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Gain-loss frames and cooperation in two-person social dilemmas: A transformational analysis.

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Gain–Loss Frames and Cooperation in Two-Person Social Dilemmas: A Transformational Analysis

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Cooperation in 2-person social dilemmas was examined when people frame outcomes as gains or as losses. It was argued that losses loom larger than gains and that depending on people's social motive, behavioral options in social dilemmas are valued differently. Results of 3 experiments supported the predictions based on prospect theory and interdependence theory: Pro-socials (cooperators) cooperated more in a loss than in a gain frame, whereas individualists cooperated less in a loss than in a gain frame. Unexpectedly, competitors cooperated as little in a loss as in a gain frame, which was attributed to a floor effect. It was concluded that this research explains inconsistent findings from previous research on gain–loss frames and shows that loss-framed individuals pursue their cooperative or individualistic goals to a greater extent than gain-framed individuals but pursue their competitive goals to about the same extent.

The way people frame information influences their judgments and decisions. The effects of framing have been found in medical decision making (e.g., Meyerowitz & Chaiken, 1987), consumer behavior (e.g., Puto, 1987), personnel selection (Huber, Neale, & Northcraft, 1987), marketing (Bettman & Sujan, 1987), auditing (Johnson, Jamal, & Berryman, 1991), and security dilemmas (Kramer, Meyerson, & Davis, 1990). Our research was concerned with the effects of framing in settings of outcome interdependence, which arises when individual outcomes are the confluence of individual decisions and the decisions of others (Kelley & Thibaut, 1978; Pruitt & Kimmel, 1977). We wanted to integrate social dilemma research that considers cooperative behavior to be a function of the *outcome frame* (i.e., the coding of prospective outcomes as gains or losses) with theory that considers cooperative behavior to be a function of *social motives* (i.e., preferences for particular patterns of self–other outcome distributions; Messick & McClintock, 1968).

Frames and Loss Aversion in Social Dilemmas

Ever since the earliest days of social psychological research, it has been commonly assumed that stimuli are judged relative

to standards of comparison and that different standards may result in different evaluations of one and the same stimulus (Plous, 1993; Thibaut & Kelley, 1959). For example, prospect theory (Kahneman & Tversky, 1979) proposes that people evaluate prospective outcomes relative to a reference outcome, an outcome judged neutral and to which one has adapted. If prospective outcomes are less favorable than the reference outcome, the decision maker is said to have a loss frame: Outcomes are coded negatively and evaluated as losses. Conversely, if prospective outcomes are equal to or more favorable than the reference outcome, the decision maker is said to have a gain frame: Outcomes are coded positively and evaluated as gains.

An innovative aspect of prospect theory is *loss aversion*, or the idea that losses loom larger than equivalent gains (Kahneman & Tversky, 1979; Tversky & Kahneman, 1991). Loss aversion is captured in prospect theory's value function, which depicts a curvilinear relation between objective outcomes and subjective utility. The slope of this value function is steeper for losses than for gains (Kahneman & Tversky, 1979), reflecting the fact that decisions involving prospective losses or prospective gains are distinguished by how much is at stake. As Tversky and Kahneman (1991) further argued, loss aversion implies that "a given difference between two options will generally have a greater impact when it is evaluated as a difference between two losses . . . than when it is viewed as a difference between two gains" (p. 1045). Results of human decision-making research are generally consistent with the notion of loss aversion (e.g., Budescu & Weiss, 1987; Kahneman, Knetsch, & Thaler, 1990; Schneider & Lopes, 1986; Tversky & Kahneman, 1991). For example, research shows that concessions made by an opposing negotiator loom larger when these are framed as an increase in others' losses rather than as a decrease in others' gains (De Dreu, Carnevale, Emans, & Van de Vliert, 1994).

In the current research, we expanded this notion of loss aversion to settings of outcome interdependence in which cooperation maximized joint outcomes and defection maximized personal outcomes. Table 1 illustrates such a two-person social dilemma (Dawes, 1980). The social dilemma on the left con-

Table 1

Two-Person Social Dilemmas for Gain and Loss Frames Both Without and With Loss Aversion

	Gain frame		Loss frame	
Other person	Participant cooperates	Participant defects	Participant cooperates	Participant defects
Social dilemma without loss aversion				
Cooperates	3/3	0/4	−1/−1	−4/0
Defects	4/0	1/1	0/−4	−3/−3
Social dilemma with loss aversion				
Cooperates	3/3	0/4	−2/−2	−8/0
Defects	4/0	1/1	0/−8	−6/−6

Note. μs and σs for the gain and loss frames in the no-loss-aversion social dilemma are 2 and 2.5 and −2 and 2.5, respectively. μs and σs for the gain and loss frames in the loss-aversion social dilemma are 2 and 2.5 and −4 and 10.0, respectively. The outcome to the right of the slash is the participant's outcome. The lower social dilemmas reflect the assumption that losses loom twice as large as equivalent gains (cf. Kahneman, Knetsch, & Thaler, 1990).

tains positive outcomes and represents a gain frame (i.e., outcomes are related to a reference outcome of 0). The one on the right contains negative outcomes and represents a loss frame (i.e., outcomes are related to a reference outcome of 4). As can be seen, joint outcomes are maximized when the participant cooperates, and personal outcomes are maximized when the participant defects. Thus, from the participant's perspective, defection is the dominant strategy because it maximizes one's own gains (or minimizes one's own losses; Dawes, 1980; Pruitt & Kimmel, 1977; Thibaut & Kelley, 1959). Two-person social dilemmas of the kind depicted in Table 1 are often used to represent a variety of interdependent situations, such as interactions between intimate partners (e.g., Kelley, 1979), business partners (e.g., Pruitt & Carnevale, 1993), and even neighboring nations (e.g., Schelling, 1960; for discussions, see Komorita & Parks, 1995; Nemeth, 1972; Pruitt & Kimmel, 1977).

As can be seen in Table 1, frame influences the subjective utility of cooperation relative to that of defection. If one assumes that loss aversion implies that losses loom twice as large as equivalent gains (cf. Kahneman et al., 1990), all outcomes in the loss-framed social dilemma should be multiplied by 2. Consequently, compared with the gain-framed social dilemma, the loss-framed social dilemma has a greater perceived grand mean ($\mu = -4$ instead of 2) and greater perceived variance (i.e., $\sigma = 10.0$ instead of 2.5). The greater perceived grand mean for the loss frame of dilemma reflects the fact that losses are more dissatisfying than equivalent gains are satisfying. This is an important factor when the individual faces the decision of whether to leave the interdependent situation (Kelley, 1984; Van Lange, 1994). The greater perceived variance of the loss framed dilemma reflects the fact that under the loss frame, the difference in utility between two behavioral options looms larger than under the gain frame. This is an important factor when the individual faces the decision of what outcome to pursue (Kelley & Thibaut, 1978; Van Lange, 1994). The larger the difference in utility between two behavioral options, the more obvious

it is what alternative to choose and what strategy to pursue (cf. Ajzen & Fishbein, 1970). In social dilemmas, defection is the dominant strategy from the individual's point of view. Loss aversion should strengthen this, and one would expect a loss frame to enhance defection and to decrease cooperation.

