

How the shadow of the future might promote cooperation

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Abstract

It has been suggested that the expectation of repeated (versus single) interaction might promote cooperation in social dilemmas. One key question is whether the anticipation of repeated interaction may promote cooperation in those with prosocial orientations, with individualistic orientations, or both. We advance the argument that repeated interaction may be perceived in terms of opportunities for punishing noncooperation and rewarding cooperation (reciprocity), and that such “contingencies” should have a relatively greater impact on individualists’ motivations to cooperate. Consistent with hypotheses, we found evidence for the idea that the mere anticipation of repeated (versus single-trial) interaction promoted cooperation, but more so in those who pursue primarily individualistic, self-interested goals than those who are more prone to pursue prosocial goals.

Keywords

human cooperation, reciprocity, shadow of the future, social dilemmas, social value orientation, trust

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Human cooperation is among the most widely studied topics in the social and behavioral sciences. Anthropologists, biologists, economists, mathematicians, political scientists, psychologists, sociologists, among others, seek to understand why people cooperate, and how human cooperation can be promoted. The study of human cooperation raises basic theoretical questions, such as how cooperation evolved among groups of human friends and, especially, strangers. After all, friends may develop relatively stable patterns of cooperation through direct reciprocity, whereas strangers typically interact in situations in which behavior cannot be understood in terms of past interactions or the expectation of future interaction.

Although strangers and friends differ in a number of psychological ways (for example, in terms of closeness, companionship, and relational commitment), one key difference between strangers and friends is the expectation of a single interaction or repeated interaction—as defined in the literature on the evolution of cooperation

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(e.g., Fehr & Gächter, 2002; Henrich et al., 2005). It is this contrast (single versus repeated interaction) that represents one of the basic dimensions that distinguishes between interdependent situations (for an interdependence analysis, see Kelley et al., 2003). And indeed, theoretically, this contrast raises fundamental questions about the evolution of cooperation among strangers, because neither kinship (which can account for cooperation among genetically related individuals) nor reciprocal altruism (which can account for cooperation among friends, and other people who interact repeatedly) can explain cooperation in strangers facing single-trial interactions.

Shadow of the future: theory and past research

In past writings, scientists have emphasized the importance of repeated interaction in several ways. For example, in his influential work, the political scientist Axelrod (1984, p. 126) coined the phrase *the shadow of the future* to suggest that people often cooperate because they foresee the rewards for cooperation and the punishments for non-cooperation, and so adopt a longer-term perspective on the situation at hand. In light of the wealth of studies on human cooperation, it is surprising that only a few studies have examined cooperation when people expect a single interaction or repeated interaction in social dilemmas. Granted, there is some research on the expectation of repeated interaction, as in research on buyer–seller interactions (Heide & Miner, 1992), or in accounting for patterns of feeding of parasites by cleaner fish (Oates, Manica, & Bshary, 2010). These and other studies provide evidence for the notion that cooperation is greater toward others with whom one expects to interact in the future.

Also, some economists and management scientists have examined the probability of continuation. A classic study by Roth and Murnighan (1978, 121 participants) supported the idea that increased probability of continuation promoted cooperation on the first trial. The percentages of cooperation varied from 19%, 30% to 36% in the conditions of low, average and high probability

of continuation (i.e., probabilities of 0.105, 0.50, and 0.895). However, a later study by Murnighan and Roth (1983, 252 participants) found weaker support. The percentages of cooperation varied from 18%, 37% to 29% in the conditions of low, average and high probability of continuation (i.e., again, probabilities of 0.105, 0.50, and 0.895). Note that these studies examine probabilities, and do not include the probability of 0 or 1. More recently, Bo (2005) did include these conditions, and found substantial differences between the conditions in which they anticipate single-trial versus repeated interactions (9% versus 46%, respectively). Thus, at first glance, it seems that an effect of the shadow of the future is reasonably well supported.

However, a few studies that have been conducted in psychology provide less conclusive evidence. A study by Insko and colleagues (2001) found similar levels of cooperation in the first trial among individuals who expect a single-trial versus repeated-trial interactions (percentages were 87% and 88%). A more recent study by Wolf et al. (2009) revealed that repeated interaction, when made salient through instructions in which people consider the effect of their own choice in a first interaction on another's response in a second interaction, did not promote cooperation. Both conditions yielded very high levels of cooperation (94% and 95% cooperation), and so perhaps, as for the findings by Insko et al. (2001), a ceiling effect could partially account for the findings.

At the same time, it is possible that the samples might differ somewhat in the motivations with which they approach these experimental situations. The studies by Roth and Murnighan used undergraduates in business administration, and the study by Bo used economics students and noneconomic students. In contrast, the studies conducted by Insko et al. (2001) and Wolf et al. (2009) have exclusively used undergraduates in psychology. Past research has revealed that the majority of psychology students hold a “prosocial” orientation; in contrast, among economics students, those with an individualistic orientation are most prevalent (Van Lange, Schippers, & Balliet, 2011). These are orientations that the

students hold after a few months studying at the university. Interestingly, Bo (2005, p. 1602) notes in the discussion of this paper that economics majors tend to cooperate less than other majors when cooperation cannot be supported as an equilibrium outcome such as in the single-trial situation. Taken together, these observations raise the question of who will be affected by an anticipation of repeated interaction—by the anticipation of the shadow of the future. What motives might be triggered by the anticipation of repeated interaction? Might it be that the shadow of the future is especially pronounced for people with self-interested orientations—in part because a rationally self-interested person should never cooperate in a single-trial social dilemma?

