# Framing and Social Information Nudges at Wikipedia\*

Maximilian Linek<sup>†</sup> Christian Traxler<sup>†‡</sup>

May 20, 2021

### **Abstract**

We analyze a series of trials that randomly assigned Wikipedia users in Germany to different web banners soliciting donations. The trials varied content or framing of social information about how many other users are donating. Framing of a given number of donors in a negative way increased donation rates. Variation in social information had no detectable effects. The findings are consistent with the results from a survey experiment. In line with donations being strategic substitutes, the survey documents that the negative framing lowers beliefs about others' donations. In contrast, the provided social information is ineffective in changing average beliefs. The ineffectiveness seems to be due to the limited salience rather than the limited credibility of the social information.

JEL Classification: C93, D91, Z13

**Keywords:** Donations; social information; framing; Wikipedia; beliefs.

<sup>\*</sup>This project would not have been possible without the cooperation of Wikimedia Germany. We would like to thank Till Mletzko and Tobias Schumann for their patient support as well as Eugen Dimant, Egon Tripodi and two anonymous referees for their constructive comments. Financial support form the Thyssen Foundation as well as Hertie School's Faculty Activity Fund is gratefully acknowledged. Georg Peter provided excellent research assistance. An earlier version of this manuscript was circulated under the title "Are Wikipedia Users Conditionally Cooperative? Evidence from Fundraising Trials".

<sup>†</sup>Hertie School, Berlin.

<sup>&</sup>lt;sup>‡</sup>Max Planck Institute for Research on Collective Goods; CESifo. traxler@hertie-school.org

# 1 Introduction

The provision of social information, information about relevant others' behavior, is a widely used behavioral policy tool. The instrument has been successfully applied, e.g., to increase payments of tax debt (Hallsworth et al., 2017), to reduce private energy consumption (Allcott, 2011) or to raise contributions to online communities (Chen et al., 2010). At the same time, there is a large body of evidence documenting that social information – similar as other nudges (Sunstein, 2017) – sometimes fails to induce behavioral change (e.g., Bicchieri and Dimant, 2019; Dimant et al., 2020; Fellner et al., 2013).

This paper studies the role of social information in the context of online donations to Wikipedia, the world's largest online encyclopedia. Wikipedia, which receives a lot of attention in social science research (e.g., Greenstein and Zhu, 2012; Gallus, 2017; Munzert, 2021), uses web banners to solicit donations. These banners, which may pop-up at the top of a user's browser window, have been controversially discussed in the behavioral science community: the banner texts typically use a negative frame and refer to low donation rates. As long as donations are strategic compliments, basic nudge logic suggests that one could generate more donations by employing a positive frame, emphasizing information that points to a higher donation frequency.

Our paper presents the results from a series of trials (A/B tests) run as part of Wikipedia's online fundraising campaigns between 2014 and 2018. We cooperated with Wikimedia Germany (henceforth WMDE), which operates the German language websites of Wikipedia.<sup>2</sup> WMDE shared with us data on all trials that systematically varied social information or the framing of this information in their banner texts. In addition, WMDE allowed us to implement a pre-registered trial. In total, we analyze six trials that produced nearly 23,000 donations, summing up to 442,167 Euro.

Two of the trials focused on the framing of a given piece of information, either communicating that 'only' (negative) or 'already N people have donated so far' (positive frame). Two further trials communicate (using a negative frame) a given number of donations but vary the reference number of (cumulative versus daily) banner impressions. The treatment banners imply donation-to-impression rates that are between 20 to 40 times higher than the corresponding rates from the control group banners. The fifth trial explains that 'less than 0.1%' (control) or 'less than 1%' (treatment) of users donate. The sixth trial closely follows the spirit of Frey and Meier (2004) and communicates either a lower (359K) or a higher total number of donors ('more than 400K'; based on the result from last year and the average numbers over the last years, respectively).

There is a long list of behavioral mechanism suggesting that the interventions could yield positive treatment effects. If the communicated information – or the positive framing of a given information – alters beliefs about the conduct of relevant others this could, in principle, increase the perceived strength of conformity pressure (Bernheim, 1994) or a social norm to donate (Bicchieri, 2005).

<sup>&</sup>lt;sup>1</sup>See, among many others, this tweet by Richard Thaler or this blog post by Evan Warfel.

<sup>&</sup>lt;sup>2</sup>WMDE hosts more than 2.5 million articles, receives more than 1 billion monthly page views, and accounts for almost 8% of the global Wikipedia traffic.

A higher donation rate or more donations might also alter the perceived quality of the provided public good (e.g., Vesterlund, 2003), which could increase an altruistic donor's motivation to donate. These (and further) channels would all imply strategic complementarity: providing (framing) social information that more people donate could increase donation rates.

A fundamentally different prediction can be derived from self-signaling models (e.g., Bénabou and Tirole, 2006, 2011), which might be quite relevant in a context of anonymous online choices.<sup>3</sup> If the self-signal return from donating is larger when relatively few others donate (e.g., because users perceive their own donation to be more crucial in supporting WMDE or keeping it independent of commercial advertisement), donations could become strategic substitutes – and we should observe negative treatment effect.

However, there are numerous theoretical and practical reasons for donations to be neither strategic complements nor substitutes. Given that the communicated donation rates are very low, it is unclear wether the descriptive, empirical information translates into an appropriate normative expectation (Bicchieri and Xiao, 2009). It further remains unclear whether social information on the conduct of the general population is credible and relevant; a single user might not feel socially 'close' to the overall population (Dimant, 2019; Goette and Tripodi, 2021). Moreover, the treatments varying the reference number of banner impressions might alter the perceived value of the public good in an unintended direction. From a more practical perspective, one has to note that Wikipedia's banners include a fairly long text. It is questionable if (and how many) users carefully read and process all the information contained in the banners. Hence, the intention-to-treat (ITT) effects observed in the trials might simply reflect that a minor variation in wording is ineffective in altering beliefs and behavior. All these arguments would point to null results.

The data from the trials provide a mixed picture. On the one hand, we find that the positive framing *reduces* click- and donation rates (relative to banner impressions). The average amount donated remains almost constant; the negative framing thus increases the total amount donated. On the other hand, we do not find any economically or statistically meaningful effects of varying social information. If anything, the data point to a weak, negative impact of the information treatments.

To narrow down the possible interpretation of these findings, we ran a survey experiment. We worked with a sample of WMDE users from Germany (which was representative for the user population in terms of their age distribution) and exposed these users to a subset of banners from the trials. We then elicited users beliefs and perceptions in several dimensions. The survey data indicate that the strength of different motives to donate – the perceived warm glow of giving as well as the expected social approval in communication with friends – are positively associated with beliefs about others' donations. In fact, this pattern holds for both, the donation rate among ones friends as well as the overall level of donations in Germany. The communicated social information thus seems relevant.

<sup>&</sup>lt;sup>3</sup>There is no perfect anonymity, of course, since a donor communicates her name and the payment information. Nevertheless, there is certainly no direct, human interaction involved and non-donors remain completely anonymous.

The survey provides no indication that the treatments alter the perceived public good value or the credibility of the social information. However, the data show that most treatments – with the notable exception of the framing variation – fail to alter average beliefs about others' behavior. A coherent interpretation of this and further results from the survey is that minor text changes in one (out of numerous) pieces of information provided in the banners are ineffective to influence average readers' beliefs and, subsequently, donation choices. This appears plausible, as most users tend to skims though the dense banner text – which is not the information they are primarily seeking when they visit Wikipedia. This interpretation would suggest that a simplification might be an crucial ingredient for an effective usage of social information nudges in these banners.

Our study speaks to several strands of research. Firstly, we contribute to the literature on charitable giving (List, 2011). Several studies in this field varied social information about donation amounts (e.g. Alpizar et al., 2008; Shang and Croson, 2009). Communicating a higher donation – which may also serve as an anchor – typically triggers a positive effect on the donated amount. These positive intensive margin effects (how much to donate) tend to be negatively associated with extensive margin decisions (to donate or not to donate): pushing up the average donation tends to reduce the number of donors.

Studies that vary information on the absolute number or the rate of donors are rare. The most well know is Frey and Meier (2004), who experiment in a student population, stressing that either 46% or 64% of other students have contributed to charitable funds in the past. The authors report a positive, but statistically insignificant treatment effect on donation rates. The effect only turns significant after conditioning on students' past donations. A further, marginally significant effect is reported by Bartke et al. (2017).<sup>4</sup> We differ from these contributions in that we focus on a series of interventions in the context of online donations within a well known context.

Secondly, finding a negative effect of positive framing on donations — paired with its positive effect on beliefs regarding the total number of donations — adds to recent evidence on strategic substitutes in collective action problems (e.g., Cantoni et al., 2019; Hager et al., 2019). Note that these findings point in a different direction than the strategic complementarity highlighted in the public goods literature (e.g., Gächter, 2007). Our data do not allow us to pin down why positive framing leads to less clicks and donations in our context. Understanding this effect as well as the role of contextual difference to studies reporting (precise) null-effects of framing (Dimant et al., 2020) is an important task for future research.

Finally, we contribute to the empirical literature on nudges that fail (Sunstein, 2017). Numerous studies, for instance, have found a very limited impact of social information provision on tax compliance (Antinyan and Asatryan, 2019, offer a comprehensive meta analysis). Null results are documented in several lab studies (in particular, in the context of anonymous choices; see e.g., d'Adda et al., 2017; Capraro and Rand, 2018; Dimant et al., 2020), highlighting the limits of social

<sup>&</sup>lt;sup>4</sup>Non-experimental evidence from pre/post variation in extensive margin information is discussed in Heldt (2005). An interesting and closely related study is Martin and Randal (2008), who jointly vary cues about donation amounts as well as the number of donors. They report effects on donation rates as well as on donated amounts.

norm nudging and belief management strategies (see, e.g., Bicchieri and Dimant, 2019). Our survey evidence suggests that the null results found in WMDE's trials could be due to the lack of salience of the provided social information – which is, to the best of knowledge, a novel argument why social information nudges fail to influence choices.

