Three studies tested the hypotheses that inequality among group members, as well as specific reasons for inequality, would significantly influence strength of group identification and cooperative responses to a social dilemma. In Study 1, participants reacted to scenarios describing a public good social dilemma. For some scenarios there was an equal distribution of initial resources, while in others the distribution was unequal. As predicted, group identification led to more cooperation in the dilemma. Starting with more money tended to reduce group identification for females but to increase it for males. In Study 2, participants were faced with an actual one-trial public good social dilemma involving real money. In some conditions, participants began with endowments of different sizes, and the inequality was explained as either random or justified. As predicted, reasons for inequality as well as the fact of inequality had an impact on group identification which, in turn, influenced cooperation in the dilemma. Replicating the results of Study 1, different conditions tended to enhance group identification for women and men. Study 3 was a conceptual replication of Study 2, and resulted in similar findings. Overall, these results may have important implications for real-world dilemmas, where inequality among the parties is almost always a salient feature.

**Keywords**

- group identification
- inequality
- social dilemma
defect than if all cooperate (Dawes, 1980). Social dilemmas have been of great research interest because they seem to capture the motivational features of many pressing real-world social problems, such as overpopulation, resource depletion, and environmental pollution (Stern, 1992). For example, an individual's personal convenience may be maximized if he or she defects by commuting to work alone in an automobile. However, if everyone chooses that course, pollution, dependence on imported energy supplies, and jammed highways soon mean that everyone is worse off than if all cooperate by using carpools or public transit.

Many social dilemmas in the real world involve people with unequal resources. Theoretically, inequality gives rise to opposing motives within each individual group member, particularly when (as in our paradigm) they are forced to decide whether or not to contribute their entire endowment (Rapoport, 1988). Those with larger endowments realize that their contributions will make a larger impact in earning the public good, increasing their motivation to contribute. However, the same individuals also see that contributing is more costly to them, which strengthens their motivation to defect. With these opposing principles potentially available, people have an almost limitless ability to rationalize decisions that are ultimately based on greed or self-interest (Batson, 1994).

Very few existing studies in the sizable empirical literature on social dilemmas have actually examined the effects of inequality. We omit reviewing studies like Marwell and Ames (1979), in which participants who start with high levels of resources have enough to earn the bonus by their contributions alone, and so face no risk. We also omit studies like Kerr and Kaufman-Gilliland (1994), in which some participants could make a larger contribution to the public good without incurring a greater cost to themselves. Studies of both these types fail to incorporate both of the competing motives that are present in the true social dilemmas with which we are concerned.

Rapoport (1988) set up a game that is relatively similar to our studies. Participants in five-member groups began with different monetary endowments and anonymously and independently decided whether or not to contribute the total endowment toward a public good. The public good was provided if the sum of contributions exceeded a threshold. Each group engaged in multiple trials and endowments varied across trials for each player. Results showed that players contributed more when they started with larger endowments, but (interestingly) they perceived that players with smaller endowments would be more likely to contribute.

Wit, Wilke, and Oppewal (1992) used four-person groups that started with equal or unequal resources. Members could contribute any proportion of their endowment to a common pool, which would be doubled and redistributed to the group members. Though participants with greater endowments contributed more in absolute terms, the proportion contributed was relatively constant. Van Dijk and Wilke (1995) obtained similar results.

Effects of reasons for inequality

Research by Kluegel and Smith (1986) suggests that not just the fact of inequality but also the perceived reasons for it are important in shaping people's responses. Inequality that is perceived
as justified by differences in members’ merit or performance is likely to be accepted by US college students as consistent with the expected patterns of rewards in a capitalist society (Snyder, Campbell, & Preston, 1982). This legitimacy may translate into an increased tendency of those who start with larger endowments to keep them as their due rather than contribute them to the group good. Thus, it is proposed that relative economic affluence will result in less cooperation if the affluence can be justified (e.g., attributed to superior intellect or performance on a task). This situation should hinder group identification processes, such as thinking about all of those involved as a single group, and stimulate self-focused thoughts. Consistent with this prediction it has been demonstrated that economic inequalities do enhance perceptions of differentiation and stimulate competitive thinking (Rothbart & John, 1985; Topalova, 1996; Tyler & Belliveau, 1995), and are often justified as legitimate by the more affluent as being based on merit (Emerson, Smith, & Sikkink, 1999; Kluegel & Smith, 1986).

It has also been shown that individuals prefer to maximize a relative advantage over others, even if this means sacrificing an absolute gain for the unique self (McClintock, Messick, Kuhlman, & Campos, 1973; Messick & Thorn gate, 1967) or for ingroup members (Tajfel & Turner, 1979). From this principle of social competition, and because of the basic self-interest motives of greed and fear (Rapoport & Eshel-Levy, 1989), it is proposed that in a social dilemma, rates of defection should be especially high if the individual has an initial economic advantage over others. In this case, defecting ensures a degree of superiority regardless of whether or not others cooperate. Cooperation may lead to absolute gains, but may also lead to a loss of the total endowment, which is relatively substantial.

