Group Processes & Intergroup Relations
2002 Vol 5(4) 319–332

G P I R

Perceived Criticality and Contributions in Public Good Dilemmas: A Matter of Feeling Responsible to All?

David De Cremer
Maastricht University

Eric van Dijk
Leiden University

The present research examined the assumption that the higher the probability that decision-makers perceive their contribution to be critical to the group outcome the higher the chance that they will contribute. Contrary to the widely accepted view that highly critical people contribute more because it is in their self-interest to do so, the authors argue that this criticality effect may also be explained, at least partly, in terms of decision-makers' focus on the consequences of own behavior on other's outcomes. In line with this, it was hypothesized that high perceived criticality activates feelings of social responsibility (which includes an other-oriented approach) and in turn influences contributions. Across three studies, using a linear public good dilemma, a step-level dilemma with different monetary endowments, and a sequential step-level dilemma, supportive evidence for this hypothesis was found. These results suggest that the self-interest explanation is too limited to fully account for the criticality effect.

keywords criticality, public goods, self-interest, social responsibility

A SOCIAL DILEMMA represents a social situation in which personal and collective interests are at odds (see Komorita & Parks, 1994; Messick & Brewer, 1983; Van Lange, Liebrand, Messick, & Wilke, 1992 for reviews). In such situations of interdependence, pursuing the personal interest may yield the individual decision-maker the highest outcomes. However, if each individual attempts to maximize his or her self-interest, the collective outcome will be lower than if each

Author's note
Address correspondence to David De Cremer, Department of Experimental Psychology, P.O. Box 616, 6200 MD Maastricht, The Netherlands [e-mail: d.decremer@psychology.unimaas.nl] Eric van Dijk, Department of Social and Organizational Psychology, University of Leiden, Wassenaarseweg 52, 2333 AK Leiden, The Netherlands. [e-mail: Dijk@fsw. LeidenUniv.nl]

[1368-4302(200210)5:4; 319–332; 027985]

individual attempts to further the collective interest (Dawes, 1980).

One type of dilemma we are confronted with frequently and which is the focus of the present research is the *public good dilemma*. Public goods can be defined as goods that are available to all. That is, no individual can be excluded from consuming it once it is provided (i.e. impossibility of exclusion; see Olson, 1965). An implication of the impossibility to exclude individuals from consumption is that the provision of public goods is problematic. After all, if it is possible to consume the good even without contributing to its provision, individuals may reason that it is in their personal interest not to contribute. The risk then is that contributions will fall short, and the public good will not be provided (Dawes, 1980; Hamburger, 1979; Luce & Raiffa, 1957).

In order to provide a public good, contributions must often surpass a certain threshold. For example, a public good may only be provided if enough members contribute, or if enough money is contributed (see e.g. Hardin, 1982). These types of public goods are typically referred to as step-level public goods (e.g. Hardin, 1982; Van de Kragt, Orbell, & Dawes, 1983). Interestingly, the notion of a provision level introduces the possibility that under some circumstances it may be in the individual group member's personal interest to contribute. The crucial element to consider here is whether or not the individual feels his or her contribution will be critical for providing the public good.

The notion of criticality refers to the issue of whether individual group members feel their contribution matters. Does their individual decision affect whether or not the public good becomes available? Without exception, scientific literature on effects of criticality shows that criticality enhances the likelihood to contribute (e.g. Chen, Au, & Komorita, 1996; Kerr, 1996). As for the why of this positive relation between criticality and willingness to contribute, the dominating view is that being critical increases contributions mainly because it becomes more in one's own self-interest to do so (e.g. Rapoport, 1987, 1988). The purpose of the present research, however, is to illustrate that strong perceptions of criticality may also increase contributions because critical decision-makers may evaluate their decisions in terms of the positive impact they can have on the outcomes of others (cf. Dawes, Van de Kragt, & Orbell, 1990).

Building on previous insights on the function of norms in situations of interdependence (e.g. Kerr, 1995; Schwartz, 1977), we examined whether the positive effect of criticality on willingness to contribute may be explained by its effect on felt responsibility to further the collective interest. That is, we examine the possibility that strong perceptions of criticality may activate the norm of social responsibility, and that this activated norm may underlie the observed relation between criticality and contribution.

Perceived criticality and cooperation in public good dilemmas

In the present article, criticality will be defined as one's subjective perception of how likely it is that one's contribution will be necessary to obtain the public good, although this does not include that one's contribution has to be objectively necessary (cf. Au, Chen, & Komorita, 1998). With the emphasis on perceived criticality, we follow theorists who stress that in order to explain choice behavior it is more important to assess how critical group members think they are than to assess whether or not they were in fact critical (see e.g. Chen et al., 1996 on perceived criticality, and Olson, 1965 and Stroebe & Frey, 1982 on 'perceived effectiveness').[1]

To date, a limited number of studies have provided support for the assumption that the more critical one perceives him/herself to be the more likely one is to contribute. Some first empirical evidence was found by Van de Kragt et al. (1983). In their study, participants were confronted with a step-level public good dilemma in which a specified number of contributors were required to provide a public good (i.e. a monetary bonus). The aim of this study was to investigate the effects of communication on public good provision. One of the main findings was that allowing people to discuss the dilemma prior to making the choice to contribute or not influenced contributions positively. It appeared

that during discussion, participants organized themselves by specifying precisely who would, and who would not, make a contribution toward the public good. In terms of Van de Kragt et al. (1983), a 'minimal contributing set' was defined in which the provision was 'assigned to a subset of members, each of whose contribution is necessary to the production of the good' (p. 113). In terms of the current article, this implied that the appointed group members were automatically critical. Subsequent analyses on actual choice behavior indicated that assigned members did indeed decide to contribute.

