

Acting for the Greater Good: Identification with Group Determines Choices in Sequential Contribution Dilemmas

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ABSTRACT

In mixed-motive interactions, defection is the rational and common response to the defection of others. In some cases, however, group members not only cooperate in the face of defection but also compensate for the shortfalls caused by others' defection. In one field and two lab studies, we examined when group members were willing to compensate for versus match defection using sequential dilemmas. We found that the level of identification with the broader group increased willingness to compensate for intragroup defection, even when it was personally costly. Compensating for a defecting partner's actions, however, is not an act of unconditional cooperation: It is accompanied by a lack of trust in the errant group member and a desire to be perceived as more ethical. Cooperation by others, on the other hand, is matched independent of whether the cooperator was an in-group or out-group member. We find similar patterns of compensation and matching when the personal cost involved contributing money or effort. Copyright © 2015 John Wiley & Sons, Ltd.

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Social dilemmas capture the common tension in group settings between cooperating to improve collective outcomes and acting selfishly to improve individual gains (for reviews, see Dawes & Messick, 2000; Messick et al., 1983). Such situations are typically studied using simultaneous, anonymous choice. A robust finding is that participants in a social dilemma match the behavior of others: They respond to defection with defection and cooperation with cooperation (Axelrod, 2006). However, decisions in simultaneous social dilemmas are often influenced by other factors, including group identity (Brewer & Kramer, 1986; Dawes & Messick, 2000), how the decision is framed (Dufwenberg, Gächter, & Henning-Schmidt, 2006), and knowledge of others' past decisions (Duffy & Feltovich, 2002). For example, when choices impact the in-group, individuals cooperate more (Arora, Peterson, Krantz, Hardisty, & Reddy, 2012; Brewer & Kramer, 1986; Dawes & Messick, 2000; Kiyonari & Yamagishi, 2004; Onorato & Turner, 2004; Terry, Hogg, & White, 1999; Turner, 1982; Yamagishi & Kiyonari, 2000) and may even go so far as to compensate for in-group shortcomings (Brewer, 1985).

Real-world dilemmas, however, are often sequential (Budescu, Rapoport, & Suleiman, 1992): Consuming a common resource such as groundwater or fish from the ocean (sequential resource-use dilemmas) may not be a decision made simultaneously by all parties. In these situations, people often see how much others have consumed and the state of the remaining resource before deciding how much to take. Similarly, people can find out how much others have contributed towards a fundraising goal (a sequential contribution dilemma) that triggers matching funds for a local school before

deciding how much to contribute. As these decision makers participate in a sequential dilemma, they have some knowledge of the resource claims and contributions made by others prior to making their own decisions. In this paper, we test people's responses to prior actions by others in sequential dilemmas as a function of their identification with the group.

Sequential dilemmas are traditionally studied in the lab as anonymous-choice dilemmas, where individuals can decide how much of a resource to use or how much to contribute towards a public good, often with information about decisions previously made by others. Past research with sequential dilemmas focuses primarily on resource dilemmas (commons dilemmas) rather than contribution dilemmas (public goods dilemmas) and points to the influence of three variables in such dilemmas: one's relative position in the sequence, the amount of resource used or requested by others within the group, and the total amount of resource available (Budescu, Au, & Chen, 1997; Rapoport, Budescu, & Suleiman, 1993). The sequential nature of the dilemma highlights how much resource is left, which can sometimes be sufficient to induce cooperative behavior and reduce consumption, particularly as group size increases or resource size decreases (Budescu & Au, 2002).

Unlike sequential resource dilemmas, however, we know less about sequential contribution dilemmas. The current state of the literature presents a missed opportunity because a contribution dilemma creates a more conservative test of people's willingness to cooperate than a resource dilemma. People cooperate less when the decision is framed as an amount they can contribute (public goods dilemmas) than when framed as an amount they can take from that pool (resource dilemmas) (Brewer & Kramer, 1986; Fleishman, 1988).

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The effect of actions by prior participants on the behaviors of subsequent participants was examined primarily in voluntary contribution experiments that examined how an initial voluntary contribution by a group leader led to contributions by others (Güth, Levati, Sutter, & van der Heijden, 2007) and experiments that examined how contributions by players informed about the value of a public good can positively influence contributions by uninformed players when such contributions are sequential (Potters, Sefton, & Vesterlund, 2005). These studies suggest that once a group signals cooperative or noncooperative behavior, group members typically follow.

There is an important exception to the preceding empirical finding: when defection by some group members obstructs the group from achieving a desired outcome, those who value the outcome may compensate and contribute more than their fair share in order to achieve the desired goal (Williams & Karau, 1991). In a step dilemma, when prior defection puts the group at risk of failing to reach the contribution level necessary to trigger the provision of a public good, subsequent group members do not simply follow suit and defect. Instead, self-interest leads them to contribute enough to achieve the public good (Erev & Rapoport, 1990). In these situations, early defections create a tough decision for those late in the sequence of contributions, especially if the late responders discover that they need to cooperate in order to reach the threshold. Depending on the payoff structures, incurring the cost to reach the threshold aligns with self-interest as long as the individual net benefit exceeds the value of contributing nothing. Thus, compensating to achieve a desired outcome (such as a high grade on a paper) that an individual would otherwise not obtain due to the loafing of others (Williams & Karau, 1991) or reaching a threshold that yields better outcomes than if the threshold was not achieved (Erev & Rapoport, 1990) is an arguably rational act, even in the face of others' defections.

We propose that people may match defection with cooperation in sequential contribution dilemmas for reasons besides self-interest. In some cases, people may incur a cost to help the group reach its goals. We posit that a player's feeling of connection to the group is an important moderator of this pattern. The impact of group identity is less understood in sequential dilemmas—a review of the literature revealed no papers that focus exclusively on the role of group affiliation in sequential dilemmas.