Previous frame research has produced only partial support for this idea. Some studies indeed have shown that the loss frame produces less cooperation than the gain frame. This was the case in studies by Brewer and Kramer (1986), McCusker and Carnevale (1995), and Komorita and Carnevale (1993, Experiment 2), who compared choices in economically equivalent social dilemmas that involved giving to a public good (loss frame) or taking from a common resource (gain frame). Equally consistent with the analysis are findings from negotiation studies that showed that loss-framed negotiators demand more, concede less, and settle less easily than gain-framed negotiators (Bazerman, Magliozzi, & Neale, 1985; Bottom & Studt, 1993; De Dreu et al., 1994; Neale & Bazerman, 1985; Neale, Huber, & Northcraft, 1987).

Inconsistent with our analysis are the significant number of studies reporting no relation between frame and cooperation or even that the loss frame leads to more cooperation. In a negotiation experiment, De Dreu, Emans, and Van de Vliert (1992b) failed to observe differences in concession size as a function of negotiator frame. Likewise, Aquino, Steisel, and Kay (1992), De Dreu, Emans, and Van de Vliert (1992a), Fleishman (1988), Rutte, Messick, and Wilke (1987), and Schwartz-Shea and Simmons (in press) all failed to observe a relation between frame and cooperation in social dilemmas. Finally, in both social dilemma (Komorita, 1987; Komorita & Carnevale, 1993, Experiment 3; McDaniel & Sistrunk, 1991) and negotiation research (Schurr, 1987), sometimes loss-framed individuals cooperated more than those with a gain frame.

Social Motives and Loss Aversion

The previous discussion illustrates that compared with a loss frame, a gain frame often produces more cooperation but that it sometimes leads to similar or even lower levels of cooperation. These inconsistencies appear independent of the research paradigms used in that within both the social dilemma and negotiation paradigms, consistent results were obtained. In addition, inconsistencies occur regardless of whether single- or multiple-shot decision tasks were used. For example, Rutte et al. (1987) and Fleishman (1988) did not find significant differences for frame, but Rutte et al. used a single-trial social dilemma and Fleishman used multiple-trial games. Finally, inconsistencies appeared even though some studies used two-person games (e.g., De Dreu et al., 1992a) or N-person dilemmas (e.g., McCusker & Carnevale, 1995; Rutte et al., 1987).

A theoretical solution to this issue derives from interdependence theory (Kelley & Thibaut, 1978). Critical in this theory is the individual's social motive, which is the preference for a particular distribution of outcomes between oneself and the interdependent other party. Social motives induce a transformation of the given social dilemma into an "effective matrix" (Kelley & Thibaut, 1978; Liebrand, Messick, & Wilke, 1993; McClintock, 1976) along the following formula:

value of outcome $= w_s{}^*$ own outcome $+ w_o{}^*$ other's outcome,

where w_s represents a subjective weight accorded to one's own outcomes and w_o, a subjective weight accorded to the other's outcomes. Although several social motives and concomitant transformations may be distinguished theoretically (e.g., McClintock, 1976), there is empirical support for the three-category typology that Deutsch (1960) referred to as cooperation, individualism, and competition. The weights for individuals with a cooperative motive are assumed to be equal and positive (i.e., $w_s = w_o = 1$); the weights for individualists are assumed to be positive for oneself and nonexistent for the other (i.e., $w_s = 1$ and $w_o = 0$); and the weights for competitors are assumed to be positive for oneself and negative for the other (i.e., $w_s = 1$ and $w_o = -1$). To illustrate this, consider the mutual cooperation cell of the given social dilemma presented in the upper left part of Table 2. Pro-socials will transform these outcomes into 6 ($[1 * 3] + [1 * 3] = 6$), individualists will transform these outcomes into 3 ($[1 * 3] + [0 * 3] = 3$), and competitors will transform these outcomes into 0 ($[1 * 3] + [-1 * 3] = 0$). Transforming all outcomes this way produces the effective matrices in the lower-left part of Table 2 (the right part of Table 2 shows the transformation analysis for a loss-framed social dilemma).

In their interdependence theory, Kelley and Thibaut (1978) argued that individuals act on the basis of these effective matrices more than on the basis of the given social dilemma. Thus, to people with a cooperative motive, cooperation yields a higher value than defection, and they should feel inclined to cooperate. To individualists and competitors, however, defection yields a higher value than cooperation, leading them to defect (for empirical evidence, see Carnevale & Lawler, 1986; De Dreu & Van Lange, 1995; Kuhlman & Marshello, 1975; McClintock & Liebrand, 1988; Van Lange & Kuhlman, 1994).

Taken together, framing outcomes as losses rather than as gains increases the difference in utility between cooperation and

defection and thus the tendency to prefer the one to the other (cf. Table 1). According to interdependence theory (Kelley & Thibaut, 1978), the individual's social motive determines whether cooperation or defection is preferred (i.e., cooperation for pro-socials and defection for individualists and competitors; cf. Table 2). Integrating these two lines of thought shows that framing outcomes as losses rather than as gains should increase the preference for defection in individualists and competitors and the preference for cooperation in individuals with a cooperative motive.

Overview of this Research

The integration of insights offered by prospect theory with interdependence theory suggested the following Frame × Motive hypothesis: Individuals with a cooperative motive will cooperate more in case of a loss rather than gain frame, whereas individuals with an individualistic or competitive motive will cooperate less in case of a loss rather than a gain frame.

In addition to the theoretical integration it embodies, this prediction potentially clarifies the inconsistencies in previous frame research. We return to this issue in the *Discussion* section of Experiment 1. We conducted three experiments to test the Frame × Motive interaction effect on cooperation. These experiments differed in the operationalization of social motive. Social motives can arise from individual differences in value orientations (Kuhlman & Marshello, 1975; McClintock & Liebrand, 1988), or as Deutsch (1973) argued, features of the situation may lead people to temporarily adopt a particular social motive. Examples of situational features affecting social motives are explicit instructions by an experimenter or by constituents, incentive schemes making particular outcome distributions more rewarding than others, or the expectation of a cooperative future interaction (Druckman, 1994; Sattler & Kerr, 1991). In Experiment 1 we tested the hypothesis that social motives based on individual differences in value orientation would interact with frame to influence cooperation. Experiment 2 tested the same hypothesis, but social motives were based on situational demands rather than dispositional value orientations. Finally, Experiment 3 replicated Experiment 2 with a cross-cultural sample and modified the procedures to examine the generalizability of the effects.

Experiment 1

Method

Design

The design was a 2 × 3 factorial involving frame (gain vs. loss) as a between-subjects variable and social value orientation (pro-social, individualist, and competitor) as a post hoc blocking variable. Dependent variables were the number of cooperative choices participants made over four noniterated trials, expected cooperation by the other, and manipulation checks. Expected cooperation by the other was assessed to control for possible frame effects on this variable.

Participants

Twenty-seven male and 54 female undergraduates from various departments (i.e., physics, languages, social sciences, history, and medical sciences) of the University of Groningen participated for 10 Dutch guil-

Table 2
Cooperative, Individualistic, and Competitive Transformations for Gain- and Loss-Framed Social Dilemmas

Other person	Gain frame		Loss frame	
	Participant cooperates	Participant defects	Participant cooperates	Participant defects
Social dilemmas with loss aversion				
Cooperates	3/3	0/4	−2/−2	−8/0
Defects	4/0	1/1	0/−8	−6/−6
Transformed social dilemmas				
Cooperative				
Cooperates	6	4	−4	−8
Defects	4	2	−8	−12
Individualistic				
Cooperates	3	4	−2	0
Defects	0	1	−8	−6
Competitive				
Cooperates	0	4	0	8
Defects	−4	0	−8	0

Note. The left side contains transformations to the gain-framed social dilemma, and the right side contains transformations to the loss-framed social dilemma assuming loss averson (i.e., losses loom twice as large).

ders (about $7). In addition, participants were given the opportunity to win a cash prize of 50 guilders (approximately $33). Students were recruited during lectures they were attending. The research was announced as an investigation on human decision making. Students who volunteered to participate were later contacted by phone and were scheduled on the basis of availability and convenience. We ensured that the small number of male participants was equally distributed among experimental conditions. We did not analyze effects for gender. Because we had no hypotheses about effects of gender and because of the small cell sizes in some instances, interpretations would have been too speculative.

