne seront pas partagées)

*

● Veuillez sélectionner une réponse ci-dessous
Veuillez sélectionner une seule des propositions suivantes :

- Moins que €20.000
 €20.001 - €40.000
 €40.001 - €60.000
 €60.001 - €80.000
 €80.001 - €100.000
 Plus que €100.000
 Préfère ne pas répondre

Activités

6e question

Pratiquez-vous les activités suivantes ?

*

● Cochez la ou les réponses
Veuillez choisir toutes les réponses qui conviennent :

- Lire pour le plaisir
 Faire de l'exercice
 Recyclage
 Travail (Travail)
 Sports d'équipe

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/fr>

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/fr>

4/10

7e question
À quelle fréquence participez-vous à des activités bénévoles?
*

Choisissez la réponse appropriée pour chaque élément :

	Moins d'une fois par an.	Une fois par an	Une fois par mois	Une fois par semaine	Plus d'une fois par semaine
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Opinion

8e question
Classez ce que vous pensez sont les problèmes mondiaux les plus urgents aujourd'hui .
*

📌 Vos réponses doivent être différentes, et vous devez les classer dans l'ordre.
📌 Veuillez sélectionner 6 réponses maximum
Numérotez chaque case dans l'ordre de vos préférences de 1 à 6

<input type="text"/>	Corruption politique
<input type="text"/>	Changement climatique
<input type="text"/>	Accès à une éducation de qualité
<input type="text"/>	Inégalité des genres
<input type="text"/>	Chômage
<input type="text"/>	Accès universel aux matchs de football en direct

<https://limesurvey.acloovain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/fr>

5/10 <https://limesurvey.acloovain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/fr>

6/10

9e question
Connaissez-vous ces organisations ? Si oui, veuillez les classer.
*

Choisissez la réponse appropriée pour chaque élément :

	Très mauvaise organisation (pas digne de confiance, pas une bonne cause)		Neutre		Très bonne organisation (digne de confiance/familier/Préf ne pas répondre)
Red Cross	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
World Wildlife Fund (WWF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Rifle Association (NRA)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greenpeace	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Médecins Sans Frontières (MSF)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mafia italienne	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questions post-enquête

<https://limesurvey.acloovain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/fr>

7/10

10e question
Merci d'avoir participé à l'enquête !

Comme récompense possible pour avoir répondu à l'enquête, vous avez maintenant la possibilité de faire un don jusqu'à **10 euros** au Fonds mondial pour la nature (WWF) (une organisation internationale engagée dans la conservation de l'environnement).
Tout ce que vous ne donnerez pas vous sera remis sous la forme d'une carte-cadeau Amazon.

(Par exemple, si vous saisissez " 3,52 " dans la zone de texte ci-dessous, 3,52 euros seront reversés au WWF en votre nom, et 6,48 euros vous seront envoyés sous la forme d'une carte cadeau Amazon.)

Le montant de votre don pour cette question sera partagé avec les autres participants par e-mail, et aussi dans une article posté sur incitingaltruism.com.

*

Répondre à cette question seulement si les conditions suivantes sont réunies :
((random
(/limesurvey319/index.php/admin/questions/sa/view/surveyid/488951/gid/86863/qid/1852753
== 1))

Veuillez écrire votre réponse ici :

10e question

Merci d'avoir participé à l'enquête !

Comme récompense possible pour avoir répondu à l'enquête, vous avez maintenant la possibilité de faire un don jusqu'à **10 euros** au Fonds mondial pour la nature (WWF) (une organisation internationale engagée dans la conservation de l'environnement).

Tout ce que vous ne donnerez pas vous sera remis sous la forme d'une carte-cadeau Amazon.

(Par exemple, si vous saisissez " 3,52 " dans la zone de texte ci-dessous, 3,52 euros seront reversés au WWF en votre nom, et 6,48 euros vous seront envoyés sous la forme d'une carte cadeau Amazon.)

Le montant de votre don pour cette question restera confidentiel et ne sera partagé.

