# Norm from the top: a social norm nudge to promote low-practiced behaviors without boomerang effect

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# Norm From The Top:
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## Abstract

Social norms have proven to be a powerful nudge for making people adopt prosocial behavior. Informing people that most of their peers behave virtuously encourages them to improve their own behavior. The purpose of this paper is to establish a new norm that can be efficient even when implemented in behaviors practiced by a minority of people, by contrast to current social norm nudges. This new norm, named "Norm From The Top", provides information based on the most altruistic people in the population. This study found that this norm acted as an efficient nudge, increasing the average decision regarding prosocial behavior. In contrast, the standard norm does not have a significant effect due to the boomerang effect. These results show the potential of applying the Norm From The Top (NFTT) to promote low-practiced prosocial behaviors and thus increase the range of prosocial behaviors that social norm nudges can enhance.

The figures on pages 12, 13, and 29 should be printed in colors.

# 1 Introduction

The interest in the impact of social norms on behaviors has been growing for the last century. Since the experiment of Salomon Asch in 1951 emphasizing the role of conformity in the decision process, numerous studies have improved our understanding of this concept (Deutsch & Gerard 1955; Reno et al. 1993; Bicchieri, 2006). Social norms can influence both favorable behaviors (keeping public places clean, respecting lines in stores) and detrimental ones (criminality [Glaeser et al., 1996]; smoking [Christakis & Fowler, 2008]). According to Bicchieri (2016), social norms can be defined as unofficial rules such that individuals tend to conform to it if: most people in their reference network conform to it or if most people in their reference network believe they ought to conform to it.
In contrast, nudge theory is more recent and has been highlighted by Sunstein and Thaler (2009). A nudge can be defined as a slight modification in the choice architecture that can alter individuals' decisions towards better, healthier, more virtuous outcomes for them, or for the society, without decreasing their own welfare.
For the last few years, the combination between nudges and social norms has proven to be a relevant tool for encouraging people to make prosocial choices (Frey & Meier, 2004; Goldstein et al., 2008). According to Aronson et al. (2005), and Eisenberg et al. (2007), "prosocial behavior represents voluntary behavior intended to benefit other individuals or even the society as a whole, comprising actions such as helping, volunteering, donating or sharing". Social norm nudges can also promote pro-environmental choices (Glazier & Mone, 2019; Kurz, 2018), a concept described by Balundé et al. (2019): "Pro-environmental behavior can be defined as all possible actions aimed at avoiding harm to and/or safeguarding the environment (Steg & Vlek, 2009), either performed in public (e.g., participation in environmental movements) or private domains (e.g., recycling: Hadler & Haller, 2011)". In the context of energy conservation, nudges tended to encourage households to bring their energy consumption closer to that of their neighbors (Allcott, 2011; Costa & Kahn, 2013).
The standard way to apply a social norm nudge is to inform people that most of their group acts in a given way (the desirable behavior) to incite them to adopt the norm. A standard structure of such information is as follows: "90% of people turn off the light before leaving the room". The objective is then two-fold, to convince the remaining 10% left to turn off the light, and to confirm to others that their behavior is correct. This concept is named "descriptive norm". A descriptive norm can also be associated with an injunctive norm that indicates the approved behavior, in our example: "and avoid energy

wastes, which are detrimental to the environment". A social norm nudge is comprised of a descriptive norm, i.e., what the behavior of other people is, and an injunctive norm, i.e., what other people approve of (Loschelder et al., 2019).

However, social norm nudges are efficient if the proportion of people who already act prosocially is above a threshold. Otherwise, the norm can potentially produce a "boomerang effect" (first documented by Schultz et al., 2007); namely, this induces a person who acts prosocially to lessen her behavior since she is informed that her prosocial contribution is above the average. Boomerang effect issues reduce the scope of social norm nudges to behaviors already practiced by most of the population, except in a few studies using "trending norms" (Mortensen et al., 2017; Sparkman & Waltman, 2017).

This paper defines and implements a new social norm nudge to solve the boomerang effect issue in the context of prosocial behaviors not practiced by the majority of people in a given group. The objective is to shape new mechanisms to extend the range of behaviors where nudges and social norms could be applied. In our experiment, we set up a new type of feedback involving descriptive and injunctive norms, and then we observe whether they are more efficient than the standard social norm feedback. This new type of feedback provides information that focuses only on the people who contribute the most to prosocial behavior in a population, i.e., "top contributors", instead of informing about the average behavior. This feedback is called "Norm From The Top". This paper investigates whether a solution for solving the boomerang effect issue can be found in constructing norms based on the top contributors of a given population, thus increasing the average decision towards prosocial behavior compared to a standard norm.

The results of our experiment show that, in a context of prosocial behavior not entirely performed by a large part of the population, the standard norm had no impact on the average decision because of the boomerang effect, consistently with the literature (Schultz et al., 2007; Richter et al., 2018). Furthermore, the standard norm generated a concentration of decisions towards the average behavior. In contrast, the Norm From The Top (called NFTT in the paper) did not generate such a detrimental effect and increased the intended contributions to prosocial behavior. Therefore, the findings of this paper advance the literature on norm nudging by expanding its possibilities towards prosocial behaviors still practiced by a minority of people in a group.

The paper is organized as follows: the experimental design of the study is detailed in the next section, while the third section focuses on the hypotheses. The fourth section is dedicated to the method of the study. We present the results in the fifth section and

conclude in the sixth and last section.

# 2 Experimental design

## 2.1 Strategy of the experiment

Gee and Meer (2019) defined an altruism budget where charitable giving can be made through a gift of money, time, or be hybrid. In line with the authors and the definition of prosocial behavior (see Section 1), we set a time donation task as prosocial behavior in an online experiment context. Following Mortensen et al. (2017), we asked participants to fill out additional surveys at the end of the experiment without being rewarded. We assume that asking for additional time from participants to act as volunteers while they are home and can spend their time in many other ways is a rational measure of their prosociality. Since the length of the additional surveys was not comprised in the duration of the experiment indicated to participants, this request set a time allocation trade-off for the participants. Participants were informed that these surveys concern environmental topics and that the data would be used for another study. The participants had to choose the number of surveys they wanted to fill out (between 0 and 8).