Procedure

Six to eight students participated in each session. On arrival in the laboratory, each participant was seated in a private cubicle equipped with an Apple Macintosh computer. The computer screen displayed information common to all participants. The participants were told that they would take part in two different studies, one concerned with human decision making (the assessment of social value orientation) and the other with decisions in groups (the main study).

Assessment of social value orientations. Social value orientations were assessed through choices in decomposed games (Kuhlman & Marshello, 1975; Messick & McClintock, 1968; Pruitt, 1967). This measurement technique has shown good internal consistency (e.g., Liebrand & Van Run, 1985) and test–retest reliability (Kuhlman, Camac, & Cunha, 1986). We used a variant of decomposed games: the so-called "triple-dominance games" (Kuhlman & Marshello, 1975). In these games, participants choose from among three different distributions of outcomes for themselves and a hypothetical other person. Each alternative corresponds to one of the three social value orientations. Outcomes were hypothetical "points" that were said to have value to both themselves and the other person. Table 3 shows three examples of the nine triple-dominance games used in Experiment 1. For each example, Option 1 corresponds to an individualistic orientation because one's own outcomes are larger than those in Option 2 or 3. Option 2 corresponds to a competitive orientation because it provides greater advantage over the other's outcomes than either Option 1 or 3. Finally, Option 3 corresponds to a pro-social orientation because it provides larger joint outcomes than either Option 1 or 2. Participants were classified if they endorsed options pertaining to a particular social value orientation at least six times. This criterion divided the original sample into three groups: pro-socials (*n* = 18), competitors (*n* = 26), and individualists (*n* = 30). The remaining 7 participants failed to meet classification criteria (i.e., making at least six choices consistent with one of the orientations) and were omitted from further analyses.

Note that the distribution of participants among the three social value orientations deviated from previous samples. Here, the number of cooperators was relatively small, whereas the number of competitors was high (cf. De Dreu & Van Lange, 1995). There may be a number of reasons for this. For example, the current sample contained a large number of medical students, who, in Groningen, are stereotypically seen as fairly competitive. Or, perhaps the way we announced our study (i.e.,

a study of "human decision making") might not have been as attractive to pro-socials as it was to individualists and competitors. One other study recruiting participants in a similar way reported a similar distribution of social value orientations (i.e., Dehue, McClintock, & Liebrand, 1993, Experiment 1: 48 pro-socials, 75 individualists, and 41 competitors).

After participants completed the social orientation measurement, the experimenter entered the private cubicle and informed the participant that the first investigation was over. The experimenter then shut down the computer and gave the participant a booklet containing general instructions, experimental manipulations for frame, and questionnaires. We shifted from a computer-mediated to a paper-and-pencil task to minimize possible carryover effects and to enhance distinctiveness between the social value orientation assessment and the actual decision-making task. The experimenter left the cubicle, to leave the participants alone during decision making.

The first part of the booklet contained some general instructions. The instructions informed participants that they had a chance to win one of three 50-guilder prizes (approximately $33), based on a lottery to be conducted at the end of the experiment. Participants were told that they would make a series of decisions about points that were to be converted into lottery tickets. They were told that for the decisions they would be matched with another person in the experiment and that choices affected their own points and those of the other participant. Participants were informed that they would remain unidentified.

Manipulation of frame. After the general instructions, frame was manipulated as in previous research (e.g., De Dreu et al., 1992a). Participants in the gain-framed condition were told that they had 0 points at the beginning but that they would win points (up to 22) by making decisions. Participants in the loss-framed condition were told that they had 22 points to start with and that they would lose points (up to everything) by making decisions. This manipulation is an effective but suboptimal way to induce a loss frame. Ideally, one would have participants play with their own money, but we abstained from this for ethical and practical reasons. Of course, using such mild manipulations implies that we tested our hypothesis in a fairly conservative way.[1]

The social dilemma game. Before making decisions, participants were given an example of a two-person social dilemma containing either positive numbers (in the gain-framed condition) or negative numbers (in the loss-framed condition; see also Table 1). The example detailed the consequences of their choices for outcomes to self and other. Participants also were told that the other person was facing the same choice. Participants then were given the opportunity to ask questions (which rarely happened). After any questions were answered, participants filled out four pages that contained a social dilemma and a measure of expectations. For each dilemma, participants either cooperated (Option A) or defected (Option B) by circling the letter of their choice. Feedback was never given about other players' choices.

Table 4 shows the social dilemmas we used in this and the subsequent

Table 3

Three Examples of a Triple-Dominance Game Used to Assess Social Value Orientations

	Example 1		Example 2		Example 3	
Outcome to	Self	Other	Self	Other	Self	Other
Option 1	50	20	50	15	60	30
Option 2	40	0	40	0	50	10
Option 3	40	40	40	40	50	50

[1] Previous researchers on frames have used a variety of methods to induce the frame, one of which was used in the current research. Another popular method is to compare give-some versus take-some games as operationalizations of the loss frame (giving to the public good is reducing one's individual assets) versus the gain frame (taking from the common resource is increasing one's personal assets). We did not use this operationalization because the give-some/take-some distinction implicitly assumes the individual level of analysis, because under the collective level of analysis, giving to the public good implies a (collective) gain, whereas taking from the common resource implies a (collective) loss. Moreover, the act of giving versus the act of taking may be accompanied by much different norms and values (e.g., altruism and sacrifice vs. egoism and self-enhancement; Fleishman, 1988; Komorita & Carnevale, 1993; Pruitt, 1967, 1970). Thus, whereas the give-some/take-some operationalization of frame may have mundane realism, it also implies a less unequivocal test of our Frame × Motive prediction.

Table 4
Social Dilemmas Used in Experiments 1–3

Other person	Dilemma 1		Dilemma 2		Dilemma 3		Dilemma 4	
	A	B	A	B	A	B	A	B
	Gain-framed social dilemmas							
Cooperates	3/3	0/4	4/4	1/5	5/5	2/6	6/6	3/7
Defects	4/0	1/1	5/1	2/2	6/2	3/3	7/3	4/4
	Loss-framed social dilemmas							
Cooperates	−1/−1	−4/0	−2/−2	−5/−1	−3/−3	−6/−2	−4/−4	−7/−3
Defects	0/−4	−3/−3	−1/−5	−4/−4	−2/−6	−5/−5	−3/−7	−6/−6

Note. The outcome to the right of the slash is the participant's outcome. Social dilemmas were given in random order. A = participant cooperates; B = participant defects.

experiments. To make the decision task less monotonous, we varied the grand mean of the social dilemmas, keeping the interdependence structure (and game variance) constant for gain- and loss-framed conditions. The grand mean is meaningful primarily compared with actual alternative interdependence situations (e.g., in stay–leave decisions) and was not expected to influence any of the dependent variables in our investigation. Indeed, the grand mean did not affect cooperation, in isolation or in interaction with frame and social motive.[2]

Expectations. The Frame × Social Value Orientation hypothesis is less valid if frame affects expectations about the other party's cooperation. For example, if the loss frame induces greater cooperative expectations than the gain frame, an alternative explanation for the predicted Frame × Social Motive interaction might be that participants with a pro-social motive cooperate more with a loss than a gain frame because the former expect more cooperation from the other party than the latter. To test this rival interpretation, we measured participants expectations about the other party's cooperation before each decision. Specifically, before each of the four decisions, participants were asked whether they had expected the other party to cooperate (i.e., choose Option A) or defect (i.e., choose Option B) using 4-point scales (1 = *will definitively choose Option B*, 2 = *will probably choose Option B*, 3 = *will probably choose Option A*, and 4 = *will definitely choose Option A*). Measuring these expectations about the other's behavior also permitted a new test of the well-corroborated hypothesis that cooperation by pro-socials would be more strongly associated with expectations about the other's cooperation than cooperation or competition by competitors, with individualists taking an intermediate position (e.g., Kelley & Stahelski, 1970; McClintock & Liebrand, 1988; Van Lange & Kuhlman, 1994).