Social identity theory (Tajfel & Turner, 1979; Abrams & Hogg, 1988) argues that group affiliation increases the centrality of the group to the individual's identity, including the importance of achieving group-related goals (Hogg, Terry, & White, 1995). If overall group contributions fall short of the group's goal, we propose that group members who identify highly with the group will compensate for in-group defection rather than follow defection. Specifically, we hypothesize that individuals who identify highly with their group will sacrifice effort, time, and money to compensate for shortfalls created by in-group defectors (*in-group compensation hypothesis*). We explored this idea through a field experiment. Along with the theory discussed earlier, the field experiment motivated the specific hypotheses later tested in this paper.

Exploratory field example

We took advantage of an actual situation within a real-world group that had been in existence for 5 years at the time of data collection to test the effect of fellow group members' actions on people's behavior in a social dilemma. Participants were members of an academic group focused on shared research interests in improving environmental decisions. Members participated actively and voluntarily, strongly suggesting a high degree of identification with and commitment to the group and its environmental goals.

Group members were informed about the opportunity to take part in a plastic bottle cap-recycling project. Plastic bottle caps require special processing and are thus typically discarded by most recycling facilities. Given the environmental orientation of this group, we assumed that members would view recycling bottle caps as a positive group goal. In addition, this goal posed an environmental contribution dilemma. Pro-environmental individuals generally avoid plastic bottles in favor of reusable bottles, creating an effortful exercise because it required multiple participants to ask others for caps.¹ Group members decided between contributing their time and effort to collect caps, a pro-social task for collective gain, or contributing their time and effort elsewhere, such as towards pro-self activities for their own enjoyment and gain. Environmental dilemmas parallel traditional social dilemmas (Bratt, 1999; Glance & Huberman, 1994; VanVugt, Meertens, & Van Lange, 1995), and we treated the situation faced by the voluntary group members as such.

Approximately 50 group members were informed about the opportunity to take part in the recycling project prior to one of the weekly meetings of the group.² The exploratory experiment was a two-cell design (description of group's behavior: cooperation versus defection). Thirty participants who attended one of the weekly group meetings in person completed an anonymous questionnaire and, in order to minimize social pressure to conform (Asch, 1957), were asked to pick up a numbered paper bag in which to bring back bottle caps. Half of the group members were randomly assigned to read that academic groups such as theirs may be seen by the public as "ahead of the curve and proactive in pro-environmental behaviors" (cooperators in environmental dilemmas), while the other half read that groups such as theirs may be seen by the public as "behind the curve and followers in pro-environmental behaviors" (defectors in environmental dilemmas). Participants stated their willingness to collect caps and, if applicable, estimated how many they would collect. Bags were disseminated and deposited anonymously. We measured effort by the number of bottle caps collected over 2 weeks.

Twenty-eight members agreed to bring in caps (14 in the cooperation condition and 16 in the defection condition), and

¹Participants noted asking others for caps.

²We assume, based on e-mail addresses and other member details, that approximately 50 members of the listserv were local and thus potential participants in this experiment. Some, however, may have been visitors and therefore unable to bring back bottle caps to participate. The exact number of local members is unknown because the e-mail list and attendance at meetings varies on a regular basis.

two declined. Participants in the cooperation condition (“ahead of the curve”) estimated that they would bring in more caps ($M=1.93$, $SD=0.27$) than those in the defection condition (“behind the curve”) ($M=1.44$, $SD=0.81$), $t(28)=2.15$, $p<.05$. Thus, participants predicted that they would match the perceived actions of their in-group. In actuality, participants in the defection condition compensated for their in-group by contributing significantly more bottle caps ($M=8.38$, $SD=9.85$) than those in the cooperation condition ($M=1.43$, $SD=1.56$), $t(28)=-2.60$, $p<.05$.

Given the large standard deviations, we examined the distributions and medians to ensure that outliers were not driving the effect. In the defection condition, the median contribution was four caps, and 37.5% of participants contributed between 10 and a maximum of 30 caps. In the cooperation condition, the median contribution was one, and no members contributed more than four caps. In this real-world dilemma, participants brought in more caps when told their in-group’s actions were perceived by others as deficient.

The dilemma found in this field setting is not uncommon. Consider a frequently encountered situation: A social or community group raises funds for a public good (such as a new swing set for a local park or microscopes for the lab in a local school). Not every individual member benefits equally from the public good, as is often the case in the real world, but the group benefits as a whole from the good. Research in the lab shows that groups are able to provide such goods, not only when individuals rationally contribute in order to reflect the proportional value the individuals will derive from the public good (Bagnoli & McKee, 1991) but also when the actual benefits to the group or the individual are unknown (Marks & Croson, 1999). The results of the exploratory field experiment suggest that as per the *in-group compensation hypothesis*, the latter case may occur because of group identification, at least when people observe the behavior of fellow in-group members. At the time of writing this paper, the authors are not aware of any literature that examines reactions to in-group and out-group members within such situations.

Previous research in simultaneous dilemmas has shown that subjects who identify with an in-group increase contributions because they trust and like other group members more (Brewer, Dull, & Lui, 1981; Kramer, Hanna, Su, & Wei, 2001). It bears pointing out that we did not expect cooperation to arise from simple in-group favoritism directed at a fellow group member (Shang, Reed, & Croson, 2008), but as a desire to act on self-identification as a group member. We propose a very different process. In a sequential contribution dilemma, an in-group member who has defected should not be liked or trusted more; rather, the desire to contribute in face of an in-group member’s defection is driven by identification with the broader in-group and despite the defector’s negative behavior. In fact, it is as if the defector’s negative behavior is perceived as that of a “black sheep” (Marques, Yzerbyt, & Leyens, 1988) that should be corrected. In this view, compensators are acting not to help the in-group member but to maintain or even enhance their group identity (Steele, 1975). We posit that identification with the in-group, rather than the specific partner, moderates compensation for in-group members who have defected.

