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An exploration of the motivational basis of take-some and give-some games

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Abstract

Surprisingly little research has investigated the particular motives that underlie choice behavior in social dilemma situations. The main aim of the present research was to ask whether behavior in take-some games (such as the multiple-person Commons Dilemma Game and the two-person Bandit Game) and give-some games (such as the multiple-person Public Goods Dilemma Game and the two-person Dictator Game) is differently affected by proself and prosocial motives. Two experimental studies were conducted. Our first experiment used a trait-based assessment of the motives, whereas in our second experiment the motives were measured as state variables. The results of both experiments revealed that proself and prosocial motives did not explain much difference between taking and giving when comparing the Commons Dilemma Game and the Public Goods Dilemma Game. Yet, our second experiment revealed that these motives did differentiate choices in the Bandit Game and the Dictator Game. More specifically, prosocial motives are more strongly related to giving behavior in the Dictator Game than to taking behavior in the Bandit Game. As such, it can be concluded that in dyadic games (but not in multiple-person games) prosocial motives (but not proself motives) predict choice behavior in a game-specific way.

Keywords: take-some games, give-some games, choice framing, trait and state motivations, interdependence

1 Introduction

Social dilemmas are mixed-motive situations that confront people with a conflict between individual and collective interests: For each individual it is more profitable to act selfishly, but such behavior harms the collective (Dawes, 1980; Messick & Brewer, 1983). Weber, Kopelman and Messick (2004) aptly noted that "social dilemmas are everywhere" (p. 281). Indeed, it is difficult to imagine an aspect of social life that is not characterized by conflicting interests in terms of self-versus-other concerns. Typical examples of mixed-motive situations include the conservation of natural resources and volunteering behaviors. In order to be able to investigate social dilemmas empirically, researchers have modeled mixed-motive situations into a range of different mixed-motive games. In these games, people must choose between cooperation and defection, thereby benefiting either their own interests or those of the collective (for overviews, see Kollock, 1998; Komorita & Parks, 1995; Van Lange, Joireman, Parks & Van Dijk, 2013).

The two main experimental paradigms used to investigate choice behavior in mixed-motive situations are the Commons Dilemma Game and the Public Goods Dilemma Game (Rutte, Wilke & Messick, 1987; Van Dijk & Wilke, 1995, 2000). These two games are usually employed as models for the study of take-some and give-some dilemmas, respectively. In the Commons Dilemma Game, multiple players share a limited common resource pool from which everyone may *take* as many endowments as he or she wants. The potential danger is overuse, because the common good is in limited supply. It is thus in each player's best interest to take as much as possible, but if the players collectively harvest too much, the common resource will be depleted and eventually get lost. Typical real-life examples of the Commons Dilemma Game concern the conservation of natural resources like water and clean air. The Public Goods Dilemma Game concerns a situation in which multiple players must choose between *giving* resources towards a public good from which all may benefit, or withholding them for private use. Players earn the most when they give nothing and profit from the donations of others (i.e., free riding). However, if players collectively give too little, the public good will cease to exist. Collective services provided by the government through taxation — such as public television, public roads, and national defense — can be seen as typical real-life examples of the Public Goods Dilemma Game.

A number of prior studies has examined the differences

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between Commons Dilemma Games and Public Goods Dilemma Games (e.g., Au & Budescu, 1999; De Dreu & McCusker, 1997; McCarter, Budescu & Scheffran, 2011; Poppe & Zwikker, 1996; Rutte et al., 1987; Van Dijk & Wilke, 1995, 2000). Most of this previous work has focused on when, and how, choice behavior alters if a game with the same payoff structure is framed as either a take-some or a give-some game. Yet, surprisingly little research has investigated how taking or giving impacts the motivational structure that underlies these games. Do both games capture the same motivational conflict? Or does the nature of their decisions alter how influential selfish and prosocial motives are? To illuminate these questions, the present research examines the motivational differences between take-some and give-some games.

1.1 Differential Motives Underlying Choice Behavior in Take-Some and Give-Some Games

Some prior studies have started to investigate the uniqueness and comparability of different mixed-motive games by exploring behavioral consistency levels across and within games. Because all mixed-motive games refer to a similar conflict in terms of selfish and other-related concerns (Messick & Brewer, 1983; Weber et al., 2004), a certain degree of behavioral consistency across different mixed-motive games can be expected. However, previous research has found rather weak associations between behaviors across games (e.g., Haesevoets, Reinders Folmer & Van Hiel, 2015), and these associations were clearly weaker than the relationships which typically emerge between behaviors in repeated versions of the same game (e.g., Haesevoets, Reinders Folmer, Bostyn & Van Hiel, 2018). These findings thus suggest that, although the self-other conflict is at the core of each mixed-motive game, there may also be considerable differences among mixed-motive games; and these differences may possibly even overshadow the games' common ground (see Pruitt & Kimmel, 1977; Van Lange et al., 2013).

