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How communication increases interpersonal cooperation in mixed-motive situations

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ABSTRACT

Evidence from two experiments indicates that task-related communication promotes cooperation in mixed-motive situations by activating interpersonal norms related to fairness and trust. In Experiment 1, task-related communication increased cooperation between individuals in a three-choice prisoner's dilemma game (PDG-Alt) but task-unrelated communication did not. In Experiment 2, cooperation was increased both by sending a task-related message to one's counterpart and receiving a cooperative task-related message from one's counterpart. Mediation analyses revealed that task-related communication increased cooperation by activating fairness and trust norms (Experiments 1 and 2). Specifically, whereas sending (relative to receiving) a task-related message increased cooperation by activating fairness norms, receiving (relative to sending) a task-related message increased cooperation by activating trust norms (Experiment 2).

Introduction

Why do individuals cooperate in mixed-motive interactions, such as the prisoner's dilemma game (PDG)? This question has puzzled social scientists for decades (for reviews, see Bicchieri, 2002; Kelley & Thibaut, 1978; Kelley et al., 2003; Komorita & Parks, 1995; Pruitt & Kimmel, 1977; Schelling, 1960). Even though competition is the rational, dominant strategy in one-shot (i.e., single-trial) PDG interactions, individuals cooperate at surprisingly high rates. For example, Insko and colleagues found that 87% of individuals cooperated in the PDG even when they only expected a single-trial interaction (Insko et al., 2001). Why are individuals so overwhelmingly cooperative? To answer this question, we conducted two experiments that examined the critical role of task-related communication in inducing cooperation. Experiment 1 tested the prediction that for communication to increase cooperation it has to be task-related (as opposed to task-unrelated) because task-related communication activates norms of fairness and trust. Experiment 2 tested the prediction that the total effect of task-related communication on cooperation can be partitioned into two components: the effect of sending a cooperative message, which rests on fairness norms, and the effect of receiving a cooperative message, which rests on trust norms.

Communication and cooperation

It is well established that communication promotes cooperation in social dilemmas and prisoner's dilemma game (Bicchieri, 2002; Bouas & Komorita, 1996; Dawes, McTavish, & Shaklee, 1977; Deutsch, 1958; Insko et al., 1993; Kerr & Kaufman-Gilliland, 1994; Kiesler, Waters, & Sproull, 1996; Loomis, 1959; Miettinen & Suetens, 2008; Mulford, Jackson, & Svedsater, 2008; Orbell, Van De Kragt, & Dawes, 1988; Sally, 1995; Wichman, 1970; Wildschut, Pinter, Vevea, Insko, & Schopler, 2003). According to one review, "a 100 round prisoner's dilemma with discussion before each round would have 40% more cooperation than the same game with no discussion" (Sally, 1995, p. 78). Communication promotes cooperation both in single-trial interactions (Insko et al., 1993) as well as in interactions involving multiple trials (Wichman, 1970).

Still, not all types of communication are equally effective at fostering cooperation. In a experiment with an N-person commons dilemma, Dawes et al. (1977) went beyond the simple comparison of present and absent communication with a design that included four conditions: (a) no-communication, (b) 10-min communication within the group regarding a topic unrelated to the commons dilemma, (c) 10-min communication within the group regarding the commons dilemma, and (d) 10-min communication within

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the group regarding the commons dilemma followed by a roll call in which preliminary decisions were announced (in every case the preliminary decisions were to cooperate). The first two conditions produced cooperation rates of 30% and 32%, respectively, while the second two produced rates of 72% and 71%, respectively. These results imply that in order for communication to have an effect it must be task-related (i.e., related to the decision), and the addition of a public commitment to the decision is not necessary.

Task-related versus task-unrelated communication

Why is task-related communication so much more effective than task-unrelated communication at eliciting cooperation in social dilemmas? We propose that it is because task-related and task-unrelated communications activate different norms. During task-related communication, individuals tend to express their intended behavior, and these expressed intentions are generally cooperative (Dawes et al., 1977; Kerr & Kaufman-Gilliland, 1994). We maintain that the primary reason why individuals express cooperative intentions during task-related communication is the powerful norm of fairness (Lind, 1997; Thibaut & Walker, 1975)—expressing an intention to cooperate is tantamount to proposing a fair distribution of resources. Furthermore, once cooperative intentions have been expressed, most individuals feel compelled to adhere to them (i.e., one should do as one says).