Hypotheses and overview of studies

Building upon our insights from the field experiment and the earlier theoretical discussion, we posit three specific hypotheses:

1. *In-group compensation hypothesis*: People will compensate for the defection of in-group members when the person identifies highly with the in-group. Thus, people who experience low identification with the group will not show compensatory behavior.
 - a. To differentiate in-group compensation from in-group favoritism, we also predict that in keeping with the “black sheep phenomenon,” people who compensate for the in-group member who defects will do so despite not trusting the defector.
 - b. In-group compensators will then also attempt to express their group identity by placing greater importance on “being ethical” or “doing the right thing” as a motivation for their cooperation.
2. *Out-group defection-matching hypothesis*: If defectors are out-group members, we predict that because there is no meaningful social identity at play, people will match defection. We predict out-group matching even in the presence of additional incentives such as reaching a threshold, which yields greater returns, because the behavior is identity driven rather than incentive driven.
3. *Cooperation-matching hypothesis*: People will match cooperative behavior because it signals positive group behavior and is likely to lead to mutually beneficial outcomes, independent of whether the cooperative individual is an in-group or out-group member.

The field experiment allowed us to measure actual behavior, an important outcome in social dilemmas. In Studies 1 and 2, we isolated the role of group identity in sequential dilemmas to better understand the underlying psychological mechanisms. We operationalized compensation as contributing more effort (Study 1) or money (Study 2) than others to increase overall group outcomes. We operationalized matching as contributing at levels similar to others, whether others cooperate or defect. In Study 1, we presented participants with a sequential contribution dilemma, modeled after the field experiment, and measured both identification and effort. We quantified contributions in terms of time dedicated to the group. Furthermore, we measured identification with the group prior to the manipulation in order to examine the relationship between identification with the group and willingness to compensate for defection. In order to better understand the influence of group identity on response to prior defection, in Study 1, the defectors were generically defined as “other group members,” while in Study 2, a specific individual was the prior defector. In Study 2, we utilized a contribution dilemma with a threshold that triggered a greater level of collective benefit, measured compensation as monetary cost to the participant, and included a condition with the presence of an out-group member. In summary, we examine the role of identification with the group in the decision to cooperate, even in the face of prior defection, in sequential dilemmas.

STUDY 1: DECISIONS IN THE LAB

In Study 1, we experimentally tested the *in-group compensation* and *cooperation-matching hypotheses* by manipulating people's perceptions of other group members' behavior in a scenario similar to the real-world group in the field study. We measured willingness to contribute effort, specifically, to volunteer time for an environmental cause. This measure allowed participants to complete the experiment in one sitting, which was unrealistic in the field experiment where the behavioral outcome of collecting bottle caps brought in at a later date was measured. Study 1 improves on the field experiment in a few ways. In the field experiment, members of the real-world group decided whether to contribute to a group goal when faced with the perception of their group as cooperating, contributing towards a group goal, or defecting. However, it is possible that people thought of the dilemma as simultaneous, not sequential. Study 1 explicitly presents the dilemma as sequential by describing past behavior of others. Study 1 also explicitly measures group identification, where high identification was assumed in the field experiment.

METHODS

Participants and procedure

One hundred undergraduate students from a US East Coast college between the ages of 18 and 26 completed a survey involving hypothetical choices in an environmental social dilemma. The experiment had a two-cell design, group's behavior: cooperation versus defection. Participants were told to imagine the following:

You are part of a group of students and scientists who are committed to understanding why people make the decisions they do vis-à-vis the environment. The group meets once a week and discusses the latest issues in environmental decision making in addition to carrying out research and publishing their findings. You have chosen to join this group voluntarily because you want to understand the motivation behind people's environmental choices.

They then answered how much they identified with the group and its members on a scale from 1 (*not at all*) to 6 (*very strongly*). In addition, they took part in an environmental social dilemma. Specifically, they answered whether or not they were willing to contribute time towards making their campus green. Participants could contribute time in half-hour increments (i.e., cooperate by giving 30 or 60 minutes of their time) along with others from their group by "working on an on-campus recycling program." Contributing zero (0) minutes of their time meant that they defected.

After participants made their initial contribution choices, they were randomly assigned to read about the perception of their group's behavior as either cooperative (pro-environmental) or defecting (non-environmental). The information was the same as in the field experiment. Thus, participants were informed generally of how their group was perceived. Following this additional information, participants again chose how much time they were willing to contribute.

Therefore, participants now could take into account prior actions of their group members in their choice, effectively converting the dilemma into a sequential one.

RESULTS AND DISCUSSION

Pre-manipulation differences

Although participants were told that they were part of a group, they made their decisions as individuals and did not interact with anyone else. Hence, analyses were conducted at the level of the individual. Prior to the manipulation, participants in the cooperation condition ($M=4.06$, $SD=0.98$) and defection condition ($M=3.98$, $SD=1.04$) identified with the hypothetical group similarly, $t(98)=0.40$, $p=.693$. In addition, participants in the cooperation condition and defection condition committed similar minutes per week ($M_{\text{cooperation}}=29.40$, $SD=15.44$; $M_{\text{defection}}=33.60$, $SD=21.55$), $t(98)=1.12$, $p=.266$. Thus, there were no significant differences among participants before reading the manipulation.

Post-manipulation differences in contributions

We tested the *cooperation-matching* and *in-group compensation hypotheses* using several approaches. As a simple starting point, we tested the difference between high and low identification with the hypothetical group by categorizing those who reported scores of 1, 2, and 3 on the 6-point scale as low identifiers and those who reported scores of 4, 5, and 6 as high identifiers. We use the continuous measure in later analyses.

We tested the number of minutes committed to the cause in a 2 (condition: group cooperates, group defects) \times 2 (identification with the group: low, high) analysis of covariance (ANCOVA), with pre-manipulation minutes committed as a control. The right-hand side of Table 1 provides means and standard deviations for minutes committed for high and low identifiers. (The left-hand side of Table 1 shows the mean minutes committed prior to the manipulation.) By controlling for pre-manipulation commitments, there was a main effect of condition with those in the cooperation condition contributing more minutes ($M=29.40$, $SD=16.41$) than those in the defection ($M=22.20$, $SD=12.84$) condition, $F(1,95)=6.48$, $p=.013$. There was a second main effect of identification with high identifiers contributing more minutes ($M=29.18$, $SD=19.35$) than low ($M=16.67$, $SD=20.94$) identifiers, $F(1,95)=9.92$, $p=.002$. More importantly, there was an interaction between condition and identification where time committed by high ($M=30.00$, $SD=7.17$) and low ($M=27.86$, $SD=21.90$) identifiers did not differ when they saw others cooperate, $F(1,95)=0.38$, $p=.601$, as predicted by the *cooperation-matching hypothesis*. However, time committed did differ between high ($M=28.48$, $SD=26.41$) and low ($M=4.62$, $SD=11.27$) identifiers when they saw others defect, $F(1,95)=14.37$, $p<.001$, supporting the *in-group compensation hypothesis*. These results, along with further analysis detailed later, suggest that identification with the group moderated reactions to other group members' actions.