Why might people make more consistent decisions in different versions of the same mixed-motive game than across different games? In response to this question, we suggest that games that involve taking and games that involve giving might be differently affected by proself and prosocial motives, thus undermining behavioral consistency across these two types of games. More specifically, we argue that, although each mixed-motive game brings the conflict between selfish interests and concern for others to the fore, the relative weight of these two conflicting motivational dimensions (proself and prosocial) might actually differ across different games. That is, in some games, behavior might be more strongly driven by the proself dimension; whereas in other games, behavior might be more strongly driven by the prosocial dimension. This reasoning is in line with the slot-machine model of interpersonal orientation of Van Lange, De Cremer, Van Vugt and Van Dijk (2007), which assumes that situational differences can alter the weight that people assign to their own interests and the interests of others.

Which motivational dimension (proself or prosocial) might be activated most strongly by games that involve taking behavior and by games that involve giving behavior? Take-some games concern decisions to harvest resources from a collectively owned resource pool. In this vein, Fleishman (1988, p. 176) has argued that "people might view the act of taking as ethically improper or exploitative." As such, the defective behavior of taking many resources can be interpreted as a typical manifestation of a selfish act. Because of this, we expect that behavior in take-some games will be most strongly affected by proself motives. Give-some games, on the other hand, concern decisions to contribute personally owned resources to a public good. And, it has been argued that "people may view the act of giving as inherently positive, as an altruistic, morally desirable act" (Fleishman, 1988, p. 176). In a giving context, cooperative behavior (i.e., giving many resources) can be seen as a typical prosocial act. Therefore, we expect that in give-some games behavior will be most strongly affected by prosocial motives. Taken together, we thus expect that taking will be more strongly driven by proself motives, whereas giving will be more strongly driven by prosocial motives (also see Rutte et al., 1987; Van Dijk & Wilke, 1995, 2000).

1.2 The Present Studies

To explore these predictions, we examined the association between proself and prosocial motives and decisions in the Commons Dilemma Game and the Public Goods Dilemma Game (Experiment 1), as well as in other games that involve taking or giving (Experiment 2).

In Experiment 1, motives underlying choice behavior were measured as trait variables. Doing so removes the need to solicit them repeatedly, and, moreover, is in line with prior research that suggests that individuals' orientation on these motivations represent enduring personality characteristics (Kuhlman & Marshello, 1975; Liebrand, 1984; Messick & McClintock, 1968). In Experiment 2 we shifted towards a state-based approach, in which the motives were assessed in relationship with the task itself. That is, after each game, we asked participants to answer some questions about their decision. These questions assessed the extent in which each motive played a role in participants' decision.

In both experiments, we solicited a wide range of motives that have been linked to choice behavior in mixed-motive games in recent theorizing (i.e., the conceptual motivational model of Thielmann, Böhm & Hilbig, 2015) or research (i.e., the empirical study on within-game behavioral consistency of Haesevoets et al., 2018). Critically, instead of pitting

these motivations against each other in hypothetical decisions (which has previously been done in measures of Social Value Orientation; e.g., Murphy, Ackermann & Handgraaf, 2011; Van Lange, 1999), we measured each motive with a separate questionnaire. As *prosocial* motives, we included fairness (which is characterized by the desire to reach equality in outcomes), altruism (which reflects the motivation to maximize the benefit of others, regardless of the outcome for oneself), concern for others (which refers to the extent individuals are concerned with the interests of others), and social welfare concerns (which comprises the preference for maximizing the welfare of the collective). As *proself* motives, we included greed (which mirrors the motivation to maximize one's own outcome), competitiveness (which reflects the desire to maximize one's relative advantage over the outcome of others), and entitlement (which reflects the belief that one deserves preferential treatment). In addition to these prosocial and proself motives, in our first experiment we also included two *fear-related* motives, namely, fear (which consists of uncertainty about other people's intentions) and risk aversion (which reflects a preference for a guaranteed outcome over a probabilistic one).

2 Experiment 1

2.1 Method

2.1.1 Sample and Procedure

A sample of 225 undergraduate students of a Belgian University participated in this study in exchange for partial fulfillment of course credit for a Social Psychology course (i.e., students could earn a total of 20 points for this course; participation in the experiment counted for 1 point). Participants were invited to the laboratory in groups of 35 to 45 persons. Participants were seated in a large room, each on a separate desk in front of a computer. During the experimental session, participants played 16 games. First, they played eight variants of the Commons Dilemma Game, followed by eight variants of the Public Goods Dilemma Game.[1] We used such game repetitions to obtain a more stable behavioral index for each game type. Participants were told that they would interact with each interaction partner only once. In reality, however, participants were not directly connected to each other during the study, but were randomly paired at the end of the experimental session, and paid according to the outcome that resulted from each player's decision in one randomly selected game variant.[2] To avoid that participants' decisions would be influenced by the choices of the other players, no feedback on the other players' decisions was provided during the experiment. In the week after the experimental session, participants were asked to complete an online survey, in which the motivational traits were measured.[3] Participants were required to complete both the experimental session and the online survey in order to receive their course credit. Forty-four participants were excluded from the analyses because they failed to answer our check questions correctly, and an additional three participants because they did not complete the online survey.[4] As such, our final sample consisted of 178 participants (19.7% men, M_{age} = 18.55, SD = 1.97).