This paper considers the number of surveys chosen by participants as the interest variable. Participants had the opportunity to stop completing surveys at the end of each survey, regardless of the number of surveys they had chosen. Importantly, the choice architecture was structured to incite participants to leave the experiment easily. Thus, the number of surveys actually filled out is lower for all treatments. This discrepancy is discussed in another paper to keep the articles with usual sizes. The number of surveys chosen corresponds to the willingness of participants to act pro-socially, especially since they were not aware of the possibility of leaving earlier when they chose their contribution of surveys.

The study involved four treatments[1]. The experiment was run first without any feedback in order to observe how people behaved without information about their peers (Treatment 1). Then, the data of this first group were used to create the three different types of feedback. The feedback are based on the number of surveys filled out. The feedback used are therefore accurate and based on the same type of population as the rest of the sample. Literature (Agerström et al., 2016) stressed the importance of providing real

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[1]Pictures of the treatments are available in the Appendix A.

numbers when setting a descriptive norm, yet this is not the method used in all nudge studies. By implementing real social norms, we avoid deception (Czajkowski et al., 2009; Croson & Treich, 2014), and we can establish our tool as a nudge (Thaler & Sunstein, 2009). Note that running the control group first did not prevent randomizing the allocation of treatments to the participants (the randomization process is detailed in the subpart 4.1). In Treatment 2, we provided these participants with the average number of surveys filled out by participants of the first treatment. This feedback corresponded to the standard descriptive norm message (Cialdini et al., 1990; Cialdini, 2003).

In the last two treatments, the feedback focused on the most significant contributors of the population (i.e., NFTT). In Treatment 3, these participants received a feedback on the number of surveys previously filled out; here we calculated the average based on the participants who had completed the highest number of questionnaires. This feedback came from the twenty participantswho filled out the most surveys, a standard that was set to keep the message credible. Yet we assume it should vary according to the framework. The feedback of Treatment 4 was also made up of the NFTT with the addition of an injunctive norm dimension (i.e., what one ought to do). In their study on energy consumption, Schultz et al. (2007) set an injunctive norm by displaying a happy/sad emoticon for the below/above average users. The authors argued that "adding an injunctive message indicating that the desired behavior is approved" may prevent from a boomerang effect (p2). In our framework, the highest contributors previously defined are called "the most devoted participants" . We assume that this term makes participants perceive the behavior as approved by their peers, and we believe this feedback was comprised of the combination between a descriptive norm (i.e., what the others do) and an injunctive norm. Aside from Schultz et al. (2007), several studies showed that this combination is efficient (Thøgersen, 2008; Habib et al., 2021) and can prevent boomerang effects (Ryoo & Kim, 2021).

## 2.2 Presentation of the experimental design

The whole experiment was composed of two sessions, spaced by two weeks. This paper focuses on the second session, which is divided into three parts [2]. The timeline of the experiment is summarized in Figure 1 below.

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[2]During the first session, the subjects had to complete personality scales. They must attend the two sessions to be remunerated. The results of the first session are discussed in another paper that has yet to be published. The entire timeline is in Appendix C.

**Fig. 1** Timeline of the experiment

| Start | 1th part | 2nd part | 3rd part | End |
|---|---|---|---|---|
| | Fastidious task | Lotteries | Additional surveys | |
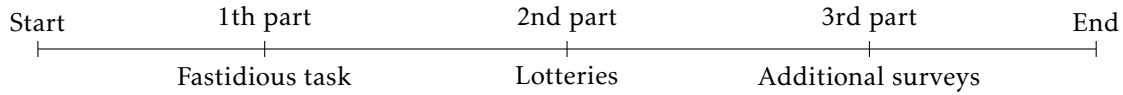
During the first part, participants had to complete a fastidious task. They received an endowment once they completed the task. Then, in the second part, they played four grids of lotteries. Participants were informed that one lottery would be randomly chosen and drawn once the experiment was over. The outcome of this lottery would then be added or subtracted from the endowment received in the first part. Before the end of the experiment, participants were asked to fill out additional surveys without being remunerated, and they faced different frameworks depending on their assigned treatment.

### 2.2.1 Effort game and lotteries

During the first part of the experiment, subjects had to carry out an effort game. Specifically, we assigned them a fastidious task (Lévy-Garboua et al., 2009) in which they had to convert ten letter codes into numbers to earn an endowment equal to 16$. This step was added beforehand to avoid the "gambling with the house money" effect (Thaler & Johnson, 1990) when playing lotteries. Johnson and Thaler (1990) discussed that risk-seeking increases "in the presence of a prior gain" (p2). In addition, giving a flat endowment to all participants enabled us to make them play lotteries in the domain of losses and gains.

The second part was dedicated to lotteries, organized into four grids [3]. Two of the grids involved risk (Holt & Laury, 2002) and the other two involved ambiguity (Chakravarty & Roy, 2009). Each grid was made up of 10 pairs of lottery choices with gradual trade-offs to elicit subjects' attitudes towards risk or ambiguity. The principal role of the lottery was first to implement a game that allowed participants to win a payoff and second, to distract them from the core of our study and avoid experimenter demand effects (Zizzo, 2010). Indeed, without the lotteries, the experiment would have been shorter, and participants could have identified prosocial behavior as the major interest of the experiment and then adapted their decisions according to what they thought the expectation of the experimenter was. Thus, participants received a flat endowment for completing the tedious task and a potential reward according to the lottery outcome. The lottery draw

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[3]The Grid 1 is illustrated in supplementary materials

took place a few hours after the experiment. By doing this, we avoided a potential effect of the payoffs on participants' willingness to behave prosocially.

### 2.2.2 Prosocial behavior

Before ending the experiment (and the lottery draw), participants received on their screen a message (see Appendix B) that introduces prosocial behavior. Note that the subjects were not required to wait for other participants between each part of the study. In addition, since the experiment was online, they could not be influenced by other subjects leaving early or staying longer in the room. We asked participants whether they were willing to fill out additional surveys without being rewarded. This was framed as a favor to trigger altruistic motivation. These surveys are related to environmental topics and are considered prosocial behavior (Mortensen et al., 2017). Environmental issues are assumed here to provoke pro-environmental motivation. Participants had to choose the number of surveys they desire to fill out (from 0 to 8). Each survey is related to a different environmental topic [4] and is made up of 8 questions. The surveys appeared in a random order for each participant. The participants who chose not to answer any surveys were conducted directly to the end of the experiment.