Table 1. Committed time pre-manipulation and post-manipulation by identification (high, low) and experimental condition (group behavior: cooperate, defect)

Identification	Question timing			
	Pre-manipulation		Post-manipulation	
	Cooperate <i>M (SD)</i>	Defect <i>M (SD)</i>	Cooperate <i>M (SD)</i>	Defect <i>M (SD)</i>
High identifiers	32.43 (22.78)	30.83 (16.80)	30.00 (7.17)	28.38 (26.41)
Low identifiers	25.71 (10.89)	36.82 (17.98)	27.86 (21.90)	4.62 (11.27)

Note: Contributions that occurred after the manipulation are on the right side of the table (in bold). We wanted to test differences between the post-manipulation means, controlling for initial levels of contribution. Thus, we included pre-manipulation contributions as a covariate, the average level of which is on the left-hand side.

To check the robustness of this simple analysis, we ran two alternative analyses. In the first test, we used ordinary least squares regression to include identification as a continuous variable and to test for changes in minutes committed by subtracting post-manipulation minutes from pre-manipulation minutes. We mean-centered participant identification with the in-group and contrast coded the group's behavior (cooperate = 0.5, defect = -0.5) so that the results can be interpreted as main effects and interactions as in a conventional analysis of variance (ANOVA) (Irwin & McClelland, 2001). The regression results for the complete and simple models are presented in Table 2. Participants who saw others cooperate and identified highly with the group contributed more, which was qualified by the two-way interaction shown in Table 2. The negative coefficient for the Group Behavior × Identification interaction indicates that the difference in time contributed between those who saw cooperative behavior and those who saw defection was smaller among participants who identified more with the group and larger among those who did not. This pattern replicates the interaction observed in the ANCOVA and is in keeping with the *cooperation-matching* and *in-group compensation hypotheses*.

Finally, although the earlier analyses control for pre-manipulation time commitments either as a covariate or as

part of a difference measure, they do not directly test how participants' commitments differed relative to the manipulation. To this end, we used a repeated-measures analysis of pre-manipulation and post-manipulation contributions as a robustness check. We submitted time committed to a 2 (condition: group cooperates, group defects) × 2 (time: pre-manipulation, post-manipulation) × 6 (levels of identification) mixed ANOVA. The pre-manipulation and post-manipulation time commitments were treated as repeated measures. There was a main effect of time, $F(1, 91) = 9.07$, $p = .003$, such that people contributed more at Time 1 ($M = 31.50$ minutes, $SD = 18.77$) than Time 2 ($M = 25.80$ minutes, $SD = 20.46$). There was an interaction between condition and time, $F(1, 91) = 8.70$, $p = .004$, which replicates the patterns observed in the ANCOVA and regression by showing that those in the defection condition contributed more at Time 1 ($M = 33.60$ minutes, $SD = 21.55$) than Time 2 ($M = 22.20$ minutes, $SD = 25.58$), $F(1, 91) = 15.48$, $p < .001$, whereas those in the cooperation condition contributed similar amounts at Time 1 ($M = 29.40$ minutes, $SD = 15.44$) and Time 2 ($M = 29.40$ minutes, $SD = 12.84$), $p = .99$. The latter provides support for the *cooperation-matching hypothesis*: Independent of identification with the group, people matched others' cooperative actions.

We also find the predicted three-way interaction between condition, identification, and time, $F(1, 91) = 2.78$, $p = .046$. In support of the *in-group compensation hypothesis* and as shown in Table 1, we find that self-reporting high identifiers compensate for others' defection by continuing to contribute at Time 2 at levels that were similar to their Time 1 contribution, $p = .56$. Self-reporting low identifiers, on the other hand, reduce their contribution at Time 2, $t(12) = 5.11$, $p < .001$, to match the group's defection.

Identification with the group moderated reactions to other group members' behavior: Participants who identified more with the group compensated for in-group defectors, whereas those who identified less matched group member defection. When group members cooperated, participants matched the cooperation. Study 1 found that the choice to match or compensate for defection varied as a function of group identity. In Study 2, we tested the hypotheses with a different measure—money—that allowed us to test for in-group compensation with a personal cost for the compensator. We also tested whether people would match out-group defection.

Table 2. Regression predicting difference in participant contributions from pre-manipulation to post-manipulation (post-manipulation minus pre-manipulation)

Variables	Unstandardized coefficients (standard errors)	Unstandardized coefficients (standard errors)
Constant	-5.70 (2.97)	-5.45 (2.92)
Group's contribution behavior (defection = -0.5, cooperation = 0.5)	10.62 (5.95)	10.65 (5.84)
Participant identification with group (mean centered)	9.81 (2.98)***	9.42 (2.93)**
Group Behavior × Participant Identification with Group		-12.44 (5.85)*
Model <i>F</i> value (<i>df</i>)	7.28 (2, 97)***	6.53 (3, 96)***
Model adjusted <i>R</i> ²	0.11	0.14

Note:
 *** $p \leq .001$;
 ** $p \leq .01$;
 * $p \leq .05$.

STUDY 2: REAL-WORLD GROUPS AND MONETARY DECISIONS IN THE LAB

Study 2 was designed to improve on Study 1 in several ways. First, it used actual monetary payoffs, a different measure of effort, which also makes the cost of compensation explicit. Second, by using a two-person threshold sequential dilemma, it allowed there to be a specific partner who could be described as an in-group or out-group member and as a defector or cooperator. Finally, it used a step-level sequential contribution dilemma where contributing sufficiently to reach a threshold triggered higher returns. This allows for a more precise test of compensatory behaviors—compensation occurs if a player makes a contribution sufficient to reach the threshold while the other player defected. We used existing real-world group ties to define in-group and out-group membership and measured participants' strength of identification with the in-group.