The Van de Kragt et al. (1983) study did not explicitly focus on effects of criticality, as the main purpose was to investigate the potential benefits of communication. However, building on this experiment, several other studies did explicitly test the link between criticality and contributions in situations in which communication was prohibited (i.e. the situation commonly observed in social dilemma research). A first line of research was conducted by Rapoport and colleagues (Rapoport, 1987, 1988; Rapoport, Bornstein, & Erev, 1989). In these studies, participants were presented a step-level public good dilemma in which a certain number of endowments had to be contributed in order to provide a public good (i.e. a monetary bonus). Criticality was manipulated by varying the size of endowment assigned to the group members (i.e. endowments differed in monetary value). Results of those studies indicated that those who had a large endowment (i.e. the rich) felt more critical and contributed more than those who had a small endowment (i.e. the poor). Similar findings have been obtained by Kerr (1992) in his research on efficacy in social dilemmas. As Kerr (1992) also noted, the efficacy concept is similar to criticalness, as it refers to the 'judgment that one's cooperative behavior will affect the chances of the group achieving a valued public good' (p. 60). Moreover, the results of a series of studies on efficacy yielded similar results concerning the positive effect on contributions. In these studies, participants were confronted with a step-level public good in which all members were given the same endowment. Decisions to contribute, however, would differentially affect provision of the good. That is, for some members a decision to contribute would have a stronger impact on provision than for others. In agreement with the idea that perceived criticality positively affects willingness to contribute, the results did indeed show that those participants who were more critical (i.e. their endowment had a larger weight) reported higher self-efficacy and were more cooperative than those who were less critical (i.e. their endowment had less weight, see also Kerr, 1989 for a relationship between group size and criticality).

Another successful line of research investigated criticality effects in sequential public good dilemmas (Au et al., 1998; Chen et al., 1996). In sequential public good dilemmas, group members decide one after the other whether or not they will contribute. These dilemmas constitute an interesting case for criticality research as the position one occupies in the sequence may affect perceived criticality. For example, in a four-person group in which a public good (bonus) becomes available only if at least three persons contribute their endowments, a person third in the sequence may perceive him or herself as more critical when learning that only one preceding member has contributed than if already two members have contributed. In agreement with the postulated criticality–contribution relation, Chen et al. (1996) demonstrated that those in critical conditions more often contributed their endowment than those in noncritical situations (see also Au et al., 1998).

Perceived criticality, perceived social responsibility, and cooperation

How to explain these effects of criticality? It appears that the dominating approach has been to interpret criticality effects in terms of its consequences for the self-interest of the individual decision-maker. Thus, implicitly, and sometimes explicitly, the assumption appears to be that criticality may affect to what extent the individual group member finds it to be in his or her own interest to contribute. This probably is best

illustrated by a quote of Van de Kragt et al. (1983) when they described their basic question with regard to the minimal contributing set as 'under what circumstances will individuals who are not constrained by a concern for the welfare of others nevertheless act so as to provide valued public goods for the groups of which they are members?' (p. 113). Indeed, their reasoning on the positive effect of designating a minimal contributing set rested on the assumption that the minimal contributing set denies the designated contributors (i.e. the critical players) the opportunity for a free ride. After all, should they back out of the agreement, the public good will not be provided.

This interpretation of the consequences of criticality in terms of self-interest is also apparent in the subsequent studies on criticality. The expected utility models by Rapoport (1987, 1988) that formed the basis of subsequent empirical research (Chen et al., 1996; Rapoport, 1988) focused on the consequences of criticality for the own outcomes of decision-makers and explicitly incorporated the notion that for critical members the outcomes associated with contributing may exceed the outcomes obtained by not contributing. This reasoning is similar to the reasoning outlined by Van de Kragt et al. (1983). That is, if one considers his/her contribution to be crucial for the establishment of the public good, then contributing one's endowment will reveal positive personal outcomes as the public good is provided. This dominating view has also been adopted by other criticality researchers (e.g. Au et al., 1998; Chen et al., 1996).

In sum, current theorizing appears to ascribe the positive effects of criticality for public good provision to a concern for the own outcomes. In this article, we argue that such a narrow perspective may not fully account for this criticality effect. More specifically, we wish to argue that *other*-oriented motives also play a role in explaining this effect and, most importantly, that these are guided by norms like the felt *social responsibility* to further the collective interest. With respect to these other-oriented motives, Dawes and colleagues (Dawes, Orbell, Simmons, & Van de Kragt, 1986; Dawes et al., 1990) used a modified designated contribution set in which each member of this designated set would receive the bonus if all the others within the designated set contributed, whereas each person outside this set received the bonus if all members within the designated set contributed (i.e. players within the designated set were thus critical to the payoffs for everyone else, but not to their own). Their results showed that the opportunity to communicate increased cooperation, suggesting that other-oriented motives might indeed play a role.

Furthermore, with respect to the social responsibility explanation, our approach fits well with a suggestion made by Kerr (1992). After discussing his effects of efficacy, he also noted that there could be an alternative interpretation for the efficacy–cooperation link. In particular, he noted that the positive effect of efficacy on cooperation would 'also follow from a norm which holds that it is the duty of those who are more capable of helping to do so [e.g., a variation of Berkowitz's (1972) norm of social responsibility]—those who can assist the group should; those who cannot, need not' (p. 75).

Circumstantial evidence for our claim that criticality and felt responsibility to further the collective interest may be intertwined comes from a quote by Messick and Brewer (1983). When discussing the potential benefits of group identification, they noted that enhanced group identification might affect the way people perceive their actions (i.e. the decisions they have to make in the social dilemma). As they put it '. . . the perceived impact of those actions is magnified [*i.e. strong criticality*]' and the individuals' sense of 'responsibility for collective outcomes enhanced' (p. 28; italics added).

