European Journal of Social Psychology
Eur. J. Soc. Psychol. **40**, 856–866 (2010)
Published online 23 June 2009 in Wiley InterScience
(www.interscience.wiley.com) **DOI**: 10.1002/ejsp.659

Research article

The benefits of empathy: When empathy may sustain cooperation in social dilemmas

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Abstract

Cooperation in social dilemmas is often challenged by negative noise, or unintended errors, such that the actual behavior is less cooperative than intended—for example, arriving later than intended for a meeting due to an unusual traffic jam. The present research was inspired by the notion that doing a little more for one's interaction partner, which may be movitvated by empathetic feelings, can effectively reduce the detrimental effects of "negative noise," or unintended incidents of noncooperation. Consistent with hypotheses, negative noise exhibited detrimental effects on cooperation, but such effects were absent when empathy-motivated cooperation was present. We conclude that empathy has broad benefits for social interaction, in that it can be an effective tool for coping with misinterpreted behaviors, thereby maintaining or enhancing cooperation. Copyright © 2009 John Wiley & Sons, Ltd.

Human behavior is universally guided by social norms or unspoken rules of social behavior. One such rule is reciprocity, or response to another's action with that same action (Gouldner, 1960; Perugini, Gallucci, Presaghi, & Ercolani, 2003). The idiom ''an eye for an eye'' is a colloquial expression of this social norm. The norm of reciprocity guides human behavior in most types of interpersonal situations, from families to the political arena. One such situation is a dyadic social dilemma. Dyadic social dilemmas are situations in which self-interest is at odds with collective or long-term interest. When these situations involved repeated interactions, people can often effectively pursue both self-interest and collective interest by adopting the behavioral norm of reciprocity, as it serves to maximize outcomes without making the user vulnerable to exploitation by others (Axelrod, 1984). For example, tit-for-tat (TFT) is a strictly reciprocal strategy in that the previous behavior of an individual is always matched during the next encounter by the reciprocator (Axelrod, 1984). TFT appears to be successful at maximizing outcomes for at least two reasons: It is forgiving, and retaliatory (Axelrod, 1984). TFT is forgiving because after a cycle of noncooperation if the other cooperates, the strategy will follow suit. It is invulnerable to exploitation because it is retaliatory—if the other actor defects, TFT will reciprocate the defection. Thus, TFT is a reactive strategy that does not change behavior unless there is a change in the other's behavior. If the other actor always defects, TFT will reciprocate defection regardless of the long-term costs.

One unfortunate consequence of reciprocal behavior in dyadic social dilemmas is an increase in noncooperative actions (i.e., conflict escalation). That is, when one or both partners intentionally or unintentionally make a noncooperative choice, the result will be noncooperative interaction, or escalating conflict. Noncooperation will increase within a strictly reciprocal environment when only one actor pursues a competitive strategy—the so-called ''bad apple'' effect (Colman,

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Received 17 October 2007
Accepted 6 May 2009

1982; Kerr et al., 2009). Since strict reciprocity can lead to increases in noncooperative behavior when just a single individual defects, researchers have sought to identify strategies that will decrease this likelihood. One such behavioral strategy is generosity, which is defined as doing a little more for an interdependent other during an interaction (van Lange, Ouwerkerk, & Tazelaar, 2002). This extra effort is thought to help reduce noncooperative behavior. A modified TFT strategy, such as ''generous TFT'' (TFT + 1), under which the individual reciprocates what the other did and adds one unit of giving, does avoid some of the problems of strict reciprocity (van Lange et al., 2002). For example, van Lange et al. (2002) demonstrated that TFT + 1, which adds a little generosity to TFT, helps individuals avoid increases in noncooperation within social dilemmas.

In social dilemmas, a ''noisy'' situation is one in which the intentions or actions of the other(s) are uncertain or unclear. Research has demonstrated that noise is a factor that influences behavior within social dilemmas (Bendor, 1993; Bendor, Kramer, & Stout, 1991; van Lange, et al., 2002; Wu & Axelrod, 1995). ''Negative noise'' occurs when a behavior is miscommunicated or misunderstood, or a mistake has been made (van Lange et al., 2002), and results in actual cooperation being less than intended cooperation, which produces reduced outcomes for the interaction partner. If the partner is employing TFT, a conflict spiral can result. Van Lange and colleagues (2002) have demonstrated that strict TFT leads to lower outcomes when noise is present within an interaction. However, they also demonstrated that using a generous behavioral strategy, such as TFT + 1, can help to reduce or overcome the detrimental effects of noise. Such effects were also observed in recent research by Klapwijk and Van Lange (2009), who even showed in a paradigm that extended games that even more sizeable forms of generosity can be quite effective at coping with noise.

