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Framing an altruistic action in periodic (versus aggregate) terms reduces people's moral evaluation of the act and the actor

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Abstract

Charities often express altruistic acts as a series of periodic payments ("donate $10 per month") as opposed to aggregating them over a longer period ("donate $120 per year"). Five experiments (three preregistered, N = 1,479) test whether the framing of an altruistic act affects observers' moral judgment of the act and the actor. Observers perceive a donation as less moral (Experiment 1) and the donor to have lower moral character (Experiments 2a & 2b) when altruistic actions are framed in periodic rather than aggregate terms. An aggregate-framed act increases observers' perception of the donors' sacrifice and the perceived magnitude of their help to the beneficiary. Experiment 3 finds that these two factors can explain the effect of framing on moral judgment. However, donors may hold incorrect intuitions about observers' moral judgment. Experiment 4 shows that donors predict that observers' moral judgment would depend on their decision to donate but not on the appeal to which they respond. The results enrich our understanding of the consequences of using periodic framing of donations, a widespread practice in the marketplace.

Keywords: temporal framing, periodic pricing, moral judgment, metaperception

Number of words: 4981

Introduction

Charities often frame donation appeals as a series of periodic payments ("donate $1 a day") instead of aggregating them over a longer period ("donate $365 a year"). For instance, the United Nations Children's Fund tells its prospective donors in the United Kingdom (UK) that "just £16 each month" can help provide life-saving vaccines to children (United Nations Children's Fund, 2019), and the relief agency CARE suggests making a $19 monthly donation can create a "lasting difference" (CARE, 2019). Such temporal (time-based) framing of donation appeals is a good idea. Research has shown that people are more likely to donate in response to a periodic appeal compared with an aggregate appeal (Atlas & Bartels, 2018; Gourville, 1998, 1999, 2003).

In the present research, we ask a different question – can the temporal frame used to describe an altruistic act affect observers' judgments? We propose that viewing an altruistic act framed in periodic (versus aggregate) terms reduces people's moral judgment of both the act and the actor. We examine whether lower moral judgment is related to inferences about donors' intention to sacrifice a personal resource for the greater good (Haidt, 2007; Nelkin, 2016) and the extent to which donations make a difference to recipients (Small et al., 2007). Finally, we test whether donors can correctly gauge that observers evaluate their prosocial actions based not only on whether they donate but also on the donation frame to which they respond.

Temporal framing and moral praise

Although the objective donation amount and the actual payment schedule do not depend on the temporal frame, past research suggests that periodic framing positively affects donation behavior (Atlas & Bartels, 2018; Gourville, 1998, 1999, 2003). In early research, Gourville (1998) found that participants were more likely to donate when presented with a

donation appeal framed as “$1 per day” compared with “$350 per year”. A periodic appeal is more likely to bring to mind small ongoing expenses, such as the cost of a daily cup of coffee, easing the decision to donate. More recently, Atlas and Bartels (2018) corroborated the above finding. They showed that participants who viewed a periodic appeal ("$2.5 per day") indicated a greater willingness to donate compared to those who viewed an aggregate appeal ("$900 per year"), driven by a belief that responding to a periodic frame will allow them to gain recurring (possibly daily) utility by donating.

In the present study, we take the perspective of an observer who views an altruistic act framed either in periodic or aggregate terms. When evaluating numerical attributes, people often pay greater attention to numbers rather than other contextual information, such as units (Bagchi & Davis, 2016; Basu & Ng, 2021; Pelham et al., 1994). Given that an aggregate frame represents the overall donation amount using a larger number, people might use this largeness of the number as a signal for the morally praiseworthiness of the altruistic act. However, we contend that greater moral praise is not simply an outcome of a mistaken belief that the aggregate-framed act is objectively larger in magnitude. Instead, we argue that observers use the largeness of the number to make inferences about two different facets of the altruistic act.

Perceived sacrifice and perceived benefit

One possibility is that when an observer views a person donating, they might ask themselves the following question: how difficult was it for the donor to make this donation (Nelkin, 2016)? If a donor donates despite facing greater difficulty in doing so, the donation might signal the donor's willingness to sacrifice a personal resource to effect a greater good, the cornerstone of moral behavior (Haidt, 2007; Nelkin, 2016; Sachdeva et al., 2015). Compared to a donor responding to a periodic appeal, one responding to an aggregate appeal

has no available comparisons with trivial ongoing expenses to cushion the pain that they might experience in parting with their money (Gourville, 1998). Thus, an observer might perceive that it is more difficult to comply with an aggregate appeal. Past research suggests that observers' moral judgments are the results of what they can infer from an agent's action (Critcher et al., 2020; Cushman, 2008). An observer might infer that the donor had a higher intention for self-sacrifice when their act was framed in aggregate terms, thus elevating moral judgment.