2.1.2 Mixed-Motive Games

Commons Dilemma Game. Participants were first presented with the Commons Dilemma Game (Hardin, 1968). In this game, four players had to simultaneously decide how many resources they wanted to *take* from a group resource. In order to create eight different variants of this take-some game, the endowment size of the group resource (low vs. high) and the magnitude of the multiplier (low vs. medium vs. high vs. very high) were orthogonally manipulated (see Table 1). In the high endowment condition, the resource pool from which participants could harvest consisted of double the resources as in the low endowment condition. In the low multiplier condition, participants were told that the endowments that were not taken by the players would to be multiplied by factor 1.5. The multiplication factor was 2 in the medium multiplier condition, 2.5 in the high multiplier condition, and 3 in the very high multiplier condition. The participants were informed that the resulting resources (after multiplication) would we divided equally among the four players, regardless of how many chips they took.

Public Goods Dilemma Game. Next, participants were presented with the Public Goods Dilemma Game (Allison & Kerr, 1994; Olson, 1965), in which four players had to simultaneously decide how many of their individually owned

[1] We also included eight Prisoner's Dilemma Games in our first experiment. The data of these games are not included in the present manuscript for two reasons. First, to create eight different versions of the Prisoner's Dilemma Game, we could not manipulate the same variables as those manipulated to create the different versions of the Commons Dilemma Game and Public Goods Dilemma Game. Secondly, the decision that participants had to make in the Prisoner's Dilemma Game did not consist of either taking behavior or giving behavior. We plan to use the data of the Prisoner's Dilemma Games in another manuscript that deals with real-life prosocial behavior.

[2] When the experiment was finished, participants were asked whether they wanted to keep their earnings or donate their earnings to a noble cause. Of all participants, 94% indicated that they wanted to donate their money to a charity.

[3] This online survey also measured Social Value Orientation, Right-Wing Authoritarianism, Social Dominance Orientation, and dispositional trust, but these data are not used in the present paper. We plan to use these personality data in another manuscript.

[4] In each part of the study, participants had to answer some check questions. Participants who were unable to answer — in each part of the study — at least $n - 1$ (i.e., the number of checks minus one) check questions correctly were excluded from further analyses. More information on these check questions is provided on our OSF webpage (https://osf.io/jrqxb).

TABLE 1: Overview of the game variants and descriptive statistics of the game behaviors (Experiment 1).

	Endowment size	Multiplication factor	Commons Dilemma (taking-behavior)		Public Goods Dilemma (giving-behavior)	
			M	*SD*	*M*	*SD*
Game variant 1: low endowment x low multiplication factor	20	1.5	8.31	7.02	8.22	6.63
Game variant 2: low endowment x medium multiplication factor	20	2	6.39	6.39	9.92	6.17
Game variant 3: low endowment x high multiplication factor	20	2.5	5.38	5.35	11.46	5.97
Game variant 4: low endowment x very high multiplication factor	20	3	5.30	5.51	12.98	6.11
Game variant 5: high endowment x low multiplication factor	40	1.5	14.93	13.78	15.72	12.96
Game variant 6: high endowment x medium multiplication factor	40	2	11.84	11.55	20.30	11.89
Game variant 7: high endowment x high multiplication factor	40	2.5	12.30	12.13	22.24	11.79
Game variant 8: high endowment x very high multiplication factor	40	3	11.84	12.66	24.03	12.52
Total (sum of the eight game variants)	**240**	**-**	**76.30**	**61.68**	**124.87**	**65.76**

Note. $N = 178$. The endowment size manipulation reflects how many resources the participants could maximally take (in the Commons Dilemma Game) or give (in the Public Goods Dilemma Game). The multiplication factor manipulation reflects with which number the remaining resources (in the Commons Dilemma Game) or the given resources (in the Public Goods Dilemma Game) were multiplied.

resources they wanted to *give* to the group resource. Here too, eight game variants were created by orthogonally manipulating the endowment size and the magnitude of the multiplier (see Table 1). In the high endowment condition, participants' individual resources at the start of the game were double to that in the low endowment condition. Endowments that were given to the collective good were said to be multiplied by a multiplication factor of 1.5 (low multiplier), 2 (medium multiplier), 2.5 (high multiplier), or 3 (very high multiplier). The resulting resources (after multiplication) were said to be divided equally among the four players (regardless of how many chips they gave).

2.1.3 Motivational Traits

The online survey measured individual differences in the following motivational traits: Fairness, altruism, social welfare concerns, concern for others, greed, competitiveness, entitlement, fear, and risk aversion. It was administered one week after the experimental session took place. Table 2 presents an overview of the scales that were employed to measure these trait motivations; the full item list is included in Appendix A.

2.2 Results

2.2.1 Game Data

The means and standard deviations of the game behaviors can be found in Table 1. Across the eight Commons Dilemma Games, participants *took* on average 76 resources from the group resource (and thus left 164 in the common pool). Across the eight Public Goods Dilemma Games, participants *gave* on average 125 resources to the group resource (and thus kept 115 for themselves). These findings indicate that participants acted more cooperatively in the Commons Dilemma Game than in the Public Goods Dilemma Game (i.e., they left more resources in the Commons Dilemma Games than that they gave in the Public Goods Dilemma Games).

