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Give what you can, take what you need – The effect of framing on rule-breaking behavior in social dilemmas

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Abstract

To investigate the impact of framing on rule-breaking behavior in social dilemmas, we incorporated a rule in a one-shot resource game with two framing-treatments: One frame was a give-some dilemma (i. e., a variant of a public goods game) and the other frame a take-some dilemma (i. e., a variant of a commons dilemma game). In each frame, all participants were part of one single collective sharing a common good. Each participant was initially equipped with one of five different endowments of points from which they must give/could take amounts to/from the common good. The exact amounts of contributions/withdrawals were regulated by the rule. Participants decided whether to cooperate and comply with the rule or to break the rule to their own advantage and at the expense of the collective (i. e., giving lower/taking higher amounts). Results of an online-experiment with 202 participants showed a significantly higher proportion of individuals breaking the rule in the take-some frame than in the give-some frame. In addition, endowment size influenced the proportion of rule-breaking behavior in the take-some frame. However, the average amounts of points not given/taken too much were not different between the frames.

Keywords— social dilemma, framing effect, rule-breaking, resource dilemma, give-some dilemma, take-some dilemma

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Declarations of interest: *none.*

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1 Introduction

Situations in which the collective interest is in conflict with the individual interest represent social dilemmas. 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).

In some social dilemma scenarios, especially in those concerning great public interest (e. g., acquisition and use of public funds), the decision on how to solve the dilemma is not left to the individual's discretion. Instead, (externally imposed) rules or laws that apply to everyone in a society regulate how to solve it. In the following, we refer to these particular scenarios as "rule-regulated social dilemmas" to distinguish them from "classic" social dilemmas in which the individual can freely decide whether to act in the interest of the collective or their own interest.

Obtaining personal advantage to the detriment of the public interest in rule-regulated social dilemmas means breaking the rule. Cooperating and benefiting the collective, however, means sticking to the rule. Prior work in this context suggests that people tend to violate externally imposed rules in social dilemma situations. In particular, field experiments on rule violation in different resource dilemma scenarios have shown that a high proportion of people tends to break the rules, namely, up to 83% in fishery, 80% in forestry, and 70% in irrigation scenarios (see, e. g., Castillo et al., 2011; Janssen et al., 2013, 2012). Moreover, Cardenas et al. (2000) found that an externally imposed rule regulating the withdrawals from a common resource could decrease other-regarding behavior and increase self-interest. Their findings suggest that implementing a rule in social dilemma scenarios may encourage the individual to act in self-interest.

Some examples of rule-breaking behavior in social dilemma scenarios that are more related to everyday social life are, for instance, using public transit without paying for the ticket, evading taxes, committing social benefit fraud or insurance fraud, and active line-cutting to get a COVID-19 vaccination earlier. These scenarios are different with respect to the presentation of the choice alternatives. In some of the scenarios, the individual decides whether to cooperate or break the rule by *not contributing* resources to a public good (e. g., not making payments to the tax authority or the provider of public transport) even though it is required by rules or law. In other scenarios, however, the individual decides whether to cooperate or break the rule by *taking* resources from a public good even though there is no legal entitlement (e. g., receiving social benefits or a COVID-19 vaccination; similar applications can be found in Cullis et al., 2015 and Wyszynski, 2020).

In the literature on social dilemma research, the difference between such giving and taking scenarios is often indicated by labeling them "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, for instance, an individual is typically equipped with a certain amount of a particular resource (endowment) and has to decide how much from the endowment they want to give to a joint account shared by a group or collective and how much they want to keep for

themselves. In take-some dilemmas, however, the individual has no or little endowment and has to decide how much to take from a joint account and, consequently, how much to leave in it.