An alternative question that the observer might ask is the following: how much benefit is the donor providing to the beneficiary of the altruistic act? Past research suggests that people are sensitive to this factor. People are generally less willing to donate if they feel that their donations make little difference to the recipients (*drop in the bucket effect*; Small et al., 2007) and favor identifiable beneficiaries over statistical ones (Lee & Feeley, 2016). The larger number used to describe the act in the aggregate frame may magnify the extent of help that the donor is providing, which, in turn, may positively affect moral judgments.

Donors' prediction of observers' judgments

A rich body of research has shown that moral acts are, at least in part, motivated by reputational concerns (Griskevicius et al., 2010; Harbaugh, 1998; Johnson & Park, 2021; Uhlmann et al., 2015), even when actors know that they are not being watched (Jordan & Rand, 2020). If observers evaluate aggregate framed donations as more moral, why has research found that periodic appeals perform better (Atlas & Bartels, 2018; Gourville, 1998)? In answering this question, we drew from the literature on metaperceptions that has documented people consistently mispredicting how others perceive their actions (Moon et al., 2020; Savitsky et al., 2001; Scopelliti et al., 2015; Sezer et al., 2018). For instance, people systematically underestimate the positive effects of their compliments (Boothby & Bohns,

2021) and overestimate the negative effects of their failures (Moon et al., 2020; Savitsky et al., 2001) on others. We explore the possibility that donors do not clearly understand the factors on which observers judge them.

Observers pay attention to both aspects of a donation, i.e., whether someone donates or not, as documented by Klein and Epley (2014), and the frame to which they comply, as we predict. However, when facing a donation decision, donors might mistakenly believe that the actual *act* of donation – their behavior – is more important to observers compared to the appeal to which they respond. They may not appreciate that observers may evaluate complying with an aggregate appeal as more moral. In other words, donors may believe that only outcomes matter to observers, contrary to research suggesting that both outcomes (Klein & Epley, 2014) and actors' intentions (Critcher et al., 2020; Inbar et al., 2012) matter to them. To the extent that reputational concerns drive altruistic acts, donors' incorrect intuition may then favor periodic appeals as these make it easier to donate, thus allowing them to signal selfless behavior (Gourville, 1998).

The current research

We test these predictions across five experiments. We examine whether framing an altruistic act in periodic terms (versus aggregate terms) lowers the moral judgment of the act (Experiment 1, preregistered) and moral character judgment of the donor (Experiments 2a & 2b). We next test the two potential reasons for the effect in Experiment 3 (preregistered) - the perceived personal sacrifice of the donor and the perceived magnitude of the benefit to the recipient. Finally, we test whether donors can correctly predict that observers would evaluate a donation framed in aggregate terms to be more moral (Experiment 4, preregistered)

In designing our stimuli, we held one or more factors such as the actual payment schedule (e.g., quarterly), the overall donation period (e.g., one year), the income of the

donor, or the ability to stop donating at any point in time constant across conditions. This ensured that we only manipulated the framing of the act.

We report all participants who completed the experiments, all experimental conditions, and all measures collected. The Supplementary Materials include power analyses for all experiments[1] and the full wording of all stimuli. Data for all experiments can be found at https://osf.io/msqx2/?view_only=71cc1fd06f2f449da4452898ff9233d1.

Experiment 1

This experiment tested whether observers perceive donations framed in periodic (versus aggregate) terms as less moral. We preregistered the hypothesis, sample size, measures, and statistical tests for this experiment on the Open Science Framework (https://osf.io/3zfnx/?view_only=e921378f48ae433aa8ff44be3efa4890).

Methods

Participants. Based on power analysis (see the Supplementary Material), we recruited 259 US participants (M_{age} = 37.68 years; 122 females, 127 males, 1 other gender, and 9 participants did not report demographic information) from Amazon Mechanical Turk and randomly assigned them to either the periodic or the aggregate frame condition of a between-subjects design.