In the remainder of the paper, Section 2 first discusses the different trials, their implementation and results. Section 3 presents the survey experiment and Section 4 concludes.

# 2 Donation Banner Trials

We study Wikipedia user's decision to donate after being exposed to a donation banner. Such a banner may slide down from the top of a user's browser window during WMDE's trialing and annual fundraising period. A click on the banner opens another website that asks users to enter their payment details and to confirm the donation amount. WMDE provided us with data that track banner impressions, banner clicks and information on (completed) donations. Beyond this information Wikipedia stores (quite differently from other players in big tech) basically no data on their users. In particular, there is no information on which Wiki page was visited before donating. We did not obtain consistent micro data on the donation levels (i.e., we observe the total donation volume and can compute average donations). Hence, our analysis will focus on the binary decision to donate (the 'extensive margin') rather then the donated amount ('intensive margin'). In addition, we examine the impact of different banners on click rates (banner clicks relative to impressions).

## 2.1 Trials and Randomization

Our analysis covers all randomized trials conducted by WMDE that systematically varied social information, the framing of this information, or information that provides indirect cues about other users' donation frequency. In addition, we designed, pre-registered and implemented our own trial.<sup>5</sup> All trials tested a baseline banner ("control") against a variation ("treatment") that changed the banner text without affecting size or format of the banner. Table 1 provides an overview of the six trials we analyze (see Online Appendix C for the layout of the banners). The trials, which were conducted between 2014 and 2018, vary in scale, ranging from 1.2 to 6.6 million impressions per trial.<sup>6</sup> In total, the six trials cover nearly 23,000 donations that sum up to 442,167 Euro.

Variation in framing. The first two trials test framing effects in the communication of a given piece of social information. The manipulations only affect one sentence of the banner text that

<sup>&</sup>lt;sup>5</sup>See AEA RCT Registry ID 3543 (November, 2018). Due to technical constraints, we were not able to implement the second trial outlined in the registration. Note further that, different from our pre-registration plan, we did not obtain data on 'x-clicks' (number of times a banner was closed by users).

<sup>&</sup>lt;sup>6</sup>Given the baseline donation rates, a simple power analysis (with  $\alpha = 5\%$ , a power of 80% and assuming i.i.d. errors) suggests that the minimum detectable effect (MDE) size of the trials ranged between 7 and 13% of the control group rate of donations to impressions (trial 1: 11.14%, 2: 13.02%, 3: 6.92%, 4: 7.48%, 5: 9.37%, 6: 11.69%). In absolute terms, the MDE was between 0.07 and 0.29 donations per 1,000 impressions.

compares numbers of donors and impressions. More specifically, trials 1 and 2 varied the framing of the (given) number of donors, referring to the number in a negative ("...but only N people donated ..."; see Table 1).

**Variation in baseline numbers.** Adopting the negative framing from above, both trials 3 and 4 alter the same sentence that communicates a given number of donors relative to a larger or a smaller baseline: the cumulative total number (control) or the average daily number (treatment) of banner impressions in millions. For a fully rational reader of the banner, the same number of donors should appear larger in the treatment conditions: the numbers imply donor-to-impression ratios that are 20 (trial 3) or 40 times (trial 4) larger than those from the control conditions.<sup>7</sup>

**Variation in social information.** The last two trials directly vary social information. Trial 5 communicates the number of worldwide Wikipedia users and notes that "less than 0.1%" (control) or "less than 1%" (treatment) donate. Trial 6, which we designed in cooperation with WMDE, closely follows the spirit of Frey and Meier (2004) in communicating a lower and a higher number of donors: the control banner notes that 359.000 users donated last year; the treatment highlights an average of "more than 400.000" annual donors "over the last years". Both pieces of information are truthful.

**Randomization.** Randomization was conducted online. During a trial, a certain fraction of users is randomly sampled the first time they load a Wikipedia page. These users are then exposed, with equal chances, to either the control or the treatment banner. WMDE provided us with data on the timing of banner impressions (in 15-minute intervals) for several trials. Similar like other studies in a large-*N* context, we find several statistically significant but quantitatively negligible imbalances. Overall, the data indicate that banner impressions are well balanced over time. The randomization technique provides no reason why this should be any different for, e.g., different Wikipedia content.

Once a banner appears, a user will continue to face this banner and might only donate after repeated exposure. This means that donation rates cannot be interpreted in terms of donations per user. As we only observe outcomes relative to total impressions, our data do not allow us to cluster standard errors at the user level. Hence, our inference will tend to over-reject the null of no effect. Accounting for this point, our discussion of the trials' results thus focuses on differences that are significant at the 1%-level.

<sup>&</sup>lt;sup>7</sup>The communicated numbers were truthful (i.e. WMDE does not engage in deception). The (daily or cumulative) impression numbers are based on banner roll-outs at a given point in time (with substantial variation in daily banner views). Recall further that these trials were conducted in 2014 and 2015.

<sup>&</sup>lt;sup>8</sup>This point is documented graphically in the Online Appendix. Figure A1 illustrates the distribution of control and treatment banner impressions from Trial 6.

<sup>&</sup>lt;sup>9</sup>The assigned banner type is stored locally, in a cookie. Unless this information is deleted, a user would be confronted with at most 10 banner impressions. Together with the random sampling (which draws a share p of users [with  $p \le 0.1$  and  $p \approx 0.01$  in most trials] into a given trial, implying a  $p^2/2$  chance of being sampled again and assigned to a different banner after deleting cookies and revisiting the webpage again) and the limited time period of a trial, this reduces the chance of exposure to different banners. Nevertheless, there is a small but non-zero risk that some users might have been exposed to different banners of a given trial.

**Table 1:** Overview of Trials

Trial	Group	Treatment text	Number of	Number of	Total revenue	Average amount	Fundraising
		Click on the texts below to display	impressions	donations	(in EUR)	donated	Year
		the full banner text online.				(in EUR)	
	Variation	in framing ("only" vs. "already")					
	control	Our donation banner is viewed more than 20 million times a day, but only 115.000 people have donated so far	1,189,600	1,329	27,012	20.32	
1	treatment	Our donation banner is viewed more than 20 million times a day. Already 115.000 people have donated so far	1,198,100	1,095	22,283	20.35	2014
_	control	Our donation banner is viewed more than 8 million times a day, but only 28.300 people have donated so far	847,970	988	21,196	21.45	2015
2	treatment	Our donation banner is viewed more than 8 million times a day. Already 28.300 people have donated so far	843,450	851	17,223	20.24	2015
	Variation	in baseline numbers (cumulative vs. daily banner impressions)					
	control	Our donation banners have been viewed more than 184 million times, but only 28.300 people have donated so far	3,268,600	3,383	69,072	20.42	2015
3	treatment	Our donation banner is viewed more than 8 million times a day, but only 28.300 people have donated so far	3,271,190	3,222	69,676	21.62	2015
4	control	Our donation banners have been viewed more than 311 million times, but only 28.300 people have donated so far	1,782,720	2,903	47,900	16.50	2015
4	treatment	Our donation banner is viewed more than 7 million times a day, but only 28.300 people have donated so far	1,782,740	2,916	46,474	15.94	2015
	Variation	in social information					
	control	More than 450 million people use Wikipedia, but less than 0.1% donate	616,400	1,881	38,259	20.34	2015
5	treatment	More than 450 million people use Wikipedia, but less than 1% donate	606,000	1,874	36,452	19.45	2015
	control	In the last year, a total of 359.000 people donated to Wikipedia	1,010,430	1,210	23,357	19.30	2010
1 2 3 4 5	treatment	Over the last years, more than 400.000 people donated to Wikipedia on average	1,016,130	1,178	23,263	19.75	2018

## 2.2 Discussion of Interventions

The specific nature of the six trails' treatment variation is quite heterogenous. The first two trials merely vary the framing of information. All subsequent trials use the negative frame ('only *N* people donated'). In fact, note that the treatment banner in trial 3 corresponds to the control banner of trial 2. (We exploit this feature in Section 3.) The second set of trials communicate a given number of donations relative to different baseline numbers: cumulative versus daily banner impressions. The different banner texts thus provide an indirect cues about others' donation frequency – assuming that users do the implicit arithmetic and compute the implicit donation rates (and neglect the difference between cumulative and daily users). Finally, trials 5 and 6 provide direct information on donation rates and the number of donors, respectively.

Assuming that the interventions influence users' expectations about others' propensity to donation, the treatments could increase donation rate if donations are strategic complements. Strategic complementarity (or, in the language of the early public goods literature, 'conditional cooperation' Gächter, 2007)<sup>10</sup> might emerge via numerous different channels: intrinsic and extrinsic non-pecuniary motives supporting pro-social norms increase with the level of norm compliance (e.g., Bicchieri, 2005; Traxler, 2010). The treatments could thus strengthen the (perceived) social norm to support Wikipedia. In a similar way, cues about others' donation rates might strengthen conformity pressure (e.g., Bernheim, 1994; Goette and Tripodi, 2021).

