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EMPIRICAL ARTICLE

Give what is required and take only what you need! The effect of framing on rule-breaking in social dilemmas

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Abstract
To investigate the impact of framing on rule-breaking in social dilemmas, we incorporated a rule in a 1-shot resource game with 2 framing treatments: in one frame, we offered a give-some dilemma (i.e., a variant of a public goods game), and in the other frame, a take-some dilemma (i.e., a variant of a commons dilemma game). In each frame, all participants were part of 1 single collective sharing a common good. Each participant was initially equipped with 1 of 5 different endowments of points from which they must give/were allowed to take amounts to/from the common good. The rule established outcome equality between participants by prescribing the exact amounts of what to give/take to/from the common good, which was finally divided equally among participants. Participants decided whether to cooperate and comply with the rule or to break the rule to their own advantage and to the detriment of the collective (i.e., giving lower/taking higher amounts). The results of an online experiment with 202 participants showed a significantly higher proportion of individuals breaking the rule in the take-some dilemma than in the give-some dilemma. In addition, endowment size influenced the proportion of rule-breaking behavior in the take-some dilemma. However, the average amounts of points not given/taken too much were not different between the 2 dilemma types.

1. Introduction

Social dilemmas are usually understood as situations in which the collective interest is in conflict with the individual interest. That is, an individual who is part of a collective could either decide to act in the interest of the collective (behave cooperatively) or act in their own interest, which would benefit the individual but harm the collective (behave in a self-serving manner). Social dilemmas can be found in many aspects of everyday social life. They are simply 'everywhere' (Weber et al., 2004, p. 281). Typical examples are extensive water consumption in drought periods even though residents were asked to conserve water and donations for a new and urgently needed hospital in the region. Residents who do not contribute to water conservation or the donation, respectively, still benefit as long as enough others contribute. However, if no one contributes, the entire community will run out of water, and no new hospital will be built. Therefore, if everyone contributes, everyone is better off than if everyone acts in self-interest.

The literature on social dilemma research typically distinguishes between 2 dilemma types: 'give-some dilemmas' (based on Bonacich, 1972) and 'take-some dilemmas' (analogous to the 'decision of pollute' in Dawes et al., 1974). In give-some dilemmas, an individual is usually equipped with a certain amount of a particular resource (endowment) and has to decide how much from their endowment they want to give to a common good shared by a group or collective and how much they want to keep for themselves. In take-some dilemmas, in contrast, the individual has no or little endowment and has to decide how much they want to take from a common good and, consequently, how much they want to leave in it.

Given that a give-some dilemma and a take-some dilemma have equivalent outcomes, they describe the same situation (i.e., the conflict between individual interest and the collective interest) in different ways (e.g., Dawes, 1980; Molenmaker et al., 2021; Van Lange et al., 2013). Different descriptions of objectively equivalent situations (commonly known as framing; Tversky & Kahneman, 1981) can affect peoples' behavior and judgments in various contexts and scenarios, including cooperation in social dilemmas (i.e., framing effect; see, e.g., Kühberger, 1998; Levin et al., 1998; Piñon & Gambara, 2005; Steiger & Kühberger, 2018, for meta-analytic reviews).

Previous research investigating the impact of framing on cooperation in social dilemmas has largely focused on the amount of resources that people (do not) give to or take away from a common good. That is, the amount of a resource a person gives to a common good (i.e., not keeping it) in give-some dilemmas is compared with the amount of a resource a person leaves in the common good (i.e., not taking it) in take-some dilemmas. In this context, findings are mixed. The most common finding is that people contribute more to the common good in give-some dilemmas than in take-some dilemmas (e.g., Andreoni, 1995; Cox, 2015; Cubitt et al., 2011; De Dreu & McCusker, 1997; Dufwenberg et al., 2011; Fosgaard et al., 2014; Gächter et al., 2017; Isler et al., 2021; Khadjavi & Lange, 2015; Sonnemans et al., 1998). However, there are a considerable number of studies showing the opposite effect, i.e., higher cooperation in take-some than in give-some dilemmas (e.g., Brewer & Kramer, 1986; Brown, 2006; Haesevoets et al., 2019; McCusker & Carnevale, 1995; Messer et al., 2013; Molenmaker et al., 2021). Furthermore, some studies found no or just a small effect (e.g., Aquino et al., 1992; Fleishman, 1988; Fosgaard et al., 2017; Rutte et al., 1987; Van Dijk & Wilke, 2000).[1]

One explanation for the mixed findings is that the direction of the framing effect depends on whether the experiment instructions focus on group or individual outcomes. In particular, cooperation is higher in take-some than in give-some dilemmas when instructions emphasize the individual gain, and the effect reverses when instructions focus on group benefits (De Dreu & McCusker, 1997; Van Lange et al., 2013). Other attempts to explain the different behavior patterns are individual differences in thinking dispositions, beliefs, value orientations, social motives, or considerations of appropriateness (e.g., Balliet et al., 2009; De Dreu & McCusker, 1997; Dufwenberg et al., 2011; Molenmaker et al., 2021; Sonnemans et al., 1998). Gächter et al. (2017) simulated 1,000 social dilemma experiments considering give-some and take-some frames, individual attitudes toward cooperation, and beliefs about other contributions. On average, the simulations show that cooperation is lower in take-some than give-some dilemmas (Gächter et al., 2017). However, 30% show the opposite or no effect explaining the mixed findings from previous literature.