Messick and Brewer's (1983) argument suggests that being aware of some connectedness to one's group induces a kind of common fate making decision-makers feel representative of this collective. Such recognition of a common interest may provide the psychological basis on which decision-makers base their decisions (e.g. De Cremer & van Dijk, in press; De Cremer & Van Vugt, 1999; Kramer & Brewer, 1984). A social psychological consequence of this process is that each member will perceive himself or herself as more critical than objectively defined

(i.e. feel more efficacious, see De Cremer & Van Vugt, 1998; Kerr, 1992) and they may perceive it to be their responsibility to contribute (i.e. the norm of social responsibility may be activated; Kerr, 1995). Thus, one's impact at the collective level and sense of social responsibility are likely to increase (Messick & Brewer, 1983).

In this article, we do not intend to address the effects of group identification. However, we do wish to address the postulated relation between perceived criticality and responsibility to further the collective interest. Being interested in effects of criticality, we examine the possibility that feeling critical may increase the value one attaches to the outcomes of interdependent others, or in other words, may increase feelings of social responsibility. Social responsibility refers to the notion that people may feel an obligation to further the interests of others (see e.g. Berkowitz, 1972; Berkowitz & Daniels, 1963). Within the social dilemma context, social responsibility has been identified as an important determinant of cooperative behavior (e.g. De Cremer & van Lange, 2001; Fleishman, 1988; van Dijk & Wilke, 1997). Social responsibility constitutes an important norm in social dilemmas as it is a shared guideline to actions that, if activated, motivates decision-makers to incorporate other's interests in his/her own contribution decision, even if decisions are to be made anonymously (Kerr, 1995; Pillutla & Chen, 1999). In this respect, it would fit very well within the current framework if criticality did indeed increase feelings of social responsibility.

So why would social responsibility underlie, at least partly, the criticality effect in step-level public good dilemmas? In order to see why, it is important to note that social responsibility is assumed to be elicited by observed dependency. That is, people generally feel responsible to further the outcomes of those who are dependent on them (see Berkowitz, 1972; Berkowitz & Daniels, 1963; De Cremer & van Lange, 2001; Fleishman, 1988; Schwartz, 1977; van Dijk & Wilke, 1997). This motivation to feel responsible to further the outcomes of others can even be evoked in situations in which no sanctions for a violation of this norm exist, an example being the social dilemma in which participants typically make their decisions individually and anonymously. Indeed, according to Schwartz's norm-activation theory (1977), feelings of social responsibility are activated when one recognizes one's interdependence with others by evaluating one's decision with respect to the outcomes of the others. This dependency–social responsibility relation is especially relevant to the provision of step-level public goods. In such public good dilemmas, group members most strongly affect the outcomes of the others in their group when they are critical. By definition, the decisions of noncritical members have little bearing on the outcomes of their fellow group members. It thus appears that particularly critical members are confronted with the fact that others are dependent on them for obtaining positive outcomes, consequently influencing their actions (i.e. a norm is assumed to alter behavior only if individuals are aware of the norm; Kerr, 1999). If this would elicit feelings of social responsibility, this might indeed (partly) explain the documented positive relation between criticality and contributions.

Summary of hypotheses

Before moving onto the studies, we would like to present the following hypotheses. First, it is predicted that strong feelings of perceived criticality will lead to higher contributions (*hypothesis 1*). Second, it is predicted that the more people perceive their decision to be critical the more strongly will they experience feelings of social responsibility (*hypothesis 2*), and these feelings are likely to mediate, at least partly, the effect of perceived criticality on contributions (*hypothesis 3*). Three studies were designed to test all three hypotheses. Study 1 is a preliminary study in which a median split is used to classify participants as high or low in perceived criticality. Study 2 uses a step-level dilemma with different monetary endowments (Rapoport, 1988) to manipulate perceived criticality. Finally, Study 3 makes use of a sequential public good dilemma in which the position in the sequence determines one's perceived level of criticality (e.g. Chen et al., 1996).

Study 1

Method

Participants and design Sixty-nine undergraduate students (40 males and 29 females, average age = 19.13, *SD* = 1.33) participated in this study to obtain course credits. The independent variable was level of perceived criticality (high vs. low).

Experimental procedure The experiment was part of a classroom exercise and was introduced as a study about decision-making in organizations. Upon arrival in different group sessions, participants were divided in groups of six and were seated. They were explicitly asked not to talk to one another and were told that their responses would remain anonymous. During the study, the experimenter was able to monitor the groups.

After this, a business scenario with the properties of a step-level public goods dilemma was introduced (see Van de Kragt et al., 1983). Participants were informed that within their group of six, each member would be a manager of a working unit of a company called *Mind Vision*. It was said that all units work independently and that quite often they have to compete for organizational resources and rewards. Participants were informed—by means of a booklet—that each fiscal quarter, working units in this company receive company resources from a common pool referred to as the *Mind Vision good*. The resource that each unit (i.e. each manager) receives is 20,000 Dutch guilders. Participants were told that financial planners within Mind Vision designed an investment plan that would enable the company to gain additional organizational resources. According to this investment plan, each unit could invest or contribute some or all of the resources received into an investment plan (see also Aquino, Steisel, & Kay, 1992).

They were told that if the sum of the investments (in this case the sum of the six managers) equalled or exceeded 48,000 Dutch guilders, they would receive a group bonus of 120,000 Dutch guilders (i.e. 20,000 guilders for each manager). Thus, in this case, all managers would receive part of the investment bonus, regardless of their contribution. However, if the total sum invested was less than 48,000 guilders, then all investments would be lost as sunk costs. Thus, each manager could lose his or her investment if the group as a whole did not contribute enough. Of course, the amount one did not invest would accrue totally to oneself. To provide an incentive for the participants, they were informed that after the study their decisions would be evaluated by the experimenter and that a reward of 50 guilders would be given to the best manager. This evaluation would be based on how much each manager obtained (i.e. the money contributed and the money received from the bonus; cf. Aquino et al., 1992; De Cremer, Snyder, & Dewitte, 2001). After this explanation some outcome possibilities were presented to ensure that participants understood the task.