Give-some and take-some dilemmas describe the same situation (i. e., the conflict between individual interest and the interest of the collective) in different ways (see e. g., Dawes, 1980; Molenmaker et al., 2021; Van Lange et al., 2013). The different but objectively equivalent description of the same problem is commonly known as framing (Tversky & Kahneman, 1981). The framing of a social dilemma in either a Give-Some or Take-Some Frame (with both having equivalent outcomes) is typically classified as "goal framing" (Levin et al., 1998). In goal frames, the outcomes or goals of a decision are usually presented either in a positive (e. g., "obtain a gain by doing x") or negative light (e. g., "suffer a loss by not doing x").

Previous research on framing effects in social dilemmas concentrated on the individual willingness to cooperate in give-some (e. g., amounts of a resource contributed to a public good) and take-some dilemmas (e. g., amounts of a resource taken from a public good). Here, findings are mixed. For instance, some studies found 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; Sonnemans et al., 1998), some studies found no or just a small effect (e. g., Aquino et al., 1992; Fosgaard et al., 2017; Rutte et al., 1987; Van Dijk & Wilke, 2000), and still others revealed the opposite effect, i. e., higher cooperation in take-some than in give-some dilemmas (e. g., Brewer & Kramer, 1986; Brown, 2006; Fosgaard et al., 2014; Haesevoets et al., 2019; McCusker & Carnevale, 1995; Molenmaker et al., 2021). It has to be noted that Van Dijk and colleagues additionally distinguished between give-some and keep-some dilemmas as well as between take-some and leave-some dilemmas (Van Dijk & Wilke, 2000; Molenmaker et al., 2021). However, their studies showed no direct impact of the give-some versus keep-some and take-some versus leave-some framing on cooperation.[1] Despite the mixed findings, previous studies overall suggest that framing can influence the willingness to cooperate in social dilemma scenarios.

However, to our knowledge, it has not been investigated so far whether the proportion of cooperating individuals depends on the presentation of a social dilemma in a Give-Some or Take-Some Frame when a rule imposes cooperation.

In the present study, we experimentally investigate the impact of framing on the number of people breaking a rule incorporated in social dilemma scenarios. Typical experimental paradigms for investigating framing effects in the context of social dilemmas are the public goods game for Give-Some Frames and the commons dilemma ("tragedy of the commons"; Hardin, 1968) for Take-Some Frames (for details see Balliet et al., 2009; Dawes, 1980; Dawes et al., 1974; Kollock, 1998). To this end, similar to Cubitt et al. (2011) and Dufwenberg et al. (2011), we study a one-shot resource game that we either frame as a give-some game (similar to the standard public goods game) or take-some game (similar to a commons dilemma game). We use a large group

[1] Van Dijk & Wilke (2000) found an effect by interpreting a one-tailed p-value of .15 as "marginally significant", and Molenmaker et al. (2021) found a significant main effect only for a particular sub-sample.

size as this paper specifically addresses social dilemmas involving many individuals (see examples above). Note that, although classical findings on the effect of group size in social dilemmas have shown mixed results (for a review see, e. g., Brewer & Kramer, 1986), more recent research, however, suggests that cooperation is stable or even increases in larger as compared to smaller groups (Barcelo & Capraro, 2015; Capraro & Barcelo, 2015; Isaac et al., 1994). Into the setup of a one-shot game with large group size, we incorporate a rule that regulates the contributions and withdrawals of the individuals. In particular, the rule prescribes that participants have to give at least or take only a predefined amount of a resource to or from the public good, respectively. Compliance with the rule by all participants will equalize payoffs (described in detail in the following section). In our experiment, participants have to agree to the rule before making their contributions and withdrawals.

Furthermore, it has been shown that behavior in public goods games and commons dilemma games can also depend on the size of endowments ("endowments asymmetry"). For instance, previous studies showed that individuals with higher endowments tend to contribute more in absolute but less in relative terms in public goods games, and they tend to withdraw more in commons dilemma games (see, e. g., Hauser et al., 2019; Nockur et al., 2021; van Dijk & Wilke, 1995; Van Dijk & Wilke, 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 being not cooperative (see, e. g., Reuben & Riedl, 2013; van Dijk & Grodzka, 1992). To investigate the effect of different endowments on rule-breaking behavior, we included them as an additional variable in the current study.