This paper aims to extend the research on the impact of framing on cooperation in social dilemmas by focusing on a particular social dilemma type that has received little attention in prior studies. The special characteristic that distinguishes what we call 'rule-regulated social dilemmas' from the common understanding of social dilemmas is that a formal rule prescribes in what way and to what extent an individual must cooperate. In particular, following the rule (and benefiting the collective) is understood as cooperation. Breaking the rule (to obtain a personal advantage to the detriment of the public interest) is understood as non-cooperation. Real-life examples of give-some rule-regulated social dilemmas are using public transit, where people must cooperate by purchasing a ticket, and fare-dodging means non-cooperation; and tax paying, where people must cooperate by paying taxes, and tax evasion means

[1]It has to be noted that Van Dijk et al. additionally distinguished between give-some and keep-some dilemmas as well as between take-some and leave-some dilemmas (Molenmaker et al., 2021; Van Dijk & Wilke, 2000). However, their studies showed no direct impact of the give-some versus keep-some and take-some versus leave-some framing on cooperation. Van Dijk and Wilke (2000) found an effect by interpreting a 1-tailed *p*-value of .15 as 'marginally significant', and Molenmaker et al. (2021) found a significant main effect only for a particular subsample.

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non-cooperation. Examples of rule-regulated take-some dilemmas are receiving social benefits, where people must cooperate by taking only what they need, and committing social benefit fraud means non-cooperation; and receiving a vaccination during a pandemic according to a priority order, where cooperation means sticking to the vaccination order, and active line-cutting means non-cooperation (similar applications can be found in Cullis et al., 2015 and Wyszynski, 2020). These examples demonstrate that implementing a rule in a social dilemma situation usually has the purpose of preventing non-cooperative behavior. However, people may still behave non-cooperatively by breaking the rule. For instance, some studies have shown that consumption rules (e. g., laws that restrict consumption) and even messages highlighting social norms can sometimes backfire (e.g., Cardenas et al., 2000; Irmak et al., 2020; Ryoo & Kim, 2023), that is, they sometimes evoke the opposite behavior that they are supposed to.

Prior studies investigating rule-breaking in social dilemmas focused on behavior in common dilemmas (take-some dilemmas). They found that people tend to break rules regulating the harvest of a shared resource, that is, by prescribing the order in which individuals are allowed to take something from a resource pool. In particular, field experiments on rule violation in different resource dilemma scenarios have shown that up to 83% break the rule in fishery, 80% in forestry, and 70% in irrigation scenarios (e.g., Castillo et al., 2011; Janssen et al., 2012, 2013). Moreover, Cardenas et al. (2000) found that an externally imposed rule regulating the withdrawals from a common resource by stipulating the time spent for harvesting could decrease other-regarding behavior and increase self-interest. Their findings suggest that implementing a rule in social dilemma scenarios may encourage individuals to act in self-interest. However, it is unclear how people cooperate in give-some rule-regulated social dilemmas and, in particular, how framing affects cooperation in the current context.

Another factor that may influence rule-breaking in social dilemmas is endowment asymmetry, that is, members of 1 collective are initially equipped with different endowments. Endowment asymmetry has been shown to influence amounts contributed and not taken in give-some and take-some dilemmas, respectively. In particular, individuals with higher endowments tend to contribute more in absolute but less in relative terms in give-some dilemmas, and they tend to withdraw more in take-some dilemmas as compared with individuals with lower endowments (e.g., Hauser et al., 2019; Nockur et al., 2021; Van Dijk & Wilke, 1995, 2000; Wade-Benzoni et al., 1996). Some studies further suggest that endowments only play a role when participants were informed about the asymmetric endowment structure or were punished for not being cooperative (e.g., Reuben & Riedl, 2013; Van Dijk & Grodzka, 1992). However, the relationship between rule-breaking and endowment asymmetry is still unclear. It is well possible that people only break the rule when they are equipped with a large endowment or when it seems particularly monetarily attractive to them. On the other hand, it is also possible that rule-breaking is not associated with the size of the endowment or the monetary benefit.

In the present study, we experimentally investigate the impact of framing on the number of people breaking a rule incorporated in social dilemma-like scenarios involving asymmetric endowments. We hypothesize that non-cooperation in terms of rule-breaking depends on the framing of a social dilemma-like scenario as a give-some or a take-some dilemma. In particular, as outlined above, cooperation is usually higher in give-some than in take-some dilemmas. Thus, we hypothesize to observe rule-breaking, that is, non-cooperation, more often in take-some than in give-some dilemmas. This tendency may, in turn, influence the amounts of contribution. According to the most common findings of previous research, we expect the number of resources taken too much from a common good in a rule-regulated take-some dilemma to be higher than the number of resources not given to the common good in a rule-regulated give-some dilemma. Finally, we include endowment asymmetry in our study since it has been shown to affect cooperation in social dilemmas, that is, contribution decreases with increasing endowments. Accordingly, people may follow the rule when they have lower endowments, and they may break it when they have higher endowments. Therefore, we hypothesize that individuals with higher endowments of a resource behave less cooperatively in rule-regulated social dilemmas, that is, they break the rule more often than individuals with lower endowments.