What if the economic advantage could be clearly and undeniably attributed to pure luck? In this situation a merit-based ideology cannot easily be used to justify defection, but can be used to justify cooperation. Also, in this situation, a needs-based ideology would lead to the same cooperative tendency (Biel, Eek, & Gaerling, 1999; Pratto, Tatar, & Conway Lanz, 1999). Consequently, this situation should inhibit differentiation processes, and self-focused thinking, promote thoughts about the group as a whole, and enhance interest in equalizing the economic standing of everyone in the group. The few studies that have been conducted along these lines have yielded results that are consistent with this proposition. In a study by Van Dijk and Wilke (1994), participants started with equal amounts but could benefit unequally if the group bonus was provided. This situation was presented as being either justified (the advantaged participants had to spend extra time in the experiment) or not justified. When the inequality was not justified (vs. when it was justified), the participants with a potential economic advantage were more willing to contribute. Joireman, Kuhlman, and Okuda (1994) examined the effects of internal (due to characteristics of the participants) versus external attributions for endowment distributions and obtained similar results. Relatedly, Samuelson (1993) found that cooperators were more concerned with fairness, whereas noncooperators were more concerned with personal self-interests. Samuelson and Allison (1994) manipulated whether or not withdrawing resources from a common pool was viewed justified (because the action was characterized as being prototypical or not). In this study, players were less likely to adhere to an equality rule when such violations were justified rather than not justified.

Taken together, the findings of these various studies are consistent with the above stated predictions. The explanation offered by Van Dijk and Wilke (1994) for their findings is also consistent with the present thesis. They argued that when faced with a resource advantage that was perceived as being unjust, participants wanted to redistribute the resources in order to obtain a more equal distribution of the wealth.

Psychological motives: Group identification and rational calculation

Theories of choice behavior in social dilemmas have often drawn on the basic assumption of
economic man: that people’s behavior is individualistic, selfish, and rational in the sense of maximizing expected personal outcomes (Caporael, Dawes, Orbell, & van de Kragt, 1989; Lynn & Oldenquist, 1986; Ostrom, 1998). If people choose (seemingly irrationally) to cooperate, it is explained in terms of some disguised or nonobvious selfish motive. For example, people might be assumed to cooperate because they expect to profit from future reciprocal cooperation, or by nonmaterial payoffs such as good feelings from following internalized moral codes, a tack that makes the assumption of rationality virtually unfalsifiable (Axelrod, 1984). However, in recent years many theorists have begun to re-examine the assumption that all behavior is individualistically and selfishly motivated. This assumption has been foundational for virtually all major accounts of human action in psychology, sociology, economics, and political science (Batson, 1994, p. 603). Yet the assumption seems to be a cultural presupposition of Western thought, whose influence was imported into scientific psychology in strong form by behaviorist thinkers, rather than an empirical finding or a logical necessity (Batson, 1994; Caporael et al., 1989; Lynn & Oldenquist, 1986). The assumption’s culturally relative nature is strongly supported by anthropological evidence (Fiske, 1991).

Of the other powerful motives that can influence human social behavior, the ones with the most significant impact on social dilemmas may be those that stem from identification with a group. When people identify with a group, the group becomes part of the psychological self (Smith & Henry, 1996; Tajfel, 1972; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). One consequence is that they come to care about group outcomes as they do about their own (Brewer, 1999). Another is that they are motivated to follow group norms in their thoughts, feelings, and behavior, as empirically demonstrated by several researchers (Garling, Gustafsson, & Biel, 1999; Jetten, Spears, & Manstead, 1997). Since the norms of an ingroup typically dictate that cooperation with fellow ingroup members is more appropriate than being selfish and greedy (Argyle, 1991; Gouldner, 1960), identification with a group should enhance cooperative responses to a social dilemma.

Empirical research has generally supported the idea that group identification improves the rate of cooperation in social dilemmas (Brewer & Kramer, 1986; Caporael et al., 1989; Frey & Bohnet, 1997; Kramer & Brewer, 1984), although notable exceptions exist (Bouas & Komorita, 1996; Chen, 1996). In some studies group members are allowed to discuss the situation, which leads to norm formation and mutual promises to cooperate. When such discussions do lead to increased cooperation, it is not clear that group identification mediates the relationship (Bouas & Komorita, 1996; Kerr & Kaufman-Gilliland, 1994; Orbell, van der Kragt, & Dawes, 1988). However, discussion is not necessary and minimal manipulations of group identification that stress even abstract and vague similarities among group members (e.g. the fact that all are students at the same university) are found to increase cooperation (Brewer & Kramer, 1986). Perceived common fate is considered by several researchers to be a component or important determinant of group identity (Brewer & Silver, 2000; Jackson, 2002; Phinney, 1990; Sherif, 1996), and manipulations of this variable have been associated with enhanced cooperation. For example, in Brewer and Kramer’s study (1986, Experiment 3), a lottery was held to determine if the points used in the dilemma would be worth two cents or five cents each. In the differentiated condition, a separate lottery was held for two different groupings of participants. In the common fate condition, which resulted in greater cooperation, a single lottery determined the outcome for all the participants in the research session.

We propose that resource inequality, compared to resource equality, damages the ability of each group member to identify with, or perceive common fate with, the entire group. On the other hand, when group members have equal resources, interpersonal differentiation should be less salient, and thoughts about the group as a whole should be relatively high. Others have taken a similar stance regarding the inverse relationship between interpersonal
inequality and positive group feelings (Barnard & Benn, 1988; Brown & Wade, 1987; Deutsch, 1975; Tyler & Belliveau, 1995). Relatedly, researchers have demonstrated that equality promotes cohesion and cooperation among dyads (Brines & Joyner, 1999). This prediction is furthermore consistent with studies of subgroup social dilemmas. The literature in this area, while limited, suggests that subgroups are the least cooperative, compared to situations involving a superordinate group or separate individuals (Foddy & Hogg, 1999; Jackson, 2001; Wit & Kerr, in press). Our paradigm could be conceptualized as one that creates two subgroups, one with a larger endowment than the other. We also expect that reasons for the inequality will influence levels of group identification. In theory, when personal affluence can be attributed to merit (as in our justified inequality condition), interpersonal comparisons and feelings of personal deservingness should be enhanced, and identification with the group diminished.

