## SOCIAL PSYCHOLOGY

# Dynamics in charity donation decisions: Insights from a large longitudinal data set

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Despite the vast body of research on charitable giving and its drivers, no research has investigated the longitudinal dynamics of individual donation decisions. We analyzed unique data with nearly 300,000 real donation decisions made by more than 20,000 individuals for a period of 10 months. Each decision entailed a choice of what to do with money received for completing a survey (on average, €0.67 per survey): keep it or donate to charity. We found that most of the participants (89%) always chose to keep the money. Within the group of people who sometimes kept and sometimes donated the money (that is, Switchers), we find that people do not change their decision very often (cf. moral consistency). However, the likelihood of donating increases when people kept the money the previous time, and the amount at stake differs substantially (both positively and negatively). Finally, once Switchers donated, they are more likely to keep the money next time if they can earn more (for example, €2 now versus €0.50 last time), signaling moral compensation. These longitudinal data provide a first step to better understand charity donation decisions, not only in terms of a more nuanced description of decision-makers but also in terms of the dynamics of charity donations.

## INTRODUCTION

Charities benefit societies by taking on its most serious challenges. To do so, they are dependent on people's willingness to donate. In 2015, a total of $373.35 billion was donated by Americans [2.1% of gross domestic product (GDP)] (1). Although this number is lower in Europe ($22.4 billion; 0.2% of GDP) (2), it highlights the importance of understanding charitable donation decisions and the drivers of these decisions. Although many people donate more than one time in their life, and previous donation decisions most likely influence subsequent decisions, so far, research has mainly studied single observations of donations. In the past, a large variety of researchers—political scientists, sociologists, economists, and social psychologists—by using a variety of methodologies have created a vast body of knowledge on which factors influence a single (or aggregated) decision of whether and how much to donate (3–7). Up to now, hardly any research is carried out on the longitudinal aspects of charity donation decisions. To put it differently, we do not know the influence of previous decisions on subsequent decisions. This study will address this void.

To be able to answer this research question, we obtained a large longitudinal data set in which more than 20,000 individuals made nearly 300,000 donation decisions in a 10-month period. Specifically, the data set is from a Dutch panel research organization. Participants of this panel complete surveys and receive money for each completed survey. Specifically, they receive €0.10 per question. After each survey, they are asked whether they want to have this money paid to their own account (listed first) or whether they want to donate it to 1 of 20 charities, including, for example, United Nations Children's Fund, STOP AIDS NOW!, and the World Wildlife Fund. With an average of 13.80 decisions per panel member, we have multiple observations per panel member to study people's donation decisions.

The decisions people made were real and not measures of hypothetical donation or self-report. Large-scale charity research often uses these self-report measures, for instance, the Household Giving Surveys by the Gallup Organization (8) or the Giving in the Netherlands Panel Study (9, 10). An important limitation of these surveys is the social desirability

bias (11): People's answers can be biased toward what they think is the correct way of answering (12). People generally overreport the donations in self-report surveys, exceeding actual donations by 30.5% (13). Our data set provides us with real decisions, therefore increasing the external validity of the results.

Moreover, a crucial aspect of studying how previous decisions influence subsequent decisions is to have data not only on the instances when people decided "Yes, I donate" but also on the instances when they decided "I keep the money myself." As trivial as this may sound, most charities do not have any individual-level data on small donations, such as door-to-door campaigns, because address information is often missing (13). As a consequence, when analyzing the administrations of charities, only the people's recorded yearly overall donations to a charity (or to charities in general) are used as the main dependent variable, aggregating all separate instances when they were asked to donate. Note that in other experimental (field) studies on charity donations, these individual data on donation decisions (yes and no decisions) are available as well. However, within this type of research donation, decisions are often only measured once (14–16), or it concerns experimental research on other types of prosocial decisions, such as repeated dictator games (17, 18). Moreover, research on direct mailing effects within a charity context (19–21) studied the effects of the frequency of direct mailings on donation decisions over time. Despite the rich insights of that research, the emails contained different ways to persuade people to donate (that is, the content of the emails varied). Because our data set contains the information about each time a person was asked the very same question to donate over a longer period of time, we were able to study these dynamics of donation decisions in a more controlled setting.