The present research seeks to illuminate these issues. We designed a social dilemma task in which participants were led to believe they would interact only once (single-trial interaction) versus 10 times (repeated-trial interaction) with the same interaction partner. We used a sequential social dilemma task, in which the interaction partner was to make first a choice followed by the participant. The interaction partner chose to give 5 out of 10 coins, so that it was possible to reciprocate less, an equal number of coins, or even more coins. Hence, the key dependent variable was the level of cooperation in the first trial, and only the mere anticipation of repeated interaction in the future (versus single-trial) could underlie cooperation. The primary question we sought to answer was whether the anticipation of the shadow of the future would be observed in individuals with prosocial versus individualistic goals. As we outline below, the hypothesis is that the shadow of the future promotes cooperation in individualists (and less so, or not at all, in prosocials).

Who should be affected by the shadow of the future?

As noted earlier, Axelrod (1984) coined the phrase *the shadow of the future* to describe the longer-term perspective that people might adopt in repeated-choice social dilemmas. Similarly, game theorists have shown that while noncooperation is rational

in a social dilemma involving a single trial, cooperation is rational in a repeated interaction social dilemma (Rapoport, 1990). Moreover, economists and psychologists have emphasized the role of similar mechanisms as well as the idea that a concern with long-term self-interest might promote cooperation at the outset of the interaction (e.g., sequential transformations, see Kelley & Thibaut, 1978; see also Balliet, Parks, & Joireman, 2009; Batson, 1994; Gallucci & Perugini, 2003; Insko et al., 2001; Joireman, 2005; Murnighan & Roth, 1983; Wolf et al., 2009).

We suggest that differences in social value orientation may be important in understanding the shadow-of-the-future effect. Social value orientation is defined in terms of preferences for particular distributions of outcomes for self and others, and centers on differences among prosocial, individualistic, and competitive orientations (Messick & McClintock, 1968; Van Lange, Otten, De Bruin, & Joireman, 1997). Prosocial orientation is defined in terms of enhancing one's own and others' outcomes (i.e., maximizing joint outcomes) as well as equality in outcomes (i.e., minimizing absolute differences in outcomes for self and another person); individualistic orientation is defined in terms of enhancing outcomes for self, and being largely indifferent to outcomes for another person (i.e., maximizing individual outcomes); and competitive orientation is defined in terms of enhancing the difference between outcomes for self and other in favor of the self (i.e., maximizing relative outcomes; Kelley & Thibaut, 1978; Van Lange, 1999).

Why is the concept of social value orientation relevant to explaining the shadow of the future? Based on principles of interdependence theory (Kelley & Thibaut, 1978) and complementary analyses of cooperation and reciprocity (e.g., Batson, 1994; Perugini & Gallucci, 2001; Van Lange & Joireman, 2008), we suggest that two broad motives might be relevant to understand cooperation in repeated interaction situations. First, we suggest that some people are likely to adopt a prosocial orientation when they approach interdependence situations, such as a social dilemma. There is indeed evidence for such a

cooperation-as-a-goal argument. For example, in many single-trial social dilemmas, prosocials exhibit fairly high levels of cooperation, often more than 50% (e.g., Van Lange & Kuhlman, 1994). Further, unlike individualists and competitors, prosocials develop cooperation with others who pursue unconditional forms of cooperation (e.g., Kuhlman & Marshello, 1975; McClintock & Liebrand, 1988; Sattler & Kerr, 1991) indicating that they resist the temptation to take advantage of such exploitable partners by not cooperating (see also Gallucci & Perugini, 2000; Parks & Rumble, 2001). A similar effect has been observed in a single-trial sequential, two-person social dilemma in which the partner makes the first choice and the participant makes the second choice, most prosocials behave cooperatively in response to a partner who behaved cooperatively (Van Lange, 1999).¹ Thus, according to the *cooperation-as-a-goal* argument, prosocials should be more prone than individualists and competitors to exhibit cooperation, even in the absence of future interaction (or past interaction).

Second, we suggest that people with a self-interested, individualistic orientation might be motivated to cooperate when they realize that it is in their (long-term) self-interest to do so. Of course, a long-term orientation might also to some degree motivate cooperation among prosocials, but according to the above line of reasoning, their cooperative motivation should already be fairly high even in the absence of future interaction. Is there evidence for the argument that cooperation may serve as a means to enhance good outcomes for self? One classic illustration is that individualists (and not prosocials) come to respond cooperatively to another person who pursues Tit-For-Tat (Kuhlman & Marshello, 1975; see also McClintock & Liebrand, 1988; Parks & Rumble, 2001; Sheldon, 1999). A Tit-For-Tat strategy begins with cooperation and subsequently makes the same choice as the other did in the previous interaction, thereby rewarding cooperation with cooperation and punishing noncooperation with noncooperation. Thus, with a Tit-For-Tat strategy, noncooperative behavior

yields noncooperative interaction, while cooperative behavior yields cooperative interaction.

Given that cooperative interaction yields greater outcomes for self than does noncooperative interaction, it makes sense for individualists to behave cooperatively rather than noncooperatively. If individualists believe that many people adopt a Tit-For-Tat strategy (and there is evidence that people generally adopt reciprocity themselves, which may suggest that they are likely to expect the same from others, e.g., Klapwijk & Van Lange, 2009), it makes sense for individualists to approach the other cooperatively when they expect repeated interaction (for related evidence, see Van Dijk, De Cremer, & Handgraaf, 2004; Stouten, De Cremer, & Van Dijk, 2005). Thus, according to this cooperation-as-means-for-self-interest argument, individualists (more than prosocials) should exhibit a more pronounced tendency to cooperate when they expect repeated interaction.