A further potential driver of strategic complementarity in donations relates to the perceived quality and value of the provided public good (Vesterlund, 2003; Potters et al., 2007). If a higher donation rate or a higher number of donations is perceived as a signal that Wikipedia offers a more valuable public good, this could raise altruistic users' motivation to donate. It is important to note, however, that the banner texts might convey very different signals. In particular, the control banners of trials 3 and 4, which emphasize a higher baseline number of user, might work into the oppositive direction: by alluding to a larger audience, the banners might actually indicate a more valuable public good as compared to the treatment banners (which communicates a lower baseline user numbers). Hence, the variation in these trials might active different channels which work in opposing directions.

From a more practical perspective, one has to keep in mind that the banners contained a lot of information (see Online Appendix C). In fact, the banner text appears to be overly long. It thus remains unclear how many users really read and process the information that is varied in the trials. Hence, our outcome data will only capture intention-to-treat (ITT) effects. Even if the communicated information is processed, it might not necessarily be perceived as credible. For instance, the different donation numbers and rates from Trials 5 and 6 (0.1% vs 1%; 359K vs exactly 400K) also imply variation in credibility, in particular, if users would update their beliefs in a self-serving manner (Bicchieri et al., 2020). The round number (400K), for instance, could appear non-credible. Irrespectively of credibility issues, the social information might not be relevant. On the one hand,

<sup>&</sup>lt;sup>10</sup>We use the term 'conditional cooperation' to refer to an empirical regularity (i.e., strategic complementarity in cooperative or pro-social behavior) rather than a specific mechanism or channel (such as indirect reciprocity).

the a single Wikipedia user might not necessarily feel socially 'close' to the overall population of Wikipedia users in Germany (Dimant, 2019; Goette and Tripodi, 2021). The treatment variation might thus be irrelevant as is not indicative for the conduct in the relevant reference group. On the other hand, the information might appear incongruous with the implicit normative expectation (see Bicchieri and Xiao, 2009) or too extreme (i.e. highlighting very low donation rates) in the sense of Croson and Shang (2013). All these arguments might work against a (positive) effect of norm nudging (Bicchieri and Dimant, 2019).

Finally, one important argument in favor of donations being strategic substitutes – which would imply *negative* treatment effects – is associated with the role of self-signaling (e.g. Bénabou and Tirole, 2006, 2011). Self-signaling motives might, in fact, play a key role in the context of online choices, as there is little scope for direct observability (and reward or punishment) by relevant others. In the light of our treatment variation, is appears plausible that the self-identity return from donating might be *larger* if relatively few others are donating – e.g., if users perceive the own donation as more important in maintaining Wikipedia or keeping it free and independent of commercial advertisement.

To wrap up, there is long list of channels and mechanism that could render donations to WMDE either strategic complements or substitutes. In the former case, we would expect positive, in the latter case, negative treatment effects. At the same time, there are several arguments for expecting null results. In the remainder of the paper, we let the data speak. Section 2.3 first presents the results from the trials. Thereafter we present complementary data from a survey experiment. While the identification of a specific mechanism is beyond the scope of this paper, the survey evidence will help to narrow down the room for interpreting the outcome from the trials.

## 2.3 Results of Trials

**Variation in framing.** Let us first consider the impact of framing. Relative to the control banners, which communicated the number of donors in a negative frame ("... but only N people donated ..."), the positive frames of the treatment banners ("already N people donated ...") had a *negative* impact on click rates: banner clicks declined significantly from 1.56 to 1.22 clicks per 1,000 impressions in trial 1 (-22%, p = 0.000); in trial 2, we observe a decline from 2.36 to 2.18 clicks (-8%, p = 0.014; see Figure A2).

Figure 1 presents similar results for donation rates, which dropped from 1.12 to 0.91 donations per 1,000 impressions (-18%) in trial 1 and from 1.17 to 1.01 donations in trial 2 (-13%). Keeping the caveat about inference in mind (see Section 2.1), we note that both effects are statistically significant at the 1%-level. In contrast, the average amount donated is very similar between treatment and control in both trials. The higher amount of total donations in the control conditions reported in Table 1 is thus driven by variation in the extensive rather the intensive margin to donate.

<sup>&</sup>lt;sup>11</sup>Note that the latter argument does not apply to trial 6, which communicated high absolute numbers.

Figure 1: Variation in framing

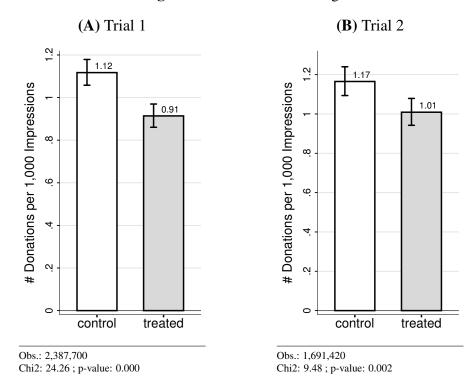
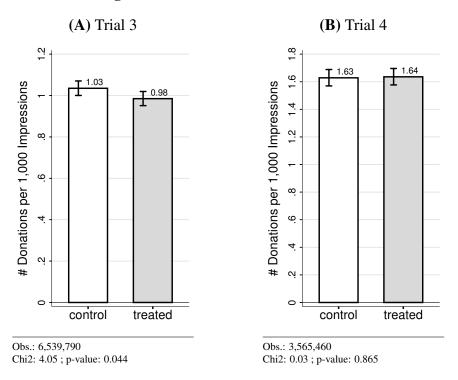


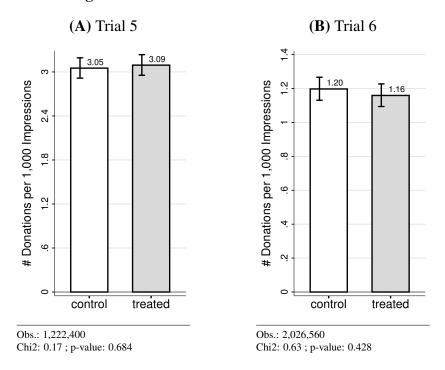
Figure 2: Variation in baseline numbers



**Variation in baseline numbers.** Next we consider the variation in the communicated number of banner impressions. In terms of click rates, we observe little variation. The data for trial 3 document 2.03 and 1.98 clicks per 1,000 impressions for the control and the treatment banner (-2%), respectively. For trial 4, the corresponding numbers are 2.58 and 2.57 (-0.4%). None of these differences is statistically significant (see Figure A3).

The results for the donation rates are presented in Figure 2. In trial 3, the donation rate dropped from 1.03 to 0.98 per 1,000 impressions (-5%; p = 0.044). This difference reflects a slightly higher conversion rate (of banner clicks into donations) in the control condition.<sup>12</sup> In trial 4, we observe a weak increase from 1.63 to 1.64 (+0.4%). The average amounts donated and total donations are again similar across the different banners (see Table 1).

Figure 3: Direct variation in social information



**Variation in social information.** Trials 5 and 6 varied social information in terms of donation rates and levels. The former stressed that less than 0.1% (control) or less than 1% of users donated (treatment). The latter trial communicated a lower (control) or higher (treatment) absolute number of (yearly) donors in the past. The data on clicks capture again relatively small and statistically insignificant differences. In trial 5, we observe click rates of 4.70 and 4.79 (+2%). The corresponding rates in trial 6 are 1.63 for the control and 1.64 for the treatment banner (+1%; see Figure A4).

The results for the donation rates, which are presented in Figure 3, do not indicate any statistically significant increase either. In trial 5, there are 3.05 donations per 1,000 impressions under the control and 3.09 donations under the treatment banner (+1%). Finally, in our pre-registered trial, a slightly lower conversion rate in the treatment condition implied a decline from 1.20 donations per 1,000 impressions in the control to 1.16 donations in the treatment group (-3%). For both trials, the average and total amount donated is once more similar between the different conditions.

<sup>&</sup>lt;sup>12</sup>The (statistically insignificant) difference in conversion rates can be explained by differential selection of heterogenous types of users into clicking the banner. If extra marginal, treatment responsive users (who are responsive in terms of clicking on the banner) tend to have different conditional probabilities to complete a donation, one obtains variation in conversion rates, despite a common 'landing page'.

<sup>&</sup>lt;sup>13</sup>Click- as well as donation rates in trial 5 are much higher than those observed for the other trials. These differences between trials are hard to interpret. They may be due to different sample periods or variation in banner layouts, colors and size (see Online Appendix C).

# 3 Survey Experiment

The results from the trials suggest that social information nudges fail to increase donations to WMDE. In fact, the framing variation from trials 1 and 2 reveals significantly lower click and donation rates under negative frames of a given social information ('only *N* people donated'). As discussed in Section 2.2, there is a long list of reasons that could explain the null results as well as the negative framing effects. To shed some light on plausible interpretations of the evidence, we ran a survey experiment.

In cooperation with a large online panel provider in Germany, we sampled a population that is representative for Wikipedia users in Germany in terms of their age distribution.<sup>14</sup> The survey randomly assigned respondents (with equal probabilities) to one of 7 banners from the trials discussed in Section 2. In particular, we implemented the control and treatment banners from trials 2, 5 and 6; we also included the control banner from trial 3. Recall that the corresponding treatment is equivalent to the control banner in trial 2. The survey experiment thus covers the variation from trial 3, too.<sup>15</sup>

**Table 2:** Survey experiment: Overview and match with trials

Survey Banner #	Obs.	Corresponding Trial/Banner	Variation
1	401	Trial 2 – Control	Neg. framing (+ low baseline number)
2	396	Trial 2 – Treatment	Pos. framing (+ low baseline number)
3	395	Trial 3 – Control	Neg. framing + high baseline number
4	392	Trial 5 – Control	'Less than 0.1%' donated
5	393	Trial 5 – Treatment	'Less than 1%' donated
6	393	Trial 6 – Control	'359K people donated' (last year)
7	402	Trial 6 – Treatment	'More than 400K donated' (average over last years)

*Notes:* The table lists the banners covered by the survey experiment, the number of observations, as well as the corresponding trials and conditions from the WMDE trials. Note that comparing survey banner #1 and #3 allows us to examine trial 3.