## 3 Hypotheses

First, we expect to find the usual effect documented in the literature with a standard social norm when the behavior is not entirely performed by a large part of the population, i.e., a backfire from the norm or, as described in the literature, a boomerang effect (Schultz et al., 2007; Richter et al., 2018).

**H1:** A social comparison feedback (Treatment 2) encourages participants to adjust their decision towards the average of the others' contributions.

According to this hypothesis, participants of T2 tend to make a decision with a smaller distance from the average than in the control group. This generates positive

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[4]Global environmental sensitivity, waste, waste composting, sustainable purchasing, reuse of electronic goods and devices, energy consumption, transports, consumption of non-reusable plastics.
The questions are available in supplementary files.

(people that would have contributed less choose more surveys) and negative effects (people that would have contributed more choose fewer surveys, i.e., boomerang effect).

As discussed earlier, participants in the third group received the NFTT feedback. We expect this to act as a high benchmark for subjects who have intentions to behave prosocially, thus inciting them to increase the contributions they intend to make.

**H2:** A feedback that provides a descriptive norm focusing on the greatest contributors (Treatment 3) improves the average decision towards prosocial behavior.

Despite the expectation of an increase in the average decision in the third treatment (compared to the second treatment), we still expect a boomerang effect. Indeed, boomerang effects theoretically appear when the feedback is only comprised of a descriptive norm without an injunctive norm.

**H3:** A descriptive Norm From The Top (Treatment 3) reduces the number of individual decisions greater than the information provided by this norm, also resulting in a boomerang effect.

We expect that introducing an injunctive norm will erase the boomerang effect found in treatments 2 and 3 and, therefore, increase the average decision towards prosocial behavior. This effect has been shown in the literature (Schultz et al., 2007).

**H4:** The combination of injunctive and descriptive norms (Treatment 4) increases the average decision towards to prosocial behavior.

**H5:** This combination erases the boomerang effect (potentially found in the third treatment [*H3*]).

# 4   Methods

## 4.1   Participants

We recruited 203 participants from Cirano (Montreal, Quebec). Cirano is an interuni-

versity center, multidisciplinary and intersectoral.[5] The center allowed us to diffuse recruitment messages to their base of respondents. We first randomly sent the message to 25% of the base to recruit the respondents of the first treatment since the feedback of other treatments is built from the responses of the first group. We then sent the message to the rest of the base to compose the three other groups. Although a long interval between the two parts of the base may affect agents' decisions, especially if significant events tend to occur, we assume that the small interval between the first group and the other groups does not allow for such undesirable effects [6].

The sample is composed of 120 women and 83 men (Average age = 37.2 ; SD = 10.5). The most represented levels of education of the participants are bachelor (81 subjects) and master (76 subjects). The average level of education of the sample is higher than the average in Quebec [7]. Participants obtained an endowment equal to 16$ [8] for the fastidious task, then the payoffs increased (up to 32$) or decreased (down to 0$) according to the result of the lottery. The minimal remuneration was 5$.

## 4.2   Materials and procedure

The experiment took place online. The 203 participants were randomly assigned to one of the four treatments:

- Control condition (T1; n=49): Participants had no information regarding other participants' actions.

- Standard norm (T2; n=51): Participants were informed that other participants filled out on average four surveys.

- Norm From The Top (T3; n=52): Participants were informed that the average of surveys filled out was above seven among the participants who had filled out the most surveys.

- Norm From The Top + injunctive norm (T4; n=51): Participants were informed that the most devoted participants filled out, on average, more than seven surveys.

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[5]The center has conducted over 800 experimental economics with the participation of the students of environing Montreal universities.

[6]All sessions were conducted on weekdays. We checked for any effects potentially induced by the day and time of each session.

[7]In Quebec, 25.5% of people aged 25 to 64 had a bachelor's degree or higher in 2016 ( *Statistics Canada. 2017*).

[8]$ Corresponds to Canadian dollars.

One participant of the control group did not finish the experiment, and his data had to be removed from the sample. The next section presents the results of the experiment. After the experiment, we checked the randomization of the four treatments according to the demographic variables (age, gender, education) and the elicited preferences (risk and ambiguity aversion).

# 5  Results

Treatments and hypotheses are summarized below.

| Table 1: Treatments | | |
| --- | --- | --- |
| Treatment | Definition | Cue received |
| Treatment 1 | Control condition | / |
| Treatment 2 | Standard norm | 4 surveys |
| Treatment 3 | Norm From The Top | 7 surveys |
| Treatment 4 | Norm From The Top + injunctive norm | 7 surveys |

| Table 2: Hypotheses | | | |
| --- | --- | --- | --- |
| Hypothesis | Treatment | Definition | Treatment compared |
| H1 | T2 | Boomerang effect of decisions towards the average | T1 |
| H2 | T3 | Increase in the average decision | T1, T2 |
| H3 | T3 | Boomerang effect towards the NFTT | T1, T2 |
| H4 | T4 | Increase in the average decision | T1, T2, T3 |
| H5 | T4 | Avoid the boomerang effect | T3 |

## 5.1  Descriptive statistics

Table 3 and Figure 2 display the number of surveys chosen per treatment. The table indicates that participants of Treatment 1 chose to complete, on average 4.73 surveys. In the end, the number of surveys they filled out was close to four. In addition, informing that the average number of surveys completed was five would have implied lying to the subjects and resulted in deceptive nudges (Croson & Treich, 2014). Thus, the feedback received in Treatment 2 is four surveys. By contrast, when the twenty participants who filled out the most questionnaires were considered, we obtained an average of more than seven surveys. We chose this criteria because, even if the feedback is real, it had to be

credible in the view of the participants. For instance, if we had chosen the first fifteen participants, the average would have been eight, which could have been seen as suspicious. Participants of Treatment 3 were indicated that the greatest contributors completed on average, more than seven surveys each, whereas participants of Treatment 4 received the same feedback with the phrase "most devoted participants".