In the context of free-flowing communication, individuals both send and receive information. What is the effect of receiving a message expressing cooperative intent from the other player? We propose that norms of trust dictate that one should give credence to this message. In the absence of countervailing information, it is appropriate for one to accept another's word, just as one would like one's word to be accepted by others. Furthermore, once the expectation has been formed that the other player will cooperate, most individuals feel compelled to "accept the olive branch" and reciprocate the anticipated cooperative choice (Gouldner, 1960). Consistent with the idea that interpersonal communication activates trust norms, Insko et al. (1993) found that interpersonal communication in a PDG context increased expected cooperation from the other side. They operationalized trust as the expectation of cooperation because this definition implies positive expectations about the behavior of another—a critical component of trust (Deutsch, 1958; Insko, Kirchner, Pinter, Efaw, & Wildschut, 2005; Lewicki, McAllister, & Bies, 1998; Loomis, 1959; Rousseau, Sitkin, Burt, & Camerer, 1998).

What norms does task-unrelated communication, or small talk, activate? When individuals engage in task-unrelated communication, they typically discuss pleasantries. This type of communication is likely to activate norms of politeness, but not fairness or trust. Fairness and trust norms are unlikely to be activated by task-unrelated communication because discussion of resource distribution and expression of cooperative intent does not occur in this context. Without discussing the task, there is little reason to become concerned with fairness and little information upon which to base trust. Although it is possible that task-unrelated communication could promote liking that could foster trust indirectly, it seems doubtful that liking promoted by task-unrelated communication would be sufficient to make many individuals expect cooperative behavior in a situation in which cooperation can be exploited.

Overview

To summarize, we propose that two important norms are activated by task-related (but not task-unrelated) communication. First, fairness norms are activated, which produce expressions of cooperative intent to which most individuals will feel compelled to adhere. Second trust norms are activated, which produce expected cooperation that most individuals will feel compelled to reciprocate. We tested these ideas in two experiments. Experiment 1 tested the basic prediction that task-related communication (compared to task-unrelated communication and no-communication) would increase cooperation by increasing concern for fairness and trust. Experiment 2 tested the idea that the total effect of task-related communication on cooperation can be partitioned into an effect of sending a task-related message to another individual and an effect of receiving a task-related cooperative message from another individual. Both sending and receiving a task-related message can increase cooperation, but for different reasons. We predicted that whereas sending a task-related message would increase cooperation primarily by increasing concern for fairness, receiving a task-related message would increase cooperation primarily by increasing trust.

Both experiments used a three-choice variation of the PDG, called PDG-Alt (Fig. 1). The corner cells of this matrix constitute a PDG, but the matrix includes a third choice that guarantees intermediate outcomes regardless of the other player's choice. This third choice is referred to as "withdrawal." We had an important reason for using the PDG-Alt rather than the traditional two-choice PDG. Noncooperation in the two-choice PDG yields the highest outcomes both when the other player is expected to compete and when the other player is expected to cooperate. In other words, in the two-choice PDG, noncooperation can reflect a concern with defending oneself against a competitive opponent (fear), a concern with taking advantage of a cooperative opponent (greed), or both. The PDG-Alt, however, was developed to separate fear and greed (Insko, Schopler, Hoyle, Dardis, & Graetz, 1990; Insko et al., 1993, 2005; Schopler et al., 1993; Schopler et al., 1995). In the PDG-Alt, competition (*Z*) yields the highest outcomes when the other player is expected to cooperate (select *X*), but withdrawal (*Y*) yields the highest outcomes when the other player is expected to compete (select *Z*) (see Fig. 1). Thus, in the PDG-Alt, the withdrawal choice is indicative of fear or distrust, and the competitive choice is indicative of greed or self-interest. Using the PDG-Alt enabled us to examine not just whether task-related communication increased cooperation, but also whether it did so by decreasing fear-based withdrawal, greed-based competition, or both.

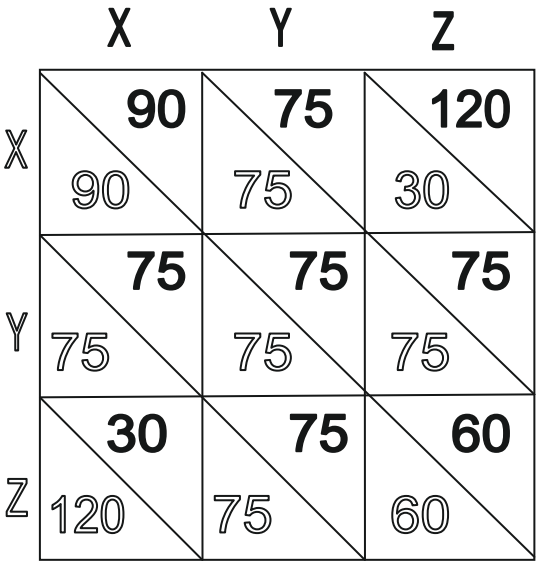

Fig. 1. Three-choice prisoner's dilemma game (PDG-Alt). This matrix represents a social interaction involving two individuals. Each individual has three-choices: *X* represents cooperation, *Y* represents withdrawal, and *Z* represents competition. The values represent the amount of money (in US cents) that each individual receives as a function of their joint choices.