But what if one’s affluence could be unambiguously and publicly attributed to pure luck? In this condition feelings of personal deservingness should be diminished and identification with the group as a whole enhanced. This proposition is consistent with research showing that people who make an internal attribution about the poor (e.g. that poor people are lazy or untalented) often consider their own socioeconomic position as justified (Batson, 1994), and tend not to support social programs to help the poor (Kluegel & Smith, 1986). On the other hand, making an external attribution regarding poverty is associated with fewer feelings of personal deservingness, and greater support for efforts to help the poor (Kluegel & Smith, 1986).

An important motivation component of Rapoport’s (1988) model is the subjective estimate that participants make when considering the economic utility of their contribution. This model suggests that cooperating is economically rational only if one’s contribution is estimated to be critical; that is, without one’s contribution, it is believed that the public good will not be obtained. From this perspective, estimates of criticalness should reliably predict cooperation. There are two other possible estimates. One’s contribution could be estimated to be redundant, that is, that the group will obtain the public good even without one’s contribution. In this case giving would be an irrational waste of resources, a redundant or superfluous action. Consequently, estimates of redundancy should be inversely related to cooperation. Contributing may also be estimated to be futile. In this case, the individual believes that so few others will contribute, that the situation is futile; the public good will not be obtained even with his or her contribution. Since one’s contribution would have no impact, it would therefore be an irrational waste of resources to contribute anything. Thus, estimates of futility should also be inversely related to cooperation.

Overview of studies and summary of hypotheses
This article focuses on public goods social dilemmas; the benefits of cooperation are shared by everyone, even those who defect (Sell & Wilson, 1991). In three studies, participants engage in a single trial social dilemma. Although a host of studies employ multiple-trial games, in these situations participants may make choices to encourage others to reciprocate cooperation, or seek to punish defection. In fact, game-theoretic analyses show that the noncooperative choice may no longer be the selfishly best when game play is repeated (Rapoport, 1967), weakening the ability to draw conclusions about behavior in true social dilemmas. We also employ a binary choice procedure that has been widely used by social dilemma researchers (e.g. Orbell et al., 1988; Rapoport et al., 1989). Participants are allocated an endowment and must decide to either give or keep the full amount. They cannot give a portion of the amount. There are many real life examples of binary choice decisions (e.g. whether or not to vote, go to meeting, give someone a jump start for their car, review a manuscript, participate in a charity event, join
a team) and non-binary choice decisions (e.g., how much time to volunteer, how much effort to expend, how much money to give). Both are equally valid domains of study, but it is important to keep in mind that they may be characterized by different sets of dynamics and may evoke different sets of reactions in people. For example, when, as in our studies, participants are given different endowment amounts (e.g., some are given US$7 and some are given US$3.50) and must give their total endowment or none of it, the only way that total equality can be achieved within an experimental session is for all participants to give. Thus, our use of a single trial, binary-choice dilemma is theoretically important, and our findings may not generalize to all social dilemma configurations.

When participants have unequal endowments, the total sum of contributions from an n number of members will not always be equal. Therefore, Rapoport’s (1988) modification is followed by replacing the criterion of a fixed number of contributors (e.g., a majority) with a fixed sum of contributions. In our studies, each participant receives a fixed endowment. Each must then decide privately and anonymously to either give (cooperate) or keep (defect) his or her total endowment knowing full-well all possible outcomes. The public good, a bonus, is supplied to each and every member if the sum of the contributions is equal to or greater than a pre-specified amount; it is not supplied otherwise. As detailed below, our research procedures eliminate, to the extent possible, the possibility that participants might anticipate later interaction with other participants that might provide selfish reasons for cooperation.

Our main predictions may be summarized as follows:

1. Individuals who identify more strongly with the group will be more likely to cooperate rather than defect.
2. Those who are allocated a larger amount will (a) identify with the group less, and (b) cooperate less, compared to those who are allocated a smaller amount.
3. Affluence that is justified on the basis of merit will lead to (a) less group identification and (b) less cooperation, compared to affluence that is obtained by luck.

Study 1

In this initial study, participants were asked to seriously contemplate a social dilemma and respond as if they were actually in the scenario described. They were randomly assigned to one of three conditions: no inequality, inequality with a greater amount, or inequality with a lesser amount.

Method

Participants Participants were 136 undergraduate students (66 males and 70 females) who participated in the experiment for a cash payment of US$10.00.

Design The basic design included a no-inequality condition (in which participants were told that all seven participants in the social dilemma were given US$5) and an inequality condition (participants were told that four randomly selected participants started with $3.50 and that three started with $7). Half of the participants in the inequality condition were told that they themselves started with $3.50 while the other half were told that they were allocated $7.

The scenarios The social dilemma scenarios were modeled on those studied by Rapoport (1988) and Caporael et al. (1989). The participant is seated in a room with six other strangers plus a researcher. There are partitions separating the seven participants and they are unable to communicate with each other. The researcher hands each participant some money. In the no-inequality condition, all the participants are given the same amount, $5.00. In the inequality conditions, the researcher shows the participants seven envelopes, three containing $7, and four containing $3.50. The envelopes are shuffled thoroughly and distributed. The participant is handed an envelope containing $7 or $3.50, determined by the luck of the draw.
In each scenario the researcher explained that the participants will independently decide to give or keep their money. The consequences of the decision were made explicit. It was explained that if they personally gave their money, it would be gone forever; but if the total amount given by the group were equal to or greater than $20, each participant would receive a $10 bonus. It was explained that their responses would be completely anonymous, and there would be no discussion of the situation before or after the decisions. After they made their decision, participants completed a post-decision questionnaire that contained the psychological measures of interest.

