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Fast track report

Beyond the information given: The power of a belief in self-interest

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Abstract

How do we interpret other's behavior when we lack important pieces of information? Do we give the other the benefit of the doubt, believing that the other behaves in a fair manner? Or do we "fill in the blanks" with self-interest? To address these questions, we designed a new method—the dice-rolling paradigm—in which participants observed another person assigning outcomes by rolling two dice and allocating one of them to the participant, who only had information about one of the two dice. Using different baselines, the results revealed that participants underestimated the outcomes the other allocated to the participants, and overestimated the outcomes the other allocated to self, indicating that people assume self-interest from others when information is incomplete. Copyright © 2009 John Wiley & Sons, Ltd.

It is an inevitable fact from social life that our well being is often influenced by other people's decisions. A boss can give a salary raise or not. And a friend can help you solve a math problem or not. When we encounter a situation where our well being is influenced by others, we usually ask: Why? Why didn't she give me a raise? Why did she help me? Indeed, as humans, we try to understand other people's intentions and motives to make sense of our social environment. However, we may often reach such judgments under circumstances in which we lack information that is needed to understand others' decisions. For example, a boss can decline a raise because the company truly lacks resources. A friend may not be able to help because she has to help another friend with a more urgent need. Without such information, one could think that my boss must be concerned with her own salary only, or that my friend is so kind now that she devoted her time for my problem.

The central question here is how people fill in the blanks in incomplete information situations—that is, situations in which there is incomplete information about behavioral options and the outcomes they produce (see Kelley et al., 2003). Do we give others the benefit of the doubt, believing that they behave in a fair or generous manner? Or do we fill in the blanks with self-interest? Or in terms of Bruner's (1957) well-known question: ''How do people go beyond the information given?'' Previous research provides answers for these questions only in the extreme case of incompleteness of information—in situations without any specific information at all.

Research on the ''norm of self-interest'' reveals that global judgments about unknown others are guided by a belief in self-interest (see Miller and Ratner, 1996, 1998, 1999). For instance, people overestimate the impact of financial rewards on their peers' willingness to donate blood. Also, people think of others as more selfish and less fair than they think of themselves (Allison, Messick, & Goethals, 1989; Van Lange & Sedikides, 1998). Thus, without having any specific information, people rely on a general belief that other people's behavior is driven by self-interest. By contrast, when information is complete, people are very adaptive to socially relevant information and the idea of reciprocity—that people respond cooperatively to others' cooperative behaviors and noncooperatively to others' noncooperative behaviors—clearly illustrates this point (Axelrod, 1984; Gouldner, 1960; Trivers, 1971, for empirical evidence, see Klapwijk & Van

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Lange, 2009; Van Lange, 1999). However, in most studies on cooperation and reciprocity, information about others' behaviors is explicitly given (e.g., ''the other allocated 5 coins out of 10 to you''). Such situations of complete information tend to ''dictate'' our beliefs and expectations, leaving little room for our judgments to be influenced by a broader ''psychology'' of assumptions, beliefs, norms, and expectations. Yet it is this psychology that is important when we need to interpret missing information, and ''fill in the blanks.''

Present Research: Dice-rolling Paradigm and Hypotheses

In the present research, we investigated social judgments in incomplete information situations in which (1) information does exist, so that people can reconsider, revise, and update their beliefs, but in which (2) information does not dictate beliefs, so that there is enough room for multiple interpretations. We sought to demonstrate that in such incomplete information situations, people tend to rely on their global beliefs and fill in missing information with a self-interest frame of mind—even when there is incomplete evidence that behavior might not be self-interested.

We designed a new paradigm for examining social judgments under incomplete information. In this paradigm, which we refer to as *the dice-rolling paradigm*, participants received incomplete information about another person's rolling of two dice. In particular, the other allocated one die to himself or herself, and one die to the participant, and the allocated dice values produced outcomes for both the participant and the other. The situation contained incomplete information, in that participants were shown the value of their own die (outcome for self), but not the value of the other's die (outcome for other). As the main dependent variable, participants were asked to estimate the value of the other's die.