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Experiment 1

Although previous research has demonstrated the importance of task-related communication for increasing interpersonal cooperation in mixed-motive situations (Dawes et al., 1977), the mechanisms via which task-related communication operates have remained shrouded. Experiment 1 tested the idea that task-related communication (compared to task-unrelated communication and no-communication) leads to increased cooperation by increasing both concern for fairness and trust. We further expected that the increased cooperation resulting from task-related communication would be mirrored by both decreased withdrawal and decreased competition. Specifically, we predicted that increased trust would decrease fear-based withdrawal (but not greed-based competition), and that increased concern for fairness would decrease greed-based competition (but not fear-based withdrawal).

Why did we predict this double dissociation (Teuber, 1955), whereby trust is linked specifically with decreased fear-based withdrawal, and concern for fairness is linked specifically with decreased greed-based competition? First, consider the relatively straightforward case of concern for fairness. Concern for fairness should reduce competition because competition does not yield an equal outcome distribution unless the other player is expected to compete, in which case withdrawal (and not competition) is the rational choice (Fig. 1). Concern for fairness should not reduce withdrawal because withdrawal guarantees an equal outcome distribution regardless of the other player's choice.

The case of trust is slightly more complicated. Trust, or the expectation that the other player will cooperate, should reduce withdrawal because matching the other player's cooperative choice with withdrawal yields lower outcomes than does matching the other player's cooperative choice with either cooperation or competition (Fig. 1). Trust should not, however, reduce competition because matching the other player's cooperative choice with competition maximizes outcomes. High trust might therefore be expected to increase competition, were it not for the fact that this would involve exploiting another person's vulnerability—something that most people would consider inappropriate in the context of interpersonal interactions. To the extent that these two opposing forces (greed and reluctance to exploit) cancel each other out, there should be no association between trust and competition. Whether they do, in fact, cancel each other out is an empirical question we address in Experiment 1.

Methods

Participants

Participants were 86 men and 86 women enrolled in introductory psychology classes at the University of North Carolina ($N = 172$). Experimental sessions were conducted with up to six participants (all of the same sex). Participants were randomly assigned to one of three-levels of a communication factor (task-related communication, task-unrelated communication, no-communication). Preliminary analyses revealed no significant gender main effects or interactions on PDG-Alt choices, so we collapsed across gender for all reported analyses.

Procedure

Participants reported to a suite that contained one large central room surrounded by six smaller rooms (numbered 1–6) for a study on "social interaction." Each participant was seated in his or her own room across the suite from another participant. Participants were instructed that during the experiment they would interact with the participant across the suite from them in a social interaction task involving a payoff matrix (Fig. 1). Participants were trained on the payoff matrix and completed several exercises to ensure understanding of the matrix. They were informed that there would be just one interaction and that, following this interaction, each person would receive their money and be dismissed individually.

Participants in the task-related communication and task-unrelated communication conditions met with their interaction partners for 5 min prior to the payoff matrix interaction. In the no-communication condition, participants did not meet or communicate with their interaction partner. Participants in the task-related communication condition discussed the choices they might make in the payoff matrix. They were informed that they should discuss their potential choices in the social interaction task, but that the communication was not binding. In the task-unrelated communication condition, participants asked and answered questions from Set I of Aron and colleagues' "small-talk" procedure (Aron, Melinat, Aron, & Vallone, 1997). Sample questions included: "What was the best gift you ever received and why?" and "If you could invent a new flavor of ice cream, what would it be?" Following the meeting, participants returned to their individual rooms, made PDG-Alt choices, and completed a questionnaire with supplementary dependent measures. After completing the dependent measures, participants were paid the money they earned in the PDG-Alt interaction and debriefed.

Dependent variables

PDG-Alt choice. The main dependent variable was participants' PDG-Alt choice. For each of the three-choices (*X*, *Y*, *Z*), participants were assigned a code of "1" if they made that choice and a code of "0" if they did not.

Concern for fairness. Concern for fairness was assessed with two items: "I wanted both individuals to earn an equal amount", and "I wanted to minimize the differences between myself and the other individual." Participants were asked to indicate the extent to which their choice was influenced by these concerns (1 = *not at all*; 7 = *very much*). The two items were averaged to form a composite measure of concern for fairness (Spearman Brown correlation = .62).