Measuring the psychological variables  Our measure of group identification was designed to tap people’s concern for the group versus the self as they made their decision. Brewer and Kramer (1986) manipulated social identity by increasing the salience of the superordinate or collective-level social identity that encompasses all the individuals in a group (collective identity condition) or an individual-level identity that differentiates among them (individual identity condition) (Brewer & Kramer, 1986, p. 545). Our measure corresponds conceptually to this type of manipulation. Two items were used: ‘When you made your decision, to what extent were you thinking about the effects your decision would have on the outcomes for this group as a whole?’ and ‘When you made your decision, to what extent were you thinking about the effects your decision would have on you as an individual?’ For both items, participants responded on 11-point scales anchored with ‘Not at all’ and ‘Very much’.

To assess participants’ estimates that their cooperation would be futile, participants were asked, ‘What do you think the probability is that so few others would give that your money would not be enough to bring the total to $20?’ To measure estimates of criticalness, they were asked, ‘What do you think the probability is that just enough of the others would give so that your contribution was essential to bring the total to $20 or more?’ Perceived redundancy was assessed with the following question: ‘What do you think the probability is that enough others would give so that the total would reach $20 or more even without your money?’ Participants responded to each of these three items by circling one of 21 percentage values presented, i.e. 0 to 100%, in 5% increments.

Results  As shown in Table 1, supporting social identity theory, thinking about the group was strongly and positively related to cooperative responses, whereas being self-focused was inversely related to cooperative responses. Further, the significant inverse correlation between thinking about the group and thinking about the self supports Tajfel’s (1982) individual–group continuum. The correlations also provide support for Rapoport’s (1988) model. As expected, the extent to which participants believed their contribution would be essential was significantly positively related to cooperation, whereas an estimate of futility was significantly negatively related to cooperation. However, contrary to this model, the extent to which participants believed that their contribution would be redundant was positively related to cooperation to a significant degree. This suggests that participants were perhaps acting out of a sense of normative obligation. That is, they were giving when they thought that was what most others would do.

The five questionnaire variables were subjected to an exploratory factor analysis using varimax rotation. The pattern of correlations and the results of the factor analysis provided empirical justification for combining the group-focused item with the inverse of the self-focused item into a single group identification variable, and for combining the essential item with the inverse of the futile item into a single rational calculation variable. When the two factors (group identification and rational calculation) and the redundancy item were entered simultaneously into a regression equation to predict cooperation, both group identification (Beta = .37, t = 5.03, p < .001), and rational calculation (Beta = .29, t = 3.25, p < .001) emerged as significant, but estimating redundancy did not (Beta = .08, t = .85, ns).

The effects of amount and participant sex on
cooperation and on the measured psychological variables (group identification, rational calculation, and redundancy) were examined in a series of analyses of variance (ANOVAs), with two significant findings. First, amount had a significant main effect on giving ($F(2,137) = 2.99, p < .05$). Those who started with the lowest amount ($3.50) were more likely to give than those who started with the largest amount ($7). The mean proportion of those giving for the $3.50 and $7 groups, respectively, were 0.69 and 0.45. The mean for the $5 equality control group, by comparison, was 0.50. Amount had no main effect on the measured variables of group identification, rational calculation, or estimated redundancy.

Second, there was a marginal sex × amount interaction effect on group identification ($F(2,137) = 2.37, p = .09$). We report this finding because the pattern is consistent with those found in Studies 2 and 3, and the effect is fully significant when only the inequality conditions are included in the analysis (i.e. participants in the $5 equality condition excluded) ($F(1,91) = 4.33, p < .05$). As depicted in Figure 1, for women, having less money increased group identification, but for males, having more money increased group identification. These results suggest that amount may have a direct impact

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<tr>
<th>Table 1. Correlations between variables</th>
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<td>1. Thinking about the group (0-10)</td>
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<td>Study 2 Money as resource</td>
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<td>Study 3 Time as resource</td>
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<td>2. Thinking about self (0-10)</td>
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<td>3. Giving futile (0-100%)</td>
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<td>4. Giving essential (0-100%)</td>
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<td>5. Giving redundant (0-100%)</td>
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<td>Study 3 Time as resource</td>
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<td>6. Cooperation (deciding to give)</td>
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* p < .05; **p < .01.
on giving, and may also have an indirect influence by affecting group identification—in opposite directions for males versus females. Males randomly allocated larger endowments identify more with the group, while the effect was reversed for females. In turn, group identification generates greater giving.

**Discussion**

As predicted from social identity theory, group identification was a strong predictor of cooperation. Rapoport's model also received support in that rational calculation was also a strong and independent predictor of cooperation. Together, these findings suggest a dual pathway to cooperation, one based on an economic calculation of maximizing personal gain, and one based on concern for the group as opposed to purely selfish interests.

As predicted, endowment amount had a direct influence on cooperation, with those with larger amounts being less likely to give. Interestingly, the amount of a participant's randomly assigned endowment affected level of group identification, but in opposite directions for men and women. Women expressed greater group identification when they had fewer resources. In contrast, men expressed greater group identification when they had more resources.

In Study 2, we attempt to replicate the findings of Study 1, including the unexpected gender by amount interaction, and also examine how different reasons for the inequality impact on cooperation. Further, in Study 2 we use a design that requires participants to make real decisions for real money rather than using a simulation methodology.

**Study 2**

In this study, participants played a single trial public-goods dilemma modeled closely on that of Caporael et al. (1989). Study 2 was a conceptual replication of Study 1, except the dilemma involved using real money, and the reason for the inequality was manipulated.