A look at the preliminary results reveals that the average number of questionnaires selected is higher in treatments 3 and 4 than in treatments 1 and 2. Econometric tests are conducted later in the paper to evaluate the significance of these differences. In terms of the standard deviation, it was found that it is higher in the group without feedback than in other groups. We assume that, at least for some participants, the feedback might have been interpreted as a reference point indicating how to behave. A Levene test shows that the variance in the control group is significantly greater than in other groups. In addition, the median value of the number of surveys chosen for each treatment corresponds to the number of surveys indicated in the feedback: four surveys in T2 and seven surveys in T3 and T4. The median in T1 is five surveys. No significant effects from demographic variables (age, gender, education) were observed.

| Table 3: Descriptive statistics | | | | |
|---|---|---|---|---|
| Average number of surveys per treatment | | | | |
| | Observations | Mean | Stv.Dev | Median |
| Treatment 1 | 48 | 4.73 | 3.28 | 5 |
| Treatment 2 | 51 | 4.84 | 2.58 | 4 |
| Treatment 3 | 52 | 5.65 | 2.98 | 7 |
| Treatment 4 | 51 | 6.06 | 2.60 | 7 |

**Fig. 2** Bar chart; average surveys per treatment
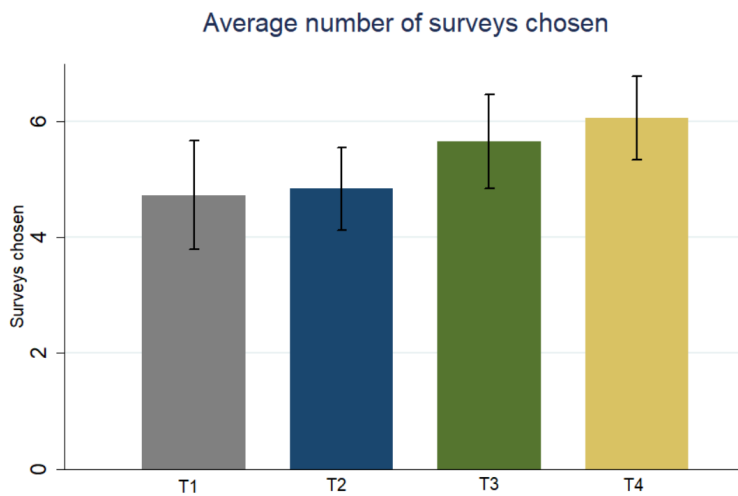
## 5.2  Sample distribution analysis

### 5.2.1  Graphics

Figures 3 illustrates the distribution of the number of surveys chosen per participant and per treatment. Appendix D provides a separate picture of the distributions of the number of surveys chosen per participant. First, the modal answer is eight surveys (the maximum) for almost every treatment. Second, there is a peak at four surveys in the second treatment (blue line). This peak is worth noting since participants of this group were informed that four surveys correspond to the average behavior.

**Fig. 3** Distribution of the number of surveys chosen per participant
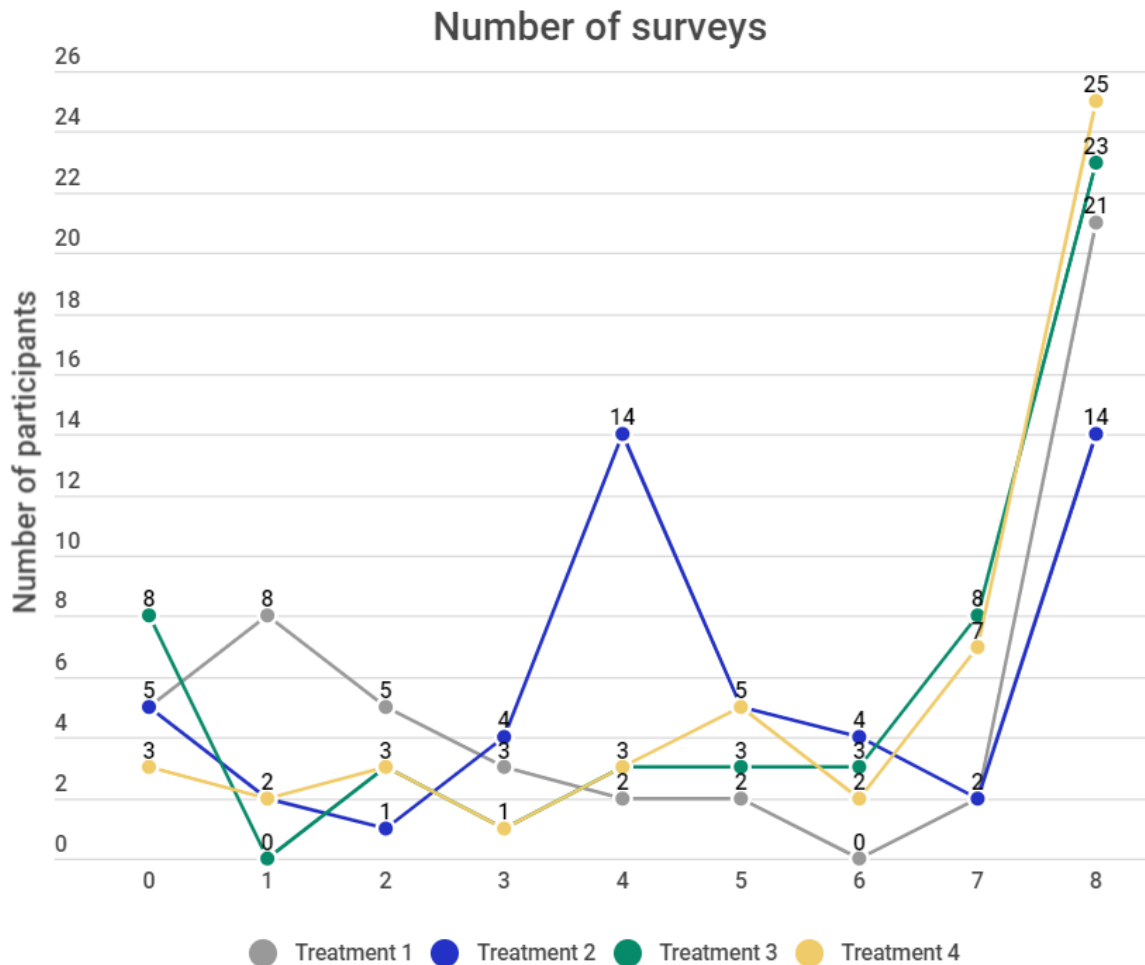


| Treatment / Surveys | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|---|
| Treatment 1 | 5 | 8 | 5 | 3 | 2 | 2 | 0 | 2 | 21 |
| Treatment 2 | 5 | 2 | 1 | 4 | 14 | 5 | 4 | 2 | 14 |
| Treatment 3 | 8 | 0 | 3 | 1 | 3 | 3 | 3 | 8 | 23 |
| Treatment 4 | 3 | 2 | 3 | 1 | 3 | 5 | 2 | 7 | 25 |