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2. Method

Typical experimental paradigms for investigating the effect of framing on cooperation in social dilemmas are the public goods game for 'give' frames, and the commons dilemma ('tragedy of the commons'; Hardin, 1968) for 'take' frames (for details, see Balliet et al., 2009; Dawes, 1980; Dawes et al., 1974; Kollock, 1998). Similar to previous studies (e.g., Cubitt et al., 2011; Dufwenberg et al., 2011), we used a 1-shot resource game in the current study that we either framed as a give-some game (similar to the standard public goods game) or take-some game (similar to a commons dilemma game). We further used a large group size to specifically simulate social dilemma situations involving many individuals (see the examples above). Note that previous studies investigating the effect of group size in social dilemmas provide mixed findings. Some studies suggest a negative correlation between cooperation and group size (e.g., Suzuki & Akiyama, 2005; Wu et al., 2016), whereas other studies, however, suggest that cooperation is stable or even increases in larger as compared with smaller groups (Barcelo & Capraro, 2015; Capraro & Barcelo, 2015; Isaac et al., 1994; Pereda et al., 2019). Into the setup of a 1-shot resource game with a large group size, we incorporated a rule regulating the contributions and withdrawals of the individuals. According to this rule, participants of the give-some game had to give at least a predefined number of points to the public good, and participants of the take-some game were allowed to take at most a predefined number of points from the public good. Compliance with the rule by all participants equalizes payoffs. Details on the experimental setup and design are described below. The experiment was conducted online using the 'questback EFS' online survey software.

2.1. Participants

Based on an α of .05 and η^2 of .06, power analyses using the R packages 'pwr' (Cohen, 1988) and 'lmSupport' (Curtin, 2018) suggest a sample size of 129 participants to maintain a statistical power of .80. We determined the sample size to n = 200 and specified the experiment parameters accordingly (see the next section for details).

Participants were invited via 'MTurk'. MTurk workers were not required to meet any additional qualifications to participate. They received a hyperlink that directed them to the online experiment. Participation was possible for both desktop and mobile device users.

In total, 242 MTurk workers (86 females and 156 males) participated in the online experiment. The mean age was 32.8 years (median: 30, range: 18–65, SD: 9.65; seven participants preferred not to indicate their age). Participation time was approximately 5 minutes on average. Participants were paid a fixed amount of $0.10. Additionally, they received $0.002 for each point earned during the experiment after completion (see below for details on this process). The average payoff was $3.16 (SD: $1.19).

Participation was anonymous and voluntary. Participants gave their informed consent before their inclusion in the study. They were screened for their ability to follow the experimental instructions. The experiment had been approved by the Jacobs University Research Ethics Committee.

2.2. Materials and design

We used a between-subjects design. Half of participants played the give-some game, and the other half played the take-some game.

2.2.1. Games

Each game was designed for 100 participants. Each participant had an individual good on a *personal account* (PA) equipped with a particular number of points (endowment). In addition, participants shared a common good, that is, a *joint account* (JA).

In the give-some game, PA's were quasi-randomly equipped with 1 of 5 amounts of points: 1,200, 1,400, 1,600, 1,800, or 2,000 points. The JA was equipped with 0 points. Participants were asked to give points from their PA to the JA.

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In the take-some game, amounts of the PA's were: 0, 200, 400, 600, and 800. The JA was equipped with 120,000 points. Participants were allowed to take points from the JA to deposit them into their PA's.

In both games, participants had the choice of whether to contribute at least a certain mandatory minimum amount of points to the JA, or keep (parts of) it for themselves. After participants had made their choice, the JA was divided among them. The exact number of points they had to contribute and the portion they finally received from the JA were defined by a rule which we explain next.

2.2.2. Rule

The rule regulated the number of points each participant must give at least to the JA in the give-some game and the maximum number of points each participant was allowed to take in the take-some game. It consisted of 2 components: a commitment to comply and a minimum requirement. The commitment to comply was the core of the rule, and it specified how many points participants were finally allowed to have in their PA's. In particular, in the give-some game, where participants had an initial endowment of more than 1,000 points, they were allowed to keep a maximum of 1,000 points, with any excess points required to be given to the JA; and in the take-some game, where participants had an initial endowment of less than 1,000 points, they were allowed to take only as many points from the JA to reach 1,000 points, but no more than that.

The minimum requirement that we labeled 'Need' indicated the minimum requirement of points each participant finally needed on their PA to receive a portion from the JA and, therefore, an additional payoff. We set the Need to 1,000 points.[2] In particular, the points in the JA were distributed equally to all participants who finished the game with ≥1,000 points on their PA. However, participants who finished the game with <1,000 points on their PA received nothing from the JA. In other words, the rule stated that PA's must not contain more than 1,000 points, and the Need stated that 1,000 points are needed to receive the additional payoff.

Note that the 2 components of the rule together make the required contributions and outcomes of both games objectively equivalent: depending on their endowment, participants had to give the identical number of points in the give-some game as they were allowed to take in the take-some game (i.e., 200, 400, 600, 800, and 1,000 points). For example, a participant with an initial endowment of 1,400 points in the give-some game must give at least 400 points to the JA. Equivalently, a participant with an initial endowment of 600 points in the take-some game was allowed to take at most 400 points from the JA. Given that all participants meet the commitment and the Need and, consequently, end up with exactly 1,000 points on their PA's, the final balance of the JA would be 60,000 points in both games. Therefore, each participant would receive a portion of 600 points from the JA in addition to the 1,000 points remaining on their PA, resulting in a final outcome of 1,600 points.

Let e be the endowment, g the points given, t the points taken, and N the Need, and the individual payoff functions for the give-some game (2.1) and the take-some (2.2) game are

$$P_i = (e_i - g_i) + \gamma\left(\frac{\sum_{i=1}^{n} g_i}{n_{\gamma=1}}\right), \tag{2.1}$$

where $\gamma = 1$ if $(e_i - g_i) \geq N$, and $\gamma = 0$ if $(e_i - g_i) < N$,

$$P_i = (e_i + t_i) + \gamma\left(\frac{120,000 - \sum_{i=1}^{n} t_i}{n_{\gamma=1}}\right), \tag{2.2}$$

where $\gamma = 1$ if $(e_i + t_i) \geq N$, and $\gamma = 0$ if $(e_i + t_i) < N$.