The decision to donate to charity or to keep the money to yourself is essentially a choice between furthering your own self-interest and acting prosocially. The field of behavioral ethics has extensively studied prosocial behavior, and we will build on these insights to speculate about predictions regarding behavior of those who did not consistently decided to keep or to donate (that is, the so-called Switchers). Within this domain of research, there are three processes known that take into account past and future (un)ethical behavior to predict subsequent behavior: moral consistency, moral habits, and moral licensing (22–24).

According to research on moral consistency, past behavior can serve as a signal to the self of how moral one is (22–28). Thus, when people

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decided to help out at a fundraising in the past, they will infer from that behavior that they value voluntarism. This subsequently leads to, for example, the decision to help out during an event of your child's school. In particular, past behavior can be seen as a signal of someone's identity: What I do defines who I am. Moral consistency would therefore imply that people are not very likely to switch a lot between behaviors and thus would predict relative static patterns of decisions: People will always donate (that is, the so-called Donators) or always keep the money (that is, so-called Keepers).

Like moral consistency, moral habits would also imply that people are not very likely to switch a lot between behaviors. Habits formation is used when we make the same decision multiple times, and habits often reflect our personal values toward that behavior (22, 29, 30). Personality traits, such as social value orientation (SVO) (31) and greed (32), which have been shown to influence prosocial behavior, might thus be important drivers of habitual donation decisions.

Both the moral habits literature and the moral consistency literature suggest the relative stability of people's ethical behavior, including charitable behavior. However, other research has shown that people also balance their (un)ethical behavior: Once they behave ethically, they subsequently behave more unethically, and vice versa. This process is known as moral licensing and basically implies that people balance between their ethical and unethical acts (22, 33–35). Sometimes they will keep the money, and sometimes they will donate. If moral licensing takes place, we would thus expect to see people switch between donating and keeping (that is, the so-called Switchers).

Moral licensing also implies that what people decided to do in the past determines which behavior is needed to balance it out again. Note that panel members in our data set can remember two aspects of their previous decision. First, they can remember their behavior in broad aspects: Did I donate—yes or no? Second, they can also remember the specifics: How much money was at stake last time? This distinction is particularly important because people always try to keep up a positive moral self-image (MSI) (36) and remember past behavior in such a way to maintain this positive MSI (37). For example, suppose you chose to donate €0.50 last time, and now you have to make a decision to donate or keep €2. You could base your current decision on the fact that you decided to donate last time to license yourself to keep the money this time, and by doing so, you would disregard the fact that you only donated €0.50 to charity last time and now will be keeping €2 for yourself. By taking into account exactly how much was at stake the previous and current time, we can test whether people base their current decision on the previous choice and amount at stake. That is, within the group of Switchers, we tested the dynamics of donation decision based on previous choice and on how much is at stake now compared to the last time.

We acknowledge that this test is based on the assumption that people can actually recall their past behavior and the amount at stake. To check this assumption, we measured people's recall ability ($n = 916$) (see the Supplementary Materials). We found that 99.3% of the participants correctly remembered whether (yes or no) they donated or kept the money, and 32.9% of the participants correctly remembered the exact amount at stake. In total, 78.2% reported an amount at stake within the range that we define as "similar amount" in the analyses (see Materials and Methods). All in all, we have sufficient reason to believe that people are able to remember their past decisions.

## RESULTS

We will first present the results of the type of decision-makers on an aggregate level and then zoom in on the dynamics within Switchers.

To study how stable (that is, Keepers or Donators) or dynamic (that is, Switchers) people's donation decisions were, we first analyzed the frequency of these different types of decision-makers. First, we find that the vast majority of individuals (89.3%) decided to always keep the money (see Table 1). Only 6.4% always donated, and 4.4% of the people were Switchers. Both moral consistency and habitual decision-making predicted these stable decisions. As argued before, personality traits, such as SVO (31) and greed (32), have been shown to be predictors of habitual behaviors. To gain more insights into the process of decision-making, we tested whether SVO and greed could predict the type of decision-maker.