The average behavior seemed to appear as a reference point for these participants. Indeed, fewer participants in T2 chose one, two, and eight surveys than in T1. It seems that people who would have selected one or two surveys increased their intended contributions to meet the average behavior, while the reverse effect applied to some people who would have chosen all of the surveys. These phenomena result in a concentration of individual choices towards the average decision. The dwindling of high intended contributions in T2 compared to T1 corresponds to the boomerang effect observed in the literature. In the same vein, note that treatments 3 and 4 are the groups with the highest number of participants who chose a contribution equal to seven surveys, the Norm From The Top. Note also that no boomerang effect seems to appear in T3.

### 5.2.2   Analysis of the distributions

We conducted statistical tests to confirm the insights illustrated in Figure 3. Non-parametric tests were performed since the data are not normally distributed (possibly due to the small sample sizes). First, we continued to study the population distribution among treatments, notably to validate the existence of the boomerang effect in Treatment 2. To do this, we performed two-sample Kolmogorov-Smirnov (KS) tests.[9] This test has been used in the nudge literature to analyze differences in the distributions of the treatments (Mol et al., 2021). Second, we seek to analyze the differences between treatments. We used the Mann–Whitney U test that compares the population of two treatments. [10] Tables 4 displays the results of the KS and MW tests when treatments are significantly different.

Table 4: Two-sample Kolmogorov-Smirnov test & Mann-Whitney U test

| Surveys chosen | | | | |
|---|---|---|---|---|
| | Two-sample KS test | | Mann-Whitney U test | |
| Treatments | D | Exact p value | z | Prob |z| |
| H0: T1 = T4 | 0.2610 | 0.055* | -1.649 | 0.0991* |
| H0: T2 = T3 | 0.3104 | 0.025** | -1.818 | 0.0690* |
| H0: T2 = T4 | 0.3137 | 0.012** | -2.551 | 0.0107** |

$p^* < .10, p^{**} < .05, p^{***} < .01$

[9]Non-parametric test that compares the cumulative distributions of two data sets. The two-sample Kolmogorov-Smirnov test does not assume that data are sampled from Gaussian distributions and is very useful for testing whether two samples come from the same distribution.

[10]Test based on the null hypothesis that, for randomly selected values X and Y from two populations, the probability of X being greater than Y is equal to the probability of Y being greater than X.

Kolmogorov-Smirnov and Mann-Whitney tests reveal significant results for the same pairs comparisons. First, the tests indicate a significant difference in the distributions of treatments 1 and 4. When added to the findings in Figure 1, these results demonstrate that the feedback of Treatment 4 positively affects the number of surveys chosen compared to the group without feedback by modifying the distribution of decisions. In addition, we observe significant differences between T2 and both T3 and T4. Therefore, replacing the standard norm with the NFTT, combined or not with the injunctive norm, shifts the distribution of decisions. Thus, given this result and the descriptive statistics, T3 and T4 have a positive effect on the number of surveys chosen compared to T2 (standard norm). Hypothesis H4 is partially validated. T4 is more efficient than T1 and T2, yet we still found no significant difference between T3 and T4, showing no significant impact of the injunctive norm when combined with the Norm From The Top. Also, there are no significant differences between T1 and T2, nor between T1 and T3.

### 5.2.3   Identifying the effects of norms

#### 1.   Boomerang effects

We built logit models to identify the source of differences in treatment distributions and confirm insights from the graph. First, we wanted to investigate whether the boomerang effect observed in the graph in Treatment 2 is significant. We created the dependent variable *Surveys=4*, which is a dummy variable equal to 1 if the number of surveys chosen by the participants is four and equal to 0 if the number of surveys chosen is strictly higher than four. Therefore, intended contributions lower than four surveys were not considered in this analysis, leaving 148 observations. This dummy variable isolates contributions to four surveys from higher contributions and enables us to study the presence of a boomerang effect in Treatment 2. The equation of the model is specified here:

$$P(S = 4) = F(\alpha + \beta_1 Treatment2_i + \beta_2 Treatment3_i + \beta_3 Treatment4_i + \epsilon_i), \qquad (1)$$

where F is the cumulative distribution function of a logistic distribution of parameters 0 and 1. The dependent variable is the dummy variable *Surveys=4* defined above. The independent variables are dummy variables that correspond to the different treatments. Treatment 1 is the reference treatment in the model. $\beta_1 Treatment2_i$, $\beta_2 Treatment3_i$ and $\beta_3 Treatment4_i$ are dummy variables equal to 1 for observations of the corresponding treatment and equal to 0 for other treatments. These variables are the same for all logit models in the paper (we also checked the age and gender variables for all models).

The results of the logit regression are presented in Table 5a. The standard norm significantly increases the proportion of intended contributions equal to four surveys compared to the control group. Since the model analyzed only the choices ≥ 4, these findings indicate a smaller proportion of high willingness to contribute when the standard norm is implemented, thus resulting in a boomerang effect. The boomerang effect is emphasized by a decrease in intended contributions equal to eight in T2 compared to T1 (see Table 8 in Appendix E). These findings also confirm the patterns seen in the graph in Figure 3. Thus, the identification of the boomerang effect in Treatment 2 validates hypothesis H1. Treatments 3 and 4 have no significant effect on the dummy variable *Surveys=4*.