We predicted *cooperation matching* by the participant when the partner cooperated, independent of the partner's group membership. As the partner would have already contributed at a high level, matching cooperation would ensure reaching the threshold and trigger greater collective and individual benefits—a response that maximized outcomes for the self. Here, the partner's identity (in-group versus out-group) is irrelevant. In the case of defection, however, we expected participants' responses to depend on both the partner's group membership and the degree to which participants identified with their own in-group. Specifically, we predicted that the *in-group compensation hypothesis* would hold for those who reported identifying highly with their in-group. Similarly, we expected to see behavior in keeping with the *out-group defection-matching hypothesis* for out-group defectors. Finally, we predicted that in-group compensation would be accompanied by low trust in the partner and a self-reported desire to be perceived as “ethical”—that is, cooperation would occur despite negative feelings towards the in-group defector.

METHODS

Participants and procedure

One hundred and one undergraduates from a US East Coast university participated in a two-person social dilemma for pay. Participants read about an investment cooperative, structured as a step-level sequential contribution dilemma, which provided a 50% return on contributions, contingent on the contributions by the two players reaching a threshold of \$11 in total. If the threshold was not reached, then no additional returns were achieved. Returns and contributions (or only contributions if threshold was not reached) were split evenly between both partners. Participants received an \$8 show-up fee and answered comprehension check questions regarding partner contribution levels as well as the amount required to reach the threshold. This ensured that the participants understood the game and its payoffs. Two participants who answered incorrectly were removed from the sample prior to analysis. The experiment was a 2 (in-group versus out-group) × 2 (partner's behavior: cooperation versus

defection) design. We conducted a pilot study in order to use meaningful real-world affiliations as in-groups and out-groups. We asked a separate group of 32 participants, who did not participate in the study, about their level of identification with students from their own college within a university, an affiliated college, and three other relevant and related schools. They identified most with students from their own college and least with students from the affiliated college, out of the five possible options.

For the full study, we recruited participants from the same college and defined an in-group partner as someone from that college and an out-group partner as someone from the sister college. In the experiment, participants were randomly assigned to read that their (fictitious) partner was either from the same college as themselves (in-group) or the affiliated college (out-group).

In order to manipulate partner action (cooperation versus defection), participants were told that their partner had either contributed between \$6 and \$8 towards the \$11 threshold (cooperated) or between \$2 and \$4 towards the \$11 threshold (defected). Participants then decided how much they wanted to contribute. In the case of a partner who defected and contributed only \$2–4, the participant needed to contribute \$7–9 to reach the threshold. It should be noted that to guarantee reaching the threshold, participants would need to give \$9, which means not only giving up their entire show-up fee (\$8) but also reaching into their own pockets to add \$1. Using a range for the partner contribution allowed for uncertainty regarding the threshold, forcing participants to choose between matching defection or compensating for the defecting partner (contributing enough to reach the threshold). A dollar amount within the range was randomly chosen to calculate final payments later. Participants could contribute any full dollar amount between \$0 and \$9. Finally, participants answered questions about how much they affiliated with their college from 1 (*low*) to 6 (*high*), as well as how much they affiliated with their partner in the experiment from 1 (*low*) to 6 (*high*), trusted their partner 1 (*not at all*) to 6 (*completely*), and desired to be perceived as “ethical” or “doing the right thing” on a scale of 1 (*not at all*) to 6 (*completely*).

RESULTS AND DISCUSSION

Independence of the identification with the in-group measure

We examined whether participants' identification with the in-group was affected by the experimental manipulation and analyzed how much participants identified with their college (in-group) versus their partners as a function of their partner's group. In a 2 × 2 ANOVA with partner's group membership (in-group versus out-group) and partner's action (cooperate versus defect) as the independent variables and *identification with the partner* as the dependent variable, participants identified more with in-group ($M = 3.81$, $SD = 1.36$) than out-group partners ($M = 2.37$, $SD = 1.13$) and more with partners who cooperated ($M = 3.55$, $SD = 1.33$) than partners who defected ($M = 2.63$, $SD = 1.40$), $F(3, 95) = 16.39$, $p < 0.01$. When we entered *identification with the group* into the ANOVA, neither of the independent variables nor their

interaction was a significant predictor, $F(3, 95) = 1.36, p = ns$. Self-reported identification with the in-group was not affected by the experimental manipulation. We therefore used it as an independent variable in subsequent analyses.

Monetary contributions

Table 3 shows the distribution of contributions by dollar amount and the mean contribution by experimental condition. To test for differences in contribution, we used participants' identification with their group along with the partner's group membership and contribution as independent variables. We contrast coded the partner's group membership (in-group = 0.5, out-group = -0.5) and the partner's contribution (cooperate = 0.5, defect = -0.5) and mean-centered participant identification with the in-group as we did in Study 1. The regression results for the complete model, as well as two simpler models, are presented in Table 4. Two main effects characterize the regression: Participants

contribute more when paired with an in-group than out-group partner and more when paired with a cooperater than a defector. There are also two 2-way interactions, which we discuss in more detail in the context of our three hypotheses.

Table 4 also shows a significant three-way interaction between partner group, partner contribution, and participant identification with the in-group. In order to compare the average contribution levels by participant identification directly, we ran a 2 (partner group: in, out) × 2 (partner action: cooperate, defect) × 2 (dichotomized participant reported identification with the in-group where high = ratings of 4 and higher on a 6-point scale, low = ratings of 3 and lower) ANOVA, which produced a significant interaction, $F(7, 91) = 8.20, p < .001$, consistent with the regression. The resulting eight means and standard deviations are shown in Table 5. Submitting the dichotomized participant identification with the in-group to the same three-way interaction allowed us to run simple effects tests in order to compare across specific subgroups, which better tests our hypotheses.