Dependent measures Perceived criticality was measured by asking participants 'How critical do you think your contribution will be for obtaining the group bonus?' A median split (median = 4.00) was performed on this measure to classify participants as high or low in perceived criticality. Feelings of social responsibility were assessed by asking participants 'To what extent do you feel it is your responsibility to further the collective's interest?' (cf. van Dijk & Wilke, 1997).

After these questions were answered, participants were asked to decide how much they wished to invest. Participants were required to specify the exact amount (ranging from 0 to 20,000 Dutch guilders) they wished to contribute. When all investments were made, participants were debriefed and thanked.

Results

Contributions In line with hypothesis 1, a one-way analysis of variance (ANOVA) on contributions showed that participants high in perceived criticality contributed more than those low in perceived criticality (*M*s = 8930 vs. 7215, respectively; $F(1, 67) = 8.41$, $p = .005$).

Social responsibility A one-way ANOVA on the social responsibility score indicated that

participants exhibited stronger feelings of social responsibility when perceived criticality was high rather than low (*M*s = 5.14 vs. 4.10; *SD*s = 1.52 and 1.30, respectively; $F(1, 67) = 8.25$, $p = .005$).

Finally, to examine whether feelings of social responsibility mediated the behavioral effect of perceived criticality an analysis of covariance was conducted with the average social responsibility score as a covariate. This analysis revealed a significant effect for the covariate ($\beta = .33$, $F(1, 66) = 8.11$, $p < .01$). In addition, the results showed that the effect of perceived criticality reported above did not reach the traditional level of significance ($p < .05$) anymore ($F(1, 66) = 3.74$, $p = .057$). More importantly, a calculation of Kenny's *z*-score (see Kenny, Kashy, & Bolger, 1998) showed that the reduction of the *F*-ratio was significant ($z = 2.21$) (if the *z*-score is higher than 1.96 it is significant at the .05 level).

Study 2

The results of the first study revealed supportive evidence for our hypotheses: as predicted, those who perceived themselves to be critical for provision of the public good contributed more and this behavioral effect appeared to be, at least partly, mediated by feelings of social responsibility. This finding adds evidence to the claim that perceptions such as perceived criticality may play an important role in determining cooperation in social dilemmas (e.g. Chen et al., 1996). In particular, perceiving one's own contribution to be critical in the establishment of the public good seems to activate feelings of social responsibility.

In Study 1, however, participants were divided in groups of perceived high criticality or perceived low criticality by means of a median split.[2] As such, a stronger experimental test of our hypothesized relationship between perceived criticality, social responsibility, and contributions is required. Therefore, in the second study a step-level public good dilemma (Van de Kragt et al., 1983) was used in which perceived criticality was directly manipulated by providing different group members with different monetary endowments (see also Rapoport, 1988). That is, the endowments given to participants at the beginning of the study were unequal in monetary value. Thus, inequality in the distribution of wealth was created. In this research paradigm, the decision of each group member will be binary (i.e. contribute or not), resulting in a situation in which 'the rich' could have a greater impact than the 'poor' (i.e. were more critical; cf. Rapoport, 1988; see also van Dijk & Wilke, 1994). This paradigm with unequal endowments was used in the second study to test our hypotheses.

Method

Participants and design Fifty-four undergraduate students (32 males and 22 females, average age = 22.25 years, *SD* = 1.97) participated voluntarily in the present study. The independent variable was the size of endowment that was provided to the participants at the beginning of the study (high vs. low).

Experimental procedure Participants read the scenario and answered the questions after participating in another, unrelated experiment. The experiment lasted a total of 1 hour and participants were paid a total of 25 Dutch guilders. Participants were asked to imagine that they were members of a work-task group consisting of five individuals (themselves and four others). They were told that their group would participate in a collective decision-making task and that no communication was allowed between the group members. Participants were further instructed that each group member would be given an endowment that would have a certain monetary value. Participants were informed that two persons would receive an endowment of 10 guilders, one person would receive an endowment of 20 guilders and two persons would receive an endowment of 30 guilders. It was made clear that these endowments would be assigned randomly to the five players in the group.

After communicating the above features, participants were told that the group as a whole had to contribute at least 60 guilders in total for each participant to earn a bonus of 60 guilders. Participants were told explicitly that this would

be a binary decision to contribute their entire endowment or not. Thus, if participants would decide to contribute their endowment they would lose this endowment for sure. But, if successful, they would earn a 60 guilder bonus. In contrast, if they would keep their endowment they would not lose their endowment, and, if successful, they would in addition also receive a 60 guilder bonus. To ensure complete understanding, the payoff scheme was explained by referring to the outcome possibilities:

1. If you contribute your endowment and the total sum of contributions is equal to or larger than 60 guilders, you will get 60 guilders.

2. If you contribute and the total sum of contributions is smaller than 60 guilders, you will get nothing.

3. If you do not contribute and the total sum of contributions is equal to or larger than 60 guilders, you will get 60 guilders as well as your endowment.

4. If you do not contribute and the total sum of contributions is smaller than 60 guilders, you will retain your endowment.

After explaining the task and the payoff scheme, participants were informed that they were assigned an endowment of 10 (i.e. *low size endowment*) or 30 (i.e. *high size endowment*) guilders.

Dependent measures To assess participants' perceptions of criticality they were asked how critical they considered their contribution to be and how much difference their decision would make for obtaining the group bonus (on a 7-point scale, 1 = not at all, 7 = very much so). The same social responsibility measure as in Study 1 was asked. Finally, participants were asked whether or not they were willing to contribute their endowment.

Results

Manipulation check A one-way ANOVA on the criticality question showed that participants in the high endowment condition perceived their contribution to be more critical than those in the low endowment condition (*M*s = 5.65 vs. 3.39, *SD*s = 1.16 and 1.61, respectively; $F(1, 52) = 34.27$, $p < .001$).