Procedures. We presented participants with information about five different people who had donated in the previous year with their donations framed in periodic or aggregate terms. In the periodic (aggregate) condition, participants read about the following people: (1)

[1] Post hoc sensitivity power analyses indicated that our samples could detect effects ranging from Cohen's *d* = .31 to *d* = .35, and Cohen's *f* = .095 (Exp 4) at .05 alpha level and 80% power. See Supplementary Materials for details.

Alex[2], who donated $5 per week ($250 in total) over the year to a local charity; (2) Sam, who volunteered for 2 hours per week (100 hours in total) over the year at a local charity; (3) Charlie, who donated 8 cans of food per week (400 cans in total) over the year to a food bank; (4) Robin, who donated 3 boxes of toys per month (35 boxes of toys in total) over the year to a children's charity; and (5) Kris, who donated 2 bags of clothes per month (24 bags of clothes in total) over the year.

After viewing the information of each donation act, we asked the participants the following: "How morally praiseworthy do you think <donor-name>'s action is?" (the name of the donor was changed according to vignette) on a 7-point scale ranging from *not praiseworthy at all* to *extremely praiseworthy*. The average of the five items (α = .89) formed our dependent variable.

Results and discussion.

As hypothesized, participants' moral evaluation of the acts was lower when we described the acts in periodic terms (M = 5.18, 95% CI = [4.98, 5.37], SD = 1.12) compared with when we described them in aggregate terms (M = 5.48, 95% CI = [5.30, 5.66], SD = 1.02, $t(257) = 2.29$, p = .023, preregistered one-tailed p = .01, Cohen's d = .28). The statistics associated with the five individual donations are reported in the Supplementary Materials. These results show that participants perceived the same donations as less morally praiseworthy when framed in periodic terms than when they were aggregated over a longer period.

[2] Across all experiments (except Experiment 3), we ensured that we used gender neutral names and no gendered pronouns in the stimuli.

Experiment 2

People's moral evaluation of an action might sometimes differ from their evaluation of the actor's moral character (Tannenbaum et al., 2011; Uhlmann et al., 2015). In particular, it remains unclear whether character judgments depend on the perceived largeness of an altruistic act. For instance, Klein and Epley (2014) found that people are insensitive to the magnitude of an altruistic act. Participants evaluated a person who donated $10 as more moral than one who did not donate at all but no more moral than one who donated $20. However, more recently, Kawamura et al. (2020) found that the extent of the costs incurred by an agent when acting prosocially (time spent helping a colleague) affected the character judgment of the agent. In Experiments 2a and 2b, we tested the prediction that responding to a periodic appeal will lower the perceived moral character of the donor. We operationalized moral character judgment using two dominant theories of character judgment. Experiment 2a used the *warmth* measure from the Stereotype Content Model (SCM; Fiske et al., 2007; Judd et al., 2005). Experiment 2b used the *moral* measure from the Morality Dominance Hypothesis (MDH; Goodwin, 2015).

This experiment additionally examined how the temporal framing of donation appeals (instead of retrospective information about past donations, as in Experiment 1) affected moral judgment. To this end, we presented participants with a vignette about a donor who encounters a donation appeal framed in periodic or aggregate terms, something people might themselves encounter in their daily lives.

Experiment 2a

Participants. Based on power analysis (see the Supplementary Materials), we recruited 309 US participants (M_{age} = 39.10 years; 168 females, 131 males, and 10 participants did not report demographic information) from Amazon Mechanical Turk and

randomly assigned them to either the periodic or the aggregate frame conditions of a between-subjects design.

Procedures. We presented participants with a scenario where a person named Alex encountered an advertisement from a charity focused on international disaster relief. In the periodic (aggregate) condition, we framed the ad appeal as follows: "A donation of $2 per week ($100 per year) can make a difference to someone's life. Donate now!" The scenario continued with Alex visiting the website of the charity and donating. We further informed participants that the donation amount would be automatically deducted from Alex's bank account every month.

Next, following Klein and Epley (2014), we asked participants to indicate their opinion about Alex based on ten traits related to warmth (*warm*, *good-natured*, *sincere*, *caring*, and *tolerant*) and competence (*competent*, *confident*, *independent*, *competitive*, and *intelligent*) on a 7-point scale ranging from *not at all* to *extremely*, with warmth and competence measures presented in random order. Next, as in Experiment 1, we asked participants, "How morally praiseworthy do you think Alex's action is?" (7-points scale; *not praiseworthy at all* to *extremely praiseworthy*).