An overview of the different banners and their link to the different WMDE trials is provided in Table 2. Balancing checks indicate that randomization was successful (see Table B1 in the Online Appendix). Our data cover 2,772 survey participants, out of which 2,744 completed the survey module (in 5.8min on average; median: 3.9min). Exactly 50% of participants were female, 21% have an age between 40–49 and almost 13% are older than 60 (see Table B1). The data cover almost 400 observations for each of the 7 banners included in the survey experiment.

<sup>&</sup>lt;sup>14</sup>We used survey data on WMDE usage across different age groups to derive sample quota in the different age bins. In addition, we imposed a balanced gender quota. Individuals indicating that they never used Wikipedia before were excluded from the survey (see Online Appendix B for details). Let us note that our survey participants faced, similar to Wikipedia users (who visit for the content but then face a donation banner), no incentives to carefully read the full banner text. The external validity of the survey findings to the WMDE user population remains untestable.

<sup>&</sup>lt;sup>15</sup>Across all 7 conditions, we used a coherent banner layout (which resembles the one from trials 1, 2, 3 and 5; see Online Appendix C).

<sup>&</sup>lt;sup>16</sup>There were no statistically significant difference in drop-outs between banners.

Once the banner was displayed, we asked participants, among others, about their beliefs about donation levels and rates in Germany and among their peers. The survey also elicited perceptions regarding the public good value of the free encyclopedia and regarding participants' responses in case of a donation (see Online Appendix B.2 for details).

## 3.1 Motives and Beliefs

Before we examine the experimental variation, we first document several pattern in the data. On average, 37% of respondents agree that donating to WMDE would make them 'feel great for doing something good'. This share is positively correlated with respondents expectations regarding the total number of donors. At the same time, expecting a higher share of friends donating is also correlated with this proxy for warm glow (see Panel a, Table B2 in the Online Appendix). <sup>17</sup>

This first motive for donating does not necessarily require communication between peers. Indeed, only 29% indicate that banners or donations to WMDE are a topic which is sometimes raised in conversations. After donating, however, an average of 27% would talk to their friends about a donation. Moreover, 34% would expect to get social approval from their friends (once they learn about the donation). Both, the propensity to initiate communication as well as the anticipation of social approval are again positively correlated with the share of friends donating as well as with the expected total number of donors in Germany (see Panel b and c, Table B2).

The empirical pattern indicates that there seems to be a clear social component in these potential drivers of donations (warm glow and social approval). In turn, this suggest that there should be some scope for social information to influence donation behavior. If a banner would increase, e.g., beliefs about the expected number of donations, this should strengthen non-pecuniary motives to donate. This leads to the question whether the different banners successfully manipulate beliefs about others' donation behavior.

## 3.2 Effects on Beliefs

To examine the banners' impact on individuals' expectations, we estimate treatment effects using linear probability models following the specification

$$y_i = \alpha + \beta \text{Treatment Banner}_i + \mathbf{X}_i \gamma + \varepsilon_i,$$
 (1)

where  $y_i$  is the dependent variable (typically a measure for beliefs about others' inclination to donate)

 $<sup>^{17}</sup>$ The regressions reported in this table pool all survey observations and compare z-scores of the different expectations about others' donations. Note further that one of the strongest differences revealed by the data is the one between respondents who indicate a zero vs a non-zero share of friends donating. The former indicate more than 10 percentage point lower rates of warm glow, intentions to communicate and 15 percentage point lower rates of expected social approval among friends (Panel a – c, Table B2).

<sup>&</sup>lt;sup>18</sup>Admittedly, this argument relies on correlational evidence. However, when we use the treatment induced variation from Trial 2 and 5 (reported in Table 3) as an instrument, we find an even stronger link between the expected level of donations and the different motives. (This IV approach obviously makes a strong assumption regarding the exclusion restriction, i.e. no direct effect of the banner text variation on outcomes.) The correlations reported in Table B2 might therefore represent lower bounds.

and  $X_i$  is a vector of control variables. We estimate this specification separately for each trial (i.e., only including treatment and control of a given trial).<sup>19</sup> The coefficient of interest,  $\beta$ , thus captures the effect of a given Treatment Banner<sub>i</sub> relative to the control group level in a given trial (reflected by the constant term,  $\alpha$ ). The results are reported in Table 3.

The estimates document that the framing variation had a significant effect on the expected total number of donations: the positive framing raises beliefs by around 6% (see Panel a, Column 5 of Table 3).<sup>20</sup> The estimate hardly changes when we control for observables (Column 6) – which is consistent with successful randomization.<sup>21</sup> The other belief dimensions do not respond to the framing variation (Panel a, Columns 1-4). For all other tested banner variations (i.e., those from trials 3, 5 and 6) we do not detect any robust effect on beliefs. The estimates for trial 5 point to a weakly significant effect (Panel c, Column 5). Once we account for multiple testing (List et al., 2019), however, the effect is far from conventional significance levels.<sup>22</sup>

With the exception of the framing trial, Table 3 documents that the social information interventions are ineffective in altering average beliefs. We should add, however, that we do detect some treatment differences for some strata of the data. For instance, if one focuses on the subsample of participants that expect between 300K and 500K donors, <sup>23</sup> one notices a visible treatment effect in trial 6 (see Figure B1 in the Online Appendix). Note that effects like these are (i) relatively modest and (ii) they apply only to very small and (potentially) (iii) endogenously selected subsamples.

Overall, the evidence indicates that the variation in social information failed to influence average beliefs regarding others' inclination to donation. One interpretation of the findings is that the average reader might skim though the banner text too quickly or is simply overwhelmed with the (relatively) long banner text (see Online Appendix C). The subtle text variations that try to convey different social information might therefore lack sufficient salience to effectively altering beliefs. The evidence suggests that the limited impact of the interventions is not due to a lack of credibility: 52% of respondents perceive the banner content as (very) credible (only 13% doubt it) and the different treatments did not significantly affect this assessment (see Columns 7 and 8, Table 3).

The framing variation of a given piece of information had, in contrast, a detectable effect on the overall number of expected donations. Recall that the framing variation also had a significant negative impact on (click and) donation rates in the trials 1 and 2. Together with the results from WMDE's trials, the survey evidence is therefore supports the notion of strategic substitutes in donations (and is inconsistent with strategic complementarity).

<sup>&</sup>lt;sup>19</sup>One obtains very similar results when one pools all data. The presentation and interpretation of these results, however, is somewhat more complicated. The same applies to the results from ordered probit models, which again yield similar results.

 $<sup>^{20}</sup>$ Note that, for each trial, Tables 3, B3 and B4 examine treatment effects on 10 outcomes. When we correct for multiple hypothesis testing (using List et al., 2019), the effect remains statistically significant (p = 0.011).

<sup>&</sup>lt;sup>21</sup>The same holds for basically all  $\beta$  coefficients from Table 3.

<sup>&</sup>lt;sup>22</sup>An unrelated but noteworthy observation concerns an inconsistency in stated beliefs: the average survey participant' indicates that 8.8% of their friends whereas only 1.4% of the total user population would donate (compare the coefficients for the constants in Columns 1 and 3, Table 3).

<sup>&</sup>lt;sup>23</sup>Respondents with expectations in this range also take 30% longer for reading and answering the survey as compared to those with beliefs below 300K donors.

Table 3: Survey experiment: Treatment effects I

Dependent Var.:	Share, C	Germany	Share,	Friends	log(D	onors)	Credibility		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
a. Positive Frami	ng – Trial	2							
Treatment	0.000 (0.001) [0.921]	0.000 (0.001)	0.004 (0.013) [0.782]	0.004 (0.013)	0.066*** (0.020) [0.011]	0.064*** (0.019)	0.058 (0.036) [0.633]	0.052 (0.035)	
Constant	0.014 (0.001)	0.014 (0.001)	0.089 (0.010)	0.089 (0.009)	12.46 (0.013)	12.46 (0.012)	0.479 (0.025)	0.482 (0.024)	
Obs.	797	797	794	794	790	790	790	790	
b. Higher Baselin	ie Number	r – Trial 3							
Treatment	-0.001 (0.001) [0.984]	-0.001 (0.001)	0.004 (0.013) [0.960]	0.000 (0.013)	-0.014 (0.019) [0.984]	-0.016 (0.018)	-0.040 (0.036) [0.919]	-0.042 (0.035)	
Constant	0.015 (0.001)	0.015 (0.001)	0.086 (0.009)	0.088 (0.009)	12.48 (0.013)	12.48 (0.013)	0.519 (0.025)	0.520 (0.024)	
Obs.	796	796	793	793	790	790	790	790	
c. Higher Percent	tage of Do	pnors – Tri	al 5						
Treatment	-0.000 (0.001) [0.993]	-0.000 (0.001)	-0.015 (0.014) [0.891]	-0.014 (0.014)	0.036* (0.021) [0.491]	0.037* (0.020)	0.032 (0.036) [0.912]	0.038 (0.035)	
Constant	0.012 (0.001)	0.012 (0.001)	0.094 (0.011)	0.094 (0.010)	12.45 (0.014)	12.45 (0.014)	0.506 (0.026)	0.504 (0.025)	
Obs.	785	785	782	782	779	779	777	777	
d. Higher Numbe	r of Dono	rs – Trial	6						
Treatment	0.001 (0.001) [0.852]	0.001 (0.001)	0.015 (0.013) [0.876]	0.010 (0.012)	0.012 (0.020) [0.956]	0.010 (0.020)	-0.020 (0.035) [0.936]	-0.024 (0.035)	
Constant	0.015 (0.001)	0.015 (0.001)	0.079 (0.009)	0.081 (0.009)	12.55 (0.014)	12.55 (0.014)	0.556 (0.025)	0.559 (0.025)	
Obs.	795	795	793	793	790	790	789	789	
Controls	N	Y	N	Y	N	Y	N	Y	

*Notes:* The table presents the results from linear probability model estimates of equation (1). Every second specification includes controls (for gender, age groups and Wikipedia usage categories; see Tab. B1). Robust standard errors are in parentheses. In squared brackets, we report the *p*-values obtained from the multiple hypothesis testing correction proposed by List et al. (2019). These *p*-values, which were computed with the mhtexp package (1000 bootstraps), account for the fact that we consider 10 outcome variables (see Tables 3, ??, and ??).