Contributions An analysis of frequencies on the contribution decisions showed that participants high in criticality more often contributed their endowment than those low in criticality (84.6% vs. 60.7%), ($\chi^2 = 3.83$, $df = 1$, $p = .05$).

Social responsibility A one-way ANOVA on the social responsibility score indicated a positive relation between criticality and feelings of social responsibility ($F(1, 52) = 12.80$, $p = .001$). Participants experienced stronger feelings of social responsibility in the high endowment condition than in the low endowment condition (*M*s = 5.88 vs. 4.60, *SD*s = 1.27 and 1.34, respectively).

To examine whether social responsibility mediated the effect of endowment size on contribution choices logistic regressions were used. A first regression analysis using social responsibility as the only predictor showed a significant relation between social responsibility and contribution behavior (Wald's $\chi^2 = 11.41$, $p < .001$): feelings of social responsibility were positively related to contributions. A second logistic regression showed that the effect of size of endowment (Wald's $\chi^2 = 3.62$, $p = .05$) disappeared when social responsibility was in the equation (Wald's $\chi^2 = 0.14$, $p = .70$). This regression analysis also showed that social responsibility was positively related to contributions (Wald's $\chi^2 = 8.43$, $p < .005$).

Study 3

Using another experimental social dilemma paradigm, the findings of Study 2 provided again supportive evidence for our hypotheses: contributions were strongly influenced by perceptions of criticality and this appeared to be accounted for, at least partly, by feelings of social responsibility. Thus, the relationship between perceived criticality, social responsibility, and contributions appears to hold across different situations in which criticality is both manipulated and assessed.

To examine the validity and robustness of this relationship even further a third study was conducted in which yet another criticality manipulation was used. More specifically, participants were placed in a sequential

step-level public good dilemma (see Chen et al., 1996). In this dilemma type, participants have to make their decision one after another and they are informed about the choices of preceding players in the sequence. Again, the decision to contribute was binary. Contrary to Study 2, no differences in endowment size were created. As we pointed out in our general discussion, this social dilemma paradigm allows one to manipulate how critical group members perceive their contribution to be because they obtain information about how many of their group members have contributed their endowment (e.g. money or points) up till they have to decide. In this way, participants are able to infer how likely the provision of the good is and how much impact their contribution will have on the final outcome. Moreover, use of such a sequential social dilemma also has the benefit of increasing ecological relevance since many real-life social dilemmas involve sequential rather than simultaneous choices and it allows an examination in more detail of the influence of preceding noncooperators on the choices of decision-makers later in the sequence (e.g. Erev & Rapoport, 1990). Again, the same predictions as in the previous studies were tested.

Method

Participants and design Fifty-one undergraduate students (30 males and 21 females) participated voluntarily in the present study. The independent variable was level of criticality (high vs. low).

Experimental procedure As in Study 1, the experiment was conducted during a small group session and was introduced as a study about decision-making. Participants were given a questionnaire that presented them with a sequential public good dilemma. Participants were explicitly asked not to talk to one another and were told that their responses would remain anonymous.

Participants were told that they were placed in a group of six people and that each group member would be given an endowment of 10 Dutch guilders. They were informed that they could contribute their endowment either to a personal account (i.e. keep it for themselves) or contribute it to the group's account (i.e. to contribute to the provision of the public good). Then, they were told that choices would be made sequentially. That is, one after another would decide to which account he or she would contribute the endowment. If at least 50 guilders would be contributed to the collective account then the public good would be provided and everyone would receive a bonus of 30 guilders. After this, the manipulation of criticality was introduced.

Participants were informed that their position in the sequence would be determined randomly. In both criticality conditions, participants were informed that they were fifth in line to make a decision. In the *high criticality* condition, it was said that three persons had decided to contribute their endowment. In the *low criticality* condition, they were told that four persons already decided to contribute their endowment to the collective account. We placed participants fifth in the sequence for two reasons. First, Chen et al. (1996) have argued convincingly that criticality influences choices more when people are placed later in the sequence. Second, if participants were placed in the last position of the sequence (i.e. sixth) then the situation would not represent a social dilemma anymore as participants would know exactly what their outcome would be.

After this manipulation, participants were asked the same criticality and social responsibility question as in Studies 1 and 2. Then, participants were asked to decide whether or not they were willing to contribute their endowment. Finally, participants were debriefed and thanked.

Results

Manipulation check A one-way ANOVA on the criticality question showed that participants in the high criticality condition perceived their contribution to be more critical than those in the low criticality condition (Ms = 5.60 vs. 4.34, SDs = 1.00 and 0.89, respectively; $F(1, 49) = 22.37$, $p < .001$).

Contributions An analysis of frequencies on the contribution decisions showed that participants high in criticality more often contributed their endowment than those low in criticality (64% vs. 34.6%) ($\chi^2 = 4.40$, $df = 1$, $p < .05$).

Social responsibility A one-way ANOVA on the social responsibility score indicated a positive relation between criticality and feelings of social responsibility ($F(1, 49) = 7.48$, $p < .01$). Participants experienced more feelings of social responsibility in the high criticality condition than in the low criticality condition (*M*s = 4.88 vs. 4.15, *SD*s = 1.20 and 0.61, respectively).

To examine whether social responsibility mediated the effect of criticality on contribution choices logistic regressions were used. A first regression analysis using social responsibility as the only predictor showed a significant relation (Wald's $\chi^2 = 11.41$, $p < .001$) indicating that stronger feelings of social responsibility are related to a greater willingness to contribute. A second logistic regression showed that the effect of criticality on contributions (Wald's $\chi^2 = 4.27$, $p < .05$) was eliminated when social responsibility was in the equation (Wald's $\chi^2 = 0.34$, $p = .55$). This regression analysis also showed that social responsibility was positively related to contributions (Wald's $\chi^2 = 9.78$, $p = .001$).