In summary, building upon the empirical and theoretical considerations described above, we derive the following hypotheses. Hypothesis 1: The framing of a rule-regulated social dilemma influences the proportion of rule-breaking behavior. Hypothesis 2: The framing of a rule-regulated social dilemma influences the amounts not given or taken too much, respectively. Hypothesis 3: Different endowments influence the proportion of rule-breaking behavior in rule-regulated give-some and take-some dilemma games.

2 Method

The present study involves an online-experiment with two framing treatments. One frame is presented as a give-some dilemma (i. e., a variant of a public goods game) and the other frame as a take-some dilemma (i. e., a variant of a commons dilemma game). In both dilemmas, all participants belong to one single collective. Each participant has to agree with an externally imposed rule that is designed to establish outcome equality among all participants of the collective. Subsequently, they can decide whether to comply with the rule or to break the rule to their own advantage and at the expense of the collective. Details on the experimental setup

and design are described below. The experiment was conducted online using the online survey software 'questback EFS Survey'.

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

2.1 Participants

Based on an α of .05 and η^2 of .1, a power analysis using the R package 'lmSupport' (Curtin, 2018) suggests 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 next section for details).

The online-experiment was conducted on December 22^{th}, 2020 (give-some dilemma game) and January 6^{th}, 2021 (take-some dilemma game). Participants were invited via MTurk (participants of the give-some dilemma game were excluded from participation in the take-some dilemma game). MTurk workers were not required to meet any additional qualifications to participate. They received a hyperlink that directed to the online-experiment involving the respective framing condition. Participation was possible for both desktop and mobile device users.

In total, 242 MTurk workers (86 female, 156 male) participated in the online-experiment. The mean age was 32.8 years (median: 30, range: 18–65, SD: 9.65; 7 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 divided participants into two groups (one group per frame). For each group, there were two different types of accounts: A *personal account* (PA) for each subject and a shared *joint account* (JA) for each group.

1.) The PA was quasi-randomly equipped with one of five amounts of points (endowments). The endowments varied in relation to a specific reference value of 1,000 points. To justify the existence of the reference value to participants, we defined it as the minimum requirement of points each participant finally needed on their PA to receive a payoff (in addition to the fixed payoff). That is, participants who finished the experiment with less than 1,000 points on their PA just received the fixed amount of \$0.10. However, participants who finished the experiment

with 1,000 points or more on their PA received \$0.002 per point, additionally to the fixed amount. We label this reference point "Need".[2] In the Give-Some (Take-Some) Frame, we selected the following five endowments: 1,200 (800), 1,400 (600), 1,600 (400), 1,800 (200), or 2,000 (0) points. Note that the absolute difference between the endowments and the Need was equivalent between the frames (i. e., 200, 400, 600, 800, and 1,000 points).

2.) The JA was shared by all participants of a group. At the end of the experiment, the JA was distributed equally among participants who met the Need on their PA (i. e., finishing with at least 1,000 points). The portion received from the JA was added to the PA.

Moreover, we imposed a *rule* stipulating that each participant must give the number of points that exceeds the Need on their PA to the JA (Give-Some Frame) or take only the number of points from the JA required to meet the Need on their PA (Take-Some Frame), respectively. Provided that all participants follow the rule, they receive equal payoffs. Breaking the rule, however, would benefit the individual participant (receives higher payoff) but harm the collective (other participants receive lower payoffs). For example, in the Give-Some Frame (Take-Some Frame), a participant with an endowment of 1,400 (600) points on their PA has to give (is allowed to take) 400 points to (from) the JA. Giving fewer points (taking more points) means breaking the rule; giving more points (taking fewer points) means not meeting the Need and, consequently, not receiving a portion from the JA.

For a group of 100 participants in the *Give-Some Frame*, the JA had an initial balance of 0 points. Provided that all participants be compliant with the rule, the final balance of the JA would be 60,000 points (the sum of expected contributions from all 100 participants).