SVO is generally known as an indicator of the relative importance of the self and the other in interpersonal settings (38–41). Specifically, SVO differentiates three types of orientations: cooperators (who try to maximize the joined outcome), individualists (who try to maximize their own outcome), and competitors (who try to maximize the difference between themselves and the other). Commonly, individualists and competitors are referred to as proselfs and cooperators as prosocials (40). Prosocials are reported to have donated more to charities than proselfs (31).

To see whether SVO could predict the type of decision-maker in our data set, we randomly selected 1048 participants from the original

**Table 1. Descriptives of full sample and the three decision types.**

| | Full sample | Keepers | Switchers | Donators |
|---|---|---|---|---|
| Age (SD) | 42.75 (15.60) | 42.82 (15.57) | 43.05 (16.23) | 41.56 (15.50) |
| **Gender** | | | | |
| Male | 36% | 37% | 36% | 28% |
| Female | 64% | 63% | 64% | 72% |
| **Political orientation** | | | | |
| Conservative | 32% | 32% | 30% | 28% |
| Liberal | 38% | 38% | 45% | 43% |
| Missing | 5% | 4% | 5% | 8% |
| Did not vote/Not allowed to vote/Don't want to say | 25% | 26% | 20% | 22% |
| **Income*** | | | | |
| Less than standard | 18% | 19% | 16% | 15% |
| Standard | 6% | 6% | 4% | 3% |
| 1 to 2× standard | 24% | 25% | 21% | 21% |
| More than 2× standard | 20% | 19% | 26% | 23% |
| Don't know | 10% | 10% | 11% | 13% |
| Don't want to say | 19% | 19% | 19% | 18% |
| Missing | 3% | 3% | 4% | 7% |
| *n* | 20,457 | 18,257 (89.3%) | 891 (4.4%) | 1309 (6.4%) |

*Because of rounding, the percentages within the Keepers were summed up to 101%.

pool of panel members and had them complete the SVO measure (40). The classifications of SVO types in this sample match previous descriptions of the general population (see table S3), indicating that the participants in our study are not a biased representation of the population. However, SVO could not predict the type of decision-maker. That is, Keepers, Donators, and Switchers could not be described in terms of different SVO types.

Second, we studied the role of dispositional greed, which is the tendency to always want more and to never be satisfied (32, 42). Dispositional greed has been found to predict greedy behavioral intentions and behavior in a Dictator game (32). Therefore, we expected that Keepers would be more greedy than Donators. We asked another randomly selected group of 1027 participants to complete the seven-item greed scale (for example, "One can never have enough money" and "I can't imagine having too much things"; Cronbach's α = 0.88). However, Donators (M = 2.95), Switchers (M = 2.91), and Keepers (M = 2.89) did not significantly differ on greed (see Materials and Methods for the statistical analyses). All in all, personality traits, such as SVO and greed, could not predict whether people are Keepers, Switchers, or Donators. Thus, they can also not account for the high percentage of stable preferences.

Because personality traits could not predict decision type, we studied the role of more general demographic variables: gender, age, political preference, and income. Previous research showed that Donators are often younger, female, less conservative, and have a lower income than nondonators (4–6, 43–45), and we tested whether these findings would be replicated here. The second column in Table 1 shows overall descriptives of the full sample, whereas the three rightmost columns show the descriptives of the three specific donation types. Multinomial logit models (see tables S1 and S2) with donation type as the dependent variable and Switchers as the reference group show that liberals (as compared to conservatives) and people who earn more than two times a modal income (as compared to less than standard) are less likely to be Keepers than Switchers. In addition, females are more likely to be Donators than Switchers. Multinomial logit models with Keepers as the reference category show that older people, people who earn a modal income (as compared to less than standard), are less likely to be Donators than Keepers. In addition, females, liberals (as compared to conservatives), and those who earn more than two times a modal income (as compared to less than standard) are more likely to be Donators than Keepers. Combined, these results suggest that Switchers seem to be a different group of people compared to Keepers and Donators, although they do share common demographics.

### Dynamics of donation decisions

To study the dynamics of longitudinal donation decisions within the group of Switchers, we looked at how the choice at $t-1$ (donate versus not donate) and the money involved at $t-1$ and $t$ (using the number of questions as a direct measure of the amount of money at stake for potential donation or income) influenced people's decisions, controlling for age, gender, and political orientation. Parameters and interpretation of panel data probit model analysis are presented in Table 2. We found that (i) those who donated at the first observation are more likely to donate at any time ($t = 0$) and that (ii) those who donated at the previous occasion are more likely to donate at the current occasion. These results are in line with moral consistency.