Since the presence of a TFT + 1 partner in a noisy interaction can decrease reciprocated noncooperation, it can be argued that any increase in generous behavior by either of the interaction partners might alleviate the detrimental effects of noise. For example, if an expected email response from a colleague is not received, an individual could react in a noncooperative manner (e.g., delay work, etc.), or he/she could choose to resend his/her message, possibly providing the colleague reasons for the delay (e.g., either the original or the colleague's response was lost in cyperspace). So it takes only a single interaction partner using a generous behavioral strategy to reverse the impact of negative noise in a reciprocal environment, even if that partner is the ''victim'' of noise. If a generous behavioral strategy will help individuals avoid conflict escalation, the question remains, ''How can we *motivate* generous behavior?'' Previous research by Batson and colleagues (e.g., Batson, 1991; Batson & Ahmad, 2001; Batson & Moran, 1999) suggests one method for increasing generous behavior is empathy. Feelings of empathy may be a powerful mechanism for motivating generous behavior, which should help individuals effectively overcome situations that might lead to increases in noncooperative behavior.

Empathy and Prosocial Behavior

Empathy has been defined as an ''other-centered'' emotion, which can result from observing another individual in need and imagining the person's situation (Batson, 1991). Several experiments have shown that empathy enhances helping and cooperation, often in contexts which cannot be understood in terms of considerations of long-term self-interest or anticipated reciprocity (Batson & Ahmad, 2001; Batson, Batson, Todd, Brummett, Shaw, & Aldeguer, 1995). As such, empathy is likely to motivate generous behavior. Also, some research has shown that in order for empathy to affect helping behavior two conditions must be met: Perception of the target as in need, and imagination of their situation and emotions (Batson, 1991; Batson, Early, Salvarani, 1997; Batson et al., 1996). In order for a need to be perceived, the individual must be aware of the difference between the current state and previous or possible states (Batson, 1991; Clark & Word, 1972; Darely & Latane, 1968). Perceiving need is not sufficient for empathy-motivated helping to occur. One must also be able to imagine the other person's perspective (Batson, 1991; Batson et al., 1996; Coke, Batson, & McDavis, 1978; Hoffman, 1977, 1981; Krebs, 1975). If an individual is unable or is instructed not to imagine the perspective of the target, he/she will be less motivated to help or act generously (Batson & Ahmad, 2001; Batson et al., 1995; Batson & Moran, 1999; Coke et al., 1978). However, van Lange (2008) counters that empathy will be activated if the perceived need is severe enough, thus perspective-taking instructions are not needed or ignored. He contends that a strong communication (e.g., imminent death of a parent) works directly to activate empathy without need for perspective-taking instructions or even in the face of objective perspective-taking instructions. In fact, van Lange (2008) found that a communication to a partner that expressed a severe need was enough to elicit an increase in empathetic emotions and the positive weight assigned to other's outcome, no matter whether subjective or objective perspective-taking instructions were given.

DOI: 10.1002/ejsp

We know of two studies that have examined the influence of empathy-motivated cooperative behavior among dyads in social dilemmas. Batson and Moran (1999) had female undergraduate students play a single-trial prisoner's dilemma (PDG) with a person with whom they had either a single written communication or no communication prior to game play. The message sent to the participant was actually controlled by the experimenters, and concerned a negative life event that the ''other person'' had just experienced, the manipulation of need. Participants either received instructions to remain objective while reading the note, or to imagine the notewriter's feelings about the situation described in the note. Batson and Moran (1999) found a significant increase in rate of cooperation if the participant received the communication and the subjective perspective-taking instructions, and showed that this increase was mediated by feelings of empathy and sympathy. Batson and Ahmad (2001) examined whether or not empathy-motivated cooperation would still occur if the participant knew the target of empathy had chosen to defect. Here, participants played a sequential PDG under which ''Other'' chose first, and that choice was made known to the participant. This type of situation is known to elicit very little cooperation from people (less than 5%) when the partner's choice is noncooperative (e.g., Shafir & Tversky, 1992; van Lange, 1999). Surprisingly, Batson and Ahmad found that nearly half of the participants (45%) in the high-empathy condition (i.e., perceived a need and took a subjective perspective) made a cooperative choice, while the percentages in the other low empathy and control conditions were, as expected, very low. While this research shows the power of empathy to motivate cooperation, it is important to note that both studies consisted of a single trial. Hence, how empathy-motivated cooperation evolves over time, and whether it can correct the detrimental effects of negative noise, is unknown.