We built a second logit model to study the presence of boomerang effects when the Norm From The Top is implemented. We followed the same method and set the dependent variable as a dummy variable named *Surveys=7*. This variable has a value of 1 if the number of surveys chosen by the participants is seven, which corresponds to the feedback sent by the NFTT, and a value of 0 if the number of surveys chosen is strictly higher than seven (i.e., eight). This analysis did not consider intended contributions lower than seven surveys, leaving 102 observations. This dummy variable isolates decisions equal to seven surveys from higher intended contributions and enables us to study the presence of a boomerang effect in Treatments 3 and 4. The equation of the model is specified here:

$$P(S = 7) = F(\alpha + \beta_1 Treatment2_i + \beta_2 Treatment3_i + \beta_3 Treatment4_i + \epsilon_i),  \qquad (2)$$

where F is the cumulative distribution function of a logistic distribution of parameters 0 and 1. The dependent variable is the dummy *Surveys=7* defined earlier. The independent variables remain the same as in the first model. The logit regression results are presented in Table 5b and show no significant effect of Treatment 3 on reducing the declared contributions higher than the feedback. Thus, no boomerang effect has been generated by the NFTT alone. Hypothesis H3 is not validated. As expected, Treatment 4 does not produce the boomerang effect. As there is no boomerang effect in Treatment 3, we cannot identify the addition of the injunctive as the element that removes the boomerang effect. Hypothesis H5 is not validated.

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| Table 5a: Logit regression on the sample including the decisions ≥ 4 surveys | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 4 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 27 | | | |
| Standard norm | 39 | 2.086[.819] | 0.011** | 8.052 [6.598] |
| NFTT | 40 | .034[.954] | 0.972 | 1.034[.986] |
| NFTT + injunctive norm | 42 | .019[.952] | 0.984 | 1.019[.970] |
| Age | | | | |
| Gender | | | | |

| Table 5b: Logit regression on the sample including the decisions ≥ 7 surveys | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 7 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 23 | | | |
| Standard norm | 16 | .359 [1.068] | 0.737 | 1.432 [1.529] |
| NFTT | 31 | 1.262[.850] | 0.138 | 3.531[3.001] |
| NFTT + injunctive norm | 32 | 1.061[.857] | 0.216 | 2.890[2.476] |
| Age | | | | |
| Gender | | | | |

## 2. Positive impacts of the norms

We are now interested in studying whether the norms lead to a decrease in intended contributions lower than the average behavior. Indeed, the concentration of decisions at four surveys in Treatment 2 could have also been triggered by a reduction of decisions equal to 0, 1, 2, and 3 surveys compared to Treatment 1. Thus, we set another dummy variable *Surveys=4'*, which equals 1 when the number of surveys corresponds to four and equals 0 for contributions lower than four surveys. The contributions higher than four surveys are not included in this model, leaving 76 observations. Although the equation of the model is written in the same way as equation (1), the set of observations is different. As in previous logit models, treatments are defined as dummy variables.

Table 6a reveals the results of the logit regression. T2 has a positive and significant effect on the dependent variable *Surveys =4'*, which confirms that the standard norm decreases the proportion of low intended contributions (between 0 and 3 surveys) compared to the control group. Treatments 3 and 4 have no effect on *Surveys =4'*.

We turn to the analysis of the positive effects of the NFTT alone and combined with the injunctive norm. We set the dummy variable *Surveys=7'* equal to 1 when the number of surveys corresponds exactly to seven and equal to 0 for choices inferior to seven

surveys. Participants who selected eight surveys are excluded from the model, leaving 119 observations. As for the previous model, the equation of the model is written in the same way as equation (2), with a different set of observations. Independent variables still correspond to the different treatments.

The results of the model are reported in Table 6b. There is a positive and significant effect of Treatments 3 and 4 on the declared contributions equal to seven surveys. These results show that the NFTT decreases the proportion of decisions lower than the norm provided to the participants compared to the control group.

| Table 6a: Logit regression on the sample including the decisions ≤ 4 surveys | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 4 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 23 | | | |
| Standard norm | 26 | 2.486[.847] | 0.003*** | 12.014 [10.175] |
| NFTT | 15 | .913[.990] | 0.356 | 2.492[2.466] |
| NFTT + injunctive norm | 12 | 1.352[1.014] | 0.183 | 3.864[3.919] |
| Age | | | | |
| Gender | | | | |

| Table 6b: Logit regression on the sample including the decisions ≤ 7 surveys | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 7 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 27 | | | |
| Standard norm | 37 | -.264 [1.040] | 0.800 | .768 [.799] |
| NFTT | 29 | 1.634[.856] | 0.056* | 5.123[4.385] |
| NFTT + injunctive norm | 26 | 1.580[.865] | 0.068* | 4.853[4.197] |
| Age | | | | |
| Gender | | | | |

Finally, note that a logit model, with the dependent variable *Surveys=4*, run on the entire dataset reveals that the standard norm significantly affects participants' decision towards choosing four surveys compared to the control group. By contrast, the logit model results with the dependent variable *Surveys=7* on the entire sample show quasi-significant results on the effect of the Norm From The Top on choosing exactly seven surveys[11]. Therefore, since the effects of the standard norm are mitigated and, in contrast, treatments implementing the NFTT affect the decisions only positively, the corroboration

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[11]Positive effect of Treatment 3 but no significant effect of Treatment 4 ($p$=0.117). See tables 9 and 10 in Appendix E.

of hypotheses H2 and H4 (partially) is confirmed.

## 5.4  Discussion

The results of the experiment show that, while the standard norm had no impact on the willingness to behave prosocially, the combination of the Norm From The Top and the injunctive norm increased the intended contributions compared to the control group. The standard norm generated the boomerang effect found in the literature (Schultz et al., 2007), showing that it reduced the proportion of intended contributions above the average behavior. Furthermore, the standard norm led to a concentration of the decisions towards the average behavior.  By contrast, the NFTT (and the combination with the injunctive norm) did not have this issue and retained an important part of high intended contributions (even increasing the seven surveys' choices) while reducing the proportion of low intended contributions. These results allow us to argue that the Norm From The Top applied as a nudge can be more adapted in contexts where a large part of the population does not adopt the desired behavior. This could be the case for new behaviors that impact emerging issues.

However, we find no significant impact when the injunctive norm is added to the Norm From The Top.  The first potential reason is a lack of observations since an increase is observed in descriptive statistics when the two norms are combined.  Nevertheless, it might be that the injunctive dimension is not pronounced enough and that Treatment 4 results instead in a Norm From The Top framed differently.

In addition, note that the modal answer was eight surveys in each treatment, revealing that the most popular choice was to contribute to all the surveys except in T2. The presence of a completion bias might justify this phenomenon. Completion bias is the tendency of people to feel compelled to complete a task once they have started it. When a person engages in prosocial behavior, she obtains greater satisfaction if she performs it entirely rather than leaving it unfinished. Thus, we can assume that some people perceived their behavior as prosocial only if the task was fully completed. Table 7 summarizes the results.