Manipulation checks. The last page of the questionnaire contained a manipulation check for frame. Participants were asked whether the decision making involved points they would lose or points they would gain.

After completing the questionnaire, the participants returned to the central room. After they were debriefed and paid, the participants were permitted to leave.

Results

Manipulation Check for Frame

Thirty-three of the 35 participants in the loss-framed condition answered correctly that their decisions involved losses; 35 of the 39 participants in the gain-framed condition responded correctly that their decisions involved gains, $\chi^2(1, N = 74) = 45.46$, $p < .001$. Social value orientation did not affect re-

sponses to this question, $\chi^2(2, N = 74) < 1$. Thus, the frame manipulation was successful.

Cooperation

The number of cooperative choices (0 = *perfectly noncooperative*, 4 = *perfectly cooperative*) was submitted to a 2 (frame) × 3 (social value orientation) analysis of variance (ANOVA). This yielded a main effect for social value orientation, $F(2, 68) = 14.03$, $p < .001$, showing that pro-social individuals made more cooperative choices than individualists and competitors. The latter two categories did not differ significantly (see row 1 of Table 5).

The main effect for frame was not significant, $F(1, 68) < 1$, but frame interacted with social value orientation, $F(2, 68) = 3.95$, $p < .025$. The cell means are shown in Table 6. Planned comparisons revealed that pro-socials with a loss frame tended to cooperate more than pro-socials with a gain frame, $F(1, 68) = 2.63$, $p < .10$, and that individualists with a loss frame cooperated less than those with a gain frame, $F(1, 68) = 5.92$, $p < .025$. Contrary to predictions, there was no effect for frame in the case of a competitive motive, $F(1, 68) < 1$, *ns*.

Expectations

We submitted the expectation about the other's behavior (averaged over the four games) to a 2 × 3 (Frame × Social Value Orientation) ANOVA. No significant effects were found for social value orientation, $F(2, 68) = 1.13$, *ns*, frame, $F(1, 68) = 1.08$, *ns*, or the Frame × Social Value Orientation interaction, $F(2, 68) < 1$. That the main effect for social value orientation did not reach the conventional level of significance was somewhat surprising because previous research has repeatedly shown

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[2] This negative result should not be taken as ultimate proof for the proposition that the grand mean does not affect cooperation. In this and subsequent experiments, variations in the grand mean were relatively small, and variations were within subject. Perhaps the between-subjects variations in the grand mean that are more substantial do reveal effects on cooperation.

Table 5

Experiment 1: Own Cooperation, Expectation About the Other's Cooperation, and Their Correlation as a Function of Social Value Orientation

Dependent variable	Social value orientation		
	Pro-socials	Individualists	Competitors
Own cooperation	2.56ₐ	1.03ᵦ	0.73ᵦ
Expectation of cooperation	2.71ₐ	2.46ₐ	2.43ₐ
Correlation	.75**	.59*	.13

Note. Cell means within one row with different subscripts differ at the .05 level according to Duncan's multiple-range test (*d*).
* $p < .01$. ** $p < .001$.

such a difference. As displayed in Table 5, however, differences in the cell means were in the expected direction, and the correlation between one's own and the expected other's cooperation was stronger for pro-socials than for competitors, $t(42) = 2.54$, $p < .05$. The correlation in the case of an individualistic orientation took an intermediate position and did not differ significantly from the other two ($ts < 1.06$).

Because frame did not affect expectations about other's cooperation, it does not appear that the Frame × Social Value Orientation interaction on cooperation is due to differences in expected cooperation. A 2 × 3 (Frame × Social Value Orientation) analysis of covariance (ANCOVA) on cooperation with the expectation about the other's cooperation as the covariate corroborated this conclusion. Although cooperation regressed significantly on the expectation about the other's cooperation ($\beta = .45$, $p < .001$), the main effect for social value orientation, as well as the interaction between frame and social value orientation, remained significant, $Fs(2, 67) = 12.80$ and 4.18, $ps < .001$ and $.019$, respectively.

Discussion

The results of Experiment 1 lend some general support to the hypothesis that frame interacts with social motive to predict cooperation in two-person social dilemmas. Pro-socials cooperated somewhat less ($p < .10$) when they had a gain rather than a loss frame, and individualists cooperated significantly more when they had a gain rather than a loss frame. In contrast to our prediction, we found no frame effects for competitors. (Possible explanations for this negative result are discussed in the General Discussion section.)

There was no main effect for frame in Experiment 1. When we assume that most research populations contain participants with cooperative, individualistic, and competitive value orientations and that the effect size for frame effects are approximately equal for pro-socials and individualists (and competitors), then the results of Experiment 1 may suggest an explanation for the absence of frame effects observed in some previous research. The transformational analysis predicted that under these conditions, frame effects should attenuate if analyses were conducted for all participants rather than by groups, on the basis of social value orientations. Also, the analysis suggested that previous studies observing greater cooperation for gain than loss frames explicitly or implicitly induced an individualistic (or competi-

tive) motive and that those finding more cooperation in the case of a loss frame implicitly or explicitly induced a pro-social orientation (e.g., through verbatim instructions or monetary incentives making certain behaviors more rewarding; see Deutsch, 1973; Sattler & Kerr, 1991).

To further substantiate this argument, we classified previous framing research according to the direction of the frame effect observed (we included only peer-reviewed research that appeared in psychology journals). Of the 18 studies discussed in the introduction, 6 reported no effects for frame; 8 reported that relative to the gain frame, the loss frame produced less cooperation; and 4 reported more cooperation in case of a loss rather than a gain frame. In making this classification, complex interaction effects between frame and other variables under investigation were not considered. Instead, our criterion was whether frame had an overall effect on cooperation (or concession making and settlement in the negotiation studies). Next, we analyzed the method sections of those studies for verbatim instructions and made a judgment about which social motive participants might have adopted. For example, instructions likely to induce an individualistic motive are "maximize your own outcomes, and do not consider those of your opponent" (De Dreu et al., 1994; McCusker & Carnevale, 1995). An example of an instruction leading to a competitive motive is "you should try to win at the expense of the other" (e.g., Schurr, 1987). An example of a pro-social motive instruction is "most subjects participating so far decided to contribute" (cf. McDaniel & Sistrunk, 1991). Instructions were scored independently by two judges who did not know the outcome of the studies; one of them did not know the hypotheses. Initial Cohen's kappa was acceptable (.73), and discrepancies were solved through discussion.