Present Research and Hypotheses

The current study was designed to test whether empathy can motivate generous behavior, which should help to overcome negative noise in social dilemmas. We were also interested in how empathy affects behavioral reactions to intentionally noncooperative others. We used an iterated social dilemma task with a programmed strategy. A third of the participants were assigned a reciprocal social dilemma task in which negative noise could influence the outcomes; a second third were assigned to a noncooperative social dilemmas task; and the rest were assigned to a non-noise reciprocal social dilemma. The task was adapted from van Lange et al. (2002). We also manipulated empathy following Batson's procedure (e.g., Batson & Ahmad, 2001; Batson & Moran, 1999). This method focuses on three conditions: High empathy, low empathy, and no communication. Prior to the social dilemma task, participants in the two empathy conditions were told of the misfortune of another person, and were instructed to imagine the other person's situation (high empathy) or take a detached, objective perspective (low empathy). In the ''no-communication'' condition, participants were not told of the other person's problem.

We advanced four hypotheses. First, based on the notion that negative noise exerts detrimental effects, we predicted that the level of cooperation will be lower in the noise condition than in the no-noise condition (Hypothesis 1). Second, based on past research on how empathy can motivate cooperative behavior, including generosity, we predicted the high-empathy partner would be motivated by empathy to act in a more cooperative manner than either the low-empathy or no-communication partner (Hypothesis 2). Third, and most important, we hypothesized that the presumed detrimental effects of noise are more pronounced when the partner perceives a need but takes an objective perspective or when no communication is received, since it is presumed empathy does not motivate cooperative behavior in these conditions (Hypothesis 3). And finally, we expected high empathy to have an influence over the course of the interaction but will be better able to overcome unintentional noncooperation than intentional noncooperation (Hypothesis 4).

METHOD

Experimental Design and Participants

The experimental design for the study was a 3 (Empathy: High, Low, or No) by 3 (Strategy: TFT with noise, TFT without noise, intentional noncooperation) completely crossed between-participants design. Twenty participants were used for

DOI: 10.1002/ejsp

each cell of the design, for a total of 180 participants. The participants were undergraduates at Washington State University who participated for partial course credit.

MEASURES

Impressions and Feeling Questionnaire

This 10-item measure of self-reported empathy was used to examine differences in levels of empathy following the empathy manipulation (Batson & Ahmad, 2001; Batson & Moran, 1999). Six of the items measured empathetic feeling toward the other, and four were distracters. A Cronbach's $\alpha = .91$ has been reported for this measure (Batson & Ahmad, 2001). Participants were asked to indicate the degree to which they feel a particular emotion towards the other person ($1 =$ not at all to $7 =$ extremely).

Materials

Participants attended the experimental session in groups of 10 to 14 in a laboratory that contained 14 private cubicles. Each cubicle contained a pen, writing area, paper and envelopes, a game matrix, one packet of questionnaires, and a Windows-based personal computer, which was connected to the internet via an internal network. Each computer was equipped with the Internet Explorer program which participants used to submit their choices during the social dilemmas task. The web form contained two questions, one for indicating choice for the social dilemma task, and the second question asked participants for their assigned number for the experiment. The information from the web form was sent instantaneously to a specific email account.

Procedure

The session began with a brief description of the study, indicating participants would be filling out questionnaires and interacting with another person. Participants were also informed they may or may not be given the opportunity to communicate with the other person.

Empathy Manipulation

The empathy manipulation was modeled after the procedure used by Batson and colleagues (Batson, 1991; Batson & Ahmad, 2001; Batson & Moran, 1999). Participants were told that experimenters were interested in how individuals react to exchanges and they may or may not be able to communicate with the other person. Participants in the high-empathy and low-empathy conditions were told they could send two notes to the other person. (Participants in the no-communication condition completed a filler task.) One note was concerning ''something of a personal nature that has happened to you recently'', and the other note was concerning ''how you feel about the quality of library services at WSU.'' They were instructed to use the paper provided and to seal their notes in the appropriate envelopes (the envelopes were pre-printed with either Personal Note or Library Note on the front). After participants completed the notes[1], they were told they had been assigned to the ''indirect communication'' condition, and as such one of their notes was randomly selected to send to the other person. All participants were told that the other person received their Library Note.