We split the discussion of the results between cases in which a panel member did not donate at the previous occasion (at $t-1$) and cases in which a panel member did donate at the previous occasion (at $t-1$) to present the interactions. For those who did not donate at $t-1$, we found the following effects: When the number of questions was substantially

lower now than the last time (for example, €0.50 now versus €2 last time), people were more likely to donate compared to when the number of questions was more or less equal (for example, €0.50 now and €0.70 last time). In addition, when the number of questions was substantially larger now than the last time (for example, €2 now versus €0.50 last time), people were more likely to donate compared to when the number of questions was more or less equal (for example, €2 now and €1.80 last time). In short, changes in the number of questions (either positive or negative changes) make previous nondonators more likely to donate.

These effects were different when participants decided to donate at $t-1$. The positive effect of having substantially fewer questions than the last time is not significant. The positive effect of having substantially more questions becomes negative. That is, when the number of questions was substantially larger now than the last time (for example, €2 now versus €0.50 last time), people who donated last time were less likely to donate compared to when the number of questions was more or less equal (for example, €2 now and €1.80 last time). To put it differently, changes in the number of questions at best make previous Donators not more likely to donate now but even less likely to donate now if the number of questions is larger. This suggests moral licensing.

### DISCUSSION

The current work investigated the dynamics in charitable decision-making using longitudinal data of real donation decisions. Results showed that many people make very stable decisions, which could be a sign of habit or moral consistency. However, we did not find that personality traits—often related to habitual behavior—are able to predict decision types. Moreover, when people kept the money previously, and the amount at stake differs substantially (both positively and negatively) from the last time, the likelihood of donating increases. However, once people have donated previously, they decide to keep the money more often the next time when they can earn more (for example, €2 now versus €0.50 last time), signaling moral licensing. Our findings corroborate survey research on self-reported momentary experiences of morality in general (and thus, not charitable giving specifically), which also showed evidence of both stable decisions and licensing (46).

The moral licensing effect in our data is especially interesting with close examination of the formal definition of psychological licensing: "people's perception that they are permitted to take an action or express a thought without fear of discrediting themselves" [(47), p.116]. This fear of discrediting oneself basically implies that people want to uphold a positive MSI. MSI is strongly influenced by past recollections of situations in which a person engaged in (un)ethical behaviors (36). Our results seem to suggest that people are able to uphold a positive MSI when making the choice to keep the €2 now when they donated €0.50 the previous time.

Related to these licensing results, a recent meta-analysis (24) suggested that the effect size of moral licensing is relatively small and suggested that statistical power be increased when studying moral licensing. Given the large $n$ in our data set, we had sufficient power to study moral licensing in the field. Moreover, the authors emphasized that researchers often studied the effect with two consecutive behaviors. We are able to study more than two decisions per panel member to provide a full picture of the pattern in donation decisions. In addition, although we found more evidence for stable patterns, we also found evidence for moral licensing.

Another interesting observation is our finding that most of the decisions are to always keep the money. This is not in line with research on self-reported donations (26) or other prosocial behaviors (14–18),