We do not know of any study that has directly tested this hypothesis. However, a recent meta-analysis (Balliet et al., 2009) revealed, contrary to their prediction, that the effect of social value orientation was not significantly more pronounced in single-trial than in iterated social dilemmas. This could be because there is no real difference or because the studies on single-trial and iterated social dilemmas that also examined social value orientations have tended to look at specific forms of iterated social dilemmas (e.g., with particular pre-programmed strategies) where differences in social value orientations may still be quite pronounced. Thus, given that this meta-analysis focuses on a comparison of behavior in both contexts (assessing behavior across multiple trials in iterated social dilemmas), a direct comparison between behavior in the first trial of a social dilemma with and without anticipation of repeated interactions has yet to be made for people with different social value orientations.

Research design and hypothesis

Our basic hypothesis—that the shadow of the future would be more pronounced for

individualists than for prosocials—was tested in a study that differed from past research in at least two respects. First, almost all past research on the shadow of the future has used a binary choice, examining cooperative versus noncooperative choices in a social dilemma task in which they make choices simultaneously. The present research extends this research by examining the degree of cooperation (rather than the binary choice to cooperate or not) and by examining a sequential social dilemma in which the other first made a choice—to give five out of ten coins. Thus, the present research examines whether people might reciprocate with fewer coins, equal coins, or perhaps more coins, than they have received under conditions of single-trial versus repeated interaction. Generally, we expected that prosocials, for whom equality is a key goal, will reciprocate about five coins, whereas individualists (and competitors) will reciprocate fewer coins, especially under conditions of a single interaction.

Second, we examined two conditions: a classic condition in which the intended choice is perfectly translated into the actual choice (no noise), and a condition in which participants were informed that the intended choice may be subject to change (noise). Specifically, in the noise condition, there was an equal chance that the actual choice was more cooperative than the intended choice, less cooperative than the intended choice, or equally cooperative as the intended choice. There are at least two reasons for including a noise and a no-noise condition. First, it provides a basis for the generality of the present findings, especially because it may be argued that noisy social dilemmas are quite common in everyday life (e.g., Bendor, Kramer & Stout, 1992; Kollock, 1993; Van Lange, Ouwerkerk, & Tazelaar, 2002). Second, it is also possible that the shadow of the future is more pronounced in noise-free situations than in noisy social dilemmas, because the latter situations may undermine cooperation and tendencies toward reciprocity used to elicit cooperation. Thus, the noise versus no-noise comparison was considered an exploratory part of the present research.

Method

Participants and experimental design

A total of 100 participants (47 men, 53 women) with an average age of 21 years took part in the present research. They were recruited at the university campus by printed flyers. Each participant was paid 3.50 Euros in exchange for participation (at the time the study was conducted, €3.50 equaled US\$4.50). The experimental design was a 2 (anticipated single-trial versus repeated interaction) \times 2 (noise: absent or present) \times 2 (social value orientation: prosocials vs. individualists). The primary dependent variable was level of (intended) cooperation; we also assessed judgments of own interaction goals during the social dilemma task.

Procedure

Eight to 15 participants attended each research session. On arrival, each participant was greeted and escorted to one of 15 cubicles, which prevented participants from communicating with each other. The entire experiment was conducted on personal computers, using a program written in Macromedia Authorware.

Measuring social value orientation

At the start of the session, participants' social value orientations were assessed using the Triple-Dominance Measure of Social Values (Van Lange et al., 1997; see Messick & McClintock, 1968), in which outcomes are presented in terms of points said to be valuable to self and the other, and the other person is described as someone they do not know and that they will never knowingly meet in the future. In each of a total of nine decomposed games, one option yielded the largest joint outcomes as well as most equality in outcomes (the prosocial option), one option yielded the largest outcomes for the participant (the individualistic option), and one option yielded the largest advantage of one's own outcomes over the other's outcomes (the competitive option). Classifications

based on this and similar instruments have yielded powerful results in predicting various behaviors, including not only cooperation in experimental social dilemmas tasks, but also volunteering in experiments (McClintock & Allison, 1989); donations to causes such as improving health and reducing poverty (Van Lange, Bekkers, Schuyt, & Van Vugt, 2007), cognition and behavior in negotiation (De Dreu & Boles, 1998), and constructive decision-making in teams and organizations (e.g., Nauta, De Dreu, & Van der Vaart, 2002).

As in previous research (e.g., McClintock & Allison, 1989; Stouten, De Cremer, & Van Dijk, 2005), participants were classified if they made at least six of the nine choices consistent with one of the three social value orientations. Using these criteria, we identified 45 prosocials, 33 individualists, and 7 competitors; 15 individuals made fewer than 6 consistent choices and thus were not classified. For the analyses, we discarded the seven competitors, because our predictions focused on the differences between prosocials and individualists rather than between prosocials versus individualists and competitors. That is, long-term outcomes for self are served by the development of mutual cooperation (versus mutual noncooperation), but mutual cooperation and mutual noncooperation do not differ in relative advantage over other's outcomes—the goal that competitors primarily pursue. Theoretically speaking, competitors should be indifferent to the shadow of the future, because in their view mutual cooperation is not to be preferred to mutual noncooperation, because in both situations their relative advantage over the other's outcomes is very small or zero. Consistent with this line of reasoning, past research has revealed that individualists, but not competitors, can be motivated to cooperate when paired with a Tit-For-Tat partner (see Kuhlman & Marshello, 1975; Van Lange & Visser, 1999; also, past studies have used a similar procedure to exclude competitors from the data; Sattler & Kerr, 1991; Van Lange, Agnew, Harinck, & Steemers, 1997). Thus, the sample consisted of 45 prosocials and 33 individualists.