*

Répondre à cette question seulement si les conditions suivantes sont réunies :
(random
(/limesurvey319/index.php/admin/questions/sa/view/surveyid/488951/gjd/86863/qjd/1852753)
== 2))

Veillez écrire votre réponse ici :

11e question

Connaissez-vous quelqu'un d'autre qui participe également à cette enquête ?

*

Veillez sélectionner une seule des propositions suivantes :

- Oui
 Non

12e question

À quelle fréquence utilisez-vous Amazon pour vos achats ?

*

Choisissez la réponse appropriée pour chaque élément :

	Jamais	Rarement	Parfois	Souvent	Très souvent
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Merci d'avoir participé à cette enquête. Les participants sélectionnés au hasard pour obtenir la récompense monétaire seront informés par e-mail.

Envoyer votre questionnaire.
Merci d'avoir complété ce questionnaire.

A.4 Survey Questions in English

6/22/22, 4:04 AM LineSurvey - UCLouvain - UCLouvain Student Survey

UCLouvain Student Survey

Short survey for UCLouvain undergraduate students.

Earn up to **20€** for completing the survey!

Please answer honestly to help improve the results of our research!

Estimated time to complete the survey is 2-4 minutes.

There are 14 questions in this survey.

Consent

Question 1

I understand that all my responses (**aside from question 10, as my response for question 10 may or may not be shared**) will be kept private, and I wish to take part in this research/survey.

*

Please choose **only one** of the following:

Yes

No

{rand(1,2)} *

<https://linesurvey.uclouvain.be/linesurvey/319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/en>

6/22/22, 4:04 AM LineSurvey - UCLouvain - UCLouvain Student Survey

Introduction

Question 2

By participating, it is possible to receive a reward. Please indicate which reward you would prefer.

A. **5 euro** Amazon gift-card. (For personal use)

B. **10 euros** for us to donate to the Greenpeace. (An organization aimed at combating climate change).

* Your response to this question will not be shared.

* If selected, donation confirmation and Amazon giftcards will be sent via email.

*

1 Choose one of the following answers
Please choose **only one** of the following:

A. Amazon giftcard

B. Donation to Greenpeace

Participant Information

Question 3

Please enter your UCLouvain Email

*

Please write your answer here:

<https://linesurvey.uclouvain.be/linesurvey/319/index.php/admin/printablesurvey/ta/index/surveyid/488951/lang/en>

6/22/22, 4:04 AM LineSurvey - UCLouvain - UCLouvain Student Survey

Question 4

Please enter your age.

*

Please write your answer here:

Question 5

Please share your family household income. (REMINDER: this information will be kept private and will not be shared)

*

1 Choose one of the following answers
Please choose **only one** of the following:

Under €20.000

€20.001 - €40.000

€40.001 - €60.000

€60.001 - €80.000

€80.001 - €100.000

Over €100.000

Prefer not to answer

Activities

6/22/22, 4:04 AM LineSurvey - UCLouvain - UCLouvain Student Survey

Question 6

Do you engage in the following activities?

*

1 Check all that apply
Please choose **all** that apply:

Reading for fun

Exercising

Recycling

Working (Job)

Team Sports

Question 7

How often do you participate in volunteer activities?

*

Please choose the appropriate response for each item:

	Less than once a year	Once a year	Once a month	Once a week	More than once a week
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Opinion

6/22/22, 4:04 AM LimeSurvey - UCLouvain - UCLouvain Student Survey

Question 8
 Rank what you believe are the most pressing global issues today.

*

● All your answers must be different and you must rank in order.
 ● Please select at most 6 answers
 Please number each box in order of preference from 1 to 6

Political Corruption
 Climate Change
 Access to Quality Education
 Gender-Inequality
 Unemployment
 Universal Access to live football matches

6/22/22, 4:04 AM LimeSurvey - UCLouvain - UCLouvain Student Survey

Question 9
 Are you familiar with these organizations? If so, please rank them.

*

Please choose the appropriate response for each item:

	Very bad organization (not trustworthy, not a good cause)		Neutral		Very good Organization (super trustworthy)	Not familiar/Not to answer
Red Cross	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
World Wildlife Fund	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
National Rifle Association	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Greenpeace	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doctors Without Borders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Italian Mafia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Post survey questions

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/en>

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<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/en>

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6/22/22, 4:04 AM LimeSurvey - UCLouvain - UCLouvain Student Survey

Question 10
 Thank you for participating in the survey!