**Table 2. Predictors of donation decisions within Switchers.**

| Variable name | Additional information variable | Parameter estimates | Interpretation of effect |
|---|---|---|---|
| Age | | 0.005** | The older, the more likely to donate |
| Gender | Reference group, male | −0.03 | No effect of gender |
| Political orientation | Reference group, liberal | | |
| Conservative | | −0.16** | Conservative voters less likely to donate than liberal voters |
| Won't tell | | −0.13 | Donation likelihood of won't-tellers not significantly different from liberal voters |
| Donation$_{t-1}$ | Donated at $t-1$ (0 = no; 1 = yes) | 0.96*** | When donated last time, one is more likely to donate now |
| Donation first observation | Donated at first observation (0 = no; 1 = yes) | 0.79*** | When donated first time in observation period, one is more likely to donate now |
| CompNegDiff | Tests effects of negative difference in number of questions when not donated last time (0 = equal number of questions; 1 = substantially less questions at $t$ than at $t-1$) | 0.40*** | When number of questions is substantially lower now than last time, one is more likely to donate than if the number of questions is equal |
| CompPosDiff | Tests effects of positive difference in number of questions when not donated last time (0 = equal number of questions; 1 = substantially more questions at $t$ than at $t-1$) | 0.12** | When number of questions substantially larger now than last time one is more likely to donate than if number of questions is equal |
| Donation$_{t-1}$* CompNegDiff | Tests difference of effect CompNegDiff when donated last time | −0.48*** | If donated last time, positive impact of CompNegDiff gets "neutralized" (0.40 + −0.48 = −0.08[†]) |
| Donation$_{t-1}$* CompPosDiff | Tests difference of effect CompPosDiff when donated last time | −0.30*** | If donated last time, positive impact of CompPosDiff becomes negative (0.12 + −0.30 = −0.18[‡]) |
| Constant | Constant | −1.24*** | |
| $\sigma^2$ | Variance component of the randomized intercept | 0.59 | |

*$P < 0.05$  **$P < 0.01$  ***$P < 0.001$    [†]This parameter estimate of −0.08 was not significant ($P = 0.210$).    [‡]This parameter estimate of −0.18 was significant ($P = 0.002$).

suggesting that people are altruistic. In addition, 70 to 90% of U.S. households donate to charity in a given year (www.philanthropyroundtable.org/), which would imply that they would be classified as Switcher or even as Donator. Our observed low rate of Switchers (and Donators) does not seem to align with these numbers. The first explanation might be that there is a selection bias in our sample, with more selfish people signing up to be panel members. However, the distribution of SVO types in our sample matched previous studies among Dutch samples (40). Moreover, we replicated previous findings on the effects of general demographics on donations, giving our data strong external validity (4–6). All in all, we do not believe selection bias to be driving our results. Still, an alternative possibility is that signing up leads to a business mind-set among these participants—because they earn money for filling in the survey—rather than an ethical or prosocial mind-set [cf. studies of Tenbrunsel and Messick (48) and Tenbrunsel and Northcraft (49)]. Although all participants might become less prosocial because of this, we still observe a distribution of proselfs and prosocials that is in line with the findings in the general Dutch population (40). However, we cannot rule out this entry decision effect with our data, but future research could study the potential differences in mind-sets between people who signed up and those who did not.

Another explanation might be that the amounts of money at stake are too small to have a meaningful psychological impact. However, money has not only instrumental value but also psychological value (50, 51). Moreover, research on moral licensing and consistency using charity donations also used low amounts, varying from donations up to $5 or $10 [for example, see the studies of Young et al. (16), Sachdeva et al. (22), and Mazar and Zhong (52)]. Therefore, we also believe that the amounts are not too small. The final explanation might be that most previous studies on charitable giving used one-time-only decisions, hypothetical decisions, and/or self-report measures, whereas we report observations of longitudinal and actual donation decisions. This difference might explain the high rate of Keepers, but we acknowledge that we do not have empirical data to support this.

Studying longitudinal dynamics of donation decisions could provide additional unique insights in future research. For example, we could study the longitudinal aspects of the well-known default effect [cf. study of Goswami and Urminsky (53)]. To date, the default effect—people's preference for the option that needs no response—has been mainly shown on one-time-only decisions, that is, whether or not to be an organ donor (54). By changing the setup within the panel research organization of how people make their changes, people will make multiple

choices over time with the same default. Specifically, when we would make the decision in a two-step procedure—first, people decide to keep or to donate, and second, when deciding to donate, panel members can choose which charity to donate to—one could study the longitudinal effects of the default effect by making the "keep to myself" or the "donate to charity" the default.

When we generalize our findings to implications for charities raising money, our results suggest that charities should make different appeals to nondonators and Donators. By changing the requested donation amount, nondonators might reconsider their decision and decide to donate. People who already donated after a previous appeal should not receive an appeal with a higher requested amount. This advice actually goes against the foot-in-the-door technique (55), which suggests that compliance with a small request increases the likelihood of complying to a larger request later on. Our data suggest that this principle does not hold for repeating donation appeals.