Discussion

The findings of Study 3 show again that perceived criticality influences contribution decisions for the establishment of a public good significantly, but now in the context of a sequential public good dilemma. Moreover, this relationship was accounted for, at least partly, by feelings of social responsibility, emphasizing again the important role of norms in contribution decisions.

General discussion

The present research examined the effect of perceived criticality on contributions across three different public good dilemma types. In addition, the role of social responsibility was examined to enhance our insight into the relationship between perceived criticality and contributions. The findings of three studies confirmed our hypotheses. First, it was found that perceived criticality and contributions were positively related. Second, the more strongly people perceived their act to be critical the more strongly they experienced feelings of social responsibility. Finally, these feelings appeared to account for the effect of perceived criticality on contributions. In the following paragraphs the most important theoretical and practical implications will be discussed.

First, the finding that criticality influenced contributions positively across three experimental studies supports previous suggestions that perceived criticality may be an important precursor of cooperation in public good dilemmas (e.g. Chen et al., 1996; Rapoport, 1988). Previous research on public good dilemmas explained this criticality effect by mainly referring to decision-makers' active pursuit of self-interest. In contrast to such an economic perspective, the present research revealed that the more critical participants perceived their contribution to be the more strongly they experienced feelings of social responsibility and these feelings seemed to account, at least partly, for the observed contribution rates. How to explain this?

As argued earlier, if decision-makers in a public good dilemma perceive their contribution to be critical, they will realize even more that the others are dependent on their decisions (i.e. social dilemma settings are by definition characterized by a high degree of interdependence; Komorita & Parks, 1994). It is this awareness of (inter)dependence that is believed to trigger feelings of social responsibility (Berkowitz, 1972; Berkowitz & Daniels, 1963). As Schwartz (1977) argues in his norm-activation theory, social responsibility will be activated when one's decisions are evaluated in terms of consequences for own and other's outcomes. Consequently, the activation of social responsibility has been found to increase prosocial behavior across a variety of situations like helping and social dilemmas (e.g. Fleishman, 1988; Harvey & Enzle, 1981). Thus, perceived criticality has a positive influence on contributions in public good dilemmas and this effect

seems to be accounted for, at least partly, by feelings of social responsibility (i.e. see the successful mediation analyses).

This finding also has interesting implications to enhance our understanding of how cooperation may be promoted. In the literature on social dilemmas, it is acknowledged that people may decide not to further the collective interest because they may fear that they will be exploited by the others (Chen et al., 1996), and because they may fear that their efforts may be wasted (e.g. Dawes et al., 1986). The fear of being exploited refers to the group members' fear that if they contribute and others do not, they may end up being the 'sucker' (Kerr, 1983). The fear of seeing one's efforts wasted refers to the possibility that the contribution may not result in the provision of the public good. Based on the current findings, we suggest that perceived criticality might activate *other*-oriented feelings that may replace concerns that are related to own outcomes. Because fear of exploitation seems to be primarily linked to a concern for own outcomes, it seems reasonable to infer that feeling responsible for the collective may eliminate this fear of being exploited and replace it by moral considerations like doing the 'good thing' (e.g. Cialdini, Kallgren, & Reno, 1991; Kerr, 1995). The fact that in Study 3 contributions in the high criticality condition were facilitated, despite the fact that participants in this condition knew that not all preceding group members had contributed (and as such they may have felt like a sucker if they would decide to contribute their endowment) is in agreement with this notion. Whether social responsibility will strongly reduce the fear that one's efforts will be wasted is of course an empirical question. However, we do think it is conceivable that the impact may be somewhat less than its impact on the fear of being exploited, because the fear that one's contributions will be wasted may in fact be linked to a concern for the outcomes of others. That is, even in situations in which the norm of social responsibility—and thus the motivation to further the outcomes of others—is evoked, it is possible for people to fear that their contributions will be wasted.

The fact that perceived criticality seems to evoke a norm like social responsibility adds to the growing body of research addressing the importance of social norms in decision-making situations like social dilemmas (e.g. De Cremer & Van Lange, 2001; Hertel, Neuhof, Theuer, & Kerr, 2000; van Dijk & Wilke, 1997). Indeed, recently, Kerr (1995) argued convincingly that norms influence choices and that more attention should be devoted to it. As such, in addition to previous social dilemma research identifying important norms like commitment (Kerr, Garts, Lewandowski, & Harris, 1997) and reciprocity (Ostrom, 1998) the present research illustrates the importance of another norm: social responsibility (see also De Cremer & Van Lange, 2001; van Dijk & Wilke, 1997).

Before closing, some limitations, strengths, and suggestions for future research need to be mentioned. A first potential limitation is that in the first study participants' subjective perception of criticality was used to create low and high criticality groups. A weakness of such an approach is, of course, that criticality is not manipulated and that as such there might be some other difference between those high and low in perceived criticality that may be the cause of the observed effects. However, in Studies 2 and 3 perceived criticality was manipulated and revealed similar results. Therefore, it seems relatively safe to say that such consistent results across three studies provide a relatively strong basis for inference. A second potential limitation concerns the mediational analyses used in our studies. Although these analyses lend credence to the claim that feelings of social responsibility mediate the effect of criticality, it should be acknowledged that they do not really 'prove' mediation. For example, the mediation may be caused by the outcome variable (i.e. reverse causal effects, Kenny et al., 1998) in a way that responding to the social responsibility item involved some type of 'dissonance reduction' to justify their future act to contribute (i.e. social responsibility was measured before contribution decisions were made) when feeling critical. Therefore, it is worthwhile to remain cautious regarding the specific directionality. A final limitation is that feelings of social responsibility and perceptions

of criticality were assessed just before participants had to make their decision. One might wonder whether this might have sensitized the participants to act in accordance with the felt social responsibility. It is difficult to exclude this possibility. However, recall that in Study 2 (see Note 3), we did ask some other questions in between, and that findings in Study 2 were in agreement with the findings obtained in Studies 1 and 3. Nevertheless, we do wish to acknowledge that our current findings may be particularly relevant to situations in which the social responsibility norm is likely to be evoked. In this respect, we also deem it conceivable that there are situations in which criticality will be less linked to social responsibility. For example, it has been established (Tenbrunsel & Messick, 1999; see also Pillutla & Chen, 1999) that in business settings ethics may be less important than in non-business settings. With respect to the current topic, this might suggest that whether criticality is linked more to the norm of social responsibility than to considerations of self-interest might be dependent on characteristics of the specific setting. It may be worthwhile for future research to further explore this possibility.