Results. As reported in Table 1, participants perceived Alex to be less warm and the donation less morally praiseworthy in the periodic frame condition than in the aggregate frame condition. Participants' perceived competence did not differ by experimental condition.

Experiment 2b

Participants. Based on power analysis (see Supplementary Materials), we recruited 329 US participants (M_{age} = 37.18 years; 176 females, 141 males, 6 other genders, and 6 participants did not report demographic information) from Amazon Mechanical Turk and

randomly assigned them to either the periodic or the aggregate frame conditions of a between-subjects design.

Procedures. We presented participants with information about Alex, who works as an executive in a medium-sized company and earns $60,000 a year. We informed participants that Alex's company is conducting a donation drive to help underprivileged children in the US. In the periodic (aggregate) condition, the donation appeal was framed as "A donation of $1 per day ($350 per year) can make a difference to someone's life. Donate now!" Participants read that Alex decided to donate, and the amount will be automatically deducted from Alex's bank account every month.

Next, following Landy et al. (2016), we asked participants to indicate their opinion of Alex based on nine traits related to morality (*moral*, *honest*, and *fair*), sociability (*sociable*, *friendly*, and *extroverted*), and competence (*competent*, *effective*, and *talented*) on 7-point scales ranging from *not at all* to *extremely,* with the three measures presented in random order. Finally, as in the past experiments, we asked participants to indicate how morally praiseworthy they found Alex's action to be on a 7-point scale ranging from *not praiseworthy at all* to *extremely praiseworthy*.

Results. As reported in Table 1, participants perceived Alex to be less moral and the donation less morally praiseworthy in the periodic frame condition than in the aggregate frame condition. Although we did not hypothesize this, participants also perceived Alex to be less sociable in the periodic frame condition. However, this difference was marginally significant. Participants' perceived competence did not differ by experimental condition.

Discussion

These results supported our predictions that complying with a periodic appeal not only lowers observers' moral evaluation of the donation but also their evaluation of the

donor's moral character. We found consistent results when using two different models of character evaluation – the SCM and the MDH. Thus, the results add to emerging findings in the literature that the moral judgment of a donation might also affect the character judgment of the donor (Kawamura et al., 2020).

Table 1

Results of independent samples t-tests in Experiments 2a and 2b

Experiment		Periodic condition		Aggregate Condition		*t*-test	Cohen's *d*
		Mean [95% CI]	SD	Mean [95% CI]	SD		
2a	Warmth	5.49 [5.33, 5.64]	.96	5.83 [5.69, 5.97]	.86	$t(307) = 3.34$, $p < .001$	.38
	Competence	4.65 [4.50, 4.81]	.98	4.80 [4.63, 4.98]	1.07	$t(307) = 1.29$, $p = .20$	.15
	Praiseworthiness	4.85 [4.64, 5.06]	1.34	5.42 [5.24, 5.61]	1.16	$t(307) = 3.99$, $p < .001$	.45
2b	Morality	5.26 [5.10, 5.42]	1.03	5.55 [5.39, 5.71]	1.05	$t(327) = 2.50$, $p = .013$	.27
	Sociability	4.74 [4.60, 4.89]	.95	4.94 [4.77, 5.10]	1.06	$t(327) = 1.74$, $p = .083$	.19
	Competence	4.92 [4.75, 5.08]	1.03	5.02 [4.85, 5.19]	1.09	$t(325) = .89$, $p = .37$	.10
	Praiseworthiness	4.81 [4.59, 5.03]	1.42	5.33 [5.14, 5.52]	1.23	$t(327) = 3.51$, $p < .001$	.39

Experiment 3

In this experiment, we tested two potential inferences that might be related to the lower moral judgment of a donation framed in periodic terms – the perceived sacrifice of the donor and the perceived benefit to the recipient (Johnson, 2020; Rubaltelli et al., 2020). We preregistered the hypothesis, sample size, measures, and exclusions for this experiment on the Open Science Framework (https://osf.io/m8dq7/?view_only=457e300b967c41b69a2db74ab939110b).

Methods

Participants. Based on power analysis (see Supplementary Materials), we recruited 262 US participants (M_{age} = 37.88 years; 124 females, 127 males, and 11 participants did not report demographic information) from Amazon Mechanical Turk and randomly assigned participants to either the periodic or the aggregate frame conditions of a between-subjects design.