In summary, the present study was one of the first to investigate longitudinal patterns in people's real (rather than self-reported) donation decisions. The results reveal that most people choose not to donate to charity. However, once they have donated previously, they decide to keep the money more often the next time when there is more money to be earned.

## MATERIALS AND METHODS
### Data set
The original data set contained 308,704 observations. Note that we followed the international review board guidelines in the entire project. Each observation represents a survey started by a panel member. Here, we are interested in a panel member's donation decisions. Panel members make the donation decision after completing a survey. Therefore, we only used the data on completed surveys for our study ($n = 296,651$; 96.10%). We excluded the donations to Serious Request ($n = 256$), which is a yearly fundraising event of a Dutch public national radio station, because we are interested in understanding regular donation behavior to charities. Serious Request is a unique event that takes place in December, and therefore, it is completely different from regular charities and may thus distort the donation behavior we are interested in. Finally, given that we studied donation behavior, we needed at least one question per survey to make sure that people made a decision involving money. We used the number of questions as a direct measure of the amount of payment: The number of questions of a survey determines the payment a participant will receive. Three things are important in this regard: (i) Participants will only be paid when completing the entire survey; (ii) the length of a survey is a random factor for participants because they cannot choose themselves the surveys they are invited to participate in; and (iii) participants cannot determine themselves how much they will earn by varying the effort they put in. Together, this indicates that the number of questions is related only to the payment and not, for instance, to the effort the participants decided to put in.

The resulting data set consisted of 282,232 donation decisions made by 20,457 unique panel members in the period of March 2014 to January 2015. The second column in Table 1 shows the descriptives of the full sample. The panel members have a mean age of 42.75 (SD, 15.60), and 64% is female. There are slightly more conservatives (38%) than liberals (32%), and 44% of the sample has an income above the national modal income.

We divided the panel members into three types on the basis of their donation behavior over time. Keepers are defined as panel members who

always keep the money to themselves. Donators always donate the money to charity, and Switchers at least donated once but did not donate always.

### Statistical analyses: Describing Keepers, Donators, and Switchers
To investigate the differences between the three donation types, we used several univariate tests. More specifically, we applied Pearson's $\chi^2$ tests for the categorical variables and one-way analysis of variance (ANOVA) tests followed by Tukey post hoc tests for the metric variables. We applied a multinomial logit model to simultaneously assess the relationships between the donation type and multiple independent variables.

First, age is significantly different across the three types ($F_{2,20454} = 4.17$, $P = 0.016$). On the basis of the Tukey post hoc tests, we concluded that Keepers are significantly older than Donators (contrast, 1.26; confidence interval, 0.22 to 2.31]). Second, the gender distribution differs across the donation types [$\chi^2(2) = 41.77$, $P = 0.000$]. Third, the distribution of political orientation differs across the types [$\chi^2(4) = 48.27$, $P = 0.000$]; the proportion of liberals seems the largest among the Switchers. Finally, the distribution of income differs significantly across the types [$\chi^2(12) = 88.55$, $P = 0.000$]. The results suggest that the proportion of the 2× modal income group is slightly larger for the Switchers than for the other types.

We also tested the predictive value of the demographics on the classification of the type of decision-maker using multinomial logit models. Results of these analyses are presented in tables S1 and S2 and reported in the Results section.

### SVO and greed as predictors of donation decisions
We randomly selected 1048 participants from the original pool of panel members and had them complete the SVO measure (40). This measure consisted of nine items, and each item consisted of three sets of outcomes describing how many valuable points the participant and how many another unknown person will get. Each item contained a competitive (for example, 480 for self and 80 for another), an individualist (for example, 540 for self and 280 for another), and a prosocial choice (for example, 480 for self and 480 for another). When participants chose six of nine items, consistent with one of the orientations, they were classified as that specific orientation. In the end, a total of 642 participants were classified as prosocial, 41 as competitive, and 261 as individualist (see table S3). Similar to other research on SVO [for example, the study of Van Lange (40)], we combined individualist and competitors into one group of proselfs.