**Method**

**Participants** Participants were 210 undergraduate students (86 males and 124 females) who participated in the experiment for a cash payment. Participants were given US$3.00 base pay for their participation. Depending on experimental conditions and the decisions made in a particular experimental session, participants could be paid an additional amount ranging from nothing to US$17.00.

**Design** The basic design was a 2 (resource amount: $3.50 versus $7.00, varied within groups) by 2 (reason for inequality of resources, between groups: random or justified). A no inequality control condition, in which all participants started with $5.00, was also conducted.

**Procedure** An experimental session consisted of seven participants seated in chairs facing the experimenter. Partitions between the chairs prevented participants from seeing each other, and they were instructed not to communicate with one another. After a brief introduction to the session, participants completed a social decision-making ability test, which asked them to distinguish authentic from fake suicide notes (as in Ross, Lepper, & Hubbard, 1975). The validity of the test was strongly emphasized. These forms were collected, and given to the experimenter's assistant for supposed scoring in an adjacent room. After 2 minutes, the assistant returned the forms and a summary of results sheet to the experimenter. Upon inspection of the results, the experimenter went on to explain exactly how the session would proceed. Each session was randomly assigned to one of three conditions.

In all conditions, each participant's endowment was represented by a cash card, which was passed out at this point in the procedure. In the no inequality condition each participant was simply given a $5 card. In the random inequality condition, four participants began with $3.50 and three participants began with $7.00. Who received which amount was truly and obviously determined by chance (the cash cards were shuffled in front of everyone). In the justified
inequality condition, four participants began with $3.50 and three participants began with $7.00, with the amounts ostensibly determined by individual performance on the social decision-making ability test. False feedback from the experimenter led the participants to believe that three of them had performed above average on the test, so they would receive the greater amount, while the others performed at below average and thus would receive the lower amount. Actually, distribution of the cards was randomly determined.

The decision-making task was then explained. As in the scenario described in Study 1, each participant decided independently to give or to keep his or her endowment. If the money was kept, the participant could take it home after the study, but if it was given it would be gone forever. However, if as a group the seven participants in a session gave more than $20, each of them, regardless of their personal decision, would receive a $10 bonus.

The participants were told truthfully that at the end of the study, they would be excused one at a time, be paid, and a few minutes would elapse between each participant’s release, so they would not anticipate future interaction with each other. Participants were then given a payoff sheet that explained all the possible outcomes, as follows:

- If you give your money and the total given is $20 or more, you will take home the $10 bonus.
- If you give your money and the total given is less than $20, you will take home nothing.
- If you keep your money and the total given is $20 or more, you will take home the money you have now PLUS the $10 bonus.
- If you keep your money and the total given is less than $20, you will take home the money you have now.

Participants were quizzed to make sure they understood the consequences of their decision. If needed, relevant parts of the instructions were repeated. Participants finally made their decision by putting their cash card into either a ‘give’ or a ‘keep’ envelope. The ‘give’ envelopes were collected and given to the assistant for tallying in the adjacent room.

A post-decision questionnaire was then passed out, which contained manipulation checks and the same questions used in Study 1 to assess group-focused thoughts, self-focused thoughts, and estimates that contributing would be futile, essential, or redundant. After the questionnaire was completed, the participants were debriefed, and escorted one at a time to the next room where they were paid by the assistant (the $3 base pay plus their earnings based on the payoff schedule previously described) and then released.

Our analyses treat individual participants rather than groups as the unit of analysis because participants did not interact and made their decisions independently. Because the design is an incomplete factorial (the reasons for inequality factor do not apply to no-inequality participants) we present first an analysis of all participants, omitting reasons for inequality, and then an analysis of only the participants in inequality conditions, including the reasons factor.

**Results: All participants**

As shown in Table 1 (second set of rows), the correlations among the variables are similar to those found in Study 1. Having group-focused thoughts was strongly related to cooperation whereas having self-focused thoughts was strongly related to defection (noncooperation). As in Study 1, these findings support social identity theory. Support for Rapoport’s (1988) model was again obtained: there was a significant positive correlation between cooperation and estimating that giving was essential, and a significant inverse relationship between cooperation and estimates that giving was futile. Estimated redundancy was unrelated to cooperation. As in Study 1, Group identification was operationally defined by averaging the group focused item and the inverse of the futile item. Group identification (Beta = .427, t = 7.42, p <
and rational calculation (Beta = .372, t = 6.15, p < .001) were found to make significant and unique contributions to predicting cooperation when entered simultaneously in a regression analysis, while estimated redundancy had no significant effect in this analysis.

The effects of endowment amount and sex on cooperation were examined in a 2-way ANOVA. Endowment amount had a strong main effect on cooperation (F(2,197) = 12.12, p < .001). The means (proportion of giving) for the $3.50, $5, and $7 groups, respectively, were: 0.58, 0.55, and 0.23. Tukey post hoc tests showed that those in the $7 condition cooperated less than those in the $3.50 or the $5 conditions (both p < .001), but that the difference between those in the $3.50 and $5 conditions was not significant. This effect of amount on giving is interpretable in terms of the motivation to maximize one’s personal outcomes—i.e. greed—which is stronger for participants who start with more money. Sex of participant had no effect on cooperation, either as a main effect or in interaction with amount. The pattern of these results is consistent with those found in Study 1.