Manipulation of game features. We subsequently asked whether our manipulations of the game features affected choice behavior. To do so, we conducted a 2 (game type: commons vs. public good) × 2 (endowment size: low vs. high) × 4 (multiplier: low vs. medium vs. high vs. very high) repeated measures analysis of variance (ANOVA), with all

TABLE 2: Overview of the motivational trait scales (Experiment 1).

Motive	Scale (developed by / based on)	# of items	*M*	*SD*	α
Fairness	Fairness Attribution Scale (Van Hiel, Vanneste & De Cremer, 2008)	5	6.05	0.77	.87
Altruism	MaxOther Scale (Tazelaar, Van Lange & Ouwerkerk, 2004)	3	4.27	1.12	.90
Social Welfare Concerns	Social Welfare Concerns Scale (Haesevoets, Reinders Folmer, Bostyn & Van Hiel, 2018)	4	5.51	1.02	.92
Concern for Others	Concern for Others Scale (Selenta & Lord, 2005)	5	5.98	0.67	.79
Greed	Dispositional Greed Scale (Krekels & Pandelaere, 2015)	6	3.17	1.15	.88
Competitiveness	Competitive Scale (Xie, Yu, Chen & Chen, 2006)	10	3.58	1.04	.86
Entitlement	Psychological Entitlement Scale (Campbell, Bonacci, Shelton, Exline & Bushman, 2004)	9	2.23	0.88	.85
Fear	Fear Attribution Scale (Van Hiel, Vanneste & De Cremer, 2008)	9	3.69	1.32	.93
Risk Aversion	General Risk Aversion Scale (Mandrik & Bao, 2005)	6	4.22	0.92	.74

Note. $N = 178$. The motivational traits were all measured using seven-point Likert scales ranging from (1) *strongly disagree* to (7) *strongly agree*. The attribution scales were slightly adapted in order to measure individual differences in the relevant motivational trait.

factors being within-participant. The results of this analysis showed that the three main effects, the three two-way interactions, and the three-way interaction were all highly significant (all Fs ≥ 4.98, ps $< .003$). These findings imply that the game type, the size of the endowments, and the magnitude of the multiplication factor all have a significant influence on participants' choices — which indicates that our manipulations were indeed successful for inducing variations in choice behavior.

Factor structure of the games. We conducted a factor analysis (Principal Axis Factoring) to investigate if the two games load on different underlying factors. Two factors were extracted from the inter-correlations among the scores on the 16 game behaviors: The eight Public Goods Dilemma Games loaded on a first factor (initial eigenvalue = 8.98; after rotation = 7.57), whereas the eight Commons Dilemma Games constituted a second factor (initial eigenvalue = 2.73; after rotation = 6.99). Most importantly, the primary factor loadings were all larger than .72, while the cross-loadings were all smaller than |.09|; indicating a clean factor structure.

The results of this factor analysis hence indicate that choice behavior is particularly contingent on the type of decision that has to be made (take or give). Accordingly, we created an index score for choice behavior in either game, by aggregating participants' (standardized) scores in the eight game variants. We reversed the scores of the Commons Dilemma Game index, so that the two game indices both pointed in the same direction. We used these created index scores as our measure of choice behavior in our subsequent analyses.[5]

[5]For both games, the extracted factor score and the created index score were almost perfectly correlated (Commons Dilemma Game: $r = .996$ and Public Goods Dilemma Game: $r = .996$; both ps $< .001$). Moreover, the correlation between the two created index scores was also rather high ($r = .53$, $p < .001$).

2.2.2 Motivational Data

Reduction of the motivations. Table 3 shows the correlation matrix of the motivational traits. To reduce these motivations to a limited number of indicators of the underlying motivational conflict, we conducted a factor analysis (again using the Principal Axis Factoring method) to extract underlying factors form the inter-correlations among the motivational items. Three motivational factors were extracted; Appendix B shows their factor loadings after Oblimin rotation. The first extracted factor (initial eigenvalue = 9.86; after rotation = 7.40) consisted of four of the six greed items, the ten competiveness items, and the nine entitlement items; hence, we labeled this the *proself* motivational factor. The second factor (initial eigenvalue = 8.03; after rotation = 7.40) consisted of the nine fear items and five of the six risk aversion items; thus, we labelled it the *fearful* motivational factor. Finally, the third factor (initial eigenvalue = 4.48; after rotation = 7.42) included the five fairness items, the three altruism items, the four social welfare concerns items, and the five concern for others items; accordingly, it was labeled the *prosocial* motivational factor. Note that two greed items (items 5 and 6) and one risk aversion item (item 5) had their primarily loadings on the wrong factor and were therefore discarded from this analysis.

2.2.3 Motivational Differences between the Games

We next explored our prediction that behavior in the Commons Dilemma Game and the Public Goods Dilemma Game

TABLE 3: Correlation matrix of the motives (Experiment 1).