## 3.3 Additional Effects

24% of respondents indicate that it is (very) important to them to donate (32% indicate that it is (very) unimportant). The different treatments did not have any significant effect on this perceived importance (Columns 1 and 2 in Table B4). Similarly, we do not find any systematic treatment effects on the perceived warm glow from donating or on the propensity to communicate and 'harvest' social approval from friends (see Table B3 in the Online Appendix).<sup>24</sup> Hence, the banner variations do not seem to directly influence these possible motives to donate.

We next consider the perceived value of Wikipedia. On average, 68% of respondents agree that Wikipedia provides a (very) valuable public good (30% are neutral and only 2% consider it worthless). Most banner variations are again ineffective in altering these perceptions. In particular, the treatment banner from trial 3 (which communicates a higher baseline number of users), exerts no positive effect (see Section 2.2). For trial 5 (which communicates that less than 0.1% vs. 1% donate), in contrast, we detect a significant *negative* treatment effect (Columns 3 and 4, Panel c, Table B4). While the observation is hard to interpret, we shall note that it does not translate into an increased importance to donate (see Columns 1 and 2). Finally, 54% agree that a donation would help Wikipedia to continue to operate without commercial advertisement (less than 12% disagree). The treatment variation of the different trials had again no effect on this agreement (Columns 5 and 6, Table B4).

# 4 Concluding Discussion

This paper studied the provision and framing of social information in the context of online donations to Wikipedia in Germany. Our analysis combined data from six trials, which varied the text of donation banners, with data from a survey experiment, that examined the banners' impact on different beliefs and perceptions. The results provide mixed evidence.

One set of trials documents that a positive framing of a given number of donors *reduces* banner clicks and donation rates (as compared to a negative frame). Complementary survey evidence indicates that the positive framing increases beliefs regarding the total number of donors. The results thus suggest that donations might be strategic substitutes rather than complements. Such a result could emerge if the positive framing ('already *N* users donated') diminishes the self-signaling value of a donation. While the survey data do not corroborate this interpretation, the evidence is nevertheless clear in showing that the negative framing yields a higher overall level of donations.

The other set of trials, which varied different pieces of social information, did not produce any economically or statistically significant effects on click or donation rates. Consistently with these results from the field, the survey evidence documents that the variation in social information had no impact on average beliefs about donation rates among friends or the total user population. A plau-

 $<sup>^{24}</sup>$ For trial 5, the data indicate a positive effect on the propensity to communicate (see Columns 3 and 4, Panel c, Table B3). When we account for multiple testing, however, this effect turns insignificant (p = 0.149).

sible interpretation of our findings is that the small text variations that try to communicate different social information lack sufficient salience within the relatively long and convoluted banner texts. In order to effectively alter beliefs – and, eventually, donation behavior – the communicated social information might require a more simple, cleaner context in the form of a much shorter and more focused banner text. A test of this hypothesis is up to future collaborations with Wikipedia.

# **References**

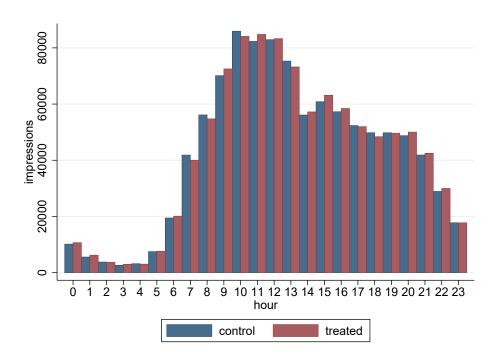
- ALLCOTT, H. (2011): "Social Norms and Energy Conservation," *Journal of Public Economics*, 95, 1082–1095.
- ALPIZAR, F., F. CARLSSON, AND O. JOHANSSON-STENMAN (2008): "Anonymity, Reciprocity, and Conformity: Evidence from Voluntary Contributions to a National Park in Costa Rica," *Journal of Public Economics*, 92, 1047–1060.
- ANTINYAN, A. AND Z. ASATRYAN (2019): "Nudging for Tax Compliance: A Meta-Analysis," ZEW Discussion Paper No. 19-055.
- BARTKE, S., A. FRIEDL, F. GELHAAR, AND L. REH (2017): "Social comparison nudges: Guessing the norm increases charitable giving," *Economics Letters*, 152, 73–75.
- BERNHEIM, B. D. (1994): "A Theory of Conformity," Journal of Political Economy, 102, 841–877.
- BICCHIERI, C. (2005): *The Grammar of Society: The Nature and Dynamics of Social Norms*, Cambridge University Press.
- BICCHIERI, C. AND E. DIMANT (2019): "Nudging with Care: The Risks and Benefits of Social Information," *Public Choice*, 1–22.
- BICCHIERI, C., E. DIMANT, AND S. SONDEREGGER (2020): "It's Not a Lie If You Believe the Norm Does Not Apply: Conditional Norm-Following with Strategic Beliefs," CESifo Working Paper No. 8059.
- BICCHIERI, C. AND E. XIAO (2009): "Do the Right Thing: But Only if Others Do So," *Journal of Behavioral Decision Making*, 22, 191–208.
- BÉNABOU, R. AND J. TIROLE (2006): "Incentives and Prosocial Behavior," *American Economic Review*, 96, 1652–1678.
- ——— (2011): "Identity, Morals, and Taboos: Beliefs as Assets," *Quarterly Journal of Economics*, 126, 805–855.
- CANTONI, D., D. Y. YANG, N. YUCHTMAN, AND Y. J. ZHANG (2019): "Protests as Strategic Games: Experimental Evidence from Hong Kong's Antiauthoritarian Movement," *Quarterly Journal of Economics*, 134, 1021–1077.

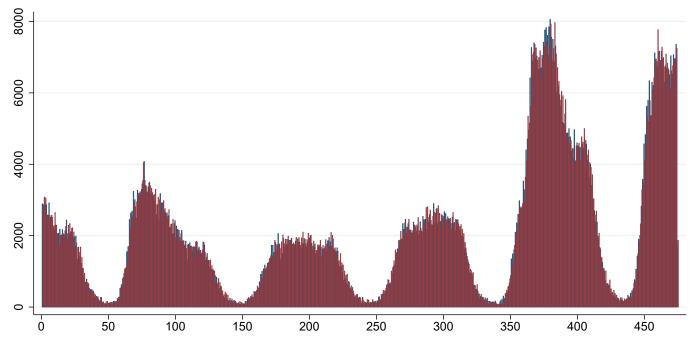
- CAPRARO, V. AND D. G. RAND (2018): "Do the Right Thing: Experimental evidence that preferences for moral behavior, rather than equity or efficiency per se, drive human prosociality," *Judgment and Decision Making*, 13, 99–111.
- CHEN, Y., M. HARPER, J. KONSTAN, AND S. X. LI (2010): "Social Comparisons and Contributions to Online Communities: A Field Experiment on MovieLens," *American Economic Review*, 100, 1358–1398.
- CROSON, R. AND J. SHANG (2013): "Limits of the Effect of Social Information on the Voluntary Provision of Public Goods: Evidence from Field Experiments," *Economic Inquiry*, 51, 473–477.
- D'ADDA, G., V. CAPRARO, AND M. TAVONI (2017): "Push, don't nudge: Behavioral spillovers and policy instruments," *Economics Letters*, 154, 92–95.
- DIMANT, E. (2019): "Contagion of pro- and anti-social behavior among peers and the role of social proximity," *Journal of Economic Psychology*, 73, 66–88.
- DIMANT, E., G. A. VAN KLEEF, AND S. SHALVI (2020): "Requiem for a Nudge: Framing effects in nudging honesty," *Journal of Economic Behavior & Organization*, 172, 247–266.
- FELLNER, G., R. SAUSGRUBER, AND C. TRAXLER (2013): "Testing Enforcement Strategies in the Field: Threat, Moral Appeal and Social Information," *Journal of the European Economic Association*, 11, 634–660.
- FREY, B. S. AND S. MEIER (2004): "Social Comparisons and Pro-Social Behavior: Testing "Conditional Cooperation" in a Field Experiment," *American Economic Review*, 94, 1717–1722.
- GALLUS, J. (2017): "Fostering Public Good Contributions with Symbolic Awards: A Large-Scale Natural Field Experiment at Wikipedia," *Management Science*, 63, 3999–4015.
- GÄCHTER, S. (2007): "Conditional Cooperation: Behavioral Regularities from the Lab and the Field and Their Policy Implications," in *Economics and Psychology: A Promising New Cross-Disciplinary Field*, ed. by B. S. Frey and A. Stutzer, Cambridge, MA: MIT Press, CESifo Seminar Series, 19–50.
- GOETTE, L. AND E. TRIPODI (2021): "Social Influence in Prosocial Behavior: Evidence from a Large-Scale Experiment," *Journal of the European Economic Association*, forthcoming.
- GREENSTEIN, S. AND F. ZHU (2012): "Is Wikipedia Biased?" *American Economic Review*, 102, 343–48.
- HAGER, A., L. HENSEL, J. HERMLE, AND C. ROTH (2019): "Political Activists as Free-Riders: Evidence from a Natural Field Experiment," IZA Discussion Paper No. 12759.
- HALLSWORTH, M., J. LIST, R. METCALFE, AND I. VLAEV (2017): "The Behavioralist as Tax Collector: Using Natural Field Experiments to Enhance Tax Compliance," *Journal of Public Economics*, 148, 14–31.
- HELDT, T. (2005): "Conditional Cooperation in the Field: Cross-Country Skiers' Behavior in Sweden," Unpublished Manuscript.
- LIST, J., A. SHAIKH, AND Y. XU (2019): "Multiple Hypothesis Testing in Experimental Economics," *Experimental Economics*, 22, 773–793.