In the *Take-Some Frame*, participants were allowed to *take* points from the JA shared by the group of 100 participants. We determined the initial balance of the JA according to the following rationale: Provided that all participants are compliant with the rule and thus, take only the number of points required to meet the Need, they would take in sum 60,000 points from the JA (the sum of expected withdrawals from all 100 participants). To end up with the identical expected final balance of the JA as in the Give-Some Frame (i. e., 60,000 points), we initially equipped the JA of the Take-Some Frame with 120,000 points.

2.3 Procedure

Participants were first introduced to the general conditions and parameters for participation. After answering some questions about their personal information (i. e., age, sex, household income, number of people in household, and current employment status), the experiment's instructions were displayed. The instructions differed with respect to the framing and initial endowment. For the Give-Some Frame, participants received the following instructions (example for a participant with a PA equipped with an initial endowment of 1,400 points):

[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).

"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."

Instructions in the Take-Some Frame were as follows (example for a participant with a PA equipped with an initial endowment of 600 points):

"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."

To make sure that participants have understood the instructions, the subsequent page displayed a summary of the instructions (see Appendix A) as well as three different statements that described essential aspects of the experiment with only one of them being correct. Participants had to choose the correct statement to continue the experiment. Two incorrect responses led to immediate termination of participation.

On the following 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 Frame; 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 Frame). 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 intended to give or take, respectively.

The page including the input field displays the following components: the individual endowment (e. g., "You have 1,400 points"), a question for contribution/withdrawal ("How many points will you give to the community account?" for the Give-Some Frame; "How many points will you take from the community account?" for the Take-Some Frame), 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 (see Appendix A). Participants could enter any number with a maximum of four digits. However, participants who entered a number higher than 1,200 were directed to an extra page. There they were asked to replace their initial input with a number lower or equal to 1,200 points. This was done to prevent the JA in the Take-Some Frame from running dry. This mechanism was implemented in both frames to maintain equality between the frames.

Finally, participants got a summary of the points contributed/withdrawn, and they needed to enter their MTurk ID (necessary for the bonus payoff). They were reminded that the responses of all participants needed to be evaluated in order to calculate the final payouts, which could take 7 to 10 days from participation.

We performed a test run and discussed the procedure and the instructions of the experiment with 33 students of an experimental philosophy lecture at the University of Oldenburg. Addi-

[3]Note that it was also possible to enter "0". The wording of this particular instruction was inadvertently partially inaccurate. In the Take-Some (Give-Some) Frame, n=3 (n=1) entered "0", and n=3 (n=0) entered "1". 1 is the smallest positive integer.

tionally, we pretested the experiment with 48 participants using the online survey manager tool SurveyCircle (https://www.surveycircle.com/).

2.4 Statistical analysis

We evaluated data using descriptive statistics, t-tests, and logistic regression analysis. In particular, we analyzed the effect of framing on the proportion of rule-breaking behavior (hypothesis 1) and the amounts not given/taken to much (hypothesis 2) using t-tests. To test whether different endowments influence the proportion of rule-breaking behavior in give-some and take-some games (hypothesis 3), we performed logistic regression analysis involving the proportions of rule-breaking behavior as the dependent variable, and different endowments and framing as independent variables.

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

2.5 Results

Of the 242 participants, 40 did not finish the experiment (1 early dropout, 39 attention test failures). Four persons participated twice. However, for these double participations, the number of points given or taken were identical or very similar in three 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.[4]

Participants gave on average 584.5 points in the Give-Some Frame, and took on average 663.4 points in the Take-Some Frame. 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 Frame; 1,530, 1,500, and 1,500 in the Take-Some Frame).