Participants in the intentionality condition were led to believe that the other had control over allocating the dice outcomes, whereas participants in the unintentionality condition were led to believe that the other had no control over allocating the outcomes. Because we also sought to validate the paradigm itself, the central hypothesis was relatively straightforward. If individuals believe that other people intend to pursue their self-interest, participants should systematically overestimate the value of the dice the other allocates to himself or herself. Such overestimation should be less pronounced—or ideally absent—for unintentional allocations where the other's intentions and allocation decisions have no influence on outcomes.

EXPERIMENT 1

Participants and Design

The participants were 52 VU University students in the Netherlands (32 women, 20 men) with an average age of 20.5 years ($SD = 2.05$). The computerized, laboratory experiment was a 2 (intentionality vs. unintentionality) $\times$ 2 (incentive: points vs. money) $\times$ 12 (blocks of trials) design with the latter being a within-participants variable. After completing the experiment, the participants were debriefed and paid 3.5€.

Procedure

The dice-rolling paradigm consisted of 12 rollings of two dice, each six-sided with values ranging from 1 through 6. Participants were told that another person, who was described as another participant in this study, would roll two dice and allocate one of them to himself or herself, and another one to the participant. After each rolling, participants would see the value of the die that the other allocated to the participant, but would not see the value of the die that the other allocated to himself or herself. We controlled the actual rollings, so that all dice values (1–6) were presented twice. Thus, participants received their fair share of 3.5 points on average, suggesting that the other allocated 3.5 points to himself or herself also, given that the sum of two dice is 7 on average. After each roll, participants estimated the value of the die the other allocated to himself or herself. Because fair allocations provided an objective baseline, estimations higher than 3.5 would provide

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clear evidence that participants assume self-interest from the other. Participants did not receive any information about the other's die during the task or any information about possible future interactions with the other.

Intentionality was manipulated by reversing the order of dice rolling and allocation (see Figure 1 for the sequence in both conditions). In the intentionality condition the other first rolled two dice (Step 1a). After the dice had settled, their values were told to be shown to the other but were not displayed to the participant. Second, the other allocated one die to the participant and another die to himself or herself (Step 2a). Third, the participant's die was revealed and the participant estimated the value of the other's die (Step 3a). In the unintentionality condition the other first allocated the dice (Step 1b), and then rolled them (Step 2b). After the dice had settled, the participant's die was revealed and the participant estimated the value of the other's die (Step 3b). Thus, as the dice were allocated before their values were known the dice outcomes were not logically influenced by the other's decision in the unintentionality condition.

We also explored differences between ''hypothetical incentives'' and ''actual incentives''. In the point condition, participants were instructed that every point has value, in that the more points the participant accumulates the better for