The social dilemma task

This task started by explaining to participants that the computers in the different cubicles were linked to a network and that they would be paired with an anonymous other to do a decision task. The social dilemma task was a give-some dilemma situation in which each participant could choose from giving no coins, giving one coin, giving two coins, up to maximally giving ten coins to the other. The number of coins they decided to give to the other constituted the degree of cooperation (for more information regarding the give-some dilemma, see Van Lange & Kuhlman, 1994; Van Lange et al., 2002). Each coin held by the participant had a value of 50 Euro cents to the participant and the value of 1 Euro to the partner. Similarly, each coin held by the partner had a value of 50 Euro cents to the partner and the value of 1 Euro to the participant. The situation represents a social dilemma in that: (1) each individual obtains greater outcomes to the extent that he or she gives fewer coins away (i.e., individual rationality); and (2) both individuals end up with greater outcomes to the extent that they jointly give more coins to each other (i.e., collective rationality; see Van Lange et al. 2002).

The number of coins and the consequences of giving away coins were displayed on the participant's computer screen. The participant faced a virtual table, divided into the participant's side, on which ten green coins for the participants were displayed (i.e., "you"), and the partner's side, on which ten blue coins for the partner were displayed (i.e., "the other"). The consequences of the players' choices were displayed through animated graphics. The coins that were given away by the participant literally moved from the participant's side to the partner's side of the table, and vice versa for the coins given away by the partner. The outcomes with which the participant and the partner proceeded and ended an interaction trial were displayed on the right of the table.

They were then informed in both the single-trial and repeated interaction condition that a lottery had determined that (for all trials, in the repeated interaction condition) the partner was

going to begin making a choice followed by the participant himself or herself (e.g., see Klapwijk & Van Lange, 2009). We provided participants with information that the partner had given the participant five out of ten coins—a moderately cooperative choice that, in fact, is very similar to the one that most participants make at a first trial (the majority tend to give away around four to six coins in a ten-coin social dilemma). By providing information about the partner's choice, we experimentally controlled their expectations about the partner's choice, thereby controlling for one potential mechanism—that prosocials would expect greater cooperation from the partner than individualists, which in turn would influence their own cooperation.

Manipulation of single-trial versus repeated trial interaction In the single-trial condition, participants were told that they would do the decision task for just one single trial, whereas in the repeated trial condition the participants were told that they would do the task for ten trials with the other. In reality, the task included only one trial; and after the first trial, participants in the repeated-choice condition were informed that there was no need for further trials.

Manipulation of noise Prior to making choices in the social dilemma, we told participants in the noise condition that, among various other issues, we were interested in examining situations in which there might be discrepancies between the decision intended by one person and the observation of that decision by another person. This general introduction provided the context in which participants in the noise condition were informed about the possible occurrence of noise during the experiment. Instructions stated that there was a good chance that the computer would change the choice of the other. More specifically, the participants were told that there was a 33% chance that the computer would subtract three coins from the choice of the other (i.e., negative noise), but also a 33% chance that the computer would add three coins to the choice of

the other (i.e., positive noise). Naturally, there was a 33% chance that the computer would not change the choice of the other (i.e., no noise). We did not use a cover story, or explain in detail why the computer might do this (to avoid a particular prime to the study) but simply noted that the computer might every now and then change the choice made by the participant, as in earlier research (Klapwijk & Van Lange, 2009).

Measuring judgments of own interaction goals

After the social dilemma task, we administered a post-experimental questionnaire which included 15 items that assessed participants' judgments of their own interaction goals. Each goal was indicated by three items, which showed good internal reliability: MaxJoint; $\alpha = .92$ (e.g., "I wanted to get the most outcomes for the two of us"), MinDiff; $\alpha = .89$ (e.g., "I wanted to minimize the differences in outcomes for me and the other"), MaxOther; $\alpha = .78$ (e.g., "I wanted to get the best outcomes for the other person"), MaxOwn; $\alpha = .78$ (e.g., "I wanted to get the most outcomes for myself"); and MaxRel; $\alpha = .86$ (e.g., "I wanted to get more outcomes than the other").

Results

Cooperation

Level of cooperation was analyzed in a 2 (single vs. repeated choice) \times 2 (social value orientation: prosocials vs. individualists) \times 2 (noise: absent or present) analysis of variance. This analysis revealed a strong main effect for social value orientation, $F(1, 70) = 9.45, p < .01, \eta^2 = .12$, revealing that prosocials exhibited greater cooperation than did individualists, $M_s = 5.29$ and $4.03, SD_s = 2.66$ and 2.21 , respectively). While the main effect for single versus repeated choice did not reach significance, $F(1, 70) = 2.63, p = .11, \eta^2 = .04$, the analysis revealed that this main effect was conditioned by social value orientation, as evidenced by an interaction effect of single versus repeated

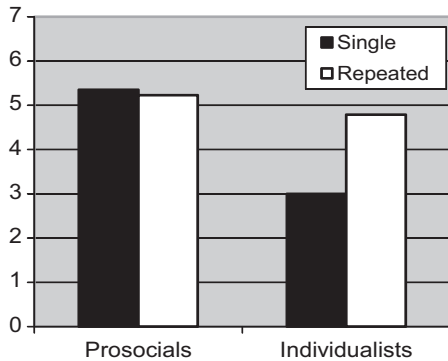


Figure 1. Average number of coins that participants gave to the other (cooperation) in the single-choice and repeated-choice conditions for prosocials and individualists.

choice and social value orientation, $F(1, 70) = 4.99, p < .05, \eta^2 = .07$. Consistent with our hypothesis, prosocials exhibited fairly high levels of cooperation, independent of whether they anticipated a single choice or repeated choices ($M_s = 5.35$ vs. 5.23 ; $SD_s = 2.89$ vs. 2.47); indeed, the single versus repeated-choice effect was absent for prosocials, $F(1, 70) = 0.24, ns, \eta^2 = .00$. In contrast, individualists exhibited greater levels of cooperation in the repeated-choice condition, $M = 4.79$, $SD = 1.93$, than in the single-choice condition, $M = 3.00$, $SD = 2.22$, as evidenced by a significant repeated-choice effect among individualists, $F(1, 70) = 6.12, p < .05, \eta^2 = .08$ (see Figure 1).²