To test whether the framing of the social dilemma influenced the proportion of rule-breaking behavior (hypothesis 1), we first compared the actual number of points given (Give-Some Frame) or taken (Take-Some Frame) 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 Frame, the mean of the endowments of all 101 participants was subtracted by the Need (1,000 points). For the Take-Some frame, the Need was subtracted by the mean of endowments of all 101 participants. That is the absolute value of the difference between the mean of the endowments and Need. The

[4]The sample size is larger than determined (n=202 instead of n=200), because the last HIT in each frame was performed simultaneously by two MTurkers.

expected values were 621.8 points in the Give-Some Frame and 586.1 points in the Take-Some Frame. A two-sided one-sample t-test revealed a significant difference between the expected and the actual number of points taken/given for the Take-Some Frame (t=2.12, df=100, p=.037) but not for the Give-Some Frame (t=−.9, df=100, p=.351). That is, overall, participants took more points from the JA in the Take-Some Frame than they would if all participants had followed the rule suggesting a significant proportion of rule-breaking behavior in this frame.

We then analyzed the difference in the proportion of rule-breaking behavior between the Give-Some Frame and the Take-Some Frame in more detail. Recall that according to the rule, participants were allowed to have at most 1,000 points on their PA after contribution or withdrawal, 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 and the Take-Some Frame after contribution or withdrawal, respectively. The distribution suggests three behavior patterns of the participants: 1.) Breaking the rule and ending up with more than 1,000 points on the PA (labeled as "rule-breaking behavior" in the following), 2.) following the rule and ending up with at most 1,000 points (labeled as "compliant behavior"), and 3.) following the rule and ending 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.

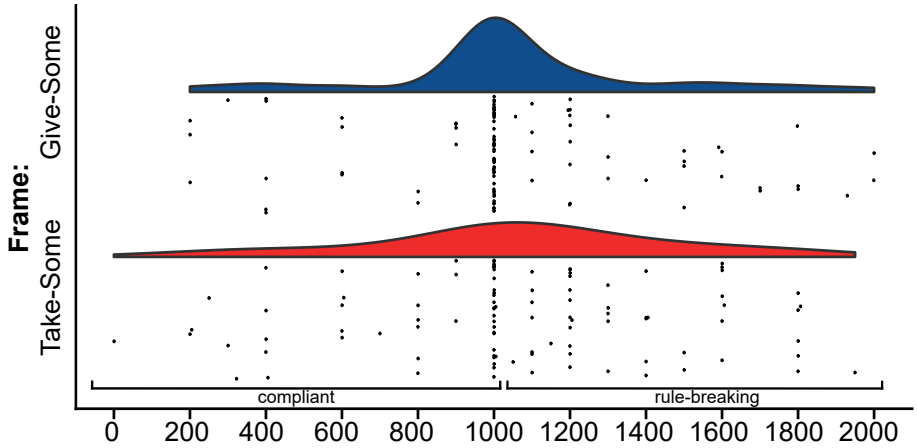

Figure 1. Estimated distribution curves of the final number of remaining points in the participants' PAs for each frame. The dots represent raw data with each dot indicating the number of points remaining on the PA of one participant.

Of the 101 participants in the Give-Some Frame, 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 21 (20.8% of all participants in the Give-Some Frame) showed altruistic behavior (i. e., giving more points than required by the rule).

Of the 101 participants in the Take-Some Frame, 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 (51.5%) from which 26 (25.7% of all participants in the Take-Some Frame) 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. Two-sided independent samples t-tests of proportions revealed that the proportion of rule-breaking behavior was higher in the Take-Some Frame than in the Give-Some Frame (t=2.46, df=199, p=.015). Consequently, compliant behavior was observed more often in the Give-Some Frame than in the Take-Some Frame. The proportion of "altruistic" behavior was not significantly different between the frames (t=.83, df=199, p=.408).