Next, the effects of amount and sex on group identification and rational calculation were examined. The only significant finding was a main effect of amount on group identification (F(2, 196) = 4.07, p < .01). Those with the larger endowment expressed less group identification than those with the smaller endowments. The means for the $3.50, $5, and $7 groups, respectively, were: 4.35, 4.11, and 3.38. Tukey post hoc tests revealed that the only significant comparison was between the $3.50 group and the $7 group (p < .01). Thus, group identification, which the first analysis shows had a major impact on giving, was also higher among those who began with smaller amounts of money. The larger endowment influenced the $7 participants to think more in terms of their personal outcomes than group welfare. Following the procedures outlined by Barron and Kenney (1986) and Sobel (1982) we conducted additional analyses to examine if the relationship between endowment amount and cooperation was mediated by group identification. The mediation effect was significant (Sobel z = 2.31, p < .02). However, this result must be interpreted with caution since the proposed mediator was assessed after cooperation was assessed. Consequently, the hypothesized flow of causation cannot be determined.

We conducted an additional analysis to examine the possibility that our participants gave their money out of rational self-interest, because they believed that their contributions would be critical for putting the group over the top to earn the bonus. The post-decision questionnaire asked participants to estimate how many other participants would give their money. (Participants in inequality conditions gave separate estimates of how many $3.50 and $7 participants would give.) From each participant’s estimates, we calculated the expected total of other participants’ contributions. If the sum of other contributions plus the participant’s own endowment was less than the $20 threshold, we say that this participant views his or her situation as futile. If the other contributions are estimated to be less than $20 but the participant’s own endowment would bring the total over $20, this participant views his or her contribution as critical. And if the estimated other contributions already exceed $20, the participant’s donation is termed superfluous. Giving is rational only for participants who are critical by this definition.

Overall, of participants who thought themselves critical, 47.2% gave their money. Thus, almost half acted rationally by this definition. But 47.8% of the participants for whom giving was completely irrational by their own estimates also gave their money (39.3% of futile participants and 66.1% of superfluous participants). Looking at the same data in another way, 22.7% of those who gave their money were in the critical category—but so were 23.1% of those who kept their money. In sum, the rate of contribution was not notably higher among participants for whom contributing would be consistent with self-interest than among participants whose responses suggested that they considered contributing to be a waste (futile or superfluous). These findings suggesting the limited power of rational self-interests to account for cooperation agree with those of Smith et al.
Results: Inequality conditions
The next set of analyses focus on inequality participants alone (n = 153), and include reasons for inequality as a factor. The independent variables are thus amount ($3.50 versus $7), reason for inequality (random or justified), and participant sex.

Not surprisingly, using just the inequality participants, the correlations among the variables were nearly identical to those shown in Table 1 for the whole sample. These data are therefore not reported. Regression analyses again showed that both group identification and rational calculation made significant and unique contributions to explaining cooperation at a magnitude similar to that found with all the participants and in Study 1 (Beta = .45, t = 5.08, p < .001, and Beta = .27, t = 2.83, p < .01, respectively).

As in the analyses using all the participants, and as in Study 1, participants who started with less money were more likely to cooperate (F(1,90) = 13.10, p < .001). There were no significant effects involving reasons for inequality or participant sex. These results are extremely similar to those obtained using all of the participants, and to those obtained in Study 1.

When we turn to analyzing the determinants of group identification, an amount × reason interaction was found (F(1,90) = 4.97, p < .05). However, this 2-way interaction was superseded by a 3-way interaction of sex × amount × reason (F(1,90) = 8.17, p < .01), which is shown in Figure 2. It was predicted that justified affluence would lead participants to rationalize their advantaged position and express less group identification. Indeed, this is what happened: in the justified condition more money led to less group identification. This trend holds for both sexes but is stronger for males than for females. In contrast, the random condition reveals a clear reversal. Now the above effect (more money decreasing group identification), rather than being relatively weaker for females, holds only for females. A larger endowment amount had the opposite effect—increasing group identification—for males. This is the same pattern that was discovered in Study 1, which involved only randomly distributed resources.

Discussion
These findings can be discussed at several levels. Most obviously, the reason for inequality (not simply the fact of inequality) does make a difference, as predicted. Further, these results suggest that different conditions (combinations of reason × amount) may trigger group identification differently among males and females.

Figure 2. Group identification as a function of endowment amount, reason (randomly determined vs. justified), and sex (Study 2).
Large endowments that are justified lead both men and women to express less identification with the group as a whole. However, when resources are randomly allocated, having a larger endowment leads men to identify more with the group. We speculate that a provider or helper schema is activated more strongly among males than among females under the conditions of a large, randomly assigned endowment. Earlier studies have shown that, because of their typical social roles, men are more likely than women to be helpful to strangers when conditions (such as specific skills or, in this case, a large endowment) make them able to help (Eagly, 1987, Eagly & Crowley, 1986).

Overall, our results suggest some of the complexities of behavior in social dilemmas that arouse strongly conflicting motives. Greed and concern for self-interest confront group identification, and the relative strengths of these motives depend on aspects of individual participants’ situations (amount), attributions (reasons), and personal characteristics (sex).

Study 3

Study 3 was a conceptual replication of Study 2, using time, rather than money, as the resource. Participants were invited to participate in a 3-hour study for partial course credit. They were then put in a social dilemma like the one described in Study 2, but instead of being allocated U$3.50, $5, or $7, they were given time vouchers that they could use to leave the study early (and still receive their full 3 hours of research participation credit). Depending on the experimental condition, participants received a time voucher worth 21 minutes, 30 minutes, or 42 minutes. If 120 minutes or more was contributed, each and every person would receive a 60 minute bonus (note that these figures represent 6 times the dollar amounts used in Studies 1 and 2, to maintain equal ratios across the studies). As in Study 2, the amounts allocated were either justified (on the basis of performance), or due to random chance. To make the design a full factorial (something Study 2 lacked), we also manipulated the reason for resource equality (the equality was justified on the basis of similar performance, or due to luck).