- LIST, J. A. (2011): "The Market for Charitable Giving," *Journal of Economic Perspectives*, 25, 157–80.
- MARTIN, R. AND J. RANDAL (2008): "How is Donation Behaviour Affected by the Donations of Others?" *Journal of Economic Behavior & Organization*, 67, 228–238.
- MUNZERT, S. (2021): "Citizen and Elite Activity on the Wikipedia Market Place of Political Information," Mimeo, Hertie School.
- POTTERS, J., M. SEFTON, AND L. VESTERLUND (2007): "Leading-By-Example and Signaling in Voluntary Contribution Games: An Experimental Study," *Economic Theory*, 33, 169–182.
- SHANG, J. AND R. CROSON (2009): "A Field Experiment in Charitable Contribution: The Impact of Social Information on the Voluntary Provision of Public Goods," *The Economic Journal*, 119, 1422–1439.
- SUNSTEIN, C. R. (2017): "Nudges That Fail," Behavioural Public Policy, 1, 4–25.
- TRAXLER, C. (2010): "Social norms and conditional cooperative taxpayers," *European Journal of Political Economy*, 26, 89–103.
- VESTERLUND, L. (2003): "The Informational Value of Sequential Fundraising," *Journal of Public Economics*, 87, 627–657.

# **Online Appendix A: Complementary Figures**

Figure A1: Impressions by Time Interval and Banner Condition – Trial 6





*Notes:* The figures illustrate the number of impressions of Trial 6 for each banner type (treatment vs control) and different time intervals. The top panel depicts impressions for each hour of the day; the lower panel indicates impressions over the entire range of the trial (in 15 minute intervals, the finest resolution we obtained from WMDE). Note that the absence of any major (red or blue) spikes suggests that banner impressions are well balanced over time.

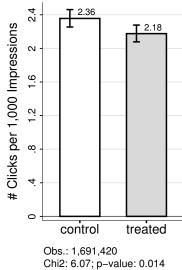
Figure A2: Variation in framing

# (A) Trial 1

# # Clicks per 1,000 Impressions 4 $\infty$ 4 0 control treated Obs.: 2,387,700 Chi2: 50.00; p-value: 0.000

Obs.: 2,387,700

# **(B)** Trial 2



Obs.: 1,691,420

Figure A3: Variation in baseline numbers

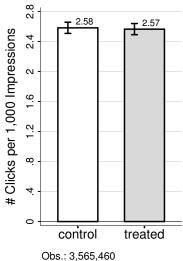
# (A) Trial 3

# # Clicks per 1,000 Impressions 9 4. $\infty$ control treated Obs.: 6,539,790

Chi2: 1.69; p-value: 0.193

Obs.: 6,539,790

**(B)** Trial 4

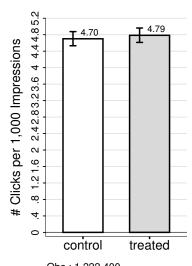


Chi2: 0.10; p-value: 0.746

Obs.: 3,565,460

Figure A4: Variation in social information

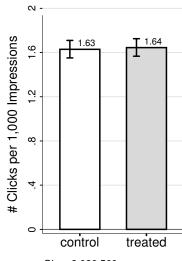
# **(A)** Trial 5



Obs.: 1,222,400 Chi2: 0.45; p-value: 0.501

Obs.: 1,222,400

# **(B)** Trial 6



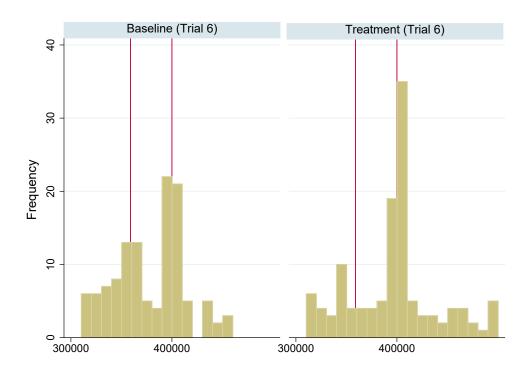
Obs.: 2,026,560 Chi2: 0.07; p-value: 0.786

Obs.: 2,026,560

# **Online Appendix B: Survey Experiment**

# **Complementary Figures and Tables: Survey Experiment**

Figure B1: Survey experiment: Treatment effect in Subsample – Trial 6



*Notes:* The figure presents responses to the question 'How many people in total will donate to Wikipedia in Germany'. The histograms zoom in the subset of responses between 300K and 500K (in bins of 10K). The panels compare the baseline (left) and the treatment banner from trial 6 – which communicated that 359K (left) and 'more than 400K' (right) donated over the last year(s), respectively. While there is clearly some round number heaping in the baseline condition (left panel), there is detectable excess mass around the communicated number (of 359K donations). This mass disappears in the right panel; instead, there is more pronounced heaping at 400K (and also more mass in the range covering 'mora than 400K'). Keep in mind that this graph covers only a small and (at least potentially) endogenously selected subset of all responses.

Table B1: Survey experiment: Summary statistics and balance

Banner #:	1	2	3	4	5	6	7	Balance
female	0.489	0.490	0.496	0.526	0.501	0.519	0.480	0.436
	(0.500)	(0.501)	(0.501)	(0.500)	(0.501)	(0.500)	(0.500)	[0.855]
16–19 years	0.092	0.083	0.089	0.115	0.087	0.097	0.050	2.455
•	(0.290)	(0.277)	(0.285)	(0.319)	(0.281)	(0.296)	(0.218)	[0.023]
20-29 years	0.192	0.217	0.225	0.186	0.204	0.198	0.224	0.589
-	(0.394)	(0.413)	(0.418)	(0.390)	(0.403)	(0.399)	(0.417)	[0.739]
30-39 years	0.185	0.162	0.200	0.202	0.165	0.191	0.221	1.154
-	(0.388)	(0.369)	(0.401)	(0.402)	(0.372)	(0.393)	(0.416)	[0.328]
40–49 years	0.219	0.217	0.197	0.202	0.206	0.219	0.214	0.190
-	(0.414)	(0.413)	(0.399)	(0.402)	(0.405)	(0.414)	(0.411)	[0.980]
50-59 years	0.190	0.182	0.159	0.166	0.196	0.201	0.164	0.742
	(0.392)	(0.386)	(0.367)	(0.372)	(0.397)	(0.401)	(0.371)	[0.615]
≥60 years	0.122	0.139	0.129	0.130	0.142	0.094	0.127	1.030
	(0.328)	(0.346)	(0.336)	(0.337)	(0.350)	(0.292)	(0.333)	[0.404]
Usage-0	0.087	0.086	0.056	0.084	0.087	0.079	0.070	0.897
	(0.283)	(0.281)	(0.230)	(0.278)	(0.281)	(0.270)	(0.255)	[0.496]
Usage-1	0.292	0.311	0.359	0.342	0.326	0.267	0.341	1.929
	(0.455)	(0.463)	(0.480)	(0.475)	(0.469)	(0.443)	(0.475)	[0.073]
Usage-2	0.267	0.263	0.220	0.219	0.211	0.300	0.249	2.154
	(0.443)	(0.441)	(0.415)	(0.414)	(0.409)	(0.459)	(0.433)	[0.045]
Usage-3	0.222	0.245	0.263	0.263	0.267	0.260	0.251	0.545
	(0.416)	(0.431)	(0.441)	(0.441)	(0.443)	(0.439)	(0.434)	[0.774]
Usage-4	0.120	0.088	0.081	0.079	0.092	0.084	0.075	0.938
	(0.325)	(0.284)	(0.273)	(0.270)	(0.289)	(0.278)	(0.263)	[0.466]
Usage-5	0.012	0.008	0.020	0.013	0.018	0.010	0.015	0.579
	(0.111)	(0.087)	(0.141)	(0.112)	(0.132)	(0.100)	(0.121)	[0.748]
Obs.	401	396	395	392	393	393	402	

Notes: The table presents summary statistics (mean and standard deviation in parentheses) for the respondents' gender, age, and Wikipedia usage. The last column presents F-statistic [with p-value in brackets] from separately regressing each of these characteristics on a full set of treatment (banner) dummies, where we test the joint hypothesis that all banner coefficients are equal to zero. Usage categories: 'daily' (0), 'several times a week' (1), 'at least once a week' (2), 'at least once a month' (3), 'at least once a year' (4), 'at least once over the last 20 years' (5).