Procedures. The stimuli for this experiment were similar to those used in Experiment 2b. In the periodic (aggregate) condition, participants read about Alex who donated in response to an appeal that stated "donate $1 per day" ("donate $350 per year"). One possibility is that participants might feel that the donor might be able to cancel their donation midway, affecting the sum that they donate. Therefore, we further informed participants that the employee could stop donating anytime they wanted by emailing the human resources department of the company.

First, as in Experiments 1 and 2, participants indicated how morally praiseworthy they found Alex's action to be on a 7-point scale ranging from *not praiseworthy at all* to *extremely praiseworthy.*

Next, we measured the two separate inferences related to the phenomenon. To measure perceived personal sacrifice, we asked participants the following: "How large was the sacrifice Alex made when donating to the cause?" (7-point scale ranging from *not large at all* to *extremely large*). To measure the perceived benefit from the act of donation, we asked participants the following: "Alex's donation will help ____." Participants could indicate their response on a 7-point bipolar scale (lower anchor: *very few children* and upper anchor: *many children*). We randomized the order of the presentation of these two measures.

Results and discussion

Main effects. As shown in Table 2, independent samples *t*-tests showed that participants perceived Alex's donation to be less morally praiseworthy, incurring lower personal sacrifice, and helping fewer children when Alex responded to a periodic appeal compared with when Alex responded to an aggregate appeal.

Indirect effects. We conducted a bootstrapping analysis with 5000 iterations using Model 4 of the PROCESS Macro for SPSS (Hayes, 2012). We entered the experimental condition (1 = periodic frame and 0 = aggregate frame) as the independent variable (X), perceived sacrifice and perceived benefit as two parallel mediators (M), and moral praiseworthiness as the dependent variable (Y). We found an indirect effect of both perceived personal sacrifice (B = -.42, SE = .10, 95% CI = [-.62, -.25]) and perceived benefit (B = -.20, SE = .07, 95% CI = [-.35, -.09]). As we did not have any *a priori* prediction for which factor would have a larger effect, we performed a pairwise contrast analysis of the two indirect effects. This suggested that there was no significant difference in the strengths of the two indirect effects (contrast: B = -.22, SE = .12, 95% CI = [-.46, .01]).

Discussion. The results from this experiment suggest that the lower moral evaluation of a donation in response to a periodic (vs. aggregate) frame might be related to

two separate judgments about the act. Observers may perceive a donation in response to a periodic appeal to incur less personal sacrifice and provide lower benefit to the recipients. Both of these inferences were related to greater moral judgment of the act framed in aggregate terms.

These results are consistent with mediation such that aggregate framing affects inferences about perceived sacrifice and benefit, leading to higher moral judgment. However, the test of the indirect effect reported above does not necessarily imply mediation and causality (see Fiedler et al., 2018). Thus, we suggest that these are two of many potential explanations for the effect and should be interpreted cautiously.

Furthermore, while the results supported our predictions, other potential explanations exist. For example, do observers misjudge the objective magnitude of the donation, which might affect moral judgments? To test this, at the end of the study, we asked participants to indicate the approximate amount that Alex would donate each month. Similar results as reported above emerged when we conducted the above analyses among participants who correctly responded to this question (see the Supplementary Materials for the full results). However, this suggests that participants can compute the objective donation amount, but not if they did compute it when responding to the dependent measures. Future research can explore this question in greater depth.

Table 2

Results of independent samples t-tests in Experiment 3

	Periodic condition		Aggregate condition		*t*-test	Cohen's *d*
	Mean [95% CI]	SD	Mean [95% CI]	SD		
Praiseworthiness	4.80 [4.53, 5.06]	1.55	5.32 [5.05, 5.56]	1.44	$t(260) = 2.80$, $p = .006$	.35
Sacrifice	2.94 [2.65, 3.26]	1.81	4.19 [3.92, 4.45]	1.60	$t(260) = 5.92$, $p < .001$	.73
Help	4.38 [4.09, 4.69]	1.73	5.31 [5.05, 5.58]	1.57	$t(260) = 4.54$, $p < .001$	.55

Experiment 4

In their moral judgments, observers consider whether a donor donates or not, as shown by Klein and Epley (2014), and the appeal to which the donors respond, as previous experiments show. However, are donors aware of these factors that observers use in their judgments?