Method

Participants One hundred fifty-five introductory psychology students (73 male, 82 female) participated for partial course credit.

Design The design was a 3 (endowment amount: 21 min, 30 min, or 42 min) × 2 (reason for amount allocated: due to random luck, or justified on the basis of individual performance).

Procedure An experimental session on individual and group decision-making consisted of seven participants, seated in individual, adjacent cubicles. The set-up prohibited visual contact and verbal communication between participants, but allowed the experimenter, standing outside the cubicles, to address the group as a whole.

Each participant had signed up for a 3-hour research session, and the group was reminded of this fact early in the session. It was added that, ‘You will receive three credits for this study. You may end up staying here for the full 3 hours. However, depending on the decision made by you and the others, you may be able to leave this study much earlier and still get all three research credits’.

Next, the participants were given the remote associations test under time pressure (2 min), which served the same function as the social decision making test used in Study 2. It was explained that the test was a valid and reliable test of creativity and that it was important in this study because ‘creative thinking is related to how well people solve various types of problems, including how well they make social decisions’. While the tests were supposedly being scored by an assistant, the experimenter explained that each person would receive a time voucher that would allow them to leave the experiment early. They would each be asked to make an anonymous decision to give their time voucher to a group pool or keep it for themselves, and ‘depending on the decisions made by you and the other participants in this session, you may...’
be asked to stay for the whole 3 hours, or you may be able to leave the experiment earlier (from 30 min to 2 hours, depending on the condition). At this point, the results of the remote associations test were given to the experimenter. Under the justified reason conditions, it was announced: 'You will receive either a 21 minute time voucher, a 30 minute time voucher, or a 42 minute time voucher, depending on how well you did on the creativity test. If you scored above average, you will get a 42 minute voucher. If you scored in the average range, you will receive a 30 minute time voucher. If you scored below average, you will receive a 21 minute time voucher'.

Under inequality, it was declared that three participants (identified only by subject number, and actually randomly determined) scored above average and so they would receive the 42 minute time vouchers, and that the other four participants scored below average and so would receive the 21 minute time vouchers. Under the conditions of equality, it was announced that each participant scored in the average range, and so each would receive a 30 min time voucher.

Under the random luck reason condition, it was announced that the time voucher amount allocated to each participant was determined completely by chance, and that three participants would receive 42 min vouchers, while the other four would receive 21 min vouchers. In the equality condition, random luck determined that each participant received a 30 min voucher.

The subsequent procedures were identical to those of Study 2 (substituting the dollar amounts used in Study 2 for 6 times the amount in minutes).

**Results**

As indicated in Table 1, the intercorrelations closely match those found in Study 1 and Study 2. Group-focused thoughts were again significantly related to cooperation, whereas thinking about the self was inversely related to cooperation. Also, as in the previous studies, estimates of futility were inversely related to cooperation, whereas estimates of essentiality were positively related to cooperation (both to a significant degree).

The composite measures of group identification and rational calculation (defined exactly as in the previous studies) were entered into a regression analysis, and both explained a significant and unique portion of cooperative behaviors (Beta = .335, $t = 4.70, p < .001$, and Beta = .319, $t = 4.78, p < .001$, respectively).

Consistent with Study 1 and Study 2, endowment amount had a significant main effect on cooperation ($F(2,155) = 5.11, p < .01$). Participants starting with a larger endowment cooperated the least ($M = 0.33$), while those who started with the smallest endowment cooperated the most ($M = 0.64$). Tukey post hoc tests determined that these means were significantly different ($p < .01$). Equality led to a moderate level of cooperation ($M = 0.49$), that did not significantly differ from the other groups.

There were no other main effects or interaction effects. As in Study 2, the effect of amount on cooperation was significantly mediated by group identification (Sobel $z = 1.91, p < .05$). However, since group identification was measured after cooperation, the hypothesized direction of causality cannot be empirically determined.

When we examined the determinants of group identification using the full model ($3 \times 2 \times 2$), no significant effects emerged. However, because we were interested in replicating the findings of Study 1 and Study 2, we examined the effects of sex and endowment amount on group identification separately for the random condition and the justified condition. As expected, when the endowments were randomly allocated, there was a marginally significant sex $\times$ amount interaction ($F(2,75) = 2.69, p = .07$), with the pattern of means closely matching those found in Study 1 and Study 2 (see Figure 3).

**General discussion**

The positive relationship between social identity and cooperation was consistent in all three of our studies, supporting hypothesis 1. This finding is consistent with previous research.
using groups (Brewer, 1985; Brewer & Kramer, 1986; Brewer & Schneider, 1990; Kramer & Brewer, 1984) and dyads engaged in business-like negotiations (Kramer, Pommerenke, & Newton, 1993). In our studies, group identification was defined as reporting relatively more concern for the group than the self when contemplating whether or not to contribute. This conceptualization of group identification is consistent with other studies (Brewer & Schneider, 1990; Frey & Bohnet, 1997; Kramer et al., 1993; Kramer & Brewer, 1984), and with social identity theory per se (Tajfel, 1982). However, it might be interesting to examine how different dimensions of group identification are affected by various social dilemma conditions and influence cooperative responses (see Jackson, 2001; Frey, 1997). In addition, our manipulations reflect one way that common fate has been operationalized in the social dilemma literature; that is, by allocating different or similar levels of endowment to participants (Bouas & Komorita, 1996; Brewer & Kramer, 1986).