Judgments of own interaction goals How do participants judge their own interaction goals? We examined the following interactions goals: three other-regarding transformations (i.e., MaxJoint, MinDiff, and MaxOther) and two self-regarding transformations (i.e., MaxOwn and MaxRel). A $2 \times 2 \times 2$ analysis of variance revealed for four interaction goals the main effect for social value orientation. Prosocials (versus individualists) viewed their own interaction goals more strongly as oriented toward MaxJoint, $M_s = 4.88$ vs. 4.16 ; $SD_s = 1.86$ vs. 1.83 ; $F(1, 70) = 6.06, p < .05, \eta^2 = .08$, MinDiff, $M_s = 4.86$ vs. 3.83 ; SD_s

$= 1.94$ vs. 1.61 ; $F(1, 70) = 8.53, p < .01, \eta^2 = .11$, as well as less strongly oriented toward MaxOwn, $M_s = 3.90$ vs. 4.66 ; $SD_s = 1.59$ vs. 1.41 ; $F(1, 70) = 6.19, p < .05, \eta^2 = .08$, and MaxRel, $M_s = 3.26$ vs. 4.03 ; $SD_s = 1.62$ vs. 1.57 ; $F(1, 70) = 4.55, p < .05, \eta^2 = .06$. Thus, relative to individualists, prosocials describe themselves as more strongly concerned with enhancing joint outcomes and equality in outcomes, and less strongly concerned with enhancing their own outcomes, either in absolute terms or relative to the other. These self-judgments are quite consistent with the conceptual distinction between prosocials and individualists, and provide some further convergent validity of the decomposed game methodology for assessing orientations that people bring into play when approaching a social dilemma.

More relevant to our hypothesis was the observation of statistical interaction effects of social value orientation and single versus repeated choice. Interestingly, this interaction was found to be significant for judgments of the goal of enhancing joint outcomes, or MaxJoint transformations, $F(1, 70) = 6.38, p < .05, \eta^2 = .08$ (the interaction was not significant for any of the other transformations). Prosocials reported a pursuit of joint outcomes in both the single-choice and the repeated-choice condition ($M_s = 4.97$ and 4.79 ; $SD_s = 1.63$ and 2.11); indeed, the single vs repeated choice effect was absent for prosocials, $F(1, 70) = 0.36, ns, \eta^2 = .00$. In contrast, individualists rated their interaction goals much more as MaxJoint oriented in the repeated-choice condition, $M = 4.82$, $SD = 1.37$, than in the single-choice condition, $M = 3.26$, $SD = 2.04$, as evidenced by a significant repeated-choice effect among individualists, $F(1, 70) = 7.61, p < .01, \eta^2 = .09$. These findings are nearly identical to those observed for cooperation. Thus, individualists exhibited greater cooperation and view their own goals more strongly as oriented toward enhancing joint outcomes when they anticipate repeated interaction rather than single interaction. For prosocials, both effects were virtually absent.³

Discussion

The present research provides good evidence in support of the hypothesis that the mere anticipation of repeated interaction promotes cooperation, but only in individualists not in prosocials. Indeed, the findings revealed that the anticipation of repeated interaction caused a descriptively large increase in cooperation in individualists, whereas it did not seem to affect individuals with prosocial orientations at all. Further, findings revealed that the anticipation of repeated interaction also caused an increase in the pursuit of joint outcomes among individualists (but not among prosocials). Together, these novel findings make an important contribution to the literature in several ways.

To begin with, the present findings provide strong support for the idea that the anticipation of repeated interaction promotes cooperation in individualists. One implication of this finding is that the shadow of the future is not solely based on learning or proximal social interaction experiences, as is sometimes assumed (e.g., see Roth, 1995). The mere anticipation of repeated interaction seems sufficient to promote cooperative behavior—and even a cooperative mindset—among individualists. This finding is also important because the expectation of future interaction does not always promote cooperation (e.g., Insko et al., 2001; Wolf et al., 2009)). The present findings suggest that one is more likely to find support for the shadow of the future if there are a substantial number of individualistically oriented participants in the sample. Given the relatively large frequencies of individualists in samples of economics students, it is possible that one is more likely to find support for the shadow of the future in samples that consist of a good number of economics students (e.g., Bo, 2005) rather than samples that include exclusively psychology students (e.g., Insko et al., 2001).

Another implication is linked to past research on social value orientation, which had already revealed that actual interaction experiences with others pursuing Tit-For-Tat enhances cooperation in individualists (Kuhlman & Marshello, 1975;

McClintock & Liebrand, 1988; Sattler & Kerr, 1991). However, none of these studies reported evidence for a strong increase in cooperation from earlier interactions to later interactions. So, a re-evaluation of these studies, based on the present research, suggests that the increase in cooperation may already have been observed from the very beginning—after they learned that the social dilemma task involved repeated interaction. After all, the present findings suggest that only the mere anticipation of repeated interaction (while expecting an “average” level of cooperation) is sufficient to promote cooperation among individualists. Theoretically, we suggested that competitors should not be motivated to cooperate by mechanisms such as Tit-For-Tat (see Kuhlman & Marshello, 1975; Van Lange & Visser, 1999) because cooperating with Tit-For-Tat does not enhance relative advantage over the other. Although one should be very careful in imputing meaning to findings observed in very small samples (which is why we did not include competitors in the analyses) but it is perhaps informative that in the sample of seven competitors, cooperation was not at all greater in the single-trial condition ($M = 3.67$, $N = 3$) than in the repeated-trial condition ($M = 2.25$, $N = 4$). It is quite striking that competitors are competitors indeed. Along with previous evidence (Kuhlman & Marshello, 1975; Van Lange & Visser, 1999), we suggest that competitors seem only motivated by differences in relative gain: getting more than others (or not getting less than others). Unlike the behavior of individualists, competitors’ behavior does not seem to be affected much by increases in their own absolute gain.