Table 3. Count of participants per level of contribution by experimental condition in Study 2 (the table is arranged from the highest mean contribution to the lowest mean contribution)

Experimental condition	No. of participants who contributed each amount										Mean contribution
	\$0	\$1	\$2	\$3	\$4	\$5	\$6	\$7	\$8	\$9	
In-group cooperate	0	0	0	0	1	5	9	0	9	0	\$6.46
Out-group cooperate	1	0	0	0	2	9	3	1	8	0	\$5.92
In-group defect	5	1	1	1	0	0	0	1	7	7	\$5.74
Out-group defect	17	2	0	2	0	1	0	0	1	5	\$2.36

Table 4. Regression predicting participant contribution levels in Study 2

Variables	Unstandardized coefficients (standard errors)	Unstandardized coefficients (standard errors)	Unstandardized coefficients (standard errors)
Constant	5.09 (0.30)**	4.99 (0.27)**	4.82 (0.26)**
Partner group membership (out-group = -0.5, in-group = 0.5)	1.81 (0.61)**	1.79 (0.56)**	1.73 (0.52)**
Partner contribution (defection = -0.5, cooperation = 0.5)	1.22 (0.31)**	1.34 (0.28)**	1.46 (0.26)**
Participant identification with in-group (mean centered)	-0.09 (0.27)	0.098 (0.26)	0.38 (0.25)
Partner Group Membership × Partner Contribution		-3.15 (1.11)**	-2.78 (1.03)**
Partner Group Membership × Participant Identification with In-group		1.80 (0.54)**	1.86 (0.51)**
Partner Contribution × Participant Identification with In-group		0.75 (0.52)	0.26 (0.50)
Partner group Membership × Partner Contribution × Participant Identification with In-group			-3.91 (1.00)**
Model <i>F</i> value (<i>df</i>)	8.77 (3, 95)**	9.54 (6, 92)**	11.63 (7, 91)**
Model adjusted <i>R</i> ²	0.19	0.34	0.43

Note:
 ** $p \leq .01$;
 * $p \leq .05$.

Table 5. Mean (*SD*) contributed by participants in dollars as a function of partner group (in-group, out-group), partner behavior (cooperate, defect), and participant identification (high, low) with in-group

Participant identification	Partner group			
	In-group		Out-group	
	Cooperate <i>M</i> (<i>SD</i>)	Defect <i>M</i> (<i>SD</i>)	Cooperate <i>M</i> (<i>SD</i>)	Defect <i>M</i> (<i>SD</i>)
High identifiers	7.13 (1.25)	7.50 (2.72)	7.10 (1.37)	0.14 (0.38)
Low identifiers	6.13 (1.26)	4.07 (4.09)	5.46 (1.20)	3.10 (3.95)

Cooperation-matching hypothesis

The premise of this hypothesis is that in the cooperation condition there is no difference based on partner group or participant identification. As a first step, consider Table 3, which shows that all but one of the participants with a cooperating partner contributed enough to reach the \$11 threshold. Specifically, 30% of participants contributed \$5, which guaranteed reaching the threshold and was thus rational. Only 6% contributed \$4 or gambled (successfully) to reach the threshold. A majority (64%) contributed \$6–8, effectively matching partner contributions of \$6–8. Any contribution above \$5 costs the participant by increasing collective and partner earnings but lowers the participant’s own earnings. Contributing a similar amount as one’s partner, even at a personal cost, suggests a desire to match cooperation, in keeping with the *cooperation-matching hypothesis*.

To test this hypothesis more specifically, we considered the significant three-way interaction between partner group, partner contribution, and participant identification shown in Table 4. Overall, the three-way interaction can be interpreted as a two-way interaction between identification and partner’s group in the defection condition (which we return to under the In-group Compensation Hypothesis section) and a lack of any effects in the cooperation condition. An ANOVA performed within the cooperation condition found no significant main effects of partner group ($F(1,46)=0.82, p=.372$), of participant identification with the group ($F(1,46)=1.46, p=.235$), or of two-way interaction ($F(1,46)=0.70, p=.408$). Participants contributed an average of \$6.17 ($SD=\1.50) when partnered with an out-group cooperator and \$6.46 ($SD=\1.32) when partnered with an in-group cooperator, $t(45)=0.69, p=.492$, supporting the cooperation-matching hypothesis.

Out-group defection-matching hypothesis

As seen in Table 4, participants’ contributions are also significantly predicted by the interaction between partner group membership and partner contribution. The negative coefficient for the Partner Group Membership × Partner Contribution interaction indicates that the difference in contributions between in-group and out-group conditions was larger in response to defectors than to cooperators.

An ANOVA performed within the defection condition revealed a main effect of partner group membership ($F(1,51)=15.45, p<.001$), no main effect of identification ($F(1,51)=.050, p=.823$), and a two-way interaction between partner group membership and identification ($F(1,51)=9.06, p=.004$), which we return to shortly. The main effect of partner group membership shows that participants made smaller contributions when partnered with an out-group defector ($M=\$2.36, SD=\3.64) than with an in-group defector, ($M=\$5.50, SD=\3.91). In sum, participants matched defection for out-group partners but not in-group partners, consistent with the *out-group defection-matching hypothesis*.

In-group compensation hypothesis

Evidence for the *in-group compensation hypothesis* comes from the significant three-way interaction between partner

group, partner action, and participant identification. Recall from Table 4 that there is a significant two-way interaction between partner group and participant identification. This interaction is not significant in the cooperation condition (as described before) but is significant in the defection condition ($F(1,51)=9.06, p=.004$). We tested the *in-group compensation hypothesis* by performing a simple effects test for high and low identifiers who faced an in-group defector; as expected, high identifiers contributed significantly more ($M=\$7.50, SD=\2.72) than low identifiers ($M=\$4.07, SD=\4.09), $t(22)=2.31, p=.03$.

Finally, overall, only 30% of those whose partners defected contributed enough (\$8 in expectation) to reach the threshold. This percentage rose to 80% for high identifiers who were paired with an in-group defector. A logistic regression (Table 6) confirmed that the probability of making a threshold-reaching contribution was driven by an interaction between participants’ identification with their in-group and partner group membership. Specifically, low identifiers did not contribute sufficient amounts when an in-group member defected or when their partner was an out-group defector (regardless of in-group identification). Participants who identified highly with their in-group were, however, more likely to contribute sufficiently—even going so far as to compensate for the shortfall created by an in-group defecting partner at a personal cost.