As a possible reward for completing the survey, you now have the option to donate up to **10 euros** to the World Wildlife Fund (an international organization committed to conservation of the environment).

Whatever you do not donate will be given to you in the form of an Amazon gift card.

(For example, if you input " 3,52 " in the textbox below, 3,52 euros will be donated to the WWF on your behalf, and 6,48 euros will be sent to you in the form of an Amazon gift card.)

Your donation amount for this question will be shared with other participants via email, as well as on an article posted on incitingaltruism.org.

*

Only answer this question if the following conditions are met:
 ((random (/limesurvey319/index.php/admin/questions/sa/view/surveyid/488951/gid/86863/qid/1852753) == 1))

Please write your answer here:

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/en>

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6/22/22, 4:04 AM LimeSurvey - UCLouvain - UCLouvain Student Survey

Question 10
 Thank you for participating in the survey!

As a possible reward for completing the survey, you now have the option to donate up to **10 euros** to the World Wildlife Fund (WWF) (an international organization committed to conservation of the environment).

Whatever you do not donate will be given to you in the form of an Amazon gift card.

(For example, if you input " 3,52 " in the textbox below, 3,52 euros will be donated to the WWF on your behalf, and 6,48 euros will be sent to you in the form of an Amazon gift card.)

Your donation amount for this question will be kept private.

*

Only answer this question if the following conditions are met:
 ((random (/limesurvey319/index.php/admin/questions/sa/view/surveyid/488951/gid/86863/qid/1852753) == 2))

Please write your answer here:

<https://limesurvey.uclouvain.be/limesurvey319/index.php/admin/printablesurvey/sa/index/surveyid/488951/lang/en>

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Question 11

Do you know anyone else that is also taking this survey?

*

Please choose **only one** of the following:

Yes

No

Question 12

How often do you use Amazon for purchases?

*

Please choose the appropriate response for each item:

	Never	Rarely	Sometimes	Often	Very often
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Thank you for participating in this survey. Randomly selected participants to obtain the monetary reward will be notified via email.

Submit your survey.

Thank you for completing this survey.

A.5 Survey Responses

Figure 4: Do you recycle?