Table 7 shows the classification of previous studies according to the direction of the frame effects. For none of the studies failing to find differences for frame were we able to find instructions favoring a particular social motive. For the studies reporting that a loss frame reduced cooperation, all but one study used verbatim instructions stressing only one's own outcomes. In addition, of the four studies reporting that a loss frame enhanced cooperation, one study (Schurr, 1987) used clearly competitive verbatim instructions and the remaining three most likely created a somewhat pro-social context (cf. Table 7). The association between the direction of frame effect and verbatim instruction was significant, $\chi^2(4, N = 18) = 25.59$, $p < .001$.

To cross-validate that analysis, we also considered the composition of samples and assumed that general undergraduate popu-

Table 6

Experiment 1: Cooperation as a Function of Social Value Orientation and Frame

Frame	Social value orientation		
	Pro-socials	Individualists	Competitors
Gain	2.11cd	1.57bc	0.67ab
Cell n	9	14	12
Loss	3.00d	0.56a	0.78ab
Cell n	9	16	14

Note. Means with different subscripts differ at the .05 level according to Duncan's multiple-range test (*d*).

Table 7
Previous Research Classified for Frame Effect, Verbatim Instructions, and Sample

Frame effect and authors	Instructions	Sample type
Frame did not affect cooperation		
Fleishman (1988)	Neutral	Sociology majors
De Dreu, Emans, and Van de Vliert (1992a)	Neutral	Psychology majors
De Dreu, Emans, and Van de Vliert (1992b)	Neutral	Undergraduates
Rutte, Messick, and Wilke (1987)	Neutral	Undergraduates
Aquino, Steisel, and Kay (1992)	Neutral	Undergraduates
Schwartz-Shea and Simmons (in press)	Neutral	Undergraduates
Loss frame reduced cooperation		
Brewer and Kramer (1986)	Individualistic	Undergraduates
McCusker and Carnevale (1995)	Individualistic	Psychology majors
Bazerman, Magliozzi, and Neale (1985)	Individualistic	Business majors
Neale, Huber, and Northcraft (1987)	Individualistic	Business majors
De Dreu et al. (1994a)	Individualistic	Psychology majors
Neale and Bazerman (1985)	Individualistic	Business majors
Bottom and Studt (1993)	Individualistic	MBA students
Komorita and Carnevale (1993, Experiment 2)	Neutral	Psychology majors
Loss frame increased cooperation		
Schurr (1987)	Competitive	MBA students
McDaniel and Sistrunk (1991)	Pro-social[a]	Business majors
Komorita (1987)	Pro-social[b]	Psychology majors
Komorita and Carnevale (1993, Experiment 3)	Pro-social[b]	Psychology majors

[a] This conclusion is based on the suspicion that additional manipulations created a pro-social norm.
[b] This conclusion is based on the fact that participants had preplay contact, which might have elicited a pro-social orientation (cf. Komorita & Carnevale, 1993).

lations contain more pro-socially and less competitively oriented participants than business and MBA samples. Again, we obtained support for our transformational analysis (see Table 7). Zero out of the six studies failing to find effects for frame and two out of four finding a loss frame to enhance cooperation used business or MBA students, whereas four out of the eight studies reporting less cooperation in case of a loss frame were conducted with business and MBA students. This association was significant, $\chi^2(2, N = 18) = 6.28, p < .05$.

The archival analysis in Table 7 is more suggestive than conclusive because it is based on commonsense assumptions and judgment rather than on empirical evidence. For example, some authors did not provide information about the absence or presence of substantial preplay contact. Also, there was some variance in the intensity of instructions leading to a particular motive. As mentioned before, we included only research reports that appeared in peer-reviewed psychology journals. Nevertheless, results were fairly consistent with those of Experiment 1 and the concomitant conclusion that frame effects may become especially apparent when one controls for social motive. Moreover, the analysis suggested that social motive attributable to situational demands (e.g., instructions or incentives) should produce effects similar to the ones we observed for social value orientation in Experiment 1. To substantiate this argument, we conducted Experiment 2, in which we examined the Frame × Social Motive interaction when social motives were incentive based rather than arising from individual differences in value orientation.

Experiment 2
Method
Design

The design was a 2 × 3 factorial, with frame (gain vs. loss) and social motive (pro-social, individualistic, or competitive) as between-

subjects variables. The amount of cooperation in 16 noniterated social dilemmas was the main dependent variable. Additional dependent variables were expected cooperation by the other person and manipulation checks. We switched to 16 rather than 4 trials to obtain a more reliable measure of cooperation.

Participants

Thirty-three male and 64 female undergraduates from the University of Groningen participated. Participants were recruited in ways similar to those of Experiment 1. They received 10 guilders (about $7) for participation. In addition, they were given a chance to win one of three 50-guilder prizes (approximately $33). Participants were randomly assigned to experimental conditions, and the experimenter did not know this assignment. Three participants incorrectly responded to the manipulation checks for both frame and social motive. We suspected malicious intent and dropped these participants from the analysis, resulting in a total sample of 94 (sample sizes N ranged from 14 to 17 per condition). For reasons mentioned before, we did not analyze effects attributable to the participant's gender.

Procedure

The procedure was identical to that used in Experiment 1, except that we did not assess social value orientations. Participants were placed in separate cubicles and were asked to fill out a questionnaire. Frame was manipulated as before by telling participants that they would either gain or lose points by making decisions.

We manipulated social motive by adapting the instructions about participants' chance to win money in a lottery based on their earnings. In the pro-social motive conditions, participants were told that their earnings were based on the sum of their own points and those of the other party. In the individualistic motive conditions, they were told that their earnings were based on their own points regardless of the other party's points. Finally, in the competitive motive conditions, participants were

told that their earnings were based on their own points minus those of the other party.

As in Experiment 1, participants were presented with an example of a social dilemma involving either positive outcomes (in the gain-framed condition) or negative outcomes (in the loss-framed condition). Subsequently, participants were presented with 16 social dilemmas, each on a new page, all identical to those used in Experiment 1 and depicted in Table 4 (i.e., each dilemma was given four times). Participants received the dilemmas in a random order determined before the experiment. For each dilemma, participants were asked to circle their choice (A or B, cooperative or competitive). Again, just before making each decision, we asked participants to indicate their expectation about the other's behavior (1 = *definitively chooses Option B*, 4 = *definitively chooses Option A*). As in Experiment 1, the variation of the game grand mean had no significant effect on cooperative behavior.

The final page of the questionnaire contained manipulation checks. To check the adequacy of the frame manipulation, we asked the participants whether the decision making involved points they would lose or points they would gain. The social motive manipulation was checked by asking participants whether the amount of lottery tickets they would get from the decision making depended on their personal earnings together with those of the other party (cooperative), on their personal earnings alone (individualistic), or on the difference between their own and the other's earnings (competitive). In addition, we asked at the end of the questionnaire the extent to which they tried to (a) obtain points both for themselves and the other party, (b) obtain points for themselves with no regard for the outcomes of the other party, and (c) obtain more points than the other party. All questions were rated on a 7-point scale (1 = *not at all*, 7 = *very much*). After completing the questionnaire, participants returned to the central room, where they were debriefed and permitted to leave.

Results

Manipulation Checks

The manipulation of frame was successful. Forty-four of the 49 participants in the gain-framed condition reported that they were dealing with gains, and 44 of the 45 participants in the loss-framed condition correctly indicated that they were dealing with losses, $\chi^2(1, N = 94) = 72.09, p < .001$. Social motive did not affect responses to this question, $\chi^2(2, N = 94) < 1, ns$.