Table 7: Results hypotheses

| Hypothesis | Treatment | Definition | Treatment compared | Result |
|:---:|:---:|:---:|:---:|:---:|
| H1 | T2 | Boomerang effect of decisions towards the average | T1 | ✓ |
| H2 | T3 | Increase in the average decision | T1, T2 | T1: x [12]  T2: ✓ |
| H3 | T3 | Boomerang effect towards the NFTT | T1, T2 | x |
| H4 | T4 | Increase in the average decision | T1, T2, T3 | T1, T2: ✓  T3: x |
| H5 | T4 | Avoid the boomerang effect | T3 | ✓ |

[12] Increase observed in descriptive statistics yet not significant statistically.

# 6   Conclusion

This study reports the results of an online experiment involving prosocial behavior (filling out surveys without monetary incentives) and implementing different social norms that act as nudges. In the literature, several studies applied the "standard" social norm as a nudge that incites people to adopt prosocial behavior. However, such tools can backfire (i.e., the boomerang effect (Schultz et al., 2007) when a sufficient part of the population does not already adopt the behavior. In this study, a new social feedback was implemented to extend the input of social norms as nudges in desirable behaviors where the standard feedback would not be efficient. This feedback, called "Norm From The Top", focuses on the action of the most altruistic people in a given population.

The results of this experiment reveal that combining a descriptive Norm From The Top and an injunctive norm increases declared contributions to prosocial behavior, while the standard social norm was inefficient in enhancing the average number of surveys chosen. Indeed, the standard norm, which informs participants about the average behavior, reduces high intended contributions and generates a concentration of decisions towards this average behavior. By contrast, the NFTT, alone or associated with an injunctive norm, does not produce a boomerang effect; therefore, we propose that it is more efficient than the standard social norm in this context. Since it provides information about people who succeed in aligning their intentions and actions, we believe the NFTT is more suitable than the standard norm to illustrate how a nudge can act as a bridge for a potential discrepancy between intention and action. NFTT seems to be seen by participants as a reference point indicating how to behave. However, this reference point is higher than the average behavior. Consequently, applying social norms built on the behavior of the greatest contributors in a group can be a solution (as trending norms can be) in situations where standard descriptive norms are not. When using social norm nudges, the NFTT has

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the potential to extend the range of prosocial behaviors for which the participation rate can be improved.

Whether adding the injunctive norm to the NFTT has a significant impact compared with the NFTT alone has yet to be observed. It is possible that the injunctive norm is not pronounced enough in our design. We faced a trade-off between making the injunctive norm more salient and avoiding a message that would induce an experimenter demand effect. Ending up, the difference with the treatment that includes only the NFTT may be closer to a framing effect than a second norm. Further experiments in that direction could indicate whether an injunctive norm is relevant when there is no boomerang effect issue. Another explanation would be that the relevance of the injunctive standard depends on how close the top standard is to the maximum contribution. Here, the NFTT was very close to the maximum number of surveys, which limited the emergence of a boomerang effect. Finally, future work could expand the number of participants per treatment in order to strengthen the validity of these results.

In addition, the prosocial behavior implemented in our study is related to environmental topics. As the environment could play a role in the participants' willingness to contribute, replacing it with other topics could reveal whether the effects of nudges are consistent. In fact, it has been shown that nudges are, in part context-dependent (Hummel & Maedche, 2019). Thus, implementing a NFTT in different prosocial behaviors, particularly in field experiments, would allow for observing its impact on real-world behaviors and, therefore, assess the external validity of this new tool. For example, in charitable giving, Kumru & Vesterlund (2010) argued that first soliciting donors with a high social ranking leads to increased donations from other donors. This demonstrates that being able to first ask for the contributions of people with the expected highest prosocial attitudes could be a solution to generating a NFTT. The practice of behaviors such as waste composting, bioproducts consumption, or blood donations are still adopted by a minority of people (at least in France) and could potentially be improved by this new social norm mechanism.

A final consideration when using the NFTT is for nudged people to identify themselves as part of the group of top contributors. If nudged people do not feel that they belong to this group, whether socially, economically, or geographically, they may not feel concerned by the norm and hence not modify their behavior.

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# Appendix:

## Appendix A:



**Fig. 4** Treatment 1; Control group framework

Translation: "How many surveys do you want to complete ?"



**Fig. 5** Treatment 2; Standard norm framework

Translation: "During previous sessions, participants completed an average of four questionnaires. How many surveys do you want to complete ?"
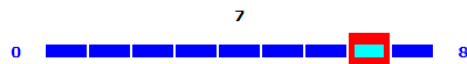
**Fig. 6** Treatment 3; Norm From The Top framework

Translation: "During previous sessions, the share of participants who completed the most questionnaires completed on average over seven questionnaires each.

How many surveys do you want to complete ?"



**Fig. 7** Treatment 4; Norm From The Top and injunctive norm framework

Translation: "During previous sessions, the most devoted participants completed on average over seven questionnaires each.

How many surveys do you want to complete ?"

## Appendix B:

The authentic message received by the participants asking to fill out additional surveys (in french):

**Fin de l'expérimentation**

Suite à ce mail, vous serez invité à transmettre votre nom et adresse mail au CIRANO. L'adresse mail du CIRANO sera indiquée dans le message.

Avant de quitter l'expérimentation, nous vous serions reconnaissants de bien vouloir prendre un peu de temps pour répondre à des questionnaires supplémentaires.
Ces questionnaires portent sur l'environnement et sont sans rapport direct avec l'expérimentation à laquelle vous venez de vous livrer. De ce fait, vous ne percevrez pas de rémunération supplémentaire pour les avoir remplis.
Vous pouvez choisir le nombre de questionnaires (jusqu'à 8, chacun ne prenant qu'une minute) que vous souhaitez remplir.

[ Valider ]

**Fig. 8** Message introducing prosocial behavior

Translation:

"Before finishing the experiment, we would be grateful if you could take some time to fill out additional surveys.
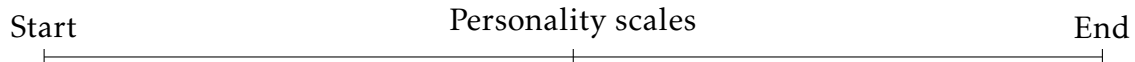
These surveys are related to the environment and are not linked with the experiment you have just carried out.