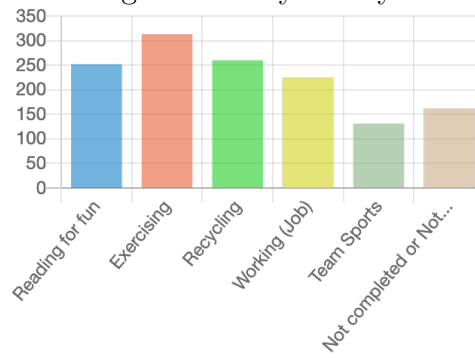


Figure 5: Volunteer Frequency

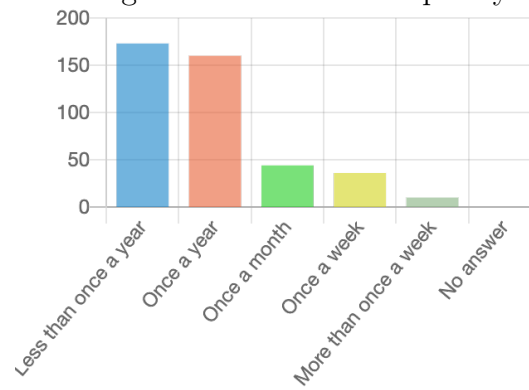


Figure 6: Initial Compensation Choice

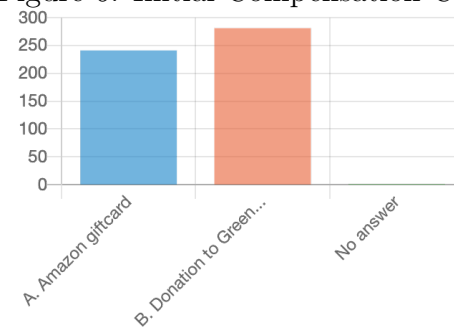


Figure 7: Opinion - Greenpeace

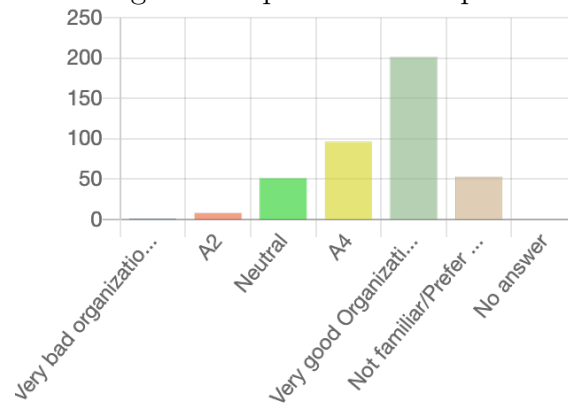


Figure 8: Opinion - World Wide Fund for Wildlife and Nature

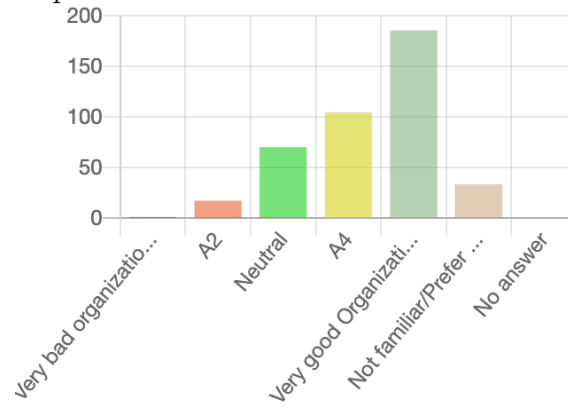


Figure 9: Opinion - Doctors Without Borders

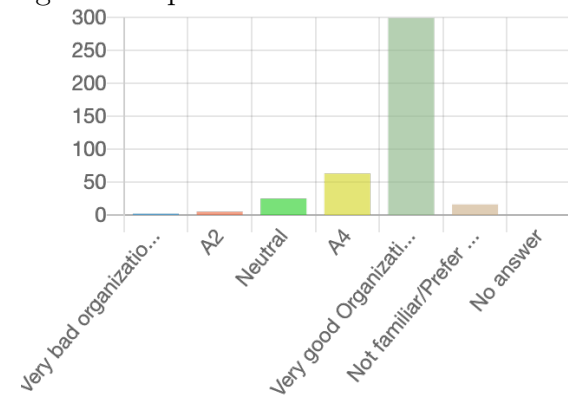


Figure 10: Opinion - Mafia

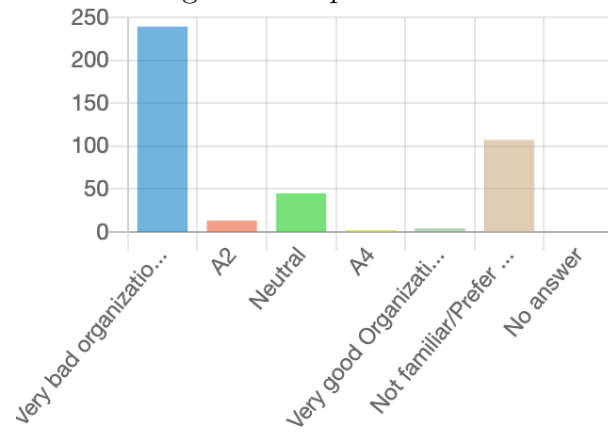


Figure 11: Know other participants of this study?

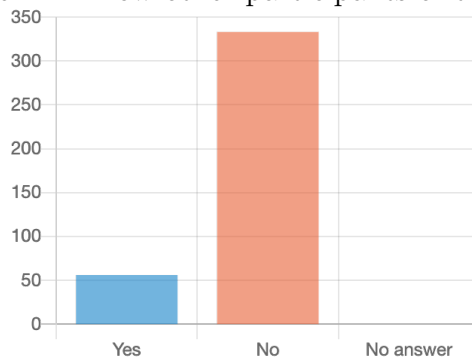


Figure 12: Amazon Frequency?