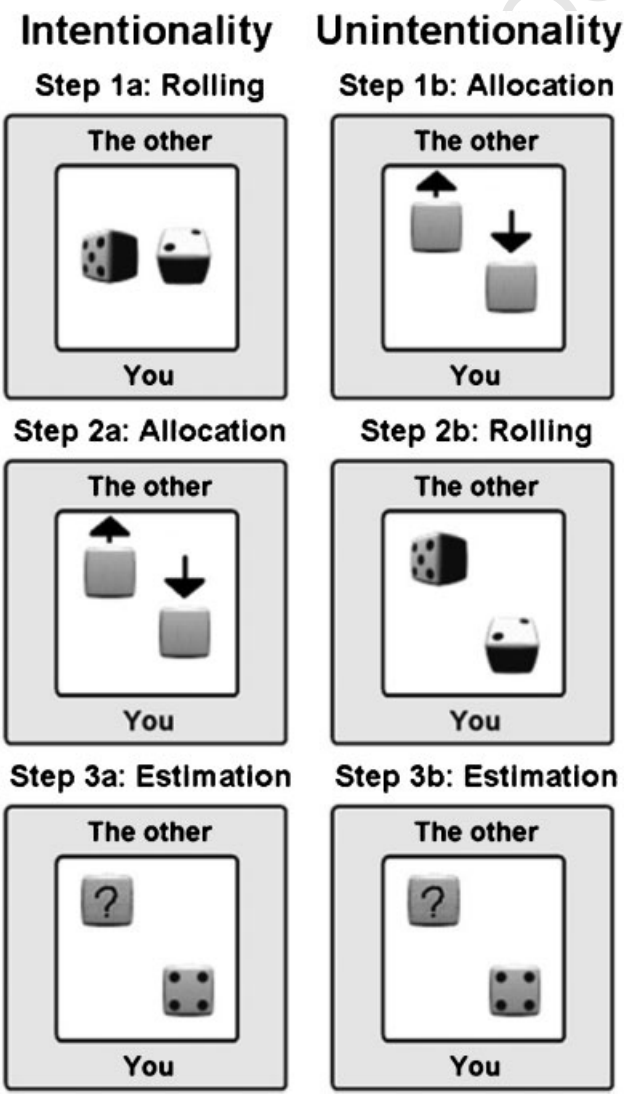

Figure 1. Graphical representation of the dice-rolling paradigm in the intentionality (Steps 1a, 2a, and 3a) and unintentionality (Steps 1b, 2b, and 3b) conditions, respectively. The following two links illustrate the dice-rolling paradigm in both conditions: http://webresearch.psy.vu.nl/ejspdemo/intentionality.htm and http://webresearch.psy.vu.nl/ejspdemo/unintentionality.htm

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him or her, and the more points the other accumulates the better for the other. In the money condition, participants received money on the basis of the other's allocations, and they were told that they had a chance to earn between 2 and 5€ in total. As the allocations were fair all participant received 3.5€.

Results and Discussion

Estimated values of the dice outcomes were analyzed in a 2 (intentionality vs. unintentionality) × 2 (incentive: points vs. money) × 12 (blocks of trials) analysis of variance, in which the latter was a within-participant variable. The analysis revealed a main effect of intentionality, indicating that, consistent with our hypothesis, participants in the intentionality condition estimated higher dice values for the other ($M = 4.37$, $SD = 0.64$) than participants in the unintentionality condition ($M = 3.54$, $SD = 0.47$), $F(1, 51) = 27.07$, $p < .001$, $\eta^2 = .361$. Two separate one-sample t-tests revealed that participants indeed overestimated the other's dice values above the chance level (=3.5) in the intentionality condition, $t(26) = 7.05$, $p < .001$, but not in the unintentionality condition $t(24) < 1$.

The main effect of intentionality generalized across various conditions. First, we did not find a main effect of the incentive manipulation $F < 1$, or an interaction between the intentionality and incentive manipulations $F < 1$. Thus, the results did not support the idea that the magnitude of assumed self-interest would depend on whether the outcomes were hypothetical points or real money. As we did not find a main effect of blocks of trials or any interactions with manipulated variables Fs < 1, the data did not support the idea that participants would have adjusted their estimations as more information about the other's behavior becomes available in later trials. Thus, Experiment 1 provides good initial support for the idea that a belief in self-interest influences judgments of overt behavior in the dice-rolling task.

EXPERIMENT 2

Experiment 1 demonstrated that even when participants receive their fair share, they maintain their belief that the other favors oneself. But do individuals also overestimate self-regarding behavior with a real other person, who may actually behave in a somewhat self-regarding manner? To address this issue, we conducted an experiment in which actual dice allocations where compared with estimated dice allocations.

Participants, Design, and Procedure

The participants were 43 VU University students (31 women, 12 men) with an average age of 20.6 years ($SD = 1.93$). The computerized, laboratory experiment was a 2 (allocation vs. estimation) × 12 (blocks of trials) design with the latter being a within-participants variable. Participants in the allocation condition made 12 resource allocations by rolling two dice and allocating one of them to themselves, and another one to the other—thereby facing the same allocation decisions than the other supposedly did in the intentionality condition in Experiment 1. Participants in the estimation condition estimated the other's dice allocations—identical to the intentionality condition in Experiment 1.

Results and Discussion

One-sample t-test revealed that the average value of the die participants allocated to themselves in the allocation condition ($M = 4.01$, $SD = 0.34$) was higher than 3.50, $t(20) = 6.82$, $p < .001$, indicating that participants indeed exhibited self-interest in their allocations. But more importantly, independent sample t-test revealed that the dice outcomes participants allocated to themselves were less self-regarding than dice outcomes participants estimated the other to allocate to oneself in the estimation condition ($M = 4.40$, $SD = 0.46$), $t(41) = 3.15$, $p = .003$. Thus, these findings indicate that although people are somewhat self-interested in their allocations, the amount of self-interest they assume from others is still significantly greater.