[2] We adopted the labeling and the exact value of 1,000 points from previous work with similar applications of reference points (Bauer, 2019; Weiß et al., 2017; Wyszynski, 2020).

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2.3. Procedure

The MTurk HIT was open for participation in 2 days in December 2020 and January 2021. Participants were quasi-randomly assigned to the give-some game or the take-some game. They were then introduced to the general conditions and parameters for participation. After answering some demographic questions (i.e., age, sex, household income, number of people in the same household, and current employment status), the experiment instructions were displayed. The instructions varied depending on the experimental condition the participant was assigned to. Participants were explicitly informed that they belong to a community including 100 MTurkers sharing 1 JA; and that each individual holds a PA equipped with 1 of the 5 amounts of points. Note that participants were informed about the asymmetric endowment structure by receiving information about the lowest and highest possible endowment. Depending on game assignment, participants were further explained the rule that regulated how many points they must give from their PA to the JA (give-some game; 'each member should only keep 1,000 points and contribute the rest of the points to the community account.') or how many points they were allowed to take from the JA to deposit them in their PA (take-some game; 'each member should only take as many points as needed to have 1,000 points on his/her personal account.'). They were told that the rule ensures a fair (equal) distribution of points among all community members ('provided that all members follow the rules, each member will get 1,000 points from her/his personal account plus 600 points from the joint account.'). The full instructions as they were used in the study can be found in Appendix A, and they are publicly available on the Open Science Framework (https://osf.io/gsq26/).

After reading the instructions, each participant was required to pass a comprehension check. In particular, they need to detect the only correct statement out of 3 statements describing essential aspects of the game. Two incorrect responses led to immediate termination of participation. During this test, a summary of the instructions was displayed.

On the subsequent page, participants were asked to agree with the rule ('I agree to keep only 1,000 points on my personal account. I commit to give the rest of my points to the community account' in the give-some game; and 'I commit to take only as many points as I need to have 1,000 points on my personal account' in the take-some game). It was required to actively select 'I agree' in a drop-down selection menu to get to the input field in which participants had to enter the number of points they were intended to give or take, respectively.

The page including the input field displays the following components: the participant's individual endowment, the question about their willingness of giving/taking ('How many points will you give to the community account?' in the give-some game; 'How many points will you take from the community account?' in the take-some game), a reminder on the Need ('Note that you need at least 1,000 points to receive your portion from the community account'), the input field ('Enter a number' with the advice 'must be a positive integer' added in parentheses),[3] and the summary of the instructions. Participants could enter any number with a maximum of 4 digits. However, participants who entered a number higher than 1,200 were directed to an extra page. They were asked to replace their initial input with a number lower or equal to 1,200 points on this page. That was done to prevent the JA in the take-some game from running dry. This mechanism was implemented in both games to maintain equality between the games.

Finally, participants were shown a summary table including the points they have given/taken and their final PA balance. They were then asked to enter their MTurk ID (necessary for the bonus payoff), and they were informed about the processing time for calculating the payments.[4]

Note that we performed a first test run with 33 students of an experimental philosophy lecture at the University of Oldenburg. Students were asked for comments on the instructions and procedure of the experiment. Additionally, we pretested the experiment with 48 participants using the online survey manager tool 'SurveyCircle' (https://www.surveycircle.com/).

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[3]Note that it was also possible to enter '0'. The wording of this particular instruction was inadvertently partially inaccurate. In the take (give) frame, $n = 3$ ($n = 1$) entered '0', and $n = 3$ ($n = 0$) entered '1'. The number '1' is the smallest positive integer.

[4]We calculated the payout for each participant according to the payoff functions (2.1) and (2.2).

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2.4. *Statistical analysis*

We evaluated data using descriptive statistics, *t*-tests, and logistic regression analysis. In particular, we used a 1-sided 1-sample *t*-test to explore whether rule-breaking occurs in the games. We further used 1-sided independent samples *t*-tests for testing the first and the second hypotheses, that is, we tested whether the proportion of participants breaking the rule is higher in the take-some than in the give-some game; and we tested whether amounts taken in the take-some game are higher than amounts not given in the give-some game. For further exploratory analysis (see the section below), we used a 2-sided independent samples *t*-tests. To test whether individuals with higher endowments break the rule more often than those with lower endowments, we performed a logistic regression analysis involving the proportions of rule-breaking behavior as the dependent variable and different endowments and the games as independent variables.

For the statistical analyses, we used the computing environments R (version 4.0.3; packages: 'descr', 'ggplot2', 'margins', and 'psych'; J. Aquino, 2018; Leeper, 2021; R Core Team, 2018; Revelle, 2020; Wickham, 2016) and MATLAB R2020b.

3. Results

Of the 242 participants, 40 did not finish the experiment (1 early dropout and 39 comprehension check failures). Four persons participated twice. However, for these double participations, the number of points given or taken were identical or very similar in 3 cases and suggested an inadvertent input (1,000 instead of 100 points as indicated in the second participation) in one case. Thus, we decided to include only the second participations in the analysis. Data of 202 participants (101 per frame) were included.[5]

Participants gave on average 584.5 points in the give-some game and took on average 663.4 points in the take-some game. Note that the analysis included the first inputs of the participants even if they entered numbers higher than 1,200 points. Six participants initially entered numbers higher than 1,200 points (2,000, 1,600, and 1,500 in the give-some game; 1,530, 1,500, and 1,500 in the take-some game).