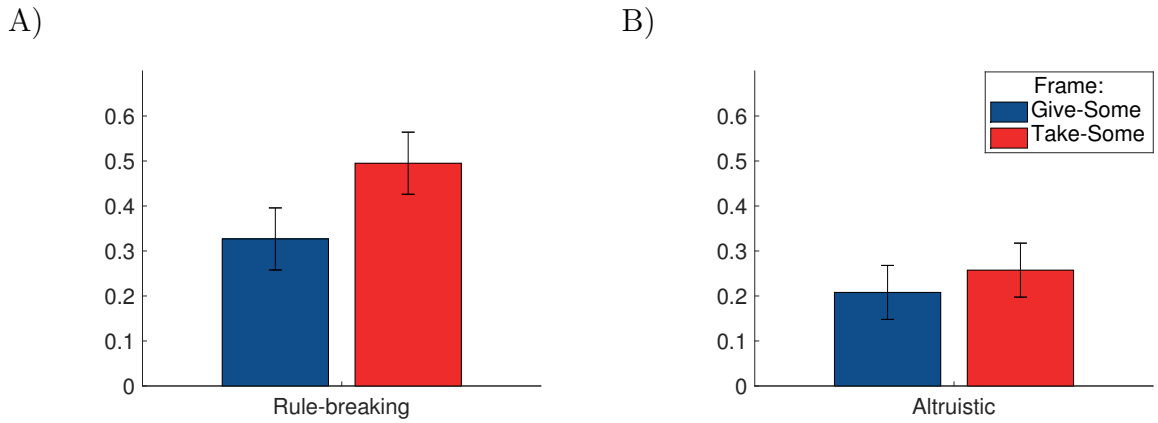

Figure 2. Proportions of rule-breaking (A) and altruistic (B) behavior per frame. Error bars indicate 95% confidence intervals. Note that "altruistic behavior" is a subset of "compliant behavior".

We tested our second hypothesis by comparing the average number of points not given in the Give-Some Frame with the average number of points taken too much in the Take-Some Frame. The test involved only participants who broke the rule. A two-sided two samples t-test revealed no differences between the average number of points not given (386.2 points) and the average number of points taken too much (426.3 points; t=−.63, df=65.72, p=.529), contradicting our second hypothesis.

The logistic regression analysis (Table 1, main effects model) showed that the different endowments had no impact on the proportion of rule-breaking individuals. Not surprisingly, the model further indicates a significant framing effect supporting the results of the independent samples t-test of proportions (see above).

Table 1
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
Frame(TS)	.689	.296	2.331	.020*	−1.059	.703	−1.508	.132
Frame(TS)×E_1					3.401	1.041	3.268	.001**
Frame(TS)×E_2					2.277	.973	2.340	.019*
Frame(TS)×E_3					1.615	.960	1.683	.092
Frame(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); Frame(TS)= Take-Some Frame (reference category: Give-Some Frame); n=202 participants. Significance codes: * p<.05, ** p<.01.

As an additional examination, we exploratory analyzed whether endowments influenced rule-breaking behavior differently in the two frames. Endowment effects may have been canceled out due to the specific response behavior in different frames. We performed logistic regression analysis involving the identical variables as in the main-effects model, and we additionally included two-way interactions between framing and endowments. The interactions model revealed significant interaction effects between framing and an endowment of 1,800/200 points, as well as between framing and an endowment of 1,600/400 points (Table 1). Significant interaction effects indicate that the effect of endowments on rule-breaking behavior depends on the framing of the social dilemma. As a post-hoc test, we grouped our sample into two sub-samples, i. e., one sub-sample per frame, and analyzed the impact of endowments separately for each sub-sample (see Appendix B). The post-hoc test showed that different endowments influenced the proportion of rule-breaking behavior in the Take-Some Frame: Proportions were significantly higher for endowments of 600 and 800 points (57% and 80%, respectively) as compared to an endowment of 0 points (21%). In the Give-Some Frame, however, no relationship between endowments and rule-breaking behavior was found. The conditional proportions of rule-breaking behavior and the average points given/taken for each endowment and frame are found in Appendix C.

A further regression analysis showed no indication for an influence of age, sex, income per person in one household, and the employment status on the proportion of rule-breaking behavior (see Appendix D).