After participants finished their notes, they were informed they would be asked to take a particular perspective when reading the note from the other person. Participants were also told that the contents of the note were completely

[1]It should be noted that after reviewing all of the notes written by participants, none of the notes were similar to the study material note, nor did the notes discuss issue that were overly emotional or of a serious nature. Sample sentences from the notes include, ''I have a test this week in math'', ''I went to a party with friends over the weekend,'' and ''I have never been to the library''.

DOI: 10.1002/ejsp

confidential. They received a slip of paper indicating the perspective they should take when reading the note—a subjective view or an objective view of the note. The objective view (low-empathy condition) indicated that individuals should not become involved with the situation described in the note but to remain detached. In the subjective view, participants were instructed to imagine how the other person felt in the situation and how it had affected the other person's life. The perspective-taking information was provided with the note and participants were told explicitly to read the information prior to reading the note. The note conveyed an individual's anguish over a recently terminated a romantic relationship. Specifically, the individual said that having just arrived as freshmen at WSU, the couple had decided to break up. The writer of the note was experiencing loneliness and worried about finding another partner. The notes given to participants were matched based on gender, in other words, males received notes written by a male writer, and females received notes written by another female. After reading the note, the participants completed the Impressions and Feelings questionnaire. Instructions for the social dilemma task were then read. The empathy manipulation was pre-tested in an independent pilot study. The pilot study did not differ in any significant way from the present study, except that participants went on to complete a different task following the manipulation. The empathy manipulation was found to be effective ($F(2,259) = 46.81$, $p < .001$). *Post hoc* tests (Tukey HSD, $p < .05$) revealed all conditions were significantly different from one another; high empathy $M = 29.34$; low empathy, $M = 24.45$; no communication, $M = 17.30$).

Social Dilemma Task and Manipulation of Strategy

The social dilemma for the current study is a variant of the PDG, which expands the number of behavioral choices for participants and is based on van Lange et al. (2002). Participants were told they would play the game with one other person in the room and the game would proceed over a number of trials. Participants were told for each trial, they could give from 0 to 10 coins to the other person. The coins were worth 50 cents to the holder, but one dollar to the other person. Participants were then instructed that the other person would be making the same choice at the same time, and that their payoff would be based on the combination of their own and the other's choices. They were also informed that when the entire experiment was complete, one person's name would be drawn to win a cash prize equal to 10% of their total payoff. The game matrix was available to participants throughout the experiment. The game was played for 26 trials, and payoff feedback was given after every trial. Participants were also told that they would use a web-based form to make their choices and that feedback about the other person's choice would be delivered by the experimenter. Participants were not told how many trials would be played.

Following the instructions, participants were led to believe they would play one another, but in fact played against a programmed strategy. Participants in the no-noise condition played against TFT, while participants in the noise condition played against TFT with negative noise. TFT with negative noise began with moderately cooperative choice of 6 on the first trial, and thereafter the participant's previous-trial choice was matched, except on ''noisy'' trials, during which the programmed choice was the participant's previous choice minus 2 (if the participant had chosen 6 on the previous trial the ''noisy choice'' was 4 on the current trial). This occurred on trial 3, and every 4th trial thereafter. For the participants in the intentional noncooperation condition a noncooperative random choice strategy was used. In other words, 4 coins is considered the moderately noncooperative choice in a 10 coin give-some game, so the strategy was based on 4 being the most frequent choice with the adjacent numbers occurring with decreasing frequency. The range of choices for the current strategy was 0–8 coins. After the 26th trial, participants were debriefed and dismissed.

Prior to making choices in the social dilemma task, participants in the noise condition were told that we were interested in examining how people make decisions in ''situations in which the actual decision(s) by both persons (one person) may every now and then be different from the decision(s) one intends to make.'' We reasoned that an incident of noise would very likely be attributed to the partner's intended behavior if participants were told nothing about the possibility of noise in the experimental laboratory (i.e., there was no reason for participants to believe that the experimenter or computer will change their choice). Also, the instructions emphasized that, although the actor would receive information when his or her choice was changed, the partner would not be informed about a change in the actor's intended choice. The incidents of noise were also illustrated by an example so that the participants could see how a decision might be changed, and how we will inform them about such changes.

As in previous research (Tazelaar, Van Lange, & Ouwerkerk, 2004; van Lange et al., 2002), these instructions were not included in the no-noise or the intentional noncooperation condition. An inherent limitation of comparing noise

DOI: 10.1002/ejsp

(instructions plus actual noise) with no noise (no instructions, no actual noise) is that any effect found can be attributed to instructions only, negative noise only, or the combination of instructions and negative noise. However, previous experiments comparing the effects of noise instructions, alone, did not yield any effects. One advantage of examining a condition in which noise is completely absent (no-noise instructions, no actual noise) is that this no-noise condition is conceptually identical to all previous research that did not examined noise in social dilemmas (i.e., thousands of studies minus three published studies). The inclusion of the intentional noncooperation condition expands current research by examining whether unintentional versus intentional deviations exert different effects on cooperation.

Also, it is important to note that, in the noise condition, we aimed to establish a basic understanding of noise and a realization that choices by participants and their partners would be changed every now and then. Presumably, this is consistent with real-life interactions, such that people understand ''noise'' and often are aware that situations may be somewhat noisy (e.g., when another person does not respond to an email, one does take into account that the other might not have received the email; cf. Weiner, 1985). We should note that throughout the instructions, we did not use value-laden words, such as ''misunderstanding'' or ''errors'' to prevent tendencies toward reactivity.

RESULTS

Manipulation Check

In order to test effectiveness of the empathy manipulation, an ANOVA was conducted, which indicated a main effect of the Empathy condition on levels of reported empathy, $F(2,153) = 45.47$, $p < .001$. *Post hoc* tests (Tukey HSD) revealed that high empathy ($M = 29.43$) and low empathy ($M = 26.80$) yielded significantly greater levels of reported empathy than did the no-communication condition ($M = 14.69$; both $ps < .05$). Thus, the sad story was sufficient to elicit relatively high levels of empathy even when the instructions emphasized objectivity and distance rather than imagining the other's perspective.

Cooperation

For purposes of analysis the trials were divided into seven blocks. The first block contained the first two trials, and each remaining block consisted of four trials. Block means were calculated and used as the unit of analysis for assessing the level of cooperative behavior. A 3 (Empathy: High empathy, low empathy, no communication) × 3 (Programmed strategy: Noise present, Noise absent, Intentional noncooperation) × 7 (blocks of trials) ANOVA, with repeated measures for blocks of trial, was conducted to examine the influence of empathy and programmed strategy on cooperative behavior. The analysis revealed several important effects. First, in line with the hypothesized detrimental effects of noise and noncooperation (Hypothesis 1), the analysis revealed a main effect for Strategy, $F(2,171) = 27.01, p < .001$, indicating that all levels differed significantly ($ps < .001$) (noncooperation, $M = 4.60$; noise, $M = 5.81$; no noise, $M = 7.31$). Second, as predicted by Hypothesis 2, the analysis revealed a main effect of Empathy, $F(2,171) = 5.71$, $p = .004$. Moreover, as predicted, the first planned contrast was significant, $F(1,171) = 11.43$, $p = .001$, indicating that the high-empathy condition ($M = 6.63$) elicited greater levels of cooperation than did the low-empathy condition ($M = 5.55$) or the no-communication condition ($M = 5.54$). The latter two conditions did not significantly differ.[2]

Of greatest interest is the significant interaction of Strategy and Empathy, $F(4,171) = 2.78$, $p = .028$. Consistent with Hypothesis 3, planned comparison analyses revealed significant interaction of Strategy with the contrast between high empathy versus low empathy and no communication, $F(2,171) = 10.00$, $p < .001$. Table 1 presents the means per condition, along with information about the *post hoc* tests (Tukey HSD). As can be seen in Table 1, noise exerted significant detrimental effects in both the control condition and the low-empathy condition. That is, under no noise, mean

[2]The correlation between reported empathy and behavior is, $r(154) = .121$, $p > .05$. The correlation between reported empathy only in the high and low empathy conditions for each Strategy condition: No noise, $r(39) = .496$, $p = .016$; Noise, $r(39) = .375$, $p = .038$; intentional noncooperation, $r(39) = .077$, $p = .639$. The lack of significant correlation for intentional noncooperation can be attributed more to strategy condition than self-reported empathy since there is a quick drop in cooperation overall in this condition.

DOI: 10.1002/ejsp

Table 1. Means for level of cooperative behavior as a function of noise and empathy conditions

	No noise	Noise	Intentional noncooperation
Control	$7.43_{a,z}$	$4.42_{b,x}$	$4.53_{b,y}$
Low empathy	$6.96_{c,z}$	$5.58_{d,x}$	$4.37_{d,y}$
Empathy	$7.53_{e,z}$	$7.46_{e,w}$	$4.88_{f,y}$

Means with different subscripts in each row (a–f) and column (w–z) differ at $p < .05$ (*Post hoc*, Tukey).

levels of cooperation are 6.96 or higher, whereas under noise these levels are significantly lower ($M = 5.58$ or lower). In contrast, in the high-empathy condition, we see that the mean level of cooperation is not different for the noise and no-noise condition (Ms = 7.46 and 7.53). In addition, in the noise condition high empathy differed from low empathy and control, $p < .05$, but this was not the case in the intentional noncooperation or reciprocal strategy conditions, $p > .05$. Also, note that intentional noncooperation always yields low levels of cooperation. Taken together, these findings indicate that empathy appears to be able to reduce or even eliminate the detrimental effects of noise. Further, empathy does not have the same influence on intentional noncooperation.

Finally, we found several effects involving blocks of trial. The analysis revealed a main effect for blocks of trial, $F(6,166) = 3.246$, $p = .005$, revealing an increase from block 1 ($M = 5.68$) to block 4 ($M = 6.38$) after which there was a decrease to original levels by block 7($M = 5.80$). Further, there was a significant interaction of noise and blocks of trials ($F(12,332) = 4.17$, $p < .001$). In the no noise condition, cooperation increased over blocks of trial (Block 1, $M = 6.39$; Block 7, $M = 7.58$), in the noise condition, cooperation did not systematically increase or decrease over blocks of trial (Block 1, $M = 5.56$; Block 7, $M = 5.72$), and in the intentional noncooperation condition, cooperation systematically decreased over blocks of trial (Block 1, $M = 5.75$; Block 7, $M = 4.11$). There was also a significant interaction between empathy and blocks of trials ($F(12,332) = 1.80$, $p = .047$). This interaction indicates that over blocks of trial cooperation did not increase or decrease for both empathy (Block 1, $M = 6.61$; Block 7, $M = 6.11$), and low empathy (Block 1, $M = 5.9$; Block 7, $M = 5.54$); however, cooperation did increase over blocks of trial for the control condition (Block 1, $M = 4.99$; Block 7, $M = 5.75$). In line with Hypothesis 4, empathy is better able to maintain cooperation overtime in the noise condition compared to the intentional noncooperation condition (see Figures 1 and 2). Also, subsequent analysis revealed that within the intentional noncooperation condition, cooperation was found to be higher for empathy ($M = 6.47$) than for low empathy ($M = 4.97$) and control ($M = 5.42$) in the first 3 trials of the task ($F(2,57) = 3.71$, $p = .031$); however, these differences were not significant in subsequent trials ($p > .05$). Generally, these findings suggest that empathy exerts effects on cooperation that endure for some interactions, but at some point tend to disappear. This makes sense in that the other's behavior forms a powerful determinant of our behavior, and at a certain point overrides the influences of empathy, which seem to be more important to the first set of interactions.

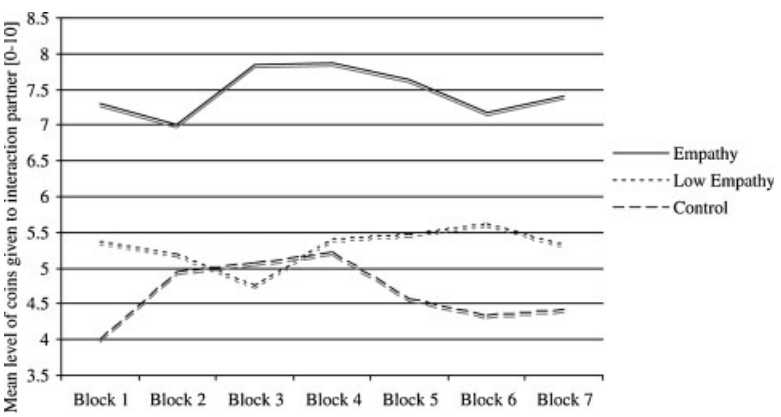

Figure 1. Mean level of cooperative behavior across blocks in each empathy condition (high/low/no empathy) in the noise condition

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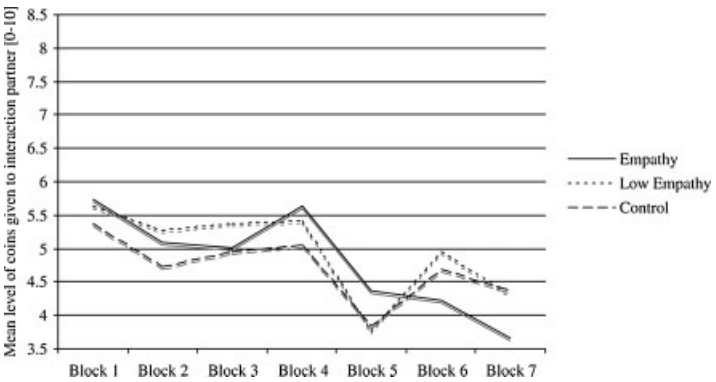

Figure 2. Mean level of cooperative behavior across blocks in each empathy condition (high/low/no empathy) in the intentional noncooperation condition

DISCUSSION

The purpose of the current research was to examine the ability of empathy to effectively motivate increased cooperative behavior in order to reduce or eliminate the detrimental effects of noise on sustained cooperative interaction. The results demonstrate that empathy-motivated cooperation helps individuals to overcome the detrimental effects of negative noise, but it is not as successful in overcoming intentional noncooperation over the long term. These finding are important because they broaden our understanding of empathy and how empathy-motivated cooperation enables individuals to avoid enduring forms of noncooperation in interpersonal interactions. In the following, we briefly discuss the findings of the present research, evaluate hypotheses, outline implications, and conclude by addressing issues for future research.

The findings provide support for the prediction that negative noise exerted detrimental effects on cooperation (Hypothesis 1)—at least in the conditions that do not deviate much from most previous research on social dilemmas. These findings are consistent with earlier empirical research (van Lange et al., 2002; Tazelaar et al., 2004), and suggest the ''power of noise.'' Apparently, in the context of social dilemmas, small incidental errors can have quite pronounced effects. Everyday life examples sometimes illustrate the pronounced impact of small errors (e.g., a slip of the tongue) on trust and interaction (e.g., enduring hostility).

One limitation of our noise manipulation however that should be explored in future research is the potentially predictable occurrence of noise. Noise occurred at regular intervals throughout the noise condition, which is not true of noise in a more natural setting and should be explored in future research. Given the regularity of noise recurrence, the noise instructions may have prompted participants to generate external attributions for behavior that deviated from TFT during the noise trials, and were thus better able to deal with noise, in comparison to intentional noncooperation.

The findings also provide good support for Hypothesis 2, the prediction that empathy motivated greater levels of cooperation when both a strong need and subjective perspective-taking instructions were present, than when empathy was low (strong need and objective perspective-taking instructions) or absent. Granted, there are two studies, revealing strong effects of empathy (Batson & Ahmad, 2001; Batson & Moran, 1999), yet both studies examined a social dilemma in which participants knowingly made only one choice. This single-trial social dilemma serves important research purposes, such as examining the interpersonal motivations underlying cooperative behavior independent of evaluations of past interactions or anticipation of future interaction.

By examining an iterated social dilemma, this research underscores the power of empathy for at least two complementary reasons. First, as noted earlier, an iterated social dilemma gives rise to the use of strategy encouraging people with selfish goals eventually to behave as cooperatively as those with cooperative goals. For example, when paired with another who pursues TFT, it makes sense to behave cooperatively for almost anyone, because mutual cooperation yields greater outcomes for oneself, for the other, and for the two together than does mutual noncooperation. Hence, the present findings suggest that empathy may exert effects above and beyond ''strategic'' considerations. This assertion is consistent with Van Lange's (2008) study in which he examined how empathy influences interpersonal motivation. He

DOI: 10.1002/ejsp

demonstrated that individuals who are experiencing empathetic concern increase the positive weight they place on other's outcomes, but this did not influence the weight placed on either their own outcomes or equality in outcomes.

Second, the present findings suggest that empathy appears to have relatively enduring effects on cooperation within a social interaction even when unintentional noncooperation has occurred. Although empathy is considered to be a relatively short-term emotional state, it is likely that this short-term emotion can exert lasting effects through social interaction. If cooperative behavior that is motivated by empathy is rewarded by the interaction partner (by a TFT partner), then the short-term emotional state brings about long-lasting effects. But when cooperative choice motivated by empathy are not reward by the partner (intentional noncooperation) then the effect of empathy is reduced. Given that many people adopt an interaction style that resembles TFT (see Van Lange, 1999), such findings may be important to understanding the development of trust, friendship, and perhaps even intimacy.

Given that reported empathy was almost as high in the low-empathy condition as in the high-empathy condition, it is possible that high-empathy induced cooperation and enhanced effective coping with noise for reasons other than empathy per se. At the outset, an alternative interpretation is somewhat unlikely given that similar or identical instructions have caused strong differences between high and low empathy in level of reports of sympathy, in helping, and in cooperation (see Batson, 1991; Batson & Ahmad, 2001; Batson & Moran, 1999). But one might argue that perhaps explicit instructions caused a pressure to conform with an unspoken message of the experimenter, along with inducing empathy (that also occurred in the low-empathy condition). Or perhaps more plausibly, given that self-reported empathy was measured directly after the manipulation, the instructions in the high-empathy condition may have caused high levels of empathy for a longer period of time than the instructions in the low-empathy condition. It is also possible that while the communication was strong enough to elicit high levels of self reported emotions from both high and low empathy, the subjective perspective-taking instructions were necessary to motivate cooperative behavior. We do not argue however that these instructions alone would increase cooperation, rather that the combination of the instructions and a strong need were necessary for emotional and behavioral changes.

The findings provide good support for our most important hypothesis, predicting that high levels of empathy help individuals to reduce or eliminate the detrimental effects of noise (Hypothesis 3). In line with van Lange (2008), we suggested that empathy might do so because it increases the positive weight associated with the interaction partner's outcomes, which in turn is likely to bring about relatively high levels of cooperation, even when repeated incidents of noise challenge cooperative interaction. As such, the present research extends previous research on noise in social dilemmas, which manipulated and compared variations of the interaction partner's strategy (van Lange et al., 2002). The present research examined a natural tendency for people to behave in a generous manner after the experience of empathy due to being informed about an unfortunate event that happened to a partner and imagining their reaction to the event. Hence, the present research contributes to a recent line of research aimed at discovering the key mechanisms for coping with noise in social dilemmas. Moreover, the present findings have several implications, two of which seem especially noteworthy.

First, in social psychology, empathy has often been studied as a variable that induced altruistic motivation—that is, benefiting another as an end in itself (Batson, 1991). Clearly, one major theoretical task for social psychology is to provide evidence relevant to altruistic motivation. But in the context of ongoing interactions, altruism may have unintended consequences, which in social dilemmas may be rather positive. That is, altruism or generosity that is motivated by empathy seems to be helpful in dealing with misperception, misinformation, and misunderstanding. Because altruistic states are communicated to others in terms of generosity and related pro-partner behaviors, it may be that through interaction people may reap the benefits of empathy—even though it was activated as a purely other-oriented motivation.

Second, it is important to note that empathy is often activated in everyday life. For example, we tend to empathize with actors in movies, with people on the street, and with animals. But just as often, we empathize with close partners, friends, and colleagues dealing with misfortunes such as illness or divorce, or children dealing with bullying or bad luck. Empathy with the other with whom we have a relationship may be relatively more enduring—or at least activated more than once. Thinking of close others, it becomes important to state the obvious: Social dilemma research has almost never studied interactions among people who are not strangers to each other. It is possible when empathy is activated in close others it becomes an even stronger motivator of generosity and perhaps an even better mechanism for coping with noise. For example, recent fMRI research suggests that empathy for close others is an emotion that is detectable in the brain. Several areas of the brain are activated when we observe the pain of close others or when mothers observe misfortune in their child, and only some of these areas seem to be linked to the experience of one's own pain (Morrison, Lloyd, DiPellegrino, &

DOI: 10.1002/ejsp

Roberts, 2004; Singer, Seymore, O'Doherty, Holger, Dolan, & Frith, 2004). Thus, empathy and interpersonal closeness are clearly deserving of greater attention in research on social dilemmas.

We close by outlining some issues for future research. First, although this research included self-reports of empathy, future research may also include other assessments, such as perceptions of a partner's considerateness, impressions of benign intent, or feelings of trust. In addition, other research should explore alternative ways to activate generous behavior given its importance in overcoming negative noise. It could be argued that familial relationships, trust, perceived similarity, and group memberships, also influence the motivation for generous behavior, since there is some evidence for this in the helping literature. And finally, we felt it was quite striking that the empathy instruction alone caused such strong differences between the high- and low-empathy conditions. At the same time, we suggest it would be useful for the future to use complementary operationalizations of empathy, especially ones that are more spontaneously activated. More generally, it should be clear that we are looking forward to more research on empathy, not only because it promotes cooperation in social dilemmas but also because it seems to help people to effectively reduce or even eliminate the detrimental effects of noise and misunderstanding in their social interactions.

ACKNOWLEDGEMENTS

The writing of this paper was in part supported by the first author's fellowship funded by Grant no. T32-MH19728 from the National Institute of Mental Health. The authors thank Dr Douglas Rumble, and three anonymous reviewers for their constructive comments on previous versions of this paper.

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DOI: 10.1002/ejsp