First, we tested whether rule-breaking occurs in the games by comparing the actual number of points given (give-some game) and taken (take-some game) with the number of points participants were expected to give or take, respectively. The expected number of points was based on the premise that all participants would have followed the rule. It was calculated as follows: for the give-some game, the mean of the endowments of all 101 participants was subtracted by the Need (1,000 points). For the take-some game, the Need was subtracted by the mean endowments of all 101 participants. This is the absolute value of the difference between the mean value of the endowments and the Need (expected and average contributions are summarized in Table 1). The expected values were 621.8 points in the give-some game and 586.1 points in the take-some game. The 1-sided 1-sample *t*-test revealed a significant difference between the expected and the actual number of points taken in the take-some game ($t = 2.12, df = 100, p = .018$) but not for the expected and the actual number of points given in the give-some game ($t = -.938, df = 100, p = .825$). That is, overall, participants took more points from the JA in the take-some game than they would if all participants had followed the rule suggesting a significant proportion of participants breaking the rule in this game.

We then analyzed the difference in the proportion of rule-breaking behavior between the give-some game and the take-some game in more detail. Recall that according to the rule, participants were allowed to have at most 1,000 points on their PA after they made their contributions or withdrawals, respectively. In addition, they also needed 1,000 points on their PA to receive their portion from the JA. Figure 1 displays the actual distribution of remaining points in the PAs of the participants for the give-some game and the take-some game after they made their contributions or withdrawals, respectively. The distribution suggests 3 behavior patterns of the participants: (1) breaking the rule and end up with

[5]The sample size is larger than determined ($n = 202$ instead of $n = 200$) because the last HIT in each game was performed simultaneously by 2 MTurkers.

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Table 1. *Contributions and rule-breaking proportions for the give-some game and take-some game, respectively.*

Cooperation	Give-some game	Take-some game
Expected contributions (points)	621.8	586.1
Average contributions (points)	584.5	663.4
Rule-breaking (%)	32.7	49.5
Avg. contribution evasion (points)	426.3	386.2

Note: Expected contributions (points) = average contributions provided that all participants follow the rule. Average contributions (points) = average number of points actually contributed by the participants in the games. Rule-breaking (%) = proportion of participants breaking the rule. Avg. evasion of contributions (points) = points that the participants should have given but did not in the give-some game; points participants have taken too much in the take-some game.

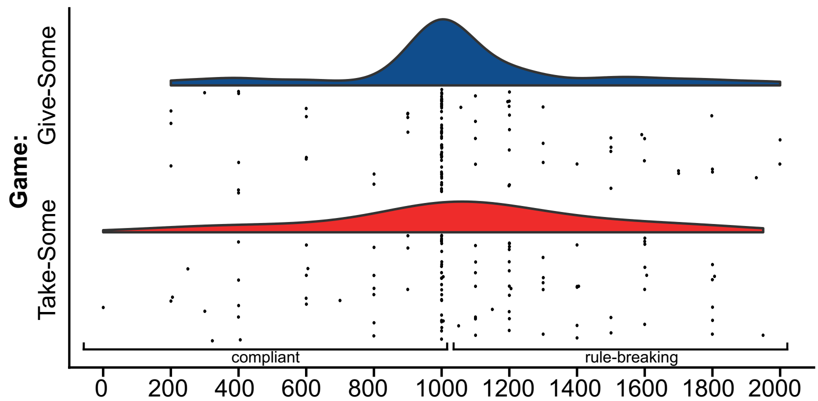

Figure 1. *Raincloud plots: probability density functions of the final number of remaining points in the participants' PAs for each game.*

Note: The dots represent raw data, with each dot indicating the number of points remaining on the PA of 1 participant.

more than 1,000 points on the PA (labeled as 'rule-breaking behavior' in the following), (2) following the rule and end up with at most 1,000 points (labeled as 'compliant behavior'), and (3) following the rule and end up with less than 1,000 points (which is also compliant with the rule, but in addition, it is the waiver of receiving the portion from the JA in favor of the other members of the collective; thus, we labeled this behavior as 'altruistic behavior'). However, we point out that we cannot provide any information about the reasons or motives of the participants who ended up with less than 1,000 points.

Of the 101 participants in the give-some game, we observed rule-breaking behavior (i.e., giving fewer points than prescribed by the rule) in 33 participants (32.7%) and compliant behavior (i.e., following the rule and giving at least the prescribed number of points) in the remaining 68 participants (67.3%) from which 47 (46.5% of all participants in the give-some game) followed the rule exactly and 21 (20.8%) showed altruistic behavior (i.e., giving more points than required by the rule).

Of the 101 participants in the take-some game, we observed rule-breaking behavior (i.e., taking more points than allowed according to the rule) in 50 participants (49.5%) and compliant behavior (i.e., following the rule and taking at most the allowed number of points) in the remaining 51 participants (50.5%) from which 25 (24.8% of all participants in the take-some game) followed the rule exactly and 26 (25.7%) showed altruistic behavior (i.e., taking fewer points than needed).