An important strength of the present research is that it shows the usefulness of an integrative approach to cooperation in social dilemmas. That is, the interactive effects of psychological variables like criticality (i.e. individual solutions; Messick & Brewer, 1983) and existing norms may enhance our understanding of when and how an individual's actions will be guided by norms and whether or not this will help to increase contributions.

Related to this, an important avenue for future research may be to examine the moderating influence of personality variables on the relationship between criticality, social responsibility, and cooperation. Personality variables like social value orientation (e.g. De Cremer & Van Lange, 2001; Van Lange, 1999) and self-monitoring (e.g. De Cremer et al., 2001) have been found to affect decision-making in social dilemmas. It is conceivable that these personality variables may also influence decision-makers in linking their perceived criticality with feelings of social responsibility. For example, individuals high in self-monitoring appear to be very much aware of their own behavior and its social consequences, whereas individuals low in self-monitoring are less responsive to situational features and display more their internal values and attitudes (Snyder, 1974, 1987). As a result, the social responsibility explanation for the criticality effect may be particularly pronounced for those high in self-monitoring. Therefore, it seems well worth pursuing such an integrative approach as it may advance our understanding of cooperation in social dilemmas.

Notes

1. To specify the exact role of criticality more, Chen and colleagues (1996) argued convincingly that criticality can take two different forms. The first type of criticality is referred to as *objective* criticality and can be defined as an all or nothing phenomenon, that is, one is critical or noncritical to the provision of the public good (see also Rapoport, 1987). In contrast, however, it is also argued that decision-makers may differ in the extent to which they consider their contribution to be critical or not, and this type of criticality is referred to as *perceived* criticality. Findings from Chen et al. (1996) found evidence that perceived criticality is a better predictor of cooperation than objective criticality. For this reason, the present research will focus on perceived rather than objective criticality.
2. The decision to present the findings by means of the median split analysis was taken for presentational reasons. An alternative would have been to conduct a series of regression analyses. It may be noted that the regression analysis revealed the same main effect as ANOVA.
3. After the criticality and social responsibility items, but before the contribution decision, participants also answered two items about their feelings of belongingness and social ties they felt with the group. Analyses revealed no significant effects for these items.

Acknowledgment

This research was supported by a fellowship of the Netherlands Organization for Scientific Research (NWO, grant no. 016.005.019) to the first author.

References

Aquino, K., Steisel, V., & Kay, A. (1992). The effects of resource distribution, voice, and decision framing on the provision of public goods. *Journal of Conflict Resolution, 36,* 665–687.

Au, W. T., Chen, X-P., & Komorita, S. S. (1998). A probabilistic model of criticality in a sequential public good dilemma. *Organizational Behavior and Human Decision Processes, 75,* 274–293.

Berkowitz, L. (1972). Social norms, feelings, and other factors affecting helping and altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 63–108). New York: Academic Press.

Berkowitz, L., & Daniels, L. R. (1963). Responsibility and dependency. *Journal of Abnormal and Social Psychology, 66,* 429–436.

Chen, X-P., Au, W. T., & Komorita, S. S. (1996). Sequential choice in a step-level public goods dilemma: The effects of cricticality and uncertainty. *Organizational Behavior and Human Decision Processes, 65,* 37–47.

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct. *Advances in Experimental Social Psychology, 24,* 201–234.

Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology, 31,* 169–193.

Dawes, R. M., Orbell, J. M., Simmons, R. T., & Van de Kragt, A. J. C. (1986). Organizing groups for collective action. *American Political Science Review, 80,* 1171–1185.

Dawes, R. M., Van de Kragt, A. J. C., & Orbell, J. M. (1990). Cooperation for the benefit of us—not me, or my conscience. In J. Mansbridge (Ed.), *Beyond self-interest* (pp. 97–110). Chicago: University of Chicago Press.

De Cremer, D., Snyder, M., & Dewitte, S. (2001). The less I trust the less I contribute (or not?): The effect of trust, accountability and self-monitoring in social dilemmas. *European Journal of Social Psychology, 31,* 93–107.

De Cremer, D., & van Dijk, E. (in press). Reactions to group success and failure as a function of identification level: A test of the goal-transformation hypothesis in social dilemmas. *Journal of Experimental Social Psychology.*

De Cremer, D., & Van Lange, P. (2001). Why prosocials exhibit greater cooperation than proselfs: The roles of social responsibility and reciprocity. *European Journal of Personality, 15,* 5–18.

De Cremer, D., & Van Vugt, M. (1998). Collective identity and cooperation in a public goods dilemma: A matter of trust or self-efficacy. *Current Research in Social Psychology, 3,* 1–11.

De Cremer, D., & Van Vugt, M. (1999). Social identification effects in social dilemmas; A transformation of motives. *European Journal of Social Psychology, 29,* 871–893.

Erev, I., & Rapoport, A. (1990). Provision of step-level public goods: The sequential contribution mechanism. *Journal of Conflict Resolution, 34,* 401–425.

Fleishman, J. A. (1988). The effects of decision framing and others' cooperative behavior on cooperation in a social dilemma. *Journal of Conflict Resolution, 32,* 162–180.

Hamburger, H. (1979). *Games as models of social phenomena*. San Francisco: Freeman.

Hardin, R. (1982). *Collective action*. Baltimore, MD: Johns Hopkins University Press.