Trust. We operationalized trust as the expectation of cooperation. To assess expected cooperation, we asked participants to indicate the likelihood (0–100) that their counterpart would choose *X*, *Y*, and *Z*. Participants were instructed that the sum of the three likelihood ratings should total 100. We used the expected cooperation item to measure trust because this item assesses the expected benevolence of one's counterpart (Insko et al., 2005).

Data analysis

The three-level communication manipulation was partitioned into two planned orthogonal contrasts. The focal contrast compared the task-related communication condition (coded "1") to the combined task-unrelated communication and no-communication conditions (coded "−1/2"). The second contrast compared the task-unrelated communication condition (coded "1") to the no-communication condition (coded "−1").

Because participants in the communication conditions interacted with another player prior to making their PDG-Alt choice, their observations were not independent. To address this concern, we conducted statistical analyses of PDG-Alt choice using weighted least squares means and variances (WLSMV) estimation in Mplus 5.1 (Muthén & Muthén, 2007). We modeled the non-independence between interacting players through the cluster command, which adjusts standard errors to account for nested data structures. For each parameter in the model, Mplus provides the ratio between a point estimate and its standard error (*SE*), which can be evaluated using the standard normal distribution (*z*-score; Muthén & Satorra, 1995).

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Table 1
Study 1: Means of PDG-Alt choices, concern for fairness and trust.

Communication	PDG-Alt choice			Fairness and trust	
	Cooperate (*X*)	Withdraw (*Y*)	Compete (*Z*)	Fairness	Trust
No-communication	.35	.43	.22	4.38	37.88
Task-unrelated	.36	.41	.22	4.34	35.63
Task-related	.75	.20	.03	5.00	65.71

Note: $N = 172$ participants (86 dyads). Values for PDG-Alt choices are the observed proportion of participants in each condition making each PDG-Alt choice. Concern for fairness ranged from 1 (*not at all*) to 7 (*very much*). Trust is the reported likelihood (0–100) that the other party would choose *X*.

We conducted separate analyses for each PDG-Alt choice. An alternative to analyzing each PDG-Alt choice separately is to partition the three-level categorical variable into two orthogonal contrasts (Wickens, 1989). A limitation of this alternative approach is that one of the contrasts (e.g., cooperation versus withdrawal) excludes participants who made the third choice (e.g., competition). In order to fully utilize the available data and keep sample size consistent for all analyses we chose to separately analyze each of the three PDG-Alt choices.[1]

Statistical analyses of concern for fairness and trust were estimated with Mplus 5.1 (Muthén & Muthén, 2007) using the cluster command and maximum likelihood estimation with robust standard errors (MLR) to account for the non-independence between interacting players.

In mediation tests for Experiment 1, we evaluated the statistical significance of indirect effects (denoted as $\alpha\beta$) by calculating a 90% confidence interval (*CI*) of the indirect effect. The $\alpha\beta$ indirect effect test is statistically significant when the *CI* does not include 0. Conceptually, this test is similar to the Sobel (1982) *z* test. There is strong evidence that tests for indirect effects based on the normal distribution, like the Sobel (1982) *z* test, have low statistical power (MacKinnon & Fairchild, 2009; MacKinnon, Fairchild, & Fritz, 2007; MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; MacKinnon, Lockwood, & Williams, 2004; Preacher & Hayes, 2008; Shrout & Bolger, 2002). Various alternatives have been proposed, including procedures based on bootstrapping, or repeatedly sampling the original data (Shrout & Bolger, 2002) and on calculating asymmetric confidence intervals based on the distribution of the indirect effect, $\alpha\beta$ (MacKinnon et al., 2002). Computer software is available to implement these more accurate procedures (e.g., MacKinnon, Fritz, Williams, & Lockwood, 2007; Preacher & Hayes, 2008). To the best of our knowledge, however, this software has not been developed to the point where it can perform mediation analyses involving (a) a hierarchical data structure; (b) dichotomous dependent variables; and (c) multiple mediators. We therefore used path models to test mediation and based our tests of indirect effects on a normal distribution but increased power by adopting a 90% (rather than 95%) *CI*. In every case, evidence for a statistically significant indirect effect based on the 90% *CI* was corroborated by a test of the joint significance of the two effects comprising the indirect effect (MacKinnon et al., 2002).

Results

Table 1 presents the means for each PDG-Alt choice, concern for fairness, and trust. Results of the significance tests are presented below.