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EXPERIMENT 3

Experiment 3 extended Experiment 1 in three important respects. First, we tested the prediction that instead of just overestimating the other's outcomes, participants may also underestimate their own outcomes when only the other's dice are shown. Second, we included another factor in which a computer was said to allocate the dice. Given that the assumption of self-interest is relevant to motivations of ''other people'', participants should not expect the computer to benefit the other more than it benefits the participant (or some other specific mechanism relevant to the dice-situation: e.g., ''I have always bad luck with chance games''). Hence, the computer condition served as another baseline for demonstrating that self-interest is only assumed from other people's intentional behaviors. Third, we tested the prediction that participants would recall the dice values after the task the same way they estimated them during the task. That is, participants in the intentionality-and-human condition would underestimate their own dice values and overestimate the other's dice values, compared to the base level of 3.5. Recalled dice values in other three conditions, by contrast, should not differ from 3.5.

Participants, Design, and Procedure

The participants were 149 North American students (63 women, 86 men) with an average age of 24.5 years ($SD = 8.14$). The experiment was administrated over the Internet and all materials were displayed on participants' web-browsers. The experiment was a 2 (intentionality vs. unintentionality) × 2 (type of information provided: participant's die vs. the other's die shown) × 2 (the decision-maker: human vs. computer) × 12 (blocks of trials) design with the latter being a within-participants variable. Because the type of incentive did not impact the findings in Experiment 1, we only used points as incentives. Also, we manipulated human vs. computer as the decision-maker. In the computer condition the dice were said to be rolled and allocated by a computer, whereas in the human condition, similar to Experiment 1, the other was said to roll and allocate the dice. We also manipulated the type of information provided. In the own die shown condition participants were given the value of their own die (identical to Experiment 1) and were asked to estimate the other's die. In the other's die shown condition participants were given the value of the other's die and were asked to estimate their own die. Finally, participants were asked to recall the average dice value they and the other had received during the dice task. Participants answered these two questions, presented in a random order, by selecting an answer from a pull-down menu in which choices ranged from 1.0 to 6.0.

Results and Discussion

Dice Estimations During the Dice Task

Estimated values of the dice outcomes were analyzed in a 2 (intentionality) × 2 (type of information: self vs. other) × 2 (decision-maker: human vs. computer) × 12 (blocks of trials) analysis of variance, in which the latter was a within-participant variable. The analysis revealed a three-way interaction between intentionality, type of information, and decision-maker manipulations, $F(1, 148) = 16.30$, $p < .001$, $\eta^2 = .104$[1]. One-sample t-test revealed, consistent with our hypothesis, that participants in the intentionality-and-human condition who were given information on their own dice values, overestimated the other's dice values ($M = 4.14$, $SD = 0.53$), $t(18) = 5.26$, $p < .001$. Also consistent with our hypothesis, participants in the intentionavlity-and-human condition who were given information on the other's dice values, underestimated their own dice values ($M = 2.91$, $SD = 0.57$), $t(17) = -4.42$, $p < .001$. By contrast, when allocations were unintentional or when they were made by a computer, participants estimated the dice values close to 3.5 (Ms were between 3.47 and 3.66 and SDs were between 0.21 and 0.48). One-sample t-tests did not reveal that these values were different from

[1]We found a main effect of the type of information manipulation $F(1, 148) = 13.94$, $p < .001$, $\eta^2 = .090$, indicating that participants estimated higher dice values for the other than they estimated for themselves. We also found a two-way interaction between the type of information and decision maker manipulations $F(1, 148) = 13.49$, $p < .001$, $\eta^2 = .090$, and another two-way interaction between the type of information and intentionality manipulations $F(1, 148) = 36.12$, $p < .001$, $\eta^2 = .204$. These effects are mainly caused by differences in means in the intentionality-human conditions, as one-sample t-tests show. Similar to Experiment 1, we did not find a main effect of block of trials or any interactions between manipulated variables $Fs < 1$.