3 Discussion and Conclusion

Previous research has shown that decisions in social dilemmas can depend on the framing as give-some or take-some dilemmas (e. g., Andreoni, 1995; Aquino et al., 1992; Brewer & Kramer, 1986; Brown, 2006; Cox, 2015; Cubitt et al., 2011; De Dreu & McCusker, 1997; Dufwenberg et al., 2011; Fosgaard et al., 2014, 2017; Haesevoets et al., 2019; McCusker & Carnevale, 1995; Sonnemans et al., 1998). Most of these studies concentrated on the effect of framing on the individual willingness to cooperate. In the typical setup, it is left to individuals to decide whether to cooperate (and to what extent) or not. However, in the current study, we investigated the impact of framing on rule-breaking behavior in rule-regulated social dilemmas where cooperation is prescribed by an externally imposed rule.

Our findings support previous research showing a relatively high proportion of people violating rules in different social dilemma scenarios (e. g., Castillo et al., 2011; Janssen et al., 2012, 2013). Furthermore, the current study demonstrates that framing influences the proportion of rule-breaking behavior in rule-regulated social dilemmas. We observed a significantly higher number of participants who broke the rule in the Take-Some Frame than in the Give-Some Frame. That is, rule-breaking behavior might occur more often in social dilemma situations in which an individual is allowed to receive a particular amount of a resource from a common good (such as receiving social benefits or a vaccine against the COVID-19) as compared to situations in which an individual must contribute to a common good (such as buying a ticket for public transport or paying taxes). Note that framing is just one of many fragments that may explain the differences in the proportion of rule-breaking behavior for the given real-life examples. Other possible factors that were not part of the current study but are mentioned in the literature are, for instance, need, greed and opportunity, and income dissatisfaction in the context of benefit fraud (see, e. g., Lamnek et al., 2000; Schäfer, 2002; Tunley, 2011) or subjective justice perception, moral values, and individual utility maximization in context of tax evasion (see, e. g., Dornstein, 1987; Fetchenhauer, 1999; Spicer et al., 1976). In addition, threat of punishment in case of rule-breaking behavior (Morgan et al., 2019) as well as interactions between individuals such as "collective rule-breaking" (Deguchi, 2014, 2018; Krause et al., 2021) may also play a role in this context. For instance, the decision to break the rules in social dilemma scenarios may depend on the other individuals' actions.

Furthermore, we unexpectedly found a relatively high number of altruistic behavior. In the Give-Some Frame, roughly a fifth of the participants gave more points than necessary, and in the Take-Some Frame, a quarter of the participants took fewer points than needed. This difference was not statistically significant. In both frames, the consequence of altruistic behavior was excluding the participant from allocating the common good due to not meeting the Need. As mentioned, we cannot provide any information about the reasons or motives behind this "self-sacrificing" behavior.

As defined in the current study, compliant (including altruistic) behavior could be interpreted as cooperative behavior in rule-regulated social dilemmas; rule-breaking behavior, however, is non-cooperative (self-serving). Accordingly, our findings support 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; Sonnemans et al., 1998) and it contradicts studies that found the opposite or no effect (e. g., Aquino et al., 1992; Brewer & Kramer, 1986; Brown, 2006; Fosgaard et al., 2014, 2017; Haesevoets et al., 2019; McCusker & Carnevale, 1995; Molenmaker et al., 2021; Rutte et al., 1987; Van Dijk & Wilke, 2000).