	CDG	PGDG	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
Motivation trait scales													
1. Fairness	.09	.19											
2. Altruism	.04	.12	.26										
3. Social Welfare Concerns	.15	.15	.45	.27									
4. Concern for Others	.14	.09	.48	.25	.60								
5. Greed	−.16	−.09	−.29	−.04	−.25	−.31							
6. Competitiveness	−.20	−.10	−.12	.07	−.07	−.14	.38						
7. Entitlement	−.26	−.19	−.35	.02	−.30	−.34	.37	.33					
8. Fear	.00	.01	.01	.29	.11	.07	.15	.25	.02				
9. Risk Aversion	−.02	−.10	−.02	.14	−.06	.01	.03	.13	.10	.46			
Extracted motivational factors													
10. Proself Factor (factor 1)	−.27	−.17	−.25	.14	−.16	−.28	.61	.84	.71	.18	.13		
11. Fearful Factor (factor 2)	−.00	−.01	−.04	.30	.05	.02	.22	.27	.04	.97	.61	.21	
12. Prosocial Factor (factor 3)	.16	.20	.75	.45	.82	.79	−.38	−.01	−.46	.12	−.02	−.22	.06

Note. N = 178. CDG = Commons Dilemma Game. PGDG = Public Goods Dilemma Game. For both games, we used the created index scores. For the Commons Dilemma Game, the signs of the correlations were reversed. $p < .01$. for all correlations of .20 or more; $p < .05$, for correlations from .16 to .19.

are differently affected by proself and prosocial motives. Towards this end, we computed correlations between the three extracted motivational factors (proself, fearful, and prosocial) and choice behavior in the two games (using the standardized index scores of the games). This analysis revealed that decisions in both games correlated significantly with the proself and the prosocial motivational factors, but not with the fearful factor. More specifically, the correlation between the Commons Dilemma Game and the proself factor was $r = -.27$, while the correlation between the Public Goods Dilemma Game and the proself factor was $r = -.17$. We calculated the difference between these two correlation coefficients using the cocor package in R (Diedenhofen & Musch, 2015); this test revealed that the difference between these two correlation coefficients did not reach statistical significance ($Z = 1.41$, $p = .159$). The correlation between the Public Goods Dilemma Game and the prosocial factor was $r = .20$, whereas the Commons Dilemma Game correlated $r = .16$ with the prosocial factor. These correlations coefficients also did not differ significantly in magnitude ($Z = 0.56$, $p = .577$).

Subsidiary canonical correlations. The correlation analyses reported above seem to indicate that there might be some specificity (i.e., the proself dimension is more influential in the Commons Dilemma Game, while the prosocial dimension is more influential in the Public Goods Dilemma Game). To test if this specificity is statistically significant, we have conducted a canonical correlation analysis between the two games and the two motivational factors using the yacca package in R (Butts, 2018). Canonical correlations are used to identify and measure the associations among two sets of variables. It determines a set of canonical variates, orthogonal linear combinations of the variables within each set that best explain the variability both within and between sets. The results of this analysis revealed that only the first (but not the second) canonical correlation was significant (first canonical correlation: $r = .30$, $\chi^2(4) = 18.83$, $p < 001$; second canonical correlation: $r = .10$, $\chi^2(1) = 1.92$, $p = .166$); which indicates that decisions in the Commons Dilemma Game and the Public Goods Dilemma Game can both be predicted from the two motivational factors, but not in a way that is specific to each game.

2.3 Discussion

Based on the findings of Experiment 1, it can be concluded that choice behavior in the Commons Dilemma Game and the Public Goods Dilemma Game did not show significantly differing associations to the proself and prosocial motivational dimensions. A possible explanation for this lack of specificity, however, is that the trait motives that we employed in Experiment 1 may be only distantly related to choice behavior. To explore this possibility, we conducted a second experiment in which the motives were measured as states.

Experiment 1 explored how taking and giving impacts the motivational structure of the Commons Dilemma Game and the Public Goods Dilemma Game. To further illu-

minate this question, Experiment 2 expanded our focus to other mixed-motive games. Specifically, in addition to the multiple-person Commons Dilemma Game and the Public Goods Dilemma Game, Experiment 2 also included the Bandit Game and the Dictator Game – which involve taking and giving in a dyadic setting, without partner dependence (Weber et al., 2004). By doing so, Experiment 2 enables us to investigate not only motivational differences between taking and giving in the Commons Dilemma Game and the Public Goods Dilemma Game (Comparison 1), but also whether such differences may be enhanced in the dyadic Bandit Game and Dictator Game (Comparison 2). Thus, Experiment 2 enables us to explore two theoretically relevant comparisons.

3 Experiment 2

3.1 Method

3.1.1 Sample and Procedure

A total of 247 US and UK adult participants — recruited through the online platform Prolific Academic (http://www.prolific.ac) — participated in the present study for payment (£1.60). Participants played four games: One Commons Dilemma Game, one Public Goods Dilemma Game, one Bandit Game, and one Dictator Game. These four games were presented in a randomized order. Each game was played only once. The instructions were identical to Experiment 1. That is, participants were told that, in each game, they would be connected to one or more fellow participants, and that they would interact with each partner only once. They were also informed that they would receive a bonus payment based on one randomly selected game. In reality, however, participants were not directly connected to each other during the study and each participant received a fixed bonus payment of £0.40. Again, participants received no information on the other players' decisions during the experiment. After each of the four games, we measured the extent to which different motives played a role in participants' decision. Eighteen participants failed to answer our included check questions correctly, and were therefore excluded from the analyses.[6] Our final sample thus consisted of 229 participants (34.1% men, M_{age} = 33.07, SD = 12.42). When inquired about their highest educational level, 5.2% reported no degree, 37.6% mentioned a high school diploma; 40.6% reported a Bachelor's degree, 14.8% a Master's degree, and 1.7% a PhD degree.