**Table B2:** Survey experiment: Motives and beliefs about others' donations

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
a. Warm Glow ('fe	eel great for d	oing somethin	ig good'); N =	= 2,747				
Share, Friends <sup>z</sup>	0.043***	0.024**					0.019*	0.003
	(0.011)	(0.011)					(0.011)	(0.011)
Share, Germany <sup>z</sup>			0.036***	0.037***			0.004	0.017
			(0.010)	(0.009)			(0.011)	(0.011)
Number Donors <sup>z</sup>					0.074***	0.055***	0.067***	0.047***
					(0.010)	(0.010)	(0.011)	(0.011)
Friends Zero	-0.117***	-0.119***	-0.130***	-0.116***	-0.110***	-0.108***	-0.095***	-0.099***
	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)	(0.020)
Constant	0.427***	0.404***	0.433***	0.413***	0.424***	0.394***	0.417***	0.395***
	(0.013)	(0.054)	(0.013)	(0.054)	(0.013)	(0.051)	(0.013)	(0.052)
b. Tell Friends ('ta	alk to friends a	about my dona	ation'); $N=2$	,747				
Share, Friends <sup>z</sup>	0.067***	0.056***					0.048***	0.039***
	(0.010)	(0.011)					(0.011)	(0.011)
Share, Germany <sup>z</sup>	, ,	, ,	0.045***	0.044***			0.012	0.018*
•			(0.009)	(0.009)			(0.010)	(0.010)
Number Donors <sup>z</sup>			` ′	` ,	0.065***	0.052***	0.047***	0.035***
					(0.009)	(0.009)	(0.010)	(0.010)
Friends Zero	-0.086***	-0.083***	-0.115***	-0.101***	-0.106***	-0.100***	-0.069***	-0.067***
	(0.018)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.018)	(0.018)
Constant	0.305***	0.162***	0.318***	0.185***	0.314***	0.167***	0.297***	0.157***
	(0.012)	(0.039)	(0.012)	(0.039)	(0.012)	(0.039)	(0.012)	(0.039)
c. Social Approva	l ('friends wor	uld approve m	y donation');	N = 2,747				
Share, Friends <sup>z</sup>	0.058***	0.038***					0.037***	0.020*
•	(0.010)	(0.010)					(0.011)	(0.011)
Share, Germany <sup>z</sup>	, ,	, ,	0.029***	0.027***			-0.011	-0.004
•			(0.010)	(0.009)			(0.010)	(0.010)
Number Donors <sup>z</sup>				•	0.081***	0.066***	0.074***	0.061***
					(0.009)	(0.010)	(0.011)	(0.011)
Friends Zero	-0.152***	-0.140***	-0.182***	-0.154***	-0.154***	-0.134***	-0.133***	-0.123***
	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)	(0.020)	(0.019)
Constant	0.407***	0.228***	0.421***	0.243***	0.408***	0.221***	0.399***	0.214***
	(0.013)	(0.046)	(0.013)	(0.046)	(0.013)	(0.048)	(0.013)	(0.047)
Controls	N	Y	N	Y	N	Y	N	Y

*Notes:* The table presents the results from linear probability model estimates with robust standard errors are in parentheses. Every second specification includes controls (for gender, age groups and Wikipedia usage categories; see Tab. B1). The dependent var. in Panel (a) is a dummy indicating (strong) agreement with feeling 'great for doing something good' (in case of a donation); in Panel (b), the dependent var. indicates (strong) agreement with the statement 'I would talk to my friends about my donation'; in Panel (c), the dependent var. indicates (strong) agreement with friends approving the donation. Variables labeled with <sup>z</sup>, which measure beliefs about the *Share of Friends*, the *Share of Wikipedia users in Germany* and the total *Number of Donations* expected for Germany, are *z*-normalized (*z*-scores). *Friends Zero* is a dummy for survey respondents who state that non of their friends would donate to Wikipedia. The number of observations is 2,747 throughout all specifications/panels.

Table B3: Survey experiment: Treatment effects II

Dependent Var.:	Warm	Glow	Tell F	riends	Social Approval		
	(1)	(2)	(3)	(4)	(5)	(6)	
a. Positive Frami	ng – Trial	2					
Treatment	0.040	0.041	0.011	0.007	0.014	0.013	
	(0.035)	(0.034)	(0.031)	(0.031)	(0.033)	(0.033)	
	[0.779]		[0.979]		[0.993]		
Constant	0.363	0.362	0.249	0.251	0.307	0.308	
	(0.024)	(0.023)	(0.022)	(0.022)	(0.023)	(0.023)	
Obs.	789	789	789	789	789	789	
b. Higher Baselir	ie Number	- Trial 3					
Treatment	-0.022	-0.027	-0.033	-0.030	-0.016	-0.023	
	(0.034)	(0.034)	(0.031)	(0.031)	(0.033)	(0.033)	
	[0.971]		[0.923]		[0.976]		
Constant	0.384	0.387	0.282	0.281	0.323	0.327	
	(0.025)	(0.024)	(0.023)	(0.022)	(0.024)	(0.023)	
Obs.	790	790	790	790	790	790	
c. Higher Percen	tage of Do	nors – Tri	al 5				
Treatment	-0.019	-0.012	0.006	0.010	0.040	0.046	
	(0.034)	(0.033)	(0.031)	(0.031)	(0.034)	(0.032)	
	[0.987]		[0.985]		[0.870]		
Constant	0.358	0.355	0.249	0.247	0.312	0.309	
	(0.024)	(0.023)	(0.022)	(0.022)	(0.024)	(0.023)	
Obs.	777	777	777	777	777	777	
d. Higher Numbe	r of Dono	rs – Trial (	6				
Treatment	0.010	0.012	0.070**	0.067**	0.038	0.028	
	(0.035)	(0.034)	(0.032)	(0.032)	(0.035)	(0.034)	
	[0.947]		[0.149]		[0.869]		
Constant	0.379	0.378	0.246	0.248	0.356	0.362	
	(0.025)	(0.024)	(0.022)	(0.022)	(0.024)	(0.024)	
Obs.	788	788	788	788	788	788	

*Notes:* The table presents the results from linear probability model estimates of equation (1). Every second specification includes controls (for gender, age groups and Wikipedia usage categories; see Tab. B1). Robust standard errors are in parentheses. In squared brackets, we report the p-values obtained from the multiple hypothesis testing correction proposed by List et al. (2019). The reported p-values, which were obtained with the mhtexp package (1000 bootstraps), account for the fact that we consider 10 outcome variables (see Tables 3, B3, and B4).

Table B4: Survey experiment: Treatment effects III

Dependent Var.:	Impo	rtance	Public	Good	Remain	Adfree
	(1)	(2)	(3)	(4)	(5)	(6)
a. Positive Frami	ng – Trial	2				
Treatment	0.040	0.035	0.040	0.031	0.025	0.023
	(0.030)	(0.029)	(0.033)	(0.032)	(0.035)	(0.035)
	[0.730]		[0.795]		[0.971]	
Constant	0.222	0.224	0.657	0.662	0.531	0.532
	(0.021)	(0.020)	(0.024)	(0.023)	(0.025)	(0.025)
Obs.	790	790	790	790	789	789
b. Higher Baselin	ie Number	- Trial 3				
Treatment	-0.010	-0.020	-0.035	-0.036	0.002	0.002
	(0.030)	(0.028)	(0.033)	(0.031)	(0.036)	(0.035)
	[0.988]		[0.921]		[0.936]	
Constant	0.232	0.237	0.692	0.693	0.529	0.529
	(0.021)	(0.020)	(0.023)	(0.022)	(0.025)	(0.024)
Obs.	790	790	790	790	790	790
c. Higher Percent	tage of Do	nors – Tri	al 5			
Treatment	0.004	0.006	-0.097***	-0.086***	-0.012	-0.003
	(0.031)	(0.029)	(0.034)	(0.032)	(0.036)	(0.035)
	[0.887]		[0.075]		[0.985]	
Constant	0.251	0.250	0.712	0.706	0.540	0.536
	(0.022)	(0.021)	(0.023)	(0.022)	(0.025)	(0.025)
Obs.	778	778	777	777	777	777
d. Higher Numbe	r of Dono	rs —- Tria	ıl 6			
Treatment	0.024	0.009	-0.025	-0.026	-0.004	0.002
	(0.031)	(0.030)	(0.032)	(0.032)	(0.035)	(0.036)
	[0.954]		[0.960]	•	[0.910]	
Constant	0.254	0.261	0.718	0.718	0.559	0.556
	(0.022)	(0.022)	(0.023)	(0.023)	(0.025)	(0.025)
Obs.	790	790	790	790	788	788
Controls	N	Y	N	Y	N	Y

*Notes:* The table presents the results from linear probability model estimates of equation (1). Every second specification includes controls (for gender, age groups and Wikipedia usage categories; see Tab. B1). Robust standard errors are in parentheses. In squared brackets, we report the p-values obtained from the multiple hypothesis testing correction proposed by List et al. (2019). The reported p-values, which were obtained with the mhtexp package (1000 bootstraps), account for the fact that we consider 10 outcome variables (see Tables 3, B3, and B4).

# **Survey experiment: Details**

- 1. How frequently do you use Wikipedia?
  - 7 response options ranging from 'every day' to 'never'
  - Respondents indicating 'never' (<5% of total survey clicks) were not admitted to the survey.
- 2. How old are you? What is your gender?
  - 6 age categories:  $<20 / 20-29 / 30-39 / ... / \ge 60$  years
  - To match the age and gender distribution of Wikipedia users in Germany, we imposed quota based on these variables.