Figure 2 visualizes the proportions of rule-breaking and altruistic behavior (the latter as a subset of compliant behavior) of the participants in each frame. The 1-sided independent samples t-test of proportions revealed that the proportion of rule-breaking behavior was higher in the take-some game than in the give-some game ($t = 2.46$, $df = 199$, $p = .007$), supporting our first hypothesis. Consequently,

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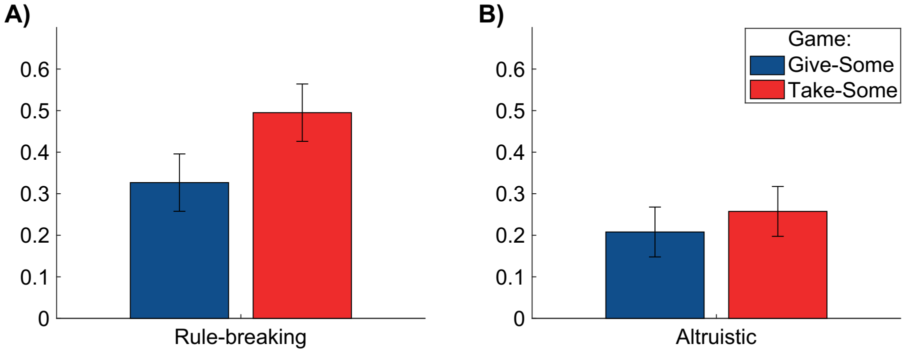

Figure 2. *Proportions of rule-breaking (A) and altruistic (B) behavior per game.*
Note: The error bars indicate 95% confidence intervals. Note that 'altruistic behavior' is a subset of 'compliant behavior'.

cooperative behavior was observed more often in the give-some game than in the take-some game. We used a 2-sided independent samples *t*-test to analyze exploratively whether the proportion of 'altruistic' behavior was different between the games, which was not the case ($t = .83, df = 199, p = .408$).

We tested our second hypothesis by comparing the average number of points taken too much in the take-some game with the average number of points participants withheld in the give-some game (Table 1, 'Avg. contribution evasion'). Since this analysis include only a subset of our sample (i.e., participants who broke the rule), we additionally report the minimum effect size that is detectable with the following *t*-test based on a statistical power of .8, an α of .05, and a sample size of 84 participants: $\eta^2_{min} = .08$. The 1-sided independent samples *t*-test revealed that the average number of points taken too much (426.3 points) is not significantly higher than the average number of points not given (386.2 points; $t = -.63, df = 65.72, p = .264$), contradicting our second hypothesis. The amounts of contributions and rule-breaking proportions are summarized in Table 1.

The logistic regression analysis (Table 2, Main effects model) showed that different endowments had no impact on the proportion of rule-breaking individuals, contradicting our third hypothesis. The model further indicates a significant framing effect (i.e., the proportion of rule-breaking is different between the games), supporting the results of the independent samples *t*-test of proportions (see above).

However, endowment effects may have been canceled out due to specific response behavior in the 2 games. Thus, we exploratively analyzed the effect of endowments separately for each game. We performed logistic regression analysis involving the identical variables as in the main-effects model, and we additionally included 2-way interactions between the games and endowments. The interactions model revealed significant interaction effects between game and an endowment of 1,800/200 points, as well as between game and an endowment of 1,600/400 points (Table 2). Significant interaction effects indicate that the effect of endowments on rule-breaking behavior depends on the dilemma type. As a post hoc test, we grouped our sample into 2 subsamples, that is, 1 subsample per game, and analyzed the impact of endowments separately for each subsample (see Table B.1 in Appendix B). The post hoc test showed that different endowments influenced the proportion of rule-breaking behavior in the take-some game: proportions were significantly higher for endowments of 600 and 800 points (57% and 80%, respectively) as compared with an endowment of 0 points (21%). However, no relationship between endowments and rule-breaking behavior was found in the give-some game. The conditional proportions of rule-breaking behavior and the average points given/taken for each endowment and frame are found in Table C.1 in Appendix C.[6]

[6]We further adjusted for the impact of sociodemographic variables (age, sex, income per person in 1 household, and employment status) on the proportion of rule-breaking behavior using another regression analysis. We observed no significant effects (see Table D.1 in Appendix D for details).

Table 2. *Regression analysis: the impact of endowment size on the proportion of rule-breaking behavior.*

	Main effects model				Interactions model			
Coefficients	Est.	SE	*z*-value	*p*-value	Est.	SE	*z*-value	*p*-value
E_1 (1,800/200 points)	.879	.469	1.875	.061	−.693	.674	−1.029	.304
E_2 (1,600/400 points)	.385	.461	.834	.404	−.693	.674	−1.029	.304
E_3 (1,400/600 points)	−.088	.466	−.189	.850	−.779	.634	−1.228	.219
E_4 (1,200/800 points)	.409	.473	.866	.387	−.277	.635	−.436	.663
Game (TS)	.689	.296	2.331	.020*	−1.059	.703	−1.508	.132
Game (TS) × E_1					3.401	1.041	3.268	.001**
Game (TS) × E_2					2.277	.973	2.340	.019*
Game (TS) × E_3					1.615	.960	1.683	.092
Game (TS) × E_4					1.598	.971	1.647	.100
(Intercept)	−1.024	.364	−2.813	.005**	−.262	.421	−.624	.533

Note: Generalized linear model (error distribution: binomial; link function: logit). Dependent variable: behavior (compliant, coded as 0; rule-breaking, coded as 1). Explanatory variables: E = Endowment (reference category: E_5 = 2,000/0 points); Game(TS) = take-some game (reference category: give-some game); n = 202 participants. Est. = unstandardized regression coefficient. SE = standard error. Marginal effects are shown in Table E.1 in Appendix E. Significance codes: $^*p < .05$, $^{**}p < .01$.

4. Summary and discussion

In the current study, we investigated the choice of individuals to break a rule prescribing cooperation in a social dilemma-like scenario that we either framed as a give-some game or as a take-some game. We observed a substantial proportion of rule-breaking in both games (about 50% in the take-some game and 33% in the give-some game). Note that these proportions appear to be smaller than those reported in previous research investigating the proportion of people violating rules in different common dilemma situations using field experiments (about 70%–83%; Castillo et al., 2011; Janssen et al., 2012, 2013).