SVO was not related to the type of decision-maker [$\chi^2(2) = 0.61$, $P = 0.736$]. To determine whether these nonsignificant results support a null hypothesis over a theory or whether the data are just insensitive, we calculated the Bayes factor (56). The Bayes factor of a model assuming dependence (between donation type and SVO type) compared to a model assuming independence is 0.042, which is lower than $^1/_3$ (that is, sufficient evidence to conclude no dependence between donation type and SVO type). Moreover, in an extended version of the multinomial logit model with donation decision-maker type as the dependent variable (base category, Switchers), the SVO parameters did not significantly predict the decision-maker type (Donators, $P = 0.957$; Keepers, $P = 0.657$). That is, Keepers, Donators, and Switchers could not be described in terms of different SVO types.

We asked another randomly selected group of 1027 participants to complete the seven-item greed scale (for example, "One can never have enough money" and "I can't imagine having too much things"; Cronbach's α = 0.88). However, Donators ($M = 2.95$; SD, 1.14; $n = 40$),

Switchers ($M = 2.91$; SD, 1.23; $n = 46$), and Keepers ($M = 2.89$; SD, 1.11; $n = 941$) did not significantly differ on greed [$F_{2,1024} = 0.06$, $P = 0.942$ (Kruskall-Wallis, $P = 0.978$)]. Similar to the study on SVO, we calculated the Bayes factor for a model based on dependence (between donation type and greed) compared to a model assuming independence. The Bayes factor was 0.051, which is smaller than $\frac{1}{3}$; therefore, there is sufficient evidence for the alternative model (that is, no effect of the donation type on greed). Moreover, in an extended version of the multinomial logit model with decision-maker type as the dependent variable (base category, Switchers), the parameters of greed were also not significant (Donators, $P = 0.737$; Keepers, $P = 0.785$). That is, Keepers, Donators, and Switchers could not be described in terms of different levels of greed.

## Statistical analyses: Patterns in Switchers' donation decisions

The model we proposed is a panel data probit model, because we observed multiple binary decisions per panel member (0, keeping to self; 1, donating to charity). We accounted for potential state dependence by including the donation decision in the previous period and for unobserved heterogeneity by including a random intercept. Although the data set is large ($T > 3$) (57), we included the first observed donation decision to account for the initial conditions problem (58) and used the Stata command gllamm to obtain the appropriate robust SE for this model (59). On the basis of earlier work in this area (4–6, 43–45), we included the demographic variables, age, gender, and political orientation. To study the interaction between the donation decision at the previous occasion and the difference between the number of questions in the previous and the current survey, we created interaction variables. We defined (the natural logarithm of) the number of questions to be different if the difference was smaller than the 25th percentile (−1.098; that is, substantially fewer questions) or larger than the 75th percentile (1.098; substantially more questions) of the distribution. Results of the analyses are in Table 2.

## Recall of previous decision and amount

We checked whether people could accurately recall whether, and how much, they donated the last time they entered the survey. To do so, we collected additional data in July 2017. From the original sample, we asked a randomly selected group of 916 participants to answer the following questions: (i) "Please recall the last time you participated in a survey from PanelWizard (so not this time). Please indicate whether you decided to keep the money to yourself or to donate the money" (I kept the money versus I donated the money); (ii) "Please indicate how much money was at stake that last time? If you are not sure, please make an estimation" (answer could be typed in). In both questions, we excluded the "don't know" option. Of all the 282,232 observations from our original data set, the highest amount paid for a survey was €3.40. We excluded 141 observations from further analyses because they indicated a higher amount than this natural cutoff value. We also excluded the observations of nine participants who did not complete both questions. The remaining number of participants was 766.

Of those 766 participants, 761 (99.34%) participants correctly remembered their decision to donate (yes or no). With respect to the amount at stake, 252 (32.90%) participants correctly remembered the exact amount. Moreover, 599 (78.20%) participants reported an amount at stake within the range that we defined as "similar amount" in the analyses (see Statistical analyses: Patterns in Switchers' donation decisions).

## SUPPLEMENTARY MATERIALS

table S1. Results of multinomial logit model (base category, Keepers) to predict decision type.
table S2. Results of multinomial logit model (base category, Switchers) to predict decision type.
table S3. Distribution of SVO types in our sample and previous studies.

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## Dynamics in charity donation decisions: Insights from a large longitudinal data set

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