These lines of reasoning may also be relevant to understanding why the magnitude of the differences between prosocials and individualists does not strongly depend on whether they are involved in a single-trial or an iterative social dilemma, as recently demonstrated in a meta-analytic review by Balliet et al. (2009). One key difference is that present research only looked at cooperation in the first trial, whereas the meta-analysis focused on cooperation in a single-trial versus cooperation across multiple trials.

Moreover, the present study controlled for the expectations regarding the other's cooperation for both prosocials and individualists. Without anticipating future interaction, individualists tend to exploit the average level of cooperation (reciprocating five coins with an average of only three coins), but tend to reciprocate almost perfectly (reciprocating five coins with an average of 4.73 coins) when they anticipate future interaction. It seems that individualists want to ensure that the other could not feel exploited to avoid repercussions or retaliation in the future. They seem to do it with a cooperative mindset, perhaps because they realize that "the dyad must choose between mutual cooperation and mutual noncooperation, and that the former is preferable to the latter" (Pruitt & Kimmel, 1977, p. 375).

The finding that the shadow of the future effect was descriptively large among individualists—but virtually absent among prosocials—is important because it helps us understand *why* the anticipation of repeated interaction may promote cooperation. That prosocials were not affected by the anticipation of repeated interaction is consistent with the argument that their behavior is *at the outset* guided by outcome transformations (cooperation-as-a-goal). We suggest that their outcome transformation includes both the desire to enhance the outcomes for self and other and the desire to obtain equal outcomes, which in combination suggests that mutual cooperation should be preferred to mutual noncooperation or unilateral noncooperation (Van Lange, 1999). At least two more specific reasons may explain why they tended to give around five coins—exactly the number of coins they had received from the other. First, equality in outcomes is a powerful concern to prosocials, as prior research on violations of fairness has indicated (e.g., Stouten et al., 2005; for neuroscientific evidence, see Haruno & Frith, 2009). Second, the desire for equality may have been enhanced because participants were provided with information about the other's level of cooperation (giving five coins). Such information may serve as a strong psychological anchor from which they do not want to deviate, and thus act as a "floor" and a "ceiling" to their behavior.

Such strong pressures to navigate around the contribution of the other may completely override any concern with the shadow of the future—perhaps also because a pursuit of equality is unlikely to be punished.

In contrast, individualists' cooperation is strongly affected by the mere anticipation of repeated interaction in the future. That is, they should adopt sequential transformations which lead them to consider the situation in light of interactions and outcome consequences in the future (cooperation-as-a-means-for-self-interest). Approaching another person cooperatively may be a "strategy" that one adopts (consciously or unconsciously) so long as the other reciprocates cooperation (for a similar argument, see Perugini & Gallucci, 2001; Van Lange & Joireman, 2008). Such a strategy may have elements of promotion (i.e., to obtain mutual cooperation) and prevention (i.e., to avoid mutual noncooperation; cf. Higgins, 1998) from both an individual or joint perspective, which may help explain why individualists perceived their interaction goals in terms of enhancing not only their own outcomes, but also joint outcomes. Indeed, this leaves several intriguing questions for future research. For example, does the realization of repeated interaction fairly automatically activate a "joint gain" orientation (MaxJoint), or is it a product of conscious calculation? Would it also happen if people learn that the other's first choice was somewhat less cooperative or more cooperative than average (or different from a salient anchor, such as five in the present study)? And to what extent might individuals "color" their view of their own interaction goals, so that they may come to believe that they cooperate out of a concern with both themselves and the other, while perhaps a concern with their own outcomes constitutes a much stronger concern? Is there really a shift in motivation triggered by the anticipation of repeated interaction?

The present findings are also relevant to broader explanations of cooperation. For example, while cooperation among friends can be understood in terms of reciprocity, cooperation among strangers with whom we interact only once (or very infrequently) poses a major theoretical

challenge to evolutionary theory—because reciprocity (or kinship) cannot account for it. Indeed, why do people cooperate with strangers, given that there is no strong reason for anticipating future interaction? The present findings indicate that for some people—those with a prosocial orientation—the anticipation of repeated interaction is not crucial, whereas for others—those with an individualistic orientation—such anticipation is crucial. It is possible that, ultimately, people differ in terms of whether they tend to approach strangers “as friends” or not. For example, one might speculate that on the basis of some “sharedness” or “neighborly feeling”—being a participant in the same study, living in the same city or area, being around the same age—or so long as pronounced differences or bases for distrust are not evident, prosocials tend to approach others in a cooperative manner without assessing or considering the strategic aspects of the situation. After all, there is evidence that a good number of strangers do help others in need, do provide help in response to a specific request, and do punish norm-violators at some cost to themselves (e.g., Henrich et al., 2005; Penner, Dovidio, Piliavin, & Schroeder, 2005). One might indeed theorize that pre-existing differences in social value orientation are more likely to become manifest in interactions with strangers than in interactions with friends. After all, with friends we typically share a future of interaction, which, in and of itself, may trigger individualists to cooperate, and even adopt a cooperative mindset as the present findings suggest (for further tentative evidence, see Van Lange, Agnew et al., 1997).