However, the results strongly support our first hypothesis: we found a significantly higher number of participants breaking the rule in the take-some game than in the give-some game. Thus, our findings are in line with previous research on framing effects in social dilemmas suggesting higher cooperation in give-some dilemmas than in take-some dilemmas (e.g., Andreoni, 1995; Cox, 2015; Cubitt et al., 2011; De Dreu & McCusker, 1997; Dufwenberg et al., 2011; Fosgaard et al., 2014; Gächter et al., 2017; Isler et al., 2021; Khadjavi & Lange, 2015; Sonnemans et al., 1998), which is the most common finding.

Furthermore, we observed a behavior pattern that we labeled ‘altruistic’ behavior among some participants. In particular, in the give-some and take-some games, roughly 20% gave more points than required, and 25% took fewer points than needed, respectively. Proportions of altruistic behavior were not statistically significantly different between the games. In both games, participants showing altruistic behavior were excluded from receiving their portion of the common good due to not meeting the Need. As mentioned, we cannot provide any explanation about the reasons or motives behind this ‘self-sacrificing’-like altruistic behavior that goes beyond speculation.

According to our second hypothesis, we expected that contributions to the common good depend on the framing of the game. In particular, we expected the number of points taken too much from the common good in the take-some game to be higher than the number of points not given to the common good in the give-some game. However, despite the higher number of rule-breaking individuals in the take-some than in the give-some game, the amounts taken too much and those not given were not different between the games. The interplay between the Need (reference value of 1,000 points), defined as a minimum requirement of points needed to receive a bonus payoff, and the rule prescribing the amounts of contribution/withdrawal may have decreased the variance of the amounts given/taken. Recent research has shown that a need defined similarly as in the current study can serve as a reference

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point in various decision-making scenarios. Thus, need has been shown to influence decisions as well as charitable donations and to moderate framing effects (e.g., Bauer, 2019; Bauer et al., 2022; Diederich et al., 2020; Weiß et al., 2017; Wyszynski et al., 2020; Wyszynski & Diederich, 2022).

Finally, we investigated the role of different endowments in social dilemma scenarios as suggested by previous studies (e.g., Hauser et al., 2019; Nockur et al., 2021; Reuben & Riedl, 2013; Wade-Benzoni et al., 1996). In particular, we examined a possible relationship between the size of the endowments and rule-breaking behavior in social dilemmas framed as give-some and take-some dilemmas. We found that different endowments only influenced the proportion of rule-breaking behavior in the take-some game but not in the give-some game. Participants with higher endowments, that is, a smaller difference to the Need, showed rule-breaking behavior more often than participants equipped with no endowment, that is, the maximum difference to the Need. That is, we observed a higher proportion of rule-breaking behavior among those who needed less as compared with those who needed more. That finding is quite interesting, and it leaves much room for speculation. For instance, although this finding supports our third hypothesis for the data of the take-some game, it is somewhat counter-intuitive with respect to the give-some game: for participants with endowments higher than 1,600 points, it might be very attractive to break the rule since their initial endowments are higher than their expected outcome when sticking to the rule. However, they did not break the rule more often than participants with lower endowments. Additional research is required for an adequate interpretation of these particular findings.

Moreover, it has to be noted that, in addition to the framing manipulation, a crucial difference between the games of the current study is the neediness status of the participants. The decision-maker's own need or neediness has been shown to influence decisions that are made to meet needs or overcome neediness (Diederich et al., 2020; Wyszynski et al., 2020; Wyszynski & Diederich, 2022). In the take-some game of the current study, participants are in need, that is, they suffer a lack of a resource that is indispensable for receiving a portion from the common good. In the give-some game, however, participants are not in need in this sense since they are equipped with an endowment exceeding the Need. Hence, the need for a resource might be another factor that influences the effects of framing and endowment asymmetry on rule-breaking behavior in social dilemmas.

As a final remark, we would like to point out that framing a rule-regulated social dilemma as give-some and take-some dilemmas and the decision-maker's own neediness are just 2 of many factors that may explain the differences in the proportion of rule-breaking behavior in real-life rule-regulated social dilemma-like situations. Other possible determinants that were not part of the current study but are mentioned in the literature are greed and opportunity, and income dissatisfaction in the take context, for example, benefit fraud (e.g., Lamnek et al., 2000; Schäfer, 2002; Tunley, 2011) or subjective justice perceptions, moral values, and individual utility maximization in the give context, for example, tax evasion (e.g., Dornstein, 1987; Fetchenhauer, 1999; Spicer & Lundstedt, 1976). In addition, threat of punishment in case of rule-breaking behavior (Morgan et al., 2019), interactions between individuals such as 'collective rule-breaking' (Deguchi, 2014, 2018; Krause et al., 2021), as well as informal rules such social norms (Bicchieri, 2005; Biel & Thøgersen, 2007; Thøgersen, 2008) may also play a role in decisions on giving or taking resources from or to a common good, respectively.

To summarize, our findings suggest that rule-breaking occurs more often in social dilemmas where individuals are allowed to take a specific amount of a resource from a common good (such as receiving social benefits or a scarce vaccine against a pandemic disease) as compared with situations in which individuals must give a specific amount of a resource to a common good (such as buying a ticket for public transport or paying taxes). Moreover, individuals with higher endowments (e.g., assets or wealth) tend to break the rule in the take-some dilemma more often than those with lower endowments. However, we did not observe this effect for the give-some dilemma.

Data availability statement. Materials and data are made publicly available on the Open Science Framework (https://osf.io/gsq26/).