Harvey, M. D., & Enzle, M. E. (1981). A cognitive model of social norms for understanding the transgression-helping effect. *Journal of Personality and Social Psychology, 41,* 866–875.

Hertel, G., Neuhof, J., Theuer, T., & Kerr, N. L. (2000). Mood effects on cooperation in small groups: Does positive mood simply lead to more cooperation. *Cognition and Emotion, 14,* 441–472.

Kenny, D. A., Kashy, D. A., & Bolger, N. (1998). Data analysis in social psychology. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (pp. 233–268). New York: Oxford University Press.

Kerr, N. (1996). 'Does my contribution really matter?': Efficacy in social dilemmas. In W. Stroebe & M. Hewstone (Eds.), *European review of social psychology* (Vol. 7, pp. 209–240). Chichester, UK: Wiley.

Kerr, N. L. (1983). Motivation loss in small groups: A social dilemma analysis. *Journal of Personality and Social Psychology, 45,* 819–828.

Kerr, N. L. (1989). Illusions of efficacy: The effects of group size on perceived efficacy in social dilemmas. *Journal of Experimental Social Psychology, 25,* 287–313.

Kerr, N. L. (1992). Efficacy as a causal and moderating variable in social dilemmas. In W. Liebrand, D. Messick, & H. Wilke (Eds.), *A social psychological approach to social dilemmas* (pp. 59–80). New York: Pergamon.

Kerr, N. L. (1995). Norms in social dilemmas. In D. Schroeder (Ed.), *Social dilemmas: Perspectives on individuals and groups* (pp. 31–47). Westport, CT: Prager.

Kerr, N. L. (1999). Anonymity and social control in social dilemmas. In M. Foddy, M. Smithson, S.

Schneider, & M. A. Hogg (Eds.), *Resolving social dilemmas: Dynamic, structural and intergroup aspects*. Philadelphia, PA: Psychology Press.

Kerr, N. L., Garts, J., Lewandowski, D. A., & Harris, S. E. (1997). That still small voice: Commitment to cooperate as an internalized versus a social norm. *Personality and Social Psychology Bulletin, 23,* 1300–1311.

Komorita, S. S., & Parks, C. D. (1994). *Social dilemmas*. Dubuque, IA: Brown & Benchmark.

Kramer, R. M., & Brewer, M. B. (1984). Effects of group identity on resource use in a simulated commons dilemma. *Journal of Personality and Social Psychology, 46,* 1044–1057.

Luce, R. D., & Raiffa, H. (1957). *Games and decisions: Introduction and critical survey*. London: Wiley.

Messick, D. M., & Brewer, M. B. (1983). Solving social dilemmas. In L. Wheeler & P. R. Shaver (Eds.), *Review of personality and social psychology* (Vol. 4, pp. 11–44). Beverly Hills, CA: Sage.

Olson, M. (1965). *The logic of collective action*. Cambridge, MA: Harvard University Press.

Ostrom, E. (1998). A behavioral approach to the rational choice theory of collective action. *American Political Review, 92,* 1–22.

Pillutla, M. M., & Chen, X-P. (1999). Social norms and cooperation in social dilemmas: The effects of context and feedback. *Organizational Behavior and Human Decision Processes, 78,* 81–103.

Rapoport, A. (1987). Research paradigms, and expected utility models for the provision of step-level public goods. *Psychological Review, 94,* 74–83.

Rapoport, A. (1988). Provision of step-level public goods: Effects of inequality in resources. *Journal of Personality and Social Psychology, 45,* 432–440.

Rapoport, A., Bornstein, G., & Erev, I. (1989). Intergroup competition for public goods: Effects of unequal resources and relative group size. *Journal of Personality and Social Psychology, 56,* 748–756.

Schwartz, S. H. (1977). Normative influences on altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221–279). New York: Academic Press.

Snyder, M. (1974). Self-monitoring of expressive behavior. *Journal of Personality and Social Psychology, 30,* 526–537.

Snyder, M. (1987). *Public appearances, private realities: The psychology of self-monitoring*. New York: Freeman.

Stroebe, W. & Frey, B. S. (1982). Self-interest and collective action: The economics and psychology of public goods. *British Journal of Social Psychology, 21,* 121–137.

Tenbrunsel, A. E., & Messick, D. M. (1999). Sanctioning systems, decision frames, and cooperation. *Administrative Science Quarterly, 44,* 684–707.

Van de Kragt, A., Orbell, J., & Dawes, R. M. (1983). The minimal contributing set as a solution to public goods problems. *American Political Science Review, 77,* 112–122.

van Dijk, E., & Wilke, H. (1994). Asymmetry of wealth and public good provision. *Social Psychology Quarterly, 57,* 352–359.

van Dijk, E., & Wilke, H. (1997). Is it mine or is it ours? Framing property rights and decision making in social dilemmas. *Organizational Behavior and Human Decision Processes, 71,* 195–209.

Van Lange, P. A. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology, 77,* 337–349.

Van Lange, P. A. M., Liebrand, W. B. G., Messick, D. M., & Wilke, H. A. M. (1992). Introduction and literature review. In W. B. G. Liebrand, D. M. Messick, & H. A. M. Wilke (Eds.), *Social dilemmas: Theoretical issues and research findings* (pp. 3–28). Oxford, UK: Pergamon Press.

Paper received 5 November 2001; revised version accepted 14 May 2002.

Biographical notes

DAVID DE CREMER is associate professor of social psychology at the department of experimental psychology, Maastricht University, the Netherlands and is currently a fellow of the Netherlands Organization for Scientific Research (NWO). His main research interests include social dilemmas, leadership, the psychology of distribution rules, and the relationship between self, identity, and procedural justice.

ERIC VAN DIJK is professor of social psychology at the department of social and organizational psychology, Leiden University, the Netherlands. His main research interests include social dilemmas, bargaining, coalition formation, behavioral economics, and the role of emotions in decision-making.