PDG-Alt choices

Participants selected cooperation more frequently in the task-related communication condition than in the task-unrelated communication and no-communication conditions pooled, $z = 4.24$, $p < .001$. The task-unrelated communication and no-communication conditions did not differ significantly, $z = 0.13$, $p = .90$. Analysis of the withdrawal choice showed that participants selected withdrawal significantly less frequently in the task-related communication condition than in the task-unrelated communication and no-communication conditions pooled, $z = -2.46$, $p = .01$. The task-unrelated communication and no-communication conditions did not differ significantly, $z = -0.14$, $p = .89$. Finally, analysis of the competitive choice showed that participants selected competition significantly less frequently in the task-related communication condition than in the task-unrelated communication and no-communication conditions pooled, $z = -2.33$, $p = .02$. The task-unrelated communication and no-communication conditions did not differ significantly, $z = 0.03$, $p = .98$.

These results clearly demonstrate that task-related communication, but not task-unrelated communication, significantly increased cooperation (compared to no-communication). Furthermore, this increase in cooperation was mirrored by a significant decrease in both withdrawal and competition.

Concern for fairness

Participants had significantly greater concern for fairness in the task-related communication condition than in the task-unrelated communication and no-communication conditions pooled, $z = 2.47$, $p = .01$. The task-unrelated communication and no-communication conditions did not differ significantly, $z = -0.14$, $p = .89$. The concern for fairness findings tracked the findings for cooperation, as well as withdrawal and competition.

Trust

Participants expected the other player to be significantly more cooperative in the task-related communication condition than in the task-unrelated communication and no-communication conditions pooled, $z = 5.05$, $p < .001$. The task-unrelated communication and no-communication conditions did not differ significantly, $z = -0.51$, $p = .61$. The findings for trust tracked those for cooperation, as well as withdrawal and competition.

Mediation analyses

We tested whether the effects of task-related communication on the PDG-Alt choices were mediated by concern for fairness and trust. For the purpose of these mediation analyses, we focused on the contrast of task-related communication versus no task-related communication (we collapsed across the no-communication and task-unrelated communication conditions).[2] For each choice, we tested a path model in which the effect of task-related commu-

[1] We acknowledge, of course, that these analyses are not independent (i.e., knowledge of two choices allows for perfect prediction of the third choice). Addressing this particular issue regarding the analysis of categorical variables, Wickens (1989, p. 189) pointed out that:

> ...in some cases the important a priori questions are not independent. Lack of independence should not prevent one from asking these questions. The failure of independence should be considered when the results are interpreted ... but independence alone should not override the construction of meaningful logits.

[2] An alternative to collapsing across the no-communication and task-unrelated communication conditions is to test the path models using only data from the task-related communication and no-communication conditions. This analytic approach revealed similar results.

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nication on choice was mediated by concern for fairness and trust. Fig. 2 presents the path-modeling results.

The primary objective of the mediation analyses was to test the hypothesis that the effect of task-related communication on increased cooperation is mediated by both concern for fairness and trust. The top panel of Fig. 2 depicts the model for cooperative choice. The evidence was consistent with dual mediation of the task-related communication effect on cooperation by concern for fairness and trust. There were significant indirect effects of task-related communication on cooperation via concern for fairness, $\alpha\beta = 0.13$, $SE = 0.07$, 90% CI: 0.02, 0.23, and via trust, $\alpha\beta = 0.89$, $SE = 0.15$, 90% CI: 0.64, 1.14.

A second objective of the mediation analyses was to examine whether concern for fairness and trust played specific roles in accounting for the effects of task-related communication on withdrawal and competition, respectively. We predicted a double dissociation: increased trust should predict decreased withdrawal (but not decreased competition), and increased concern for fairness should predict decreased competition (but not decreased withdrawal).

The middle panel of Fig. 2 depicts the model for withdrawal choice. As predicted, there was evidence for mediation of the task-related communication effect on withdrawal by trust only. The indirect effect of task-related communication on withdrawal via trust was significant, $\alpha\beta = -0.76$, $SE = 0.16$, 90% CI: -1.02, -0.50. There was no evidence for mediation by concern for fairness. That is, although task-related communication increased concern for fairness, concern for fairness did not predict withdrawal.

The bottom panel of Fig. 2 depicts the model for competitive choice. As predicted, there was evidence for mediation of the task-related communication effect on competition by concern for fairness. The indirect effect of task-related communication on competition via concern for fairness was significant, $\alpha\beta = -0.25$, $SE = 0.11$, 90% CI: -0.43, -0.07. Unexpectedly, however, there was also evidence for mediation by trust. The indirect effect of