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Appendix A: Experiment instructions

Give-some game (example for a participant equipped with an initial endowment of 1,400 points in their PA):

> In this experiment, you belong to a community consisting of 100 MTurkers. All members of the community have a personal account containing a certain number of points (between 1,200 and 2,000 points). Your personal account is equipped with 1,400 points. Additionally, there is a joint account called 'community account' shared by all members of your community. The balance of the community account is initially 0 points. Each member must contribute a part of her/his points to the community account. After all members made a contribution, the points in the community

> account will be evenly split among all members who have at least 1,000 points on her/his personal account. Additionally, each member will keep the points remaining in her/his personal account. To ensure a fair distribution of the points among all members of your community, each member should only keep 1,000 points and contribute the rest of the points to the community account. Thus, all members would finally receive the same number of points: The points remaining on the personal account plus the share from the joint account. For instance, provided that all members follow the rules, each member will get 1,000 points from her/his personal account plus 600 points from the joint account. You will receive $0.002 per point. For instance, your 1,400 points are worth $2.80.

Take-some game (example for a participant equipped with an initial endowment of 600 points in their PA):

> In this experiment, you belong to a community consisting of 100 MTurkers. All members of the community have a personal account containing a certain number of points (between 0 points and 800 points). Your personal account is equipped with 600 points. Additionally, there is a joint account called 'community account' shared by all members of your community. The balance of the community account is initially 120,000 points. Each member is allowed to take a certain number of points from the community account. After all members have made a withdrawal, the remaining points in the community account will be evenly split among all members who have at least 1,000 points on her/his personal account. Additionally, each member will keep the points in her/his personal account. To ensure a fair distribution of the points among all members of your community, each member should only take as many points as needed to have 1,000 points on her/his personal account. Thus, all members would finally receive the same number of points: The points from the personal account plus the share from the joint account. For instance, provided that all members follow the rules, each member will get 1,000 points from her/his personal account plus 600 points from the joint account. You will receive $0.002 per point. For instance, your 600 points are worth $1.20.

Appendix B: The effect of endowment size on the proportion of rule-breaking behavior (post hoc test)

Table B.1. *Logistic regression: proportion of rule-breaking behavior depending on endowment sizes separately for each frame.*

Coefficients:	Give-some game				Take-some game			
Endowments	Est.	SE	*z*-value	*p*-value	Est.	SE	*z*-value	*p*-value
1,800/200 points	−.277	.635	−.436	.663	1.322	.734	1.801	.072
1,600/400 points	−.779	.634	−1.228	.219	.836	.720	1.161	.246
1,400/600 points	−.693	.674	−1.029	.304	1.584	.703	2.255	.024*
1,200/800 points	−.693	.674	−1.029	.304	2.708	.793	3.414	<.001***
(Intercept)	−.262	.421	−.624	.533	−1.322	.563	−2.349	.019

Note: Generalized linear model (error distribution: binomial; link function: logit). Dependent variable: behaviour (compliant, coded as 0; rule-breaking, coded as 1). Explanatory variable: Endowments (reference category: 2,000/0 points). Significance codes: *$p < .05$, ** $p < .01$, ***$p < .001$.

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Appendix C: Conditional proportions and average points given/taken

Table C.1. *Conditional proportions: rule-breaking behavior and average points given/taken as a function of framing and endowments.*

	Give-some game				Take-some game			
Endowments	Prop.	SD	Avg. points	SD	Prop.	SD	Avg. points	SD
2,000/0 points	.435	.507	759.6	502.5	.211	.419	816.3	382.2
1,800/200 points	.368	.496	694.8	267.4	.500	.514	676.8	417.4
1,600/400 points	.261	.449	596.1	377.7	.381	.498	690.0	419.8
1,400/600 points	.278	.461	507.9	313.8	.565	.507	524.4	248.6
1,200/800 points	.278	.461	305.9	334.8	.800	.410	637.8	329.2

Note: Prop. = proportion of rule-breaking participants; SD = standard deviation; Avg. points. = the number of points given on average (give-some game) and the number of points taken on average (take-some game).

Appendix D: Regression analysis of covariates

Table D.1. *Logistic regression: the impact of participant's characteristics on the proportion of rule-breaking behavior.*

Coefficients	Est.	SE	*z*-value	*p*-value
Age (numeric covariate)	−.029	.018	−1.603	.109
Sex (male)	.351	.333	1.052	.293
Income/person in household ($1,000–$2,000)	.238	.344	.69	.49
Income/person in household ($2,001–$3,000)	.173	.562	.308	.758
Income/person in household (>$3,000)	16.762	1354.629	.012	.99
Employment status (not working)	−16.141	1038.359	−.016	.988
Employment status (apprentice/student)	−.402	.806	−.499	.618
Employment status (working ≤35hr/week)	−.113	.332	−.339	.735
(Intercept)	.460	.692	.665	.506

Note: Generalized linear models (error distribution: binomial; link function: logit). Dependent variable: proportion of rule-breaking behavior. Explanatory variables (reference category): Age (numeric covariate), Sex (female), Income/person in household (<$1,000), and Employment status (working more than 35hr/week).

Appendix E: Marginal effects of variables

Table E.1. *Logistic regression: marginal effects of variables shown in Table 2 (main effects model).*

Variable	AME	SE	*z*-value	*p*-value
E_1 (1,800/200 points)	.208	.108	1.925	.054
E_2 (1,600/400 points)	.088	.105	.838	.402
E_3 (1,400/600 points)	−.019	.101	−.189	.850
E_4 (1,200/800 points)	.094	.108	.868	.385
Game(TS)	.160	.068	2.371	.018

Note: AME = Average marginal effect. Model: Generalized linear models (error distribution: binomial; link function: logit; see the main effects model in Table 1 for details).

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