[6]After each of the four game instructions, participants were asked to answer two comprehension questions. Participants who were unable to answer six out of eight ($n - 2$) check questions correctly were excluded from further analyses (more information on these check questions can be found on our OSF webpage: https://osf.io/jrqxb).

3.1.2 Mixed-Motive Games

Commons Dilemma Game. In the Commons Dilemma Game, four players had to simultaneously decide how much to *take* from a collective resource that consisted of 160 chips (each chip being worth £0.01). By means of a slider (beginning at 0 and moving up to 40), participants indicated how many chips they wanted to take from the group resource. Participants were told that the chips that were not taken by the players would to be multiplied by factor 2.5, and that the resulting number of chips (after multiplication) would then be divided equally among the four players, regardless of how many chips they took.[7]

Public Goods Dilemma Game. In the Public Goods Dilemma Game, four players had to simultaneously decide how much of their 40 individually owned chips they wanted to *give* to the group resource. Participants were again presented by a slider which started at 0 and moved up to 40. Participants were informed that the chips that were given by the players would to be multiplied by factor 2.5, and then equally divided between the four players.

Bandit Game. The Bandit Game reflects a two-person take-some game (Eichenberger & Oberholzer-Gee, 1998). At the start of this game, the participants possessed 0 chips while the other player possessed 100 chips. By means of a slider (beginning at 0 and moving up to 100), the participants had to decide how many of the other player's chips they wanted to *take* for themselves. The participants were informed that the other player has no influence, and thus must accept their decision.

Dictator Game. The Dictator Game is a two-person give-some game (Kahneman, Knetsch & Thaler, 1986). At the start of this game, the participants possessed 100 chips while the other player possessed 0 chips. During the task, the participants must decide how many of their own chips they wanted to *give* to the other player. Again, we presented participants with a slider which started at 0 and moved up to 100. Here too, participants were informed that the other player has no influence on their decision.

3.1.3 Motivational States

In Experiment 2, we adopted a state-based approach to the motivations. As such, following each of the four games, we assessed to which extent each motive played a role in participants' decision. We included the same prosocial (fairness, altruism, social welfare concerns, and concern for others)

[7]To represent the Commons Dilemma Game and the Public Goods Dilemma Game in Experiment 2, we utilized the version that displayed the highest factor loading in Experiment 1 (i.e., game variant 7).

TABLE 4: Descriptive statistics and correlations between the game behaviors (Experiment 2).

	M	*SD*	Range	1.	2.	3.
1. Commons Dilemma Game (taking-behavior)	11.82	11.72	0-40			
2. Public Goods Dilemma Game (giving-behavior)	26.45	11.78	0-40	.38		
3. Bandit Game (taking-behavior)	50.93	24.95	0-100	.32	.27	
4. Dictator Game (giving-behavior)	41.06	20.89	0-100	.26	.41	.48

Note. $N = 229$. For the Commons Dilemma Game and the Bandit Game, the signs of the correlations were reversed (so that all game behaviors point in the same direction). $p < .01$ for all correlations.

and proself (greed, competitiveness, and entitlement) motives as in the previous study (the fearful motives were no longer included). To assess these motives as states, we utilized the interpersonal orientation measures of Van Lange and colleagues (2007; also see Klapwijk & Van Lange, 2009; Tazelaar, Van Lange & Ouwerkerk, 2004). The items of all motive scales are listed in Appendix C.

3.2 Results

3.2.1 Game Data

The means, standard deviations, and inter-correlations between the four game behaviors are displayed in Table 4. This table shows that the four game behaviors were all significantly correlated with each other. In the Commons Dilemma Game, participants took on average 12 chips from the group resource (and thus left 28 chips in the group resource). In Public Goods Dilemma Game, participants gave on average 26 chips to the group resource (and thus kept 14 chips for themselves). In the Bandit Game, participants took on average 51 chips from the other player (and thus left 49 chips for the other player). In the Dictator Game, participants gave on average 41 chips to the other player (and thus kept 59 chips for themselves). As in Experiment 1, these findings indicate that participants acted more cooperatively in the take-some situations than in the equivalent give-some situations.

3.2.2 Motivational Data

Reduction of the motivations. Appendix D shows the correlation matrix of the motivational states, separately for each of the four mixed-motive games. For each of these four games, we conducted a factor analysis to extract two motivational factors from the inter-correlations among the motivational items (extraction method: Principal Axis Factoring; rotation method: Oblimin). For each of the four games, we were able to extract a *prosocial* motivational factor (which consists of the fairness, altruism, social welfare concerns, and concern for others items) and a *proself* motivational factor (which consists of the greed, competitiveness, and entitlement items). Appendix E provides an overview of the factor loadings of these two factors, separately for each of the four games. Note that for the Bandit Game, the three altruism items and the first two concern for others items had their primarily loadings on the wrong factor and were therefore discarded from the analysis in Model B.