Several explanations for the effect of framing on cooperation in social dilemmas have been provided by previous research. For instance, goal framing effects are often accounted for by prospect theory (Kahneman & Tversky, 1979) that considers losses to loom larger than gains. This approach has been applied on the framing of social dilemmas by interpreting the give-some dilemma as loss-frame and the take-some dilemma as gain-frame (e. g., Brewer & Kramer, 1986; De Dreu & McCusker, 1997; McCusker & Carnevale, 1995; Rutte et al., 1987). In such interpretations, the framing effect is often considered as manifested in individual preferences (Fosgaard et al., 2017). However, our results showed that individuals broke the rule more frequently in the gain-frame than in the loss-frame, suggesting gains to loom larger than losses in our study. That is, rule-breaking behavior in social dilemmas does not seem to be described well by prospect theory. Possible alternative explanations are individual dispositions, beliefs, considerations of appropriateness, or value orientations of the participants (e. g., Balliet et al., 2009; Dufwenberg et al., 2011; Molenmaker et al., 2021; Sonnemans et al., 1998). Fosgaard et al. (2017) further suggest that the effect of framing on cooperation in social dilemmas could be based on the misperception of the decision problem (i. e., incorrect understanding of the best strategy to increase the outcome of the collective) in at least one of the frames. Note that, to avoid any possibility of confusion, we provided clear advice in the instructions for the participants in the current study, and we thoroughly pretested the experiment for comprehensibility. It was further checked whether participants had understood the instructions to minimize the frequency of misperception.

It has to be noted that additionally to the framing manipulation, a crucial difference between the frames of the current study is the neediness status of the participants. In the Take-Some Frame, participants are in need, i. e., they suffer a lack of a resource that is indispensable for receiving a portion from the common good (Need). In the Give-Some Frame, 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 also influence rule-breaking behavior in give-some and take-some dilemmas.

According to our second hypothesis, we expected that the amounts not given and the amounts taken too much depend on the framing. However, despite the higher number of rule-breaking individuals in the Take-Some than in the Give-Some Frame, the amounts not given or taken too

much were not different between the frames. 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. For instance, recent research has shown that a need defined similarly as in the current study can serve as a reference point in various decision making scenarios and also moderate framing effects (see, e. g., Bauer, 2019; Bauer et al., 2020; Diederich et al., 2020; Weiß et al., 2017; Wyszynski et al., 2020).

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 Frame but not in the Give-Some Frame. Participants with higher endowments, i. e., a smaller difference to the Need, showed rule-breaking behavior more often than participants equipped with no endowment, i. e., maximum difference to the Need. That is, we observed a higher proportion of rule-breaking behavior among those who needed less as compared to those who needed more. This is an interesting result that leaves much room for speculation. Additional research is required for an adequate interpretation of this particular finding.

To conclude, our study shows that framing rule-regulated social dilemmas as Give-Some Frame or a Take-Some Frame can influence the proportion of participants breaking the rule. Additionally, our results suggest that the size of endowments plays a role in the decision to break the rules in the Take-Some Frame but not in Give-Some Frame. Moreover, although more participants broke the rule in the Take-Some Frame than in the Give-Some Frame, the amounts not given/taken too much to/from the public good were not different between the frames.

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A Appendix: Instructions summary

Give-Some Frame:

- Your personal account is equipped with 1400 points.
- The balance of the community account is initially 0 points.
- Each community member should only keep 1000 points and give the rest of the points to the community account.
- The community account will eventually be shared equally among all community members, who have at least 1000 points in the personal account.
- Your portion from the community account will be added to the points remaining in your personal account.
- Thus, all community members would finally receive the same amount of points.

Take-Some Frame:

- Your personal account is equipped with 600 points.
- The balance of the community account is initially 120000 points.
- Each community member is allowed to take as many points as needed to have 1000 points on her/his personal account.
- The community account will eventually be shared equally among all community members, who have at least 1000 points in the personal account.
- Your portion from the community account will be added to the points you have in your personal account.
- Thus, all community members would finally receive the same amount of points.

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

Table B1
Logistic regression: Proportion of rule-breaking behavior depending on endowment sizes separately for each frame.

Coefficients:	Give-Some Frame				Take-Some Frame			
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.

C Appendix: Conditional proportions and average points given/taken

Table C1
Conditional proportions: rule-breaking behaviour and average points given/taken as a function of framing and endowments.

	Give-Some Frame				Take-Some Frame			
Endowment	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. = number of points given on average (Give-Some Frame), number of points taken on average (Take-Some Frame).

D Appendix: Regression analysis of covariates

Table D1
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 ⩽35hrs/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), employment status (working more than 35hrs/week).

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