In this experiment, we presented participants with a donation appeal, framed either in aggregate or periodic terms. We asked participants the extent to which an observer would judge their act as moral if they chose to donate and if they chose not to donate, i.e., their donation decision. Thus, the study had a 2X2 mixed design with appeal frame as a between-subjects factor and donation decision as a within-subjects factor. This mimicked real life as

actors choose either to donate or not but view only one of the frames in an appeal. Furthermore, compared to a fully between-subjects design, a repeated-measures design increased the statistical power of the experiment (Lakens, 2016).

We expected that participants would indicate that observers' moral judgments would depend more on their donation decision but less on the appeal to which they respond. We preregistered the research questions, sample size, and measures for this experiment on the Open Science Framework (https://osf.io/6cuzw/?view_only=3a3e997c85a84e0193d48a84b5bd683d).

Methods

Participants. Based on power analysis (see Supplementary Materials), we recruited 320 US participants (M_{age} = 38.18 years; 182 females, 137 males, and 1 other gender) from Amazon Mechanical Turk using the CloudResearch platform. We randomly assigned participants to either the periodic or the aggregate frame condition.

Procedures. We asked participants to imagine that they work at a medium-sized company and sit next to a coworker named Alex. We informed participants that their company was conducting a donation drive asking employees if they would like to donate food to the local foodbank. In the periodic (aggregate) condition, we told participants that the company asked them if they would like to donate 8 cans of food per week (400 cans of food in total) for the next year. Participants read that they noticed that Alex was standing next to them as they were reading the email. We used this stimulus as we had found in Experiment 1 that participants had evaluated a donation of 400 cans of food over a year as more morally praiseworthy compared to a donation of 8 cans of food per week over a year ($M_{aggregate}$ = 5.67, SD = 1.08, $M_{periodic}$ = 5.18, SD = 1.40, $t(257) = 3.09$, $p = .002$; see the Supplementary Materials).

We presented participants with the following two items on a 9-point scale (-4 = *very unpraiseworthy* to 4 = *very praiseworthy*) in randomized order: "How morally praiseworthy do you think Alex will find your action to be if (1) …you choose to donate food to the local foodbank?" and (2) "…you choose not to donate food to the local foodbank?"

Results. We conducted a two-way mixed ANOVA on participants' prediction of Alex's moral judgment with appeal frame as the between-subjects factor and the donation decision (donate/do not donate) as the within-subjects factor. The results revealed that only the effect of the donation decision was significant ($F(1,318) = 713.15$, $p < .001$, $\eta_p^2 = .69$). We found a nonsignificant effect of both the appeal frame ($F(1,318) = 2.32$, $p = .13$, $\eta_p^2 = .007$) and the interaction between the appeal frame and the donation decision ($F(1,318) = 2.64$, $p = .10$, $\eta_p^2 = .008$). Importantly, one-way ANOVA indicated that participants' prediction of observers' moral judgment if they chose to donate was not significantly different based on appeal frame ($F(1,318) = .17$, Bonferroni-corrected $p = 1.00$, $\eta_p^2 = .005$). Additional analyses are reported in the Supplementary Materials. The descriptive statistics are reported in Table 3.

Discussion. These results suggest that participants believed Alex's moral judgment would depend only on whether they donated or not. In their predictions. they disregarded the appeal to which they responded. However, as the results from the previous experiments show, observers do pay attention to the appeal frame. This reconciles our findings with previous research documenting the effectiveness of periodic framing. If people believe only donation decisions matter, to the extent reputational concerns drive altruistic acts, this would favor periodic appeals as they make donation decisions easier (Gourville, 1998).

Table 3

Descriptive statistics for Experiment 4

	Periodic condition		Aggregate condition	
Donation decision	Mean [95% CI]	SD	Mean [95% CI]	SD
Donate	2.39[a] [2.19, 2.59]	1.33	2.33[b] [2.11, 2.55]	1.36
Do not donate	-1.44[a] [-1.68, -1.21]	1.53	-1.07[b] [-1.36, -.77]	1.82

[a,b] *Only these pairs were significantly different (see Supplementary Materials)*

General Discussion

The results from this research show that observers have a lower moral evaluation of donations framed in periodic (versus aggregate) terms. Observers evaluated past donations to be less moral (Experiment 1) and the donor to be less warm (Experiment 2a) and less moral (Experiment 2b) when donations were framed in periodic terms. Such lower moral judgment was related to perceived lower personal sacrifice of the donor and less benefits provided to the recipients (Experiment 3). Conversely, donors mistakenly believed that observers' moral judgments would be based only on their decision to donate but not on the appeal to which they respond (Experiment 4).