### Randomization

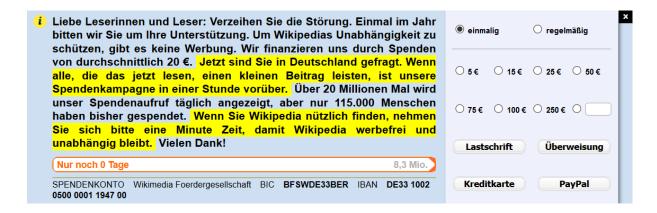
- At this point, participants were randomly assigned to one of 7 banners (see Table 2).
- 3. Wikipedia uses banners like the one displayed above to prompt visitors of their webpage to donate. What do you think is the share of Wiki users **in Germany** that donate to Wikipedia?
  - Response via slider (indicating, e.g., '1 out of 1000 users'; range:  $0 50 \%_{00}$ )
- 4. What is the share of Wiki users **among your peers** that donate to Wikipedia?
  - Response via slider (indicating, e.g., '1 out of 100'; range: 0 100%)
- 5. How many people in total will donate to Wikipedia in Germany in 2021?
  - Response via slider (range: 200K 600K)
- 6. How important is it to you personally, to support Wikipedia with a donation?
  - 5 response options (from 'very important' to 'not at all important')
- 7. How valuable is Wikipedia for the general public?
  - 5 response options (from 'very valuable' to 'not at all valuable')
- 8. The banner contains several pieces of information. How credible do you think this information is?
  - 5 response options (from 'very credible' to 'not at all credible')

- 9. Assume you would respond to the banner and donate. Do you agree with the following statements?
  - (a) I would feel great for doing something good.
  - (b) I would talk to my friends about my donation.
  - (c) My friends would approve my donation.
  - (d) My donation facilitates that Wikipedia can continue to operate without commercial advertisement.
    - 5 response options (from 'strongly agree' to 'strongly disagree')
- 10. Has the topic Wikipedia banners/donations ever been raised by your peers?
  - 5 response options (from 'yes, frequently' to 'no, never')

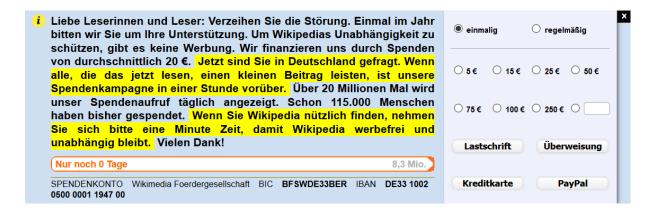
# Online Appendix C – Banner Layout and Text

The figures below indicate the different banners used in the six trials. All banners of trials 1 to 4 included sliders, which reported (daily adopting) numbers regarding the cumulative donation volume relative to a fixed, pre-specified target value. Except for trial 3, these sliders would also indicate a count to the projected end of the donation campaign (i.e., when the targeted donation total is reached).

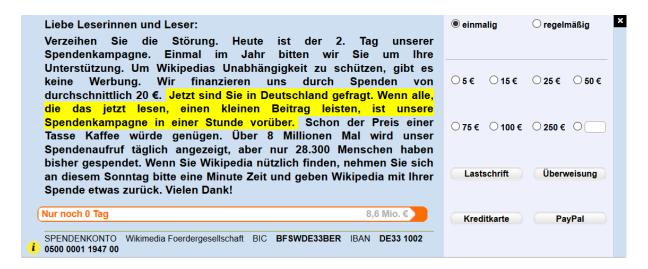
Trial 1 - Control



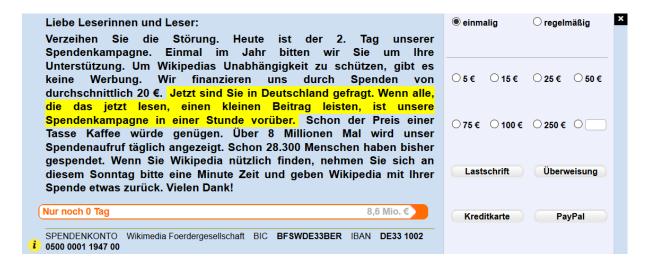
### Trial 1 – Treatment



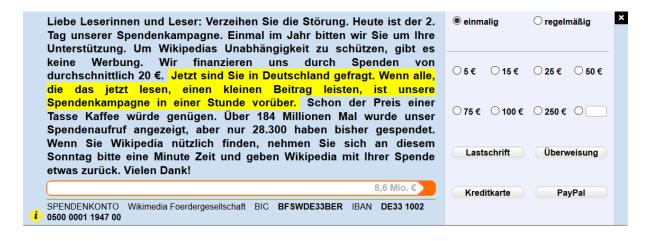
Trial 2 - Control



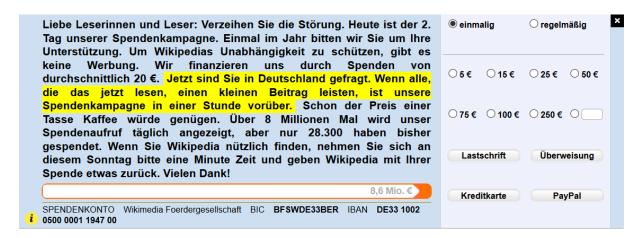
Trial 2 – Treatment



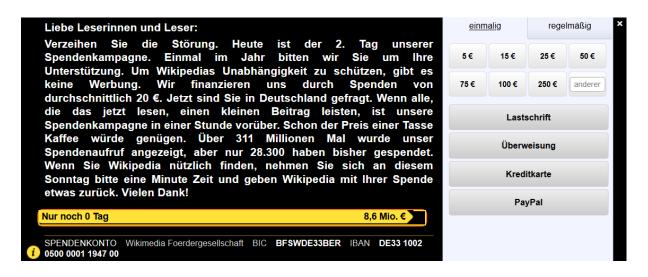
Trial 3 – Control



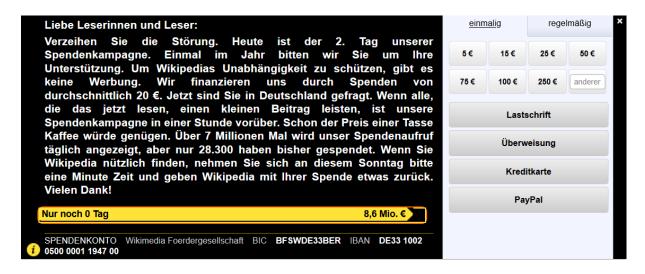
### Trial 3 – Treatment



### Trial 4 - Control



Trial 4 – Treatment



## Trial 5 - Control

Liebe Leserinnen und Leser: Verzeihen Sie die Störung. Einmal im Jahr einmalig oregelmäßig bitten wir Sie um Ihre Unterstützung. Um Wikipedias Unabhängigkeit zu schützen, gibt es keine Werbung. Wir finanzieren uns durch Spenden von durchschnittlich 20 €. <mark>Jetzt sind Sie in Deutschland gefragt. Wenn</mark> ○ 5 € ○ 15 € ○ 25 € ○ 50 € alle, die das jetzt lesen, einen kleinen Beitrag leisten, ist unsere Spendenkampagne in einer Stunde vorüber. Über 450 Millionen ○ 75 € ○ 100 € ○ 250 € ○ Menschen nutzen Wikipedia, aber weniger als 0,1% spenden. Wenn Sie Wikipedia nützlich finden, nehmen Sie sich an diesem Sonntag bitte eine Minute Zeit und geben Wikipedia mit Ihrer Spende etwas Lastschrift Überweisung zurück. Vielen Dank! SPENDENKONTO Wikimedia Foerdergesellschaft BIC BFSWDE33BER IBAN DE33 1002 Kreditkarte PavPal 0500 0001 1947 00

## Trial 5 – Treatment

Liebe Leserinnen und Leser: Verzeihen Sie die Störung. Einmal im Jahr einmalig regelmäßig bitten wir Sie um Ihre Unterstützung. Um Wikipedias Unabhängigkeit zu schützen, gibt es keine Werbung. Wir finanzieren uns durch Spenden von durchschnittlich 20 €. <mark>Jetzt sind Sie in Deutschland gefragt. Wenn</mark> ○ 5 € ○ 15 € ○ 25 € ○ 50 € alle, die das jetzt lesen, einen kleinen Beitrag leisten, ist unsere Spendenkampagne in einer Stunde vorüber. Über 450 Millionen ○ 75 € ○ 100 € ○ 250 € ○ Menschen nutzen Wikipedia, aber weniger als 1 % spenden. Wenn Sie Wikipedia nützlich finden, nehmen Sie sich an diesem Sonntag bitte eine Minute Zeit und geben Wikipedia mit Ihrer Spende etwas zurück. Lastschrift Überweisung Vielen Dank! SPENDENKONTO Wikimedia Foerdergesellschaft BIC BFSWDE33BER IBAN DE33 1002 **PayPal** Kreditkarte 0500 0001 1947 00

## Trial 6 - Control



### Trial 6 – Treatment



### Translation:

Dear Readers, please excuse the disturbance. This Friday we ask you in Germany:

In the last year, a total of 359.000 people donated to Wikipedia. [*Treatment banner*: Over the last years, more than 400.000 people donated to Wikipedia on average.] If everyone reading this gave a small amount, our campaign would end in an hour. Sure, we could make a lot of money with ads. But then Wikipedia wouldn't be the same. We wouldn't be able to trust it. This is why Wikipedia is funded by donations. If you consider Wikipedia useful, please take a minute and, with your donation, give something back to Wikipedia. Many thanks!

*Note:* Given the German text of the treatment, it should implicitly be quite clear that the 400.000 refer to a *yearly* average. However, this was not explicit in the text.