The cost of in-group compensation

Compensating for in-group defection came at a cost, resulting in lower earnings for participants. Contributing \$0 (full defection) would have increased earnings by 20%. Compensating required sacrifice and was costly.

We also calculated the difference between final participant and partner earnings (where final earnings were calculated as the original \$8 payment minus the amount contributed towards the threshold plus the equal payoff triggered by reaching the threshold). As expected, participants made an average of \$2.63 less ($SD=\4.00) than their in-group defecting partner and \$0.75 more ($SD=3.90$) than out-group defecting partners, $t(50)=3.07, p=.003$. Earning more than the out-group partner, that is, taking monetary

Table 6. Logistic regression predicting threshold contribution in Study 2 (defection condition)

Variables	Unstandardized coefficients (standard errors)	Exp(B)
Constant	-1.07 (0.43)*	0.34
Partner group membership (out-group = -1, in-group = 1)	1.10 (0.43)*	3.00
Participant identification with in-group (mean centered)	-0.05 (0.44)	0.95
Partner Group Membership × Participant Identification with the In-group	1.28 (0.89)**	3.59

Note:
 ** $p \leq .01$;
 * $p \leq .05$; ~ $p \leq .08$.

advantage of the out-group partner's contribution, was effectively matching defection, and the reverse of compensation—it was as close to punishment as was allowed in the studies in this paper.

Trust and appearing ethical

To test that sacrifice for in-group defectors was not driven by general in-group favoritism, we regressed self-reports of partner trust against variables in Table 4 and found two main effects. Mean levels of trust of partner reported by participants are shown in Table 7. As expected, participants trusted in-group partners ($M=3.15, SD=1.37$) more than out-group ones ($M=2.57, SD=1.32; p=.031$). They also trusted cooperative partners ($M=3.55, SD=1.36$) more than partners who defected ($M=2.21, SD=1.02, p<.001$). There were no interactions. Thus, a very different pattern emerges for feelings of trust than for contributions. Although participants who report high identification trusted an in-group defecting partner less ($M=2.29, SD=0.91$) than an in-group partner who cooperates ($M=4.00, SD=1.22$), they contributed nearly identical amounts. We interpret this gap between behavior and feelings as indicating that high identifiers compensate for in-group defection not out of in-group favoritism, but despite negative feelings about the in-group defector.

In a second analysis, we regressed participant's ratings of the importance to be seen as ethical on the same predictor variables as in Table 4. As shown by the means reported in the second part of Table 7, there are no significant main effects, but there is an interesting two-way interaction between partner group and partner contribution ($F(1, 91)=16.22, p<.001$). Participants were more concerned about looking ethical when paired with out-group cooperators ($M=5.39, SD=0.78$) and with in-group defectors ($M=5.29, SD=1.20$) and less concerned about looking ethical when paired with in-group cooperators ($M=4.58, SD=0.93$) or out-group defectors ($M=4.29, SD=1.38$). As shown in Table 7, this trend was stronger among those who identified highly with the group, although the three-way interaction was not significant ($p=.15$). We tentatively propose that participants wish to signal to out-group cooperators that they too “do the right thing”—suggesting that they are showing virtue

by working cooperatively with an out-group member. In contrast, participants appear to want to “teach” deviant in-group defectors the right way to behave but have no important message to send to fellow in-group cooperators.

In summary, Study 2 provides evidence for the *in-group compensation*, *out-group defection-matching*, and *cooperation-matching* hypotheses. In keeping with the premise that in-group compensation, although costly to the participant, was not mere in-group favoritism, it was accompanied by lower trust in the defection in-group partner and a desire to be seen as “ethical.”

GENERAL DISCUSSION

In mixed-motive interactions, the standard response to defection is to match it (Baker, Gibbons, & Murphy, 2008). Prior research suggests that this standard response is ignored when the benefit from cooperating in the face of prior defection is greater than the outcome were one to also defect (Karau & Williams, 1993; Erev & Rapoport, 1990). The results in this paper suggest that people may cooperate in response to defection in sequential contribution dilemmas for reasons besides self-interest, and in fact, people may even incur a personal cost to help a valued group reach its goals. We find identification with the group is sufficient to encourage people to compensate for defection by exerting additional effort in a field setting (exploratory field experiment), by dedicating extra time to make up for defector-caused shortfalls in a hypothetical sequential dilemma (Study 1), and by incurring a personal cost in a lab sequential dilemma for actual monetary payoffs (Study 2).

Previous studies have shown that people may cooperate in response to defection but do so out of self-interest—for example, when their contributions reach a threshold that triggers a payment greater than the cost of the contribution. The results in this paper suggest a different motivation for cooperation in the face of defection. Greater group affiliation increases the importance of the group and therefore its goals to the individual (Hogg et al., 1995). We found that people who reported identifying highly with the group were willing to sacrifice to achieve the group's goals supporting the *in-group compensation hypothesis*. Individuals who did not

Table 7. Mean (SD) reported trust of partner and desire to be seen as ethical by participants as a function of partner group (in-group, out-group), partner behavior (cooperate, defect), and participant identification with in-group (high, low)

Participant identification	Partner group			
	In-group		Out-group	
	Cooperate <i>M (SD)</i>	Defect <i>M (SD)</i>	Cooperate <i>M (SD)</i>	Defect <i>M (SD)</i>
Trust of partner				
High identifiers	4.13 (1.55)	2.50 (0.97)	3.00 (1.16)	1.86 (1.07)
Low identifiers	3.94 (1.06)	2.14 (0.86)	3.15 (1.57)	2.24 (1.14)
Desire to be seen as ethical				
High identifiers	4.75 (1.17)	5.60 (0.70)	5.80 (0.42)	4.14 (1.77)
Low identifiers	4.50 (0.82)	5.07 (1.44)	5.08 (0.86)	4.33 (1.28)

identify with the in-group, however, did not show compensation for defection even when the defector is an in-group member. Importantly, it was identification with the group, rather than liking for the in-group partner, that determined compensation.