Social motive also was manipulated successfully. Thirty-one of the 33 participants in the cooperative motive condition, 28 of the 30 participants in the individualistic motive condition, and 31 of the 31 participants in the competitive motive condition responded correctly to the question of how the amount of lottery tickets would be determined, overall $\chi^2(4, N = 94) = 128.24, p < .001$.

In addition, a 2 × 3 (Frame × Social Motive) multivariate analysis of variance (MANOVA) on the ratings for the three social motive questions revealed only the expected multivariate main effect for social motive, $F(6, 174) = 13.21, p < .001$. A cooperative motive (see row 1 of Table 8) received higher ratings in the pro-social motive condition than in the other two conditions, $F(2, 88) = 34.92, p < .001$. The individualistic motive (see row 2 of Table 8) received higher ratings in the individualistic and competitive motive conditions than in the pro-social motive conditions, $F(2, 88) = 40.40, p < .001$, and a competitive motive (see row 3 of Table 8) received higher ratings in the competitive and individualistic motive conditions than in the pro-social motive conditions, $F(2, 88) = 17.44, p < .001$.

Table 8
Experiment 2: Self-Reported Social Motive, Own Cooperation, Expectation About the Other's Cooperation and Their Association as a Function of Social Motive

Dependent variable	Social motive		
	Pro-social	Individualistic	Competitive
Cooperative motive	6.60$_a$	3.03$_b$	3.19$_b$
Individual motive	3.06$_b$	6.00$_a$	5.61$_a$
Competitive motive	3.30$_b$	5.20$_a$	5.52$_a$
Own cooperation	12.90$_a$	5.99$_b$	2.56$_c$
Expected cooperation	3.15$_a$	2.61$_{a,b}$	2.22$_b$
Correlation	.77**	.59*	.54*

Note. Cell means within one row with different subscripts differ at the .05 level according to Duncan's multiple-range test (*d*). Correlations are between one's own cooperation and the expectation about the other's cooperation.
* $p < .01$. ** $p < .001$.

Cooperation

The number of cooperative choices in the 16 social dilemmas was submitted to a 2 (frame) × 3 (social motive) ANOVA, which yielded a main effect for social motive, $F(2, 88) = 83.12, p < .001$ (see row 4 of Table 8), as well as Social Motive × Frame interaction, $F(2, 88) = 6.74, p < .010$. Cell means are given in Table 9. Planned comparisons showed that within the cooperative motive condition, individuals with a loss frame cooperated more than individuals with a gain frame, $F(1, 88) = 4.39, p < .05$; that within the individualistic motive condition, individuals with a loss frame cooperated less than those with a gain frame, $F(1, 88) = 5.70, p < .025$; and that within the competitive motive condition, individuals with a loss frame cooperated as little as those with a gain frame, $F(1, 88) < 1, ns$. The latter, nonsignificant result was unexpected, but it was consistent with the findings of Experiment 1.

Expectations

As in Experiment 1, we submitted the expectation about the other's cooperation (averaged over the 16 games) to a 2 × 3 (Frame × Motive) ANOVA. A main effect for social motive, $F(2, 88) = 22.08, p < .001$, showed that pro-socials expected more cooperation than competitors, with individualists taking an intermediate position that did not significantly differ from the other two social motive conditions (for cell means, see row 5 of Table 8). No other effects were observed (all *F*s < 1). Hence, the data suggest that frame did not affect expectations about the other's cooperativeness. Also, row 6 of Table 8 shows that, once again, there was a somewhat stronger association between one's own cooperation and expected cooperation in the pro-social motive condition than in the competitive motive condition, $t(64) = 1.63, p < .10$. As in Experiment 1, the individualistic motive condition took an intermediate position, in which the correlation did not significantly differ from the other two social motive conditions (*t*s < 1, *ns*).

To corroborate the notion that our Frame × Social Motive interaction on cooperation was not due to frame effects on expectations about the other's cooperation, we conducted a 2 × 3

Table 9
Experiment 2: Cooperation as a Function of Social Motive and Frame

	Social motive		
Frame	Pro-social	Individualistic	Competitive
Gain	11.53_b	7.58_c	2.00_d
Loss	14.25_a	4.39_d	3.12_d

Note. Means with different subscripts differ at the .05 level according to Duncan's multiple-range test (d).

(Frame × Social Motive) ANCOVA on cooperation with the expectation about the other's cooperation as the covariate. Cooperation regressed on the expectation about the other's cooperation $(\beta = .62, p < .001)$, but the expectation about the other's cooperation did not affect the Frame × Social Motive interaction on cooperation: The main effect for social motive, as well as the interaction between frame and social motive, remained significant, $Fs(2, 87) = 41.57$ and 7.05, $ps < .001$, respectively.

Discussion

As in Experiment 1, results of Experiment 2 show that social motives interacted with frame to predict cooperation in social dilemmas. This hypothesis now appears to have construct validity, in that it held for social motives stemming both from individual differences in value orientation (Experiment 1) and from incentives (Experiment 2). Also, results of Experiments 1 and 2 together offer an explanation for the inconsistencies surrounding previous empirical analyses of frame effects in social dilemmas and negotiation. Again, however, we failed to obtain significant frame effects for competitive participants. As mentioned earlier, explanations are discussed in the General Discussion section.

Experiments 1 and 2 provided evidence for our hypothesis while controlling for a possible confound: the possibility that decisions involving gains or losses evoke differential expectations about the other's cooperation. However, asking people about their expectations may influence choices by creating a new standard of comparison to evaluate outcomes or by inducing a specific mindset (Herr, 1986). Also, asking participants what they expect the other party to do might have highlighted the fact that they had no information whatsoever about the other party. Finally, explicitly referring to the other's behavior may increase awareness of the dangers of cooperative behavior (i.e., fear of being taken advantage of). Consequently, participants in the first two experiments might have focused somewhat too heavily on the noncooperative part of the matrix, thus limiting the generalizability of our results. Therefore, we thought it was critical to replicate our findings from Experiment 2 without asking participants about their expectations. Another goal of Experiment 3 was to obtain a cross-cultural replication. To achieve this, we conducted an experiment similar to Experiment 2 using American rather than Dutch undergraduates.

Experiment 3

Method

Design

The design was a 2 × 3 factorial, with frame (gain vs. loss) and social motive (cooperative, individualistic, or competitive) as between-

subjects variables. The average amount of cooperation in a series of noniterated dilemmas was the main dependent variable. The other dependent variables were checks for frame and for motive.

Participants

Ninety-four undergraduates from the University of Illinois at Urbana–Champaign, randomly drawn from the participant pool of the psychology department, participated for course credit. In addition to course credit, participants were given the opportunity to win a cash lottery prize of $20 (as part of the social motive manipulation). Participants were randomly assigned to experimental conditions, and the experimenter did not know this assignment. Three suspicious participants were omitted from the analyses (they failed to respond correctly to the manipulation checks for both frame and social motive). About 50% of the participants were women.

Procedure and Independent Variables

The procedure and manipulation of the independent variables were identical to those of Experiment 2, except that participants filled out the questionnaire in large classrooms containing about 30 participants seated at a reasonable distance from each other.

Several differences about the questionnaire should be mentioned. Because of time constraints, we asked participants to make choices 12 rather than 16 times. The games were identical to those used in Experiments 1 and 2, except that we used Dilemmas 2 and 4 six times each (see Table 4). Again, the grand mean did not significantly influence cooperation. In addition to these changes, and for reasons outlined earlier, we did not question participants about their expectations about the other's cooperation.