In addition to the social identity motive, data from all three of our studies offer evidence that rational self-interests play a significant role in determining choice behaviors. However, the results also make it clear that this is not the sole or even primary motivator of decisions in social dilemmas, as traditional theories have assumed (Batson, 1994; Caporael, et al., 1989). For example, in Study 2, more than three quarters of those who contributed believed that their giving was not critical to earning the group bonus. Also, in each study estimated redundancy was positively related to cooperation, which is contrary to a rational self-interest perspective. In fact, such estimates were more strongly related to concern about the group than concern about the self. Our research and many other studies have clearly shown that even in minimal group situations involving strangers, humans tend to take on a group identity, which profoundly influences all types of social behavior (Abrams & Hogg, 1990; Smith & Henry, 1996; Turner et al., 1987). The group becomes part of the psychological self, and thus acting on behalf of the group becomes blurred with acting on behalf of the self. This is, of course, a completely different notion of the self than that assumed by rational self-interest theorists.

Little previous research has investigated the impact of inequality on responses to a social dilemma, and results have been inconsistent. Our findings indicate that when confronted with a social dilemma, people with relatively fewer resources cooperate more than those with greater amounts, as predicted (hypothesis 2). These results are consistent with previous work.

Figure 3. Group identification as a function of endowment amount, reason (randomly determined vs. justified), and sex (Study 3).
showing that relative affluence hinders cooperation in social dilemmas (Rapoport et al., 1989), as well as in other social situations (Brines & Joyner, 1999; Coburn, 2000; Pfeffer & Langton, 1993).

More broadly, previous research provides ample evidence that conflicting motives operate within affluent individuals faced with a social dilemma (Rapoport, 1988). On the one hand, they may feel impelled to give because their contribution is more critical to achieving the public good; on the other hand, they may feel impelled to keep because of greed. Rapoport and Eshed-Levy (1989) have demonstrated that both fear of losing resources and greed for profit are important motivators of noncooperative action in social dilemmas involving no inequality. It seems reasonable to assume that having relatively larger amounts of resources would increase the salience of such fearful and greedy motives. Participants in the high endowment groups may be less cooperative because they simply have more to lose. This possibility could be investigated by employing certain procedures, as a money back guarantee to eliminate the fear factor (Caporael, et al., 1989; Rapoport & Eshed-Levy, 1989). Of course when there is no possible negative consequence to giving, which is the case with a money back guarantee, the situation is no longer a social dilemma as traditionally defined. It is also possible that identification was higher among the less affluent participants because they were in the numerical majority, which could have made identification with the overall group easier.

Our data also demonstrate that the effects of resource inequality depend on the reasons for the inequality. Research and theory concerned with attitudes toward inequality (Kluegel & Smith, 1986) led us to predict that affluence that was legitimized (based on performance) would interfere with feelings of group identity and hinder cooperation. Contrariwise, we believed that affluence that was undeniably due to a random and public distribution of resources should promote group identity, and thus boost cooperation. However, the effects were not as simple and universal as we hypothesized, but instead depended on amount and participant sex.

In each study when resources were randomly distributed to individuals, men indicated more group identification when they had larger endowments, but women indicated more group identification when they had smaller endowments. We speculate that this pattern could be attributed to a provider or helper schema that a large endowment activates for the male participants more than the female participants because of males' typical social roles (Eagly, 1987; Eagly & Crowley, 1986). Since this finding was unanticipated and only marginally significant in some of the analyses, additional research is needed to verify the pattern and test possible explanations.

The gender differences are especially interesting since prior research has yielded inconsistent results. Sell and Wilson (1991) and Sell, Griffith, and Wilson (1993, Study 2) found that women cooperated less than men. Stockard, van de Kragt, and Dodge (1988) found the reverse, and yet other studies have found no significant sex differences. Clearly, more research is needed to clarify possible differences in the ways males and females interpret social dilemma situations. For example, do they perceive them primarily as opportunities for cooperation and altruism, or as situations in which personal outcomes should be maximized? Theoretical answers to questions like this may be facilitated by further studies of the ways reasons for inequality affect group identification and social cooperation, and of what specific schemas are particularly salient for males versus females.

Although not assessed directly (see note 1), our findings are consistent with research investigating subgroup social dilemmas. The literature in this area, while limited, suggests that subgroups are the least cooperative, compared to situations involving a superordinate group or separate individuals (Foddy & Hogg, 1999; Jackson, 2003; Wit & Kerr, in press). Given the nature of the paradigm used in our studies, however, it is difficult to draw any firm conclusions regarding the effects of subgroups. Our inequality conditions could be conceptualized
as subgroups or simply as separate individuals who happen to have different degrees of wealth. Given that social dilemmas in the real world often involve subgroups of people (e.g. management and labor) and such situations seem to be especially difficult to resolve, this seems to be an important area for future research efforts.

Social dilemmas, such as pollution, depletion of natural resources, and recycling, have been a pervasive problem throughout history and have a growing impact on people’s lives as population and environmental pressures continue to mount at the community, national, and global levels. As people seek to solve those dilemmas, they almost always confront situations of inequality between individuals and groups. As our data indicate, such inequality interferes with the successful resolution of social dilemmas, especially if the more prosperous individuals see their position as justified. However, these effects of the reasons for inequality are not yet well understood, and in some cases they may push men and women in opposite directions. Continued research along these lines should advance our understanding of the very real social dilemmas facing our society and the globe.

Note
1. We originally intended to run conditions involving allocations to subgroups (randomly determined or justified), but limits on our time and money led us to drop those conditions in order to obtain larger samples in the other conditions.

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References
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