Participants matched the defection of out-group defectors, in keeping with the *out-group defection-matching* hypothesis. In fact, they were more likely to take monetary advantage of the out-group defector's low contribution by matching defection, which one could argue is a form of punishment (Dreber, Rand, Fudenberg, & Nowak, 2008). As all contributions were divided equally, complete defection (contributing \$0) can increase earnings by as much as 20%. While participants chose to earn more than their out-group defecting partners, they chose to earn less than their in-group defecting partners. Consistent with the *cooperation-matching hypothesis*, we found no differences in response to in-group and out-group members when people observed cooperation.

Although people typically trust members of the same group (Brewer & Kramer, 1985), in-group compensation was not accompanied by trust in the in-group defector. Interestingly, this produced a discrepancy between how people felt and their behavior. Such discrepancies have been observed in other situations. In trust games, people self-report a lack of trust of others while still choosing to transfer money that signals a high level of trust (Fetchenhauer & Dunning, 2009). Similarly, Wang, Galinsky, and Murnighan (2009) find that people have strong negative feelings about the "bad or dishonest" (defecting) behavior of others but do not necessarily act on those feelings. We speculate that participants who identified highly with the in-group, taking the perspective of "good" group members, judged the defector ("bad" group member) more harshly but then chose to behave according to the positive group image to which they hold themselves (Galinsky, Wang, & Ku, 2008).

The desire of compensators to be perceived as "ethical" or "doing the right thing" in Study 2 is congruent with suppressed trust in the in-group defector. In combination with the distrust of the in-group defector, there is a possibility that compensators wanted to model "good" behavior, in keeping with the adage that actions speak louder than words. It was as if in-group defectors were viewed as a "black sheep" (Marques et al., 1988) who needed to be taught a lesson.

Limitations and future directions

Our results suggest that individuals match cooperation by others independent of group identity and match defection by out-group members, but those who identify highly with the in-group compensate for in-group defectors rather than simply matching their defection. This compensation, however, is accompanied by low trust in the partner and a desire to appear ethical. These results raise three broad areas for future research. First, future work could disentangle the social image motivations that underlie people's compensation behaviors. Do they serve as a signal to themselves, serving as a pat on their back, or a signal to others to project their identity as an "ethical" person? People might compensate in order to model good behavior for the in-group defector, to signal

what it means to be part of their group to an out-group defector, or possibly even to signal to the fellow in-group members that they expect others to follow and cooperate. Just as likely, people might be signaling to themselves that they are "ethical."

A second question for future research is the temporality of compensation. In this paper, we used one-shot sequential dilemmas, leaving open the question of how long compensators might continue their compensatory behavior. Given the cost of compensation, they may switch to matching the defection (Camerer & Fehr, 2006) at some point—again, a question for future studies. Although matching defection is implicitly punishing the defector, we did not have an option where participants could explicitly punish defection (Fehr & Gächter, 2002). We believe that even under such circumstances, for at least the first transgression, those identifying highly with their in-group will compensate for in-group defectors. Future work could also test the conditions under which people choose to compensate for versus punish others' defection. In the short term, costly compensation may prove more efficient for achieving a group's goal compared with punishment, which will not bring the group closer to the goal. In the long term, if the goal is to rehabilitate a defector's actions, compensation may prove too costly because it gives the defector no reason to cooperate when others ensure that they reach the group's goal. If the goal is to influence the other's cooperation, the threat of punishment may not serve to help group morale while compensation may help reset the norm of the group for others to follow, isolating the defector's behaviors as a one-off incident.

A third area of possible investigation is whether our predictions would hold for repeated simultaneous dilemmas. A repeated simultaneous dilemma can, under certain constraints, effectively act as a sequential dilemma, as pointed out by a helpful reviewer. Past research shows that people with high group identity increased their cooperation from Round 1 to 2 in a multi-round simultaneous contribution dilemma compared with those with low group identity (De Cremer & van Dijk, 2002). These results suggest that people might compensate. Similarly, there is some evidence that defection in sequential dilemmas may, much like repeated simultaneous dilemmas, follow a monotonic function when identity is not a consideration (Rapoport, 1997), but it is unclear what influence might be exerted by strong identification with the group. Again, these are questions for future studies.

We should note that a sequential dilemma provides a more conservative test for our hypotheses than a simultaneous dilemma with repeated rounds because the social and economic contexts are the same across players, that is, they are all playing the same round, with knowledge of what others have done. Uncertainty regarding others' behavior is lower in this instance. In the case of the simultaneous dilemma with repeated rounds, the possibility still exists that others could cooperate in the current round, even if they did defect in past rounds—perhaps they are following a tit-for-tat strategy, which would require past defectors to cooperate if others do so. Increased cooperation has a potential, but not certain, cost to the cooperator in a simultaneous dilemma. Not so in a sequential dilemma. Here, compensation

is certain to have a comparative cost because the other person already defected in the same round. Furthermore, people may use cooperation strategically in a repeated simultaneous dilemma, in order to induce cooperation from others in later rounds for example, with the hope of a larger payoff for the group.

Conclusions

Our findings hold implications for many social and environmental dilemmas, where decisions are often made within a group and where social connections, although abstract or symbolic, can motivate collectively beneficial actions. In highlighting the importance of group identity as the determinant for compensation and cooperative reciprocity, they provide simple yet powerful solutions as observed in all three studies. Merely invoking peoples' identification with the group is an inexpensive and easily implemented solution to employ for important and consequential goals. Merely reminding people of their identification, through use of a school or organization's logo, may prove enough to overcome defection by its members.

Unlike a lab study, where context may encourage participation, field study participants can anonymously walk away from defectors, a preferred alternative to counter-defection (Yamagishi, 1988), and yet they did not do so in our exploratory field experiment. Together, the lab and field studies in this paper suggest that social change may benefit from group members who are willing to take on personal costs to do the right thing for the group as a whole, independent of others' actions. The results provide a hopeful view of cooperation, and even beyond that—of compensating for others when the group matters. In the face of defection, people cooperated at a cost to themselves: Such a view could provide leverage in situations when defection has already occurred or where defection appears to be the economically (but perhaps not socially) rational response.

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