Regarding the manipulation checks for frame and social motive, the following changes were made. To check for the adequacy of the frame manipulation, we asked participants the extent to which they were concerned with losses or gains (1 = *entirely concerned with losses,* 7 = *entirely concerned with gains*). To check the social motive manipulation, we used questions similar to those used in Experiment 2. First, participants were asked whether the amount of lottery tickets they would get from the decision making depended on their personal earnings together with those of the other party (cooperative motive), their personal earnings alone (individualistic motive), or the difference between their own and the other's earnings (competitive motive). We also asked them at the end of the questionnaire the extent to which they tried to (a) be very cooperative or very competitive (1 = *very competitive,* 7 = *very cooperative*); (b) obtain as many points for themselves as possible (1 = *not at all,* 7 = *very much*); and (c) obtain more than the other party by as many points as possible (1 = *not at all,* 7 = *very much*).

Results

Manipulation Checks

A 2 × 3 (Frame × Social Motive) ANOVA on the ratings of the manipulation check for frame showed that loss-framed individuals $(M = 2.56)$ were more concerned with losses than were gain-framed individuals $(M = 5.56)$, $F(1, 85) = 64.43$, $p < .001$. No other effects were significant (see row 1 of Table 10 for the cell means broken down for social motive).

Confirming the manipulation of social motive, 91% of the participants in the cooperative motive condition gave the correct response, 88.6% of the participants in the individualistic motive condition provided the correct answer, and 88.5% of the participants in the competitive motive condition answered correctly, $\chi^2(4, N = 94) = 136.33$, $p < .001$. In addition, a 2 × 3 (Frame × Social Motive) MANOVA on the three motive-related

Table 10

Experiment 3: Concern for Loss, Self-Reported Social Motive, and Cooperation as a Function of Social Motive

	Social motive		
Variable	Pro-social	Individualistic	Competitive
Concern for loss	3.92$_a$	3.90$_a$	4.23$_a$
Cooperative motive	5.23$_a$	3.17$_b$	3.23$_b$
Individualistic motive	3.60$_a$	5.93$_b$	5.06$_b$
Competitive motive	2.86$_b$	4.74$_a$	5.00$_a$
Cooperation	9.15$_a$	1.26$_b$	1.09$_b$

Note. Cell means within one row with different subscripts differ significantly at the .05 level according to Duncan's multiple-range test (d).

questions revealed a multivariate main effect for social motive, $F(6, 168) = 8.07$, $p < .001$. Follow-up tests revealed significant effects for motive for the cooperative motive-related question, $F(2, 85) = 12.98$, $p < .001$, for the individualistic motive related question, $F(2, 85) = 13.59$, $p < .001$, and for the competitive motive-related question, $F(2, 85) = 14.42$, $p < .001$. A cooperative motive received higher ratings in the pro-social motive condition than in the individualistic and competitive motive conditions (see row 2 of Table 10), whereas the individualistic and competitive motives received higher ratings in the individualistic and competitive motive conditions than in the pro-social motive condition (see rows 3 and 4 of Table 10).

Cooperation

The number of cooperative choices in the 12 social dilemmas was submitted to a 2 (frame) × 3 (social motive) ANOVA. This yielded a main effect for social motive, $F(2, 85) = 62.25$, $p < .001$, showing that participants in the cooperative motive condition cooperated more than those in the individualistic motive condition or in the competitive motive condition (for cell means, see row 5 of Table 10). There also was a significant two-way interaction between social motive and frame, $F(2, 85) = 5.16$, $p < .01$. Table 11 shows the cell means. Planned comparisons revealed that within the cooperative motive conditions, loss-framed individuals cooperated more than gain framed individuals, $F(1, 85) = 7.13$, $p < .01$; that within the individualistic motive condition, loss-framed individuals cooperated less than those with a gain frame, $F(1, 85) = 4.47$, $p < .05$; and that within the competitive motive condition, loss-framed individuals cooperated as little as those with a gain frame, $F(1, 85) < 1$, ns.

Discussion

Results of Experiment 3 support the hypothesis that frames and social motives interacted to predict cooperation (except for competitors) even when participants were not primed to focus on the noncooperative part of the outcome matrices. Also, the results indicate that our hypothesis appeared to be as valid for Americans as for the Dutch participants in the first two experiments.

General Discussion

People judge outcomes relative to a standard of comparison, and these relative judgments of outcomes in terms of gains and losses affect their behaviors in a variety of settings. The current research was concerned with such frame effects in two-person social dilemmas, in which the focal party's cooperation or defection influenced his or her own outcomes as well as those of an interdependent other party. Consistent with prospect theory (Kahneman & Tversky, 1979), we argued that because of loss aversion—losses loom larger than equivalent gains—the difference in utility of cooperation and defection in social dilemmas should loom larger under a loss than a gain frame. Following interdependence theory (Kelley & Thibaut, 1978), we further argued that the preference for cooperation or defection would arise from social motives and concomitant outcome transformations. This led to the prediction that cooperators make more cooperative choices when they have a loss rather than a gain frame, whereas individualists and competitors make less cooperative choices under a loss than a gain frame.

Results of our three experiments were generally consistent with this transformational analysis: Cooperators cooperated more under a loss rather than a gain frame and individualists cooperated less under a loss than a gain frame. These effects were found for social motives arising from individual differences in value orientation (Experiment 1) and for social motives based on external incentives (Experiments 2 and 3). They further appeared independent of expectations about the other party's cooperation, both when we directly controlled for such influence (Experiments 1 and 2) and when participants were not prompted to focus on the other's behavior (Experiment 3). Finally, the experiments indicate that the Frame × Social Motive interaction was valid in both the Dutch and American samples (Experiments 1 and 2 vs. Experiment 3). Thus, our three experiments corroborate the Frame × Social Motive hypothesis, lend to it construct and cross-cultural validity, and rule out the most obvious alternative explanation. In addition, we demonstrated that the transformational analysis can account for at least some of the inconsistencies in previous research (cf. Table 7).

In none of the experiments did we obtain support for the prediction that competitors with a loss frame should defect more than competitors with a gain frame. One possible explanation is that competitors are strongly inclined to defect and that a "floor effect" prohibited the predicted frame effects to come out. Another possibility is that the utility function is characterized by "diminishing returns," meaning that identical differences in objective values produce smaller differences in subjec-

Table 11

Experiment 3: Cooperation as a Function of Social Motive and Frame

	Social motive		
Frame	Pro-social	Individualistic	Competitive
Gain	8.14$_b$	3.62$_c$	2.80$_{c,d}$
Loss	10.25$_a$	1.40$_d$	1.54$_d$

Note. Means with different subscripts differ at the .05 level according to Duncan's multiple-range test (d).

tive utility when those differences in subjective utility occur at more extreme values of objective values. Because (transformed) outcomes are more extreme for competitors (cf. Table 2), this might overwhelm the effect attributable to frame.[3]

The current research showed both theoretically and empirically how fundamental insights advanced by prospect theory (Kahneman & Tversky, 1979) may be incorporated into interdependence theory (Kelley & Thibaut, 1978). This lends generality to the notion of loss aversion, which remains largely confined to the domain of individual decision making. For example, the notion of loss aversion has been used to explain deviations from expected utility theory such as preference reversals (Tversky & Kahneman, 1991), the status quo bias (Samuelson & Zeckhauser, 1988), the endowment effect (Kahneman et al., 1990), and escalating commitment to a failing course of action (Brockner & Rubin, 1985). Granted, there has been previous research on frames in social dilemmas, but as far as we know, the current research is among the first to provide a theoretical link between loss aversion and cooperation and defection in settings of outcome interdependence.