Factor congruence. We subsequently calculated the degree of congruence between the sets of factor loadings reported in Appendix E. More specifically, following Harman's (1976) empirical rule, we computed correlations among the factor loadings that were obtained in each of the four games (for the Bandit Game, we used the two factors that were extracted in Model B). The result of this analysis indicates that the four extracted prosocial factors show high congruence (i.e., the correlations among their factor loadings ranged from $r = .96$ to $r = .98$). Similarly, the four extracted proself factors were also highly congruent (i.e., correlations among their factor loadings ranged from $r = .96$ to $r = .99$).

3.2.3 Motivational Differences between the Games

As in Experiment 1, we first examined if games that involve taking behavior and games that involve giving behavior are differently affected by proself and prosocial motivations, by comparing the motivational profile of the Commons Dilemma Game with that of the Public Goods Dilemma Game (Comparison 1). Similar analyses were also conducted for the Bandit Game versus the Dictator Game comparison (Comparison 2). Before conducting these analyses, we first reversed the scores of the two take-some games (Commons Dilemma Game and Bandit Game), so that the scores of all four games pointed in the same direction.

Commons Dilemma Game versus Public Goods Dilemma Game. We first computed correlations between the two extracted motivational factors (proself and prosocial factor) and choice behavior in the Commons Dilemma Game and the Public Goods Dilemma Game. As in Experiment 1, decisions in both games correlated significantly with both motivational factors. More precisely, the correlation between the Commons Dilemma Game and the proself fac-

tor was $r = -.38$, while the correlation between the Public Goods Dilemma Game and the proself factor was $r = -.27$. We again tested the statistical significance of the difference between these two correlations. The test showed that the difference between these two correlation coefficients did not reach statistical significance ($Z = 1.50$, $p = .135$). For the prosocial factor, we found a correlation $r = .45$ with behavior in the Public Goods Dilemma Game, while the Commons Dilemma Game correlated $r = .41$. Here too, these two correlation coefficients did not differ significantly ($Z = 0.71$, $p = .481$).

Bandit Game versus Dictator Game. We next computed correlations between the two extracted motivational factors and choice behavior in the Bandit Game and the Dictator Game. Decisions in both of these games showed significant associations with both the proself and the prosocial factor. Yet, when comparing the strength of these associations, the proself factor was not associated more strongly ($Z = 1.57$, $p = .116$) with decisions in the Bandit Game ($r = -.71$) than with decisions in the Dictator Game ($r = -.63$). However, the prosocial factor did show a significantly stronger association ($Z = 6.25$, $p < .001$) with decisions in the Dictator Game ($r = .67$) than with decisions in the Bandit Game ($r = .29$). This latter finding seems to indicate that, in line with our predictions, prosocial motives are more strongly related to giving behavior in the Dictator Game than to taking behavior in the Bandit Game.

Subsidiary canonical correlations. The correlation analyses for our first comparison indicate that the proself motivational factor is more strongly related to taking behavior in the Commons Dilemma Game, whereas the prosocial motivational factor is more strongly associated with giving behavior in the Public Goods Dilemma Game. To test if this specificity is statistical significant, we again conducted canonical correlation analysis. Towards this end, we first created a sum score of the proself factors of the two games as well as a sum score of the prosocial factors of the two games. The analysis (using these sum scores) revealed that the first canonical correlation did reach statistical significance (first canonical correlation: $r = .50$, $\chi^2(4) = 65.37$, $p < .001$), but the second one did not reach statistical significance (second canonical correlation: $r = .05$, $\chi^2(1) = 0.50$, $p = .479$). As in Experiment 1, choice behavior in multiple-person games can be predicted from the two motivational dimensions, but not in a game-specific way.

For our second comparison, the reported correlations also seem to indicate that there might be some specificity, as the proself factor is more influential in the Bandit Game and the prosocial factor in the Dictator Game. To test the statistical significance of this specificity, we again conducted a canonical correlation analysis (in which we again used combinations of the motive factors). The results of this analysis revealed that both resulting canonical correlates were highly significant (first canonical correlation: $r = .74$, $\chi^2(4) = 203.83$, $p < .001$; second canonical correlation: $r = .31$, $\chi^2(1) = 23.41$, $p < .001$). This finding indicates that taking and giving in the Bandit Game and the Dictator Game are associated with similar motives, yet considerable differences exist between the strength of the association of these motives with choice behavior. Or stated differently, the significance of the second canonical correlation reveals that, for these two games, the motives predict choice behavior in a game-specific way. When taking a closer look at the raw correlations (with the motive factors combined over both games), it is apparent that prosocial motives more strongly predict giving behavior in the Dictator Game ($r = .62$) than taking behavior in the Bandit Game ($r = .34$), while proself motives are about equally strongly related to taking and giving in both games ($r = -.60$ and $r = -.65$, for respectively the Bandit Game and the Dictator Game).

3.3 Discussion

In Experiment 2, we employed a state-based approach to measure the motivations and included two additional mixed-motive games. An interesting observation is that, in the present study, the correlations between the motives and the game behaviors were considerably larger than in Experiment 1. Despite these larger correlations, the results of the present experiment revealed, similar to the prior study, no substantial motivational differences between the Commons Dilemma Game and the Public Goods Dilemma Game. When comparing the motivational profile of the Bandit Game with that of the Dictator Game, we found specificity, but largely for the prosocial motives — which were more influential in the Dictator Game than in the Bandit Game.