Conclusion

People should be more likely to cooperate when involved in repeated interaction (in the future, as with friends) than when facing a single interaction (as with strangers). The contribution of the present research consists of the demonstration that the shadow of the future may be observed even when people merely anticipate repeated (but finite) interaction. While the shadow of the future has repeatedly been analyzed in terms of direct

learning (from direct social interaction experience), it seems that this takes on general value in the form of a cooperative mindset, where the mere anticipation of repeated interaction may inspire cooperative behavior, although only in those who are prone to take an individualistic, self-regarding approach to social interaction situations with strangers. Such findings not only contribute to our understanding of the theoretical debate about the evolution of cooperation among strangers, but also illuminate when and why individual differences in social value orientation matter. At least behaviorally, the present findings raise the possibility that differences in social value orientation seem to matter the most in interactions with strangers rather than friends. Thus, the “sunny” part of the shadow of the future is that the mere anticipation of future (and finite) interaction inspires individualists to cooperate in the here and now.

Notes

1. In addition to social value orientation, cooperation as a goal may also be rooted in relationship processes or group processes, such as dependence, satisfaction, or identification, all important motivators for cooperation. Examples are relational commitment (e.g., Rusbult et al., 1991) and social identification (e.g., De Cremer & Van Vugt, 1999), and both of these variables have been discussed from an outcome transformational perspective.
2. Of lesser relevance, the analysis revealed an interaction of single-repeated choice and noise, $F(1, 70) = 4.11, p < .05, \eta^2 = .06$. When expecting a single choice, participants exhibited greater cooperation under noise ($M = 5.11, SD = 2.75$) than under no noise ($M = 3.78, SD = 2.90$); when expecting repeated choices, noise ($M = 4.96, SD = 1.85$) and no noise ($M = 5.11, SD = 2.68$) yield very similar levels of cooperation. Perhaps participants were more strongly motivated to ensure that their level of cooperation passed a certain threshold in the single-choice condition, because an incident of negative noise cannot be corrected later on (in contrast to the repeated choice situation). Clearly, the meaning and robustness of this finding await future research.
3. The analysis for MaxJoint also revealed a main effect for the presence or absence of noise, $F(1, 70)$

= 4.24, $p = .043$, $\eta^2 = .06$, indicating that judgments of their pursuit of joint outcomes was stronger under noise, $M = 4.83$, $SD = 1.86$, than under no noise, $M = 4.28$, $SD = 1.86$. Speculatively, one might argue that participants wanted to ensure that the other did not suffer from the risk of negative noise, and therefore were more likely to be oriented toward enhancing outcomes for themselves and the other.

References

- Axelrod, R. (1984). *The evolution of cooperation*. New York: Basic Books.
- Balliet, D., Parks, C. D., & Joireman, J. A. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations*, 12, 533–547.
- Batson, C. D. (1994). Why act for the public good? *Personality and Social Psychology Bulletin*, 20, 603–610.
- Bendor, J., Kramer, R. M., & Stout, S. (1991). When in doubt... Cooperation in a noisy prisoner's dilemma. *Journal of Conflict Resolution*, 35, 691–719.
- Bo, P. D. (2005). Cooperation under the shadow of the future: Experimental evidence from infinitely repeated games. *American Economic Review*, 95, 1591–1604.
- 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.
- De Dreu, C. K. W., & Boles, T. L. (1998). Share and share alike or winner take all? The influence of social value orientation upon choice and recall of negotiation heuristics. *Organizational Behavior and Human Decision Processes*, 76, 253–276.
- Fehr, E., & Gächter, S. (2002). Altruistic punishment in humans. *Nature*, 415, 137–140.
- Gallucci, M., & Perugini, M. (2000). An experimental test of a game-theoretical model of reciprocity. *Journal of Behavioral Decision Making*, 13, 367–389.
- Gallucci, M., & Perugini, M. (2003). Information seeking and reciprocity: A transformational analysis. *European Journal of Social Psychology*, 33, 473–495.
- Haruno, M., & Frith, C. D. (2009). Activity in the amygdala elicited by unfair divisions predicts social value orientation. *Nature Neuroscience*, 13, 160–161.
- Heide, J. B., & Miner, A. S. (1992). The shadow of the future: The effects of anticipated interaction and frequency of contact on buyer–seller cooperation. *Academy of Management Journal*, 35, 265–291.
- Henrich, J., Boyd, R., Bowles, S., Gintis, H., Fehr, E., Camerer, C., McElreath, R., Gurven, M., Hill, K., Barr, A., Ensminger, J., Tracer, D., Marlow, F., Patton, J., Alvard, M., Gil-White, F., & Henrich, N. (2005). “Economic Man” in cross-cultural perspective: Ethnography and experiments from 15 small-scale societies. *Behavioral and Brain Sciences*, 28, 795–855.
- Higgins, E. T. (1998). Promotion and prevention: Regulatory focus as a motivational principle. In M. P. Zanna (Ed.), *Advances in experimental social psychology* (Vol. 30, pp. 1–46). New York: Academic Press.
- Insko, C. A., Schopler, J., Gaertner, L., Wildschut, T., Kozar, R., Pinter, B., Finkel, E. J., Brazil, D. M., Cecil, C. L., & Montoya, M. R. (2001). Interindividual-intergroup discontinuity reduction through the anticipation of future interaction. *Journal of Personality and Social Psychology*, 80, 95–111.
- Joireman, J. (2005). Environmental problems as social dilemmas: The temporal dimension. In A. Strathman & J. Joireman (Eds.), *Understanding behavior in the context of time: Theory, research, and application* (pp. 289–304). Mahwah, NJ: Lawrence Erlbaum.
- Kelley, H. H., Holmes, J. W., Kerr, N. L., Reis, H. T., Rusbult, C. E., & Van Lange, P. A. M. (2003). *An atlas of interpersonal situations*. New York: Cambridge University Press.
- Kelley, H. H., & Thibaut, J. W. (1978). *Interpersonal relations: A theory of interdependence*. New York: Wiley.
- Klapwijk, A., & Van Lange, P. A. M. (2009). Promoting cooperation and trust in “noisy” situations: The power of generosity. *Journal of Personality and Social Psychology*, 96, 83–103.
- Kollock, P. (1993). An eye for an eye leaves everyone blind: Cooperation and accounting systems. *American Sociological Review*, 58, 768–786.
- Kuhlman, D. M., & Marshello, A. (1975). Individual differences in game motivation as moderators of pre-programmed strategic effects in prisoner's dilemma. *Journal of Personality and Social Psychology*, 32, 922–931.
- McClintock, C. G., & Allison, S. (1989). Social value orientation and helping behavior. *Journal of Applied Social Psychology*, 19, 353–362.
- McClintock, C. G., & Liebrand, W. B. G. (1988). The role of interdependence structure, individual value orientation and other's strategy in social decision making: A transformational analysis. *Journal of Personality and Social Psychology*, 55, 396–409.
- Messick, D. M., & McClintock, C. G. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology*, 4, 1–25.