Incorporating loss aversion into the analysis of cooperative behavior has several implications for interdependence theory (Kelley & Thibaut, 1978). Our analysis showed how loss aversion may strengthen behavioral tendencies set forth by social motives and concomitant outcome transformations. This may enhance sensitivity to the fact that judgment is relative, in social dilemmas as much as in any other domain involving judgment and decision making. Second, it may help to explain the effects on cooperation of other variables thought to influence perceived differences between the utility of cooperation and that of defection. For example, researchers have compared cooperation in games played for points (low difference) with games played for money (high difference). In reviewing these studies, Kelley and Thibaut (1978, pp. 197–199) noted that the effects were equivocal. Although some researchers have found more cooperation under a monetary incentive, others have reported the opposite effect. With Kelley and Thibaut, we suspect that fundamental differences in social motives that were implicitly or explicitly induced may explain these inconsistent findings.

The current emphasis on loss aversion and social motives is part of growing stream of research on the role of cognitive–motivational processes mediating cooperation in social dilemmas. Other experiments have examined person perception (De Dreu, Yzerbyt, & Leyens, 1995; Van Lange & Kuhlman, 1994), interpersonal trust (Parks & Vu 1995), and reliance on equality heuristics (Allison & Messick, 1990). The importance of this line of research is that it consistently qualifies fundamental aspects of rational decision theories such as game theory. For example, game theorists tend to assume that settings of outcome interdependence are approached in terms of immediate self-interest, and they tend to argue that the coding of outcomes as losses or as gains should make no difference in predicting cooperation and defection. Our research tends to make false both assumptions and points to interdependence theory as a viable alternative.

A fourth implication of the current research is that framing outcomes as losses may turn out to be highly profitable, in the sense that loss-framed individuals seem to be more "optimizing" decision makers than gain-framed individuals. That is, individuals with a loss frame cooperate more than those with a gain

frame when joint outcomes are at stake, but they compete more when personal outcomes are at stake. In a sense, these data are consistent with two other findings in the domain of interdependent decision making. First, there is evidence suggesting that loss-framed individuals take more time to make decisions (De Dreu et al., 1992a; Dehue et al., 1993; Schneider, 1992). Second, there is some evidence that loss-framed individuals scrutinize decision alternatives better than gain-framed decision makers (De Dreu et al., 1992a; Dunegan, 1993). Future research might explore the hypothesis that loss-framed individuals engage in thorough, systematic processing of information and that gain-framed individuals engage in superficial, heuristic processing (for a discussion of systematic and heuristic processing, see Chaiken, Eagly, & Liberman, 1989).

Although our findings lend general support for the Frame × Social Motive prediction, our research did not provide direct empirical evidence for the underlying mechanisms. We relied on two fundamental assumptions: loss aversion and outcome transformation. Although each assumption has received good empirical support in various domains of research, further research is needed to demonstrate decisively that loss aversion and outcome transformations are mediating the interaction between frame and social motive. This is even more important because rival interpretations of our data may appear plausible. For example, one may wonder whether social motives moderate or mediate the effects of frame on cooperation. That is, the effects of frame on cooperation occur because relative to the gain frame, the loss frame enhances pro-socials' cooperative motivation, individualists' egoistic motivations, and competitors' motivation to maximize their relative advantage. At first sight, it appears that a mediation analysis predicts an identical pattern of results as a moderator analysis. Mediation also would imply, however, that frame should directly influence social motives (see Baron & Kenny, 1986). Thus, in both Experiments 2 and 3, we should have found that frame influenced ratings on the self-reported social motives. This was never found. The other way around, one might argue that social motives influence the individual's sensitivity to losses. For example, cooperators might be particularly sensitive to losses, whereas competitors are not at all sensitive. We are unaware of empirical and theoretical arguments favoring this explanation, but future research might explore this issue in more detail.[4]

In the current research we used one single paradigm, thus allowing for a monomethod bias (Cook & Campbell, 1979). Our archival analysis revealing a similar pattern argues against this, but we tend to interpret this only as circumstantial evidence. Previous researchers have used various types of social dilemma

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[3] We are grateful to an anonymous reviewer for suggesting this explanation.

[4] One might argue that if social motive differentially influences sensitivity to losses, we should have obtained effects for social motives on our manipulation checks for frame. This was never the case. However, our manipulation checks were not good measures of loss aversion and sensitivity to losses. In addition, in all three experiments, checks were administered after the task, and participants could look back to their decision task to verify the answer to the manipulation check (although we instructed them to answer the questions "without looking back"). For these reasons, we are reluctant to use these manipulation check items as proof for or against a mediation model.

games, both two-person and N-person games, and have used both single-shot and multitrial dilemmas. As argued in the introduction, these differences in paradigms cannot account for the inconsistencies in the direction of frame effects. However, we also relied on one single operationalization of frame, and we cannot yet exclude that variations herein, in the type of dilemmas or in the time horizon, moderate the strength of frame effects or qualify the Frame × Motive interaction observed in our research.

Related to this is whether our findings translate to social dilemmas in which feedback about the other party's behavior is available. Pruitt (1967, 1970) and Komorita & Carnevale (1993) found that without information about the other person's behavior, different representations of one and the same interdependence structure failed to affect cooperation (cf. the lack of main effects for frame in the current research). However, in Pruitt's work, matrix representation interacted with the other's behavior through the elicitation of different social motives. Consistent with this, various researchers have observed an interaction between frame and the other player's behavior on cooperation in social dilemmas (e.g., Fleishman, 1988; McCusker & Carnevale, 1995; McDaniel & Sistrunk, 1991). Research is needed to understand how frame, social motive, and the other person's behavioral strategy jointly affect cooperation in social dilemmas.

A third potential limitation of the current research is that our analysis may be restricted to situations in which interdependent parties have full information about their own and the other person's payoffs, a situation rare in many daily life settings of mixed-motive interdependence (Pruitt & Carnevale, 1993). People may make assumptions about their interdependent other's outcomes and priorities and acquire insight by exchanging information about priorities and outcomes. Thus, people may construe complete information, which then is subject to transformational processes. Carnevale and Keenan (1990; see also Carnevale & Pruitt, 1992), for example, crossed negotiator frame with social motive (individualistic vs. cooperative) in a negotiation setting in which parties had information only about their own payoffs. They found that in the individualistic motive condition, loss-framed negotiators had lower settlement rates than gain-framed negotiators, an effect that vanished in the cooperative motive condition. Carnevale and Keenan demonstrated that in the case of a cooperative motive, loss-framed negotiators seek agreements of high joint benefit to a greater extent than do gain-framed negotiators. This is consistent with our analysis that in the case of a cooperative motive, loss-framed individuals cooperate more and are more concerned about joint welfare than are gain-framed individuals.

Our research provided evidence for an interaction between frame and social motivation, simultaneously excluding some of the more viable alternative explanations. The transformational analysis integrated prospect theory and interdependence theory and helped explain inconsistencies in previous framing research. More generally, our research adds to the argument that various forms of interdependent decision making cannot be sufficiently understood by the simple assumption that individuals approach others in terms of their immediate self-interest. Rather, their social motives prescribe the kind of rationality they pursue; the extent to which this rationality is pursued depends in part on the individual's gain or loss frame and concomitant loss aversion.

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