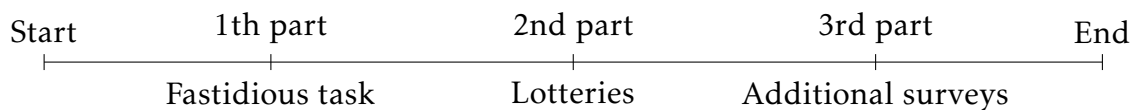Therefore, you will not receive any reward for filling it out.

You can choose the number of surveys (up to eight, lasting only one minute each) you wish to fill out."

## Appendix C:

First session (Day 1)

Start            Personality scales            End

Second session (Day 15)

Start     1th part     2nd part     3rd part     End

Fastidious task     Lotteries     Additional surveys
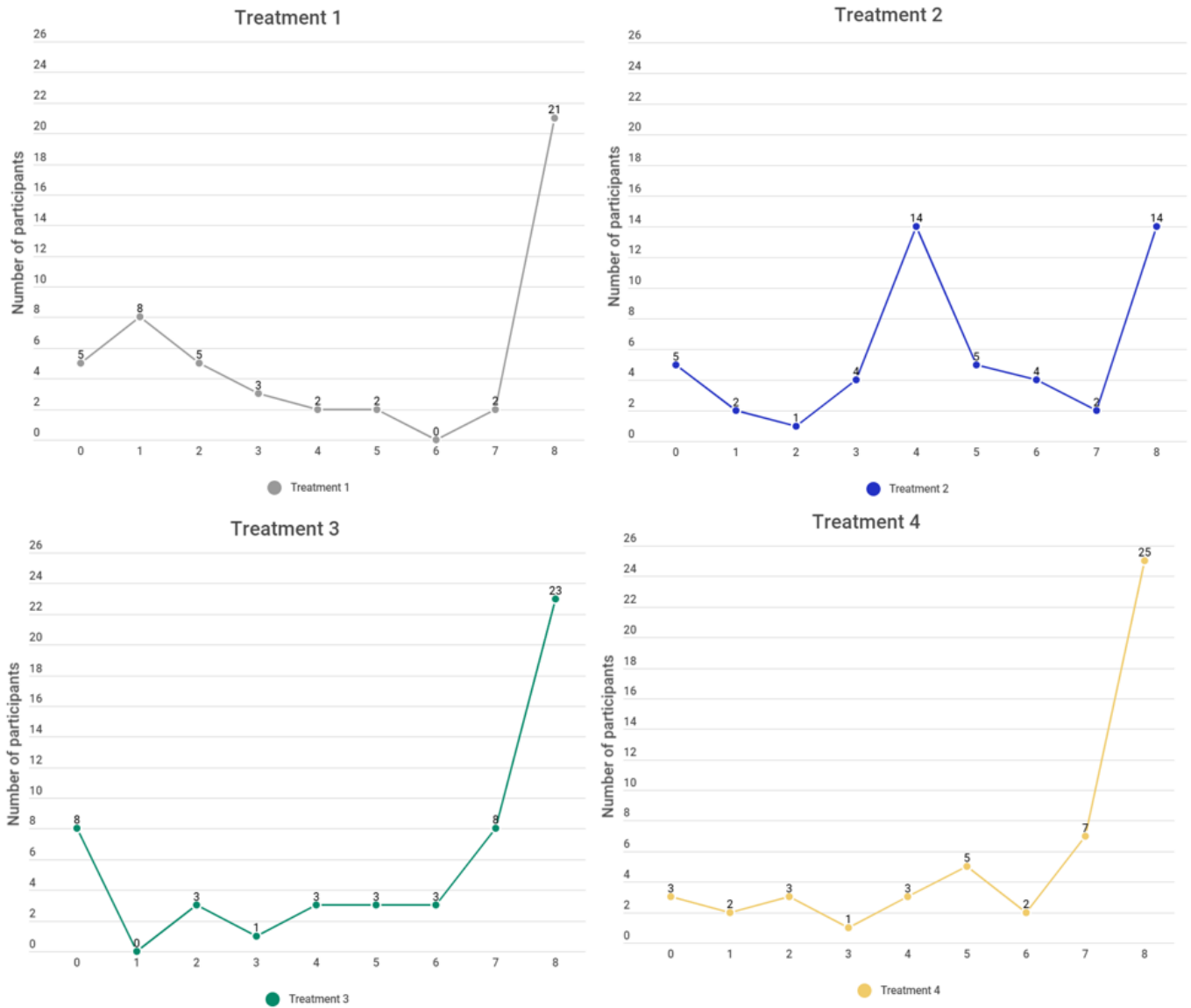
## Appendix D:

**Fig. 9** Distribution of the number of surveys chosen decomposed per treatment

# Appendix E:

| Table 8: Logit regression on the whole sample | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 8 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 48 | | | |
| Standard norm | 51 | -.715[.430] | 0.097* | .489 [.211] |
| NFTT | 52 | .019[.404] | 0.963 | 1.019[.411] |
| NFTT + injunctive norm | 51 | .215[.405] | 0.596 | 1.239[.501] |
| Age | | | | |
| Gender | | | | |

| Table 9: Logit regression on the whole sample | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 4 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 48 | | | |
| Standard norm | 51 | 2.243[.795] | 0.005*** | 9.425 [7.493] |
| NFTT | 52 | .317[.938] | 0.735 | 1.374[1.288] |
| NFTT + injunctive norm | 51 | .398[.939] | 0.672 | 1.488[1.397] |
| Age | | | | |
| Gender | | | | |

| Table 10: Logit regression on the whole sample | | | | |
|---|---|---|---|---|
| Variable | Dummy variable: Surveys chosen = 7 | | | |
| | Obs | Coef [Std. Dev] | p-value | Odds ratio [Std. Dev] |
| Control group | 48 | | | |
| Standard norm | 51 | -.051[1.025] | 0.960 | .950 [.974] |
| NFTT | 52 | 1.440[.820] | 0.079* | 4.221[3.460] |
| NFTT + injunctive norm | 51 | 1.303[.831] | 0.117 | 3.682[3.061] |
| Age | | | | |
| Gender | | | | |