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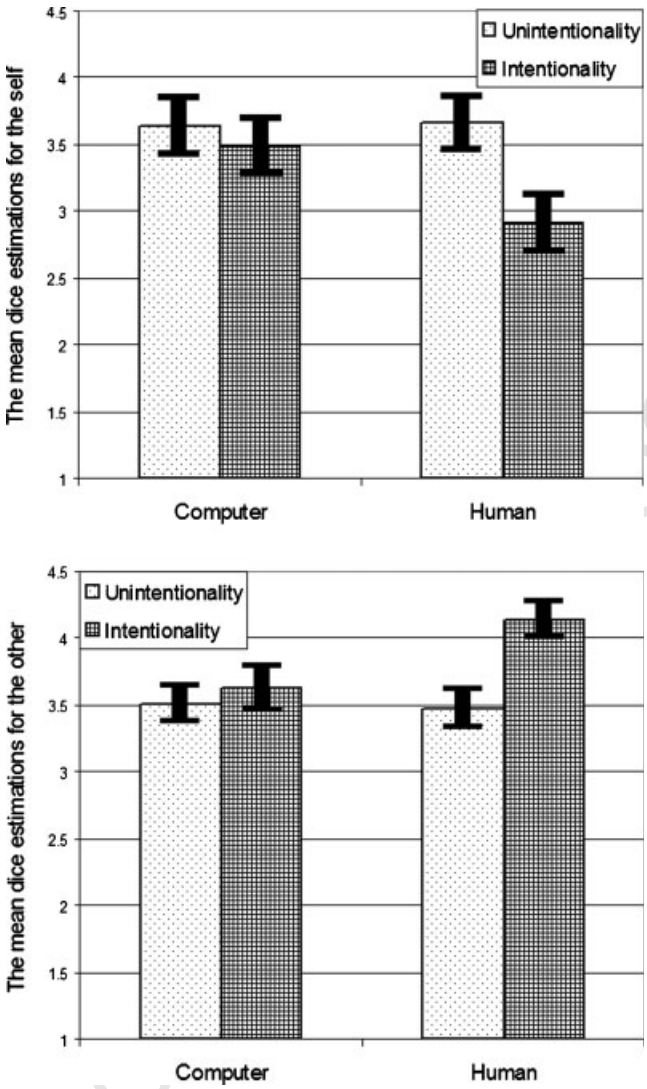

Figure 2. The mean estimated dice values allocated to the self and the other in Experiment 3. The 95% confidence intervals are presented in line graphs

3.5, except that in the computer-and-intentionality condition participants slightly overestimated the dice values the computer allocated to the other ($M = 3.63$, $SD = 0.21$), $t(16) = 2.45$, $p = .027$. The means across all eight experimental conditions are presented in Figure 2.

Dice Recall After the Dice Task

We performed another series of one-sample *t*-tests to examine whether or not the dice value recalls differed from the baseline of 3.5. Almost identical results compared ongoing dice estimations were found. Consistent with the hypothesis, participants in the intentionality-and-human condition underestimated their own dice values ($M = 3.16$), $t(36) = -2.89$, $p = .007$ and overestimated the other's dice values ($M = 3.80$), $t(36) = 2.79$, $p = .008$. We also found that participants in the unintentionality-and-computer condition overestimated their own dice values ($M = 3.73$), $t(36) = 2.89$, $p = .006$. Because the remaining five comparisons did not statistically differ from 3.5, our analysis concluded that dice recalls can be explained by our hypothesis in seven out of eight possible comparisons.

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Interestingly, we also found that the way in which participants assumed self-interest in the recall task was influenced by the type of information they were provided with. Independent sample *t*-test revealed that participants who were shown their own die did not underestimate its value ($M = 3.41$) as much as participants who were shown the other's die ($M = 2.89$), $t(35) = 2.25$, $p = .026$. This supports the idea that an underestimation of one's own dice values is attributable to the tendency "to fill in the blanks" with a belief of self-interest. By contrast, such underestimation is absent when participants were given information about their dice and thus did not need to fill in the blanks.