Our findings contribute to various themes within the larger body of research documenting that people use moral acts to infer the actor's character (Uhlmann et al., 2015). We show that observers view both the donation and the donor less positively when they respond to a periodic appeal, a widely used appeal frame (Atlas & Bartels, 2018; Gourville, 1998). We further show that moral judgments are related to inferences that observers draw

from the temporal frame about the donors' self-sacrifice and the magnitude of benefits to the recipients. The findings also contribute to the current debate on whether observers' moral judgments depend on the magnitude of the benefit (see Kawamura et al., 2020, and Klein & Epley, 2014, for opposing findings). We show that the way a donation is framed (in this case, temporally) can also affect observers' inferences about the magnitude of the benefit and their moral judgments. Our findings are consistent with and add to the literature documenting that observers' moral judgments are based on inferences about an actor's intention and not necessarily the actual outcome of the act (Critcher et al., 2020; Cushman, 2008; Inbar et al., 2012). Finally, our findings add to the scant but growing literature on how observers judge positive moral acts and altruistic actors (Anderson et al., 2018; Anderson et al., 2020).

Our research also contributes to the literature documenting the misalignment between people's metaperceptions and observers' actual evaluations (Boothby & Bohns, 2021; Moon et al., 2020; Scopelliti et al., 2015; Sezer et al., 2018). While past research in this area has mainly focused on social settings such as bragging (Sezer et al., 2018), failures (Moon et al., 2020; Savitsky et al., 2001), and complimenting others (Boothby & Bohns, 2021), we document this effect in the domain of moral judgments. We show that donors mistakenly believe that observers care only about their donation decisions and do not appreciate the fact that observers are also sensitive to the appeal to which they respond. This also reconciles the present work with past research documenting the effectiveness of periodic appeals (Atlas & Bartels, 2018; Gourville, 1998). If donors believe that only donation decisions (but not appeal frames) matter, periodic appeals are attractive as they are simply easier to comply with.

Given the efficacy of periodic appeals, charities will continue to use them. However, charities can use aggregate framing in all other communications[3]. For instance, research suggests that making self-promotion mandatory can increase donations (Yang & Hsee, 2021). Charities can provide donors with social media badges or other promotional devices indicating the aggregate amount that donors have donated in the past. This can lead donors to receive greater accolades from observers while inspiring observers to act altruistically (Anderson et al., 2018). While many donation decisions are private, others are not (e.g., donations made in the workplace and on gofundme.com). Furthermore, donors often describe their altruistic acts to others (e.g., mentioning the number of hours volunteered on their résumés). Our findings suggest that donors can signal more effectively, if they so desire, by responding to aggregate framed appeals or by framing their actions in aggregate terms.

Directions for future research

Future research can build on our findings in multiple ways. First, more research is needed to document the exact underlying reason for the phenomenon. While we show that observers make inferences about sacrifice and benefit from the appeal frame, there are other possibilities. For instance, as noted in Experiment 3, observers may misjudge the actual magnitude of a donation. Another possibility is that observers mistakenly believe that periodic frames have lower time commitment for donors. While we controlled for these possibilities in Experiment 3, our design and statistical controls were not perfect. Future research can examine whether these and other inferences can also explain the phenomenon. Furthermore, we do not explore the underlying reason for the asymmetry between donors' intuition about observers' judgments and observers' actual judgments. This merits a more in-depth investigation by future researchers. Finally, while we used monetary stimuli in most

[3] See Experiment S1 in the Supplementary Materials for an example

studies (except Experiments 1 and 4), future research can examine the phenomenon in domains such as volunteering, fundraising, and social activities by corporations.

A logical direction for future research would be to examine how donors' behavior would change if, via some intervention, they hold the correct belief about observers' judgments. This might potentially reverse the well-documented effectiveness of periodic pricing (Gourville, 1998). Another avenue would be to examine whether examples of people's donations framed in aggregate terms might inspire others to act altruistically (Anderson et al., 2018). However, negative consequences might occur if observers perceive the donation framed in aggregate terms as an amount they would not have donated themselves (Minson & Monin, 2012) or as a donation that deviates from social norms (Kawamura & Kusumi, 2020). Future research can examine these consequences in greater depth.

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