4 General Discussion

Many conflicts in daily life arise from competing interests in terms of selfish versus prosocial concerns. In research, various mixed-motive games have been developed to study these conflicting interests. Although the basis of all mixed-motive games resides in this self-other conflict, these games also seem to exhibit unique elements. To gain more insight into the motivational basis of different mixed-motive games, we conducted two experimental studies. The main aim of these studies was to investigate if games that involve taking behavior show differing associations to proself and prosocial motivations than games that involve giving behavior. We predicted that taking and giving might modulate the importance of proself and prosocial motives between structurally equivalent games (as in the "slot-machine model" of interpersonal orientation of Van Lange et al., 2007). Our results

illustrate that motivational differences between taking and giving only occur in games that are characterized by lower interdependence and greater simplicity, that is, in dyadic games.

4.1 Differential Effects of Proself and Prosocial Motives

In Experiment 1, no significant differences between the Commons Dilemma Game and the Public Goods Dilemma Game in the association between motives and choice behavior were observed. However, given that the associations between the trait motives and the choice behaviors were generally low, we complemented this study with a second experiment in which the studied motives were measured as states, and taking and giving was also examined in dyadic settings.

Experiment 2 revealed stronger associations between the motives and the choice behaviors. However, when comparing the Commons Dilemma Game to the Public Goods Dilemma Game, as in the first experiment, no significant motivational differences were observed. Yet, when comparing taking and giving in the two dyadic games, giving behavior in the Dictator Game was associated more strongly with prosocial motives than taking behavior in the Bandit Game. The proself motives were about equally strongly related with choice behavior in both games. As such, Experiment 2 provides evidence that prosocial motives may be associated more with giving than with taking; but this evidence for specificity was observed only in dyadic games.

How can we understand these findings? The results of our studies suggest that motivational differences between taking and giving may be observed more readily in situations that are characterized by lower complexity and interdependence. In multi-person games, such differences seem to be obscured by the greater social complexity of decision-making. In such settings, choice behavior is likely to be shaped by other factors such as expectations about the other players' behavior (see Fleishman, 1988; Van Dijk & Wilke, 2000; Weber et al., 2004), which may attenuate the impact of the measured motivations. Indeed, a number of studies has shown that expectations about how other people will behave strongly affect people's choices in social dilemma situations (e.g., Dawes, McTavish & Shaklee, 1977; Kelley & Stahelski, 1970; Schroeder, Jensen, Reed, Sullivan & Schwab, 1983). In this vein, it is possible that our measurements of the motives might have missed the relevance of expectancies with respect to the other players' behavior, which can also help us explain why no differential effects of the motives were found when comparing the two multiple-person games with each other. Note that such considerations about the other players' behavior are strongly reduced in our dyadic games, where participants can decide unilaterally. In this setting, the impact of our motivational measures seems to be more pronounced, and some indications for distinct motivational bases for taking and giving can be observed.

4.2 Limitations and Future Research Suggestions

When moving from Experiment 1 to Experiment 2, two major changes were implemented. That is, in our second experiment the motives were measured as states (instead of traits), and we included two additional mixed-motive games (i.e., the Bandit Game and the Dictator Game). As a result of this, it is unclear whether the motivational traits that we measured in our first experiment also relate to behavior in the Bandit Game and the Dictator Game. Future research in this domain is therefore encouraged to investigate if the motivational differences that we found between these two dyadic games also hold true with a trait-based assessment of the motivations.

Another important avenue for future research is to gain more understanding of the processes that underlie taking and giving behavior, and the factors that may modulate their associations to choice behavior. Take-some dilemmas concern decisions to take resources from a collectively owned resource pool (in case of the Commons Dilemma Game) or another person (in case of the Bandit Game). Because childhood socialization practices generally define giving as "good" and taking form others as "bad" (for a similar argument, see Fleishman, 1988, p. 176), it can be expected that, in the context of take-some games, people will refrain from taking a lot of resources (as this is considered bad behavior). In accordance with this reasoning and the results of Brewer and Kramer (1986), our experimental studies revealed that participants indeed displayed greater cooperation when the games were framed in terms of taking than when they were framed in terms of giving.

Importantly, in addition to prosocial and proself motives (on which we focused in the present research), differences between taking and giving are likely to also be rooted in other processes, including partner expectations, accountability, perceived norms, and efficacy (Kopelman, Weber & Messick, 2002; Weber et al., 2004). Furthermore, differences between taking and giving could also be explained by endowment effects (Kahneman, Knetsch & Thaler, 1991), such that people feel more entitled to resources that they regard as their property (Leliveld, Van Dijk & Van Beest, 2008). Future research may build on the present findings to identify an expanded profile for taking and giving behavior, as well as its dependence on other structural features (such as provision point, group size, etc.). By doing so, we may better understand how take-some and give-some games shape people's mindset – and discover avenues by which socially beneficial mindsets may be activated, so that the collective interest can be promoted.

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