GENERAL DISCUSSION

The major purpose of the present research was to examine that a belief in the self-interest of other people might underlie specific social judgments in incomplete information situations. Using a new methodology, the dice-rolling paradigm, our results provide strong support for the hypothesis that under incomplete information, people assume and erroneously perceive others' behavior to stem from self-interest. Self-interest was assumed when outcomes represented money or points (Experiment 1), for both overestimation of outcomes allocated to the other, and underestimation of outcomes allocated to the participant (Experiment 3), for recall of other's past behavior (Experiment 3), and for judgments of present behavior (Experiments 1 and 3). Importantly, the overestimation of self-interest was observed in comparison to a baseline in which the other person needed to allocate before rolling the dice (no intention, Experiments 1 and 3) or when the computer made allocation decisions (Experiment 3). Moreover, Experiment 2 revealed that while in reality people's allocations are significantly greater than 3.5 indicating self-interest, people estimate that others exhibit even more self-interest than the level of self-interest is in actual behavior. Thus, what people conclude about other's self-interest seems to be a function of (a) what other people actually do (because there is self-interest in their allocations), and (b) incomplete information that is made "complete" by a strong belief in self-interest. Finally, the overestimation of self-interest was observed mainly in the domain where explicit information was not provided, rather than in the domain where explicit information was provided (Experiment 3), supporting the idea that incomplete information is a precondition for the belief in self-interest to express itself.

The current research demonstrates that in people's attempt to make sense of the social environment, they tend to make incomplete information complete by filling in the blanks with a belief in self-interest. This extends previous research in that the belief in self-interest is not only about judgments of global beliefs about motivators of other people in general (Miller & Ratner, 1998), or about comparisons of the self with other people in general (Allison et al., 1989; Van Lange & Sedikides, 1998) but also about attributions regarding others' overt behavior. Even when people observe others and have some—though incomplete—information about their actual behavior, a belief in self-interest seems to be used to "go beyond the information given."

It is interesting to note that cooperation and reciprocity have been studied almost exclusively in the context of complete information (for a more detailed discussion, see Nowak & Sigmund, 2005; Van Lange, Ouwerkerk, & Tazelaar, 2002). In the light of the present findings, this literature needs to be reviewed with a critical eye, as incomplete information may lead people to expect less cooperation from others, which in turn might undermine their own tendencies to behave in a cooperative manner. For example, past research has revealed that the well-known Tit-For-Tat strategy elicits high levels of cooperation under conditions of "complete information" but relatively low levels of cooperation when there may be unintended errors in the actions of others (i.e., incidents of noise, Klapwijk & Van Lange, 2009; Van Lange et al., 2002). Perhaps people no longer give Tit-For-Tat the benefit of the doubt when incompleteness of information allows multiple interpretations. Such reasoning may also be relevant to explaining why uncertainty about other's actions—social uncertainty—tend to undermine cooperation in social dilemmas involving many people (e.g., Suleiman, 1997; Van Dijk, Wit, Wilke, & Budescu, 2004; Wit & Wilke, 1998).

Before closing, we wish to outline some lines of research for future work. One interesting extension would be to examine the validity of our findings in different types of interpersonal relationships. For example, in ongoing relationships or in relationships with relatives it may not be functional to assume self-interest (e.g., in communal relationships, Clark & Mills, 1993[Q3]; Rusbult & Van Lange, 2003). Conversely, the assumption of self-interest may be even stronger for groups, or representatives of groups, as people think more positively about people than about groups (e.g., Insko & Schopler, 1998; Sears, 1983). Motivational aspects of social judgments also deserve attention in future research, as we did not assess or

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manipulate people's motivation to make accurate judgments in the present work. It would be interesting to explore whether and how the need for accuracy might make the assumption of self-interest more or less pronounced. This could be studied simply by offering monetary rewards for accuracy, or more indirectly by influencing the importance of being accurate or not in such social judgments—for example by adjusting the power structure of the situation, or by introducing future interaction possibilities.

We close by outlining an important implication of the present findings. In particular, we wish to note that situations of incomplete information tend to receive relatively little attention in social psychology. However, such situations are of great theoretical and societal relevance, as they form a serious threat to the development of human cooperation. When global beliefs of self-interest are translated into specific judgments (e.g., attributions, expectations, and recall), then it is likely that people act upon such specific judgments, by behaving in noncooperative ways, and eventually eliciting noncooperative behavior form others as well—indeed, a classic example of a self-fulfilling prophecy (see also Kelley & Stahelski, 1970; Miller, 1999). Therefore, to improve interactions in which cooperation may be undermined by beliefs in self-interest, we need to know more about the ways in which heuristics such as ''give others the benefit of the doubt'' or complementary frames of references operate, so that people are less likely to fall prey to the idea that other people are merely self-interested. This is all the more important in real life interactions in which it seem to be the rule, rather than the exception, that we have less than complete information about the actions of others.

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