- Murnighan, J. K., & Roth, A. E. (1983). Expecting continuing play in prisoner's dilemma games. *Journal of Conflict Resolution*, *27*, 279–300.
- Nauta, A., De Dreu, C. K. W., & Van der Vaart, T. (2002). Social value orientation, organizational goal concerns, and interdepartmental problem-solving behavior. *Journal of Organizational Behavior*, *23*, 199–213.
- Oates, J., Manica, A., & Bshary, R. (2010). The shadow of the future affects cooperation in a cleaner fish. *Current Biology*, *20*, 472–473.
- Parks, C. D., & Rumble, A. C. (2001). Elements of reciprocity and social value orientation. *Personality and Social Psychology Bulletin*, *27*, 1301–1309.
- Penner, L. A., Dovidio, J. F., Piliavin, J. A., & Schroeder, D. A. (2005). Prosocial behavior: Multilevel perspectives. *Annual Review of Psychology*, *56*, 365–392.
- Perugini, M., & Gallucci, M. (2001). Individual differences and social norms: The distinction between reciprocators and prosocials. *European Journal of Personality*, *15*, 19–35.
- Perugini, M., Gallucci, M., Presaghi, F., & Ercolani, A. P. (2003). The personal norm of reciprocity. *European Journal of Personality*, *17*, 251–283.
- Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. *Annual Review of Psychology*, *28*, 363–392.
- Rapoport, A. (1990). *Experimental studies of interactive decisions*. Dordrecht: Kluwer Academic Publishers.
- Roth, A. E. (1995). Introduction to experimental economics. In J. H., Kagel, & A. E., Roth (Eds). *Handbook of experimental economics* (pp. 3–109). Princeton, NJ: Princeton University Press.
- Roth, A. E., & Murnighan, J. K. (1978). Equilibrium behavior and repeated play in the prisoner's dilemma. *Journal of Mathematical Psychology*, *17*, 189–198.
- Rusbult, C. E., Verette, J., Whitney, G. A., Slovik, L. F., & Lipkus, I. (1991). Accommodation processes in close relationships: Theory and preliminary empirical evidence. *Journal of Personality and Social Psychology*, *60*, 53–78.
- Sattler, D. N., & Kerr, N. L. (1991). Might versus morality explored: Motivational and cognitive bases for social motives. *Journal of Personality and Social Psychology*, *60*, 756–765.
- Sheldon, K. M. (1999). Learning the lessons of tit-for-tat: Even competitors can get the message. *Journal of Personality and Social Psychology*, *77*, 1245–1253.
- Stouten, J., De Cremer, D., & Van Dijk, E. (2005). All is well that ends well, at least for proselves: Emotional reactions to equality violation as a function of social value orientation. *European Journal of Social Psychology*, *35*, 767–783.
- Van Dijk, E., De Cremer, D., & Handgraaf, M. J. J. (2004). Social value orientations and the strategic use of fairness in ultimatum bargaining. *Journal of Experimental Social Psychology*, *40*, 697–707.
- 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., Agnew, C. R., Harinck, F., & Steemers, F. G. (1997). From game theory to real life: How social value orientation affects willingness to sacrifice in ongoing close relationships. *Journal of Personality and Social Psychology*, *73*, 1330–1344.
- Van Lange, P. A. M., Bekkers, R., Schuyt, Th., & Van Vugt, M. (2007). From games to giving: Social value orientation predicts donating to noble causes. *Basic and Applied Social Psychology*, *29*, 375–384.
- Van Lange, P. A. M., & Joireman, J. A. (2008). How can we promote behavior that serves all of us in the future? *Social Issue and Policy Review*, *2*, 127–157.
- Van Lange, P. A. M., & Kuhlman, D. M. (1994). Social value orientations and impressions of partner's honesty and intelligence: A test of the might versus morality effect. *Journal of Personality and Social Psychology*, *67*, 126–141.
- Van Lange, P. A. M., Otten, W., De Bruin, E. N. M., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, *73*, 733–746.
- Van Lange, P. A. M., Ouwerkerk, J. W., & Tazelaar, M. J. A. (2002). How to overcome the detrimental effects of noise in social interaction: The benefits of generosity. *Journal of Personality and Social Psychology*, *82*, 768–780.
- Van Lange, P. A. M., Schippers, M., & Balliet, D. (2011). Who volunteers in psychology experiments? An empirical review of prosocial motivation in volunteering. *Personality and Individual Differences*, in press.
- Van Lange, P. A. M., & Visser, K. (1999). Locomotion in social dilemmas: How we adapt to cooperative, Tit-For-Tat, and noncooperative partners. *Journal of Personality and Social Psychology*, *77*, 762–773.
- Wolf, S. T., Cohen, T. R., Kirchner, J. L., Rea, A., Montoya, R. M., & Insko, C. A. (2009). Reducing intergroup conflict through the consideration of future consequences. *European Journal of Social Psychology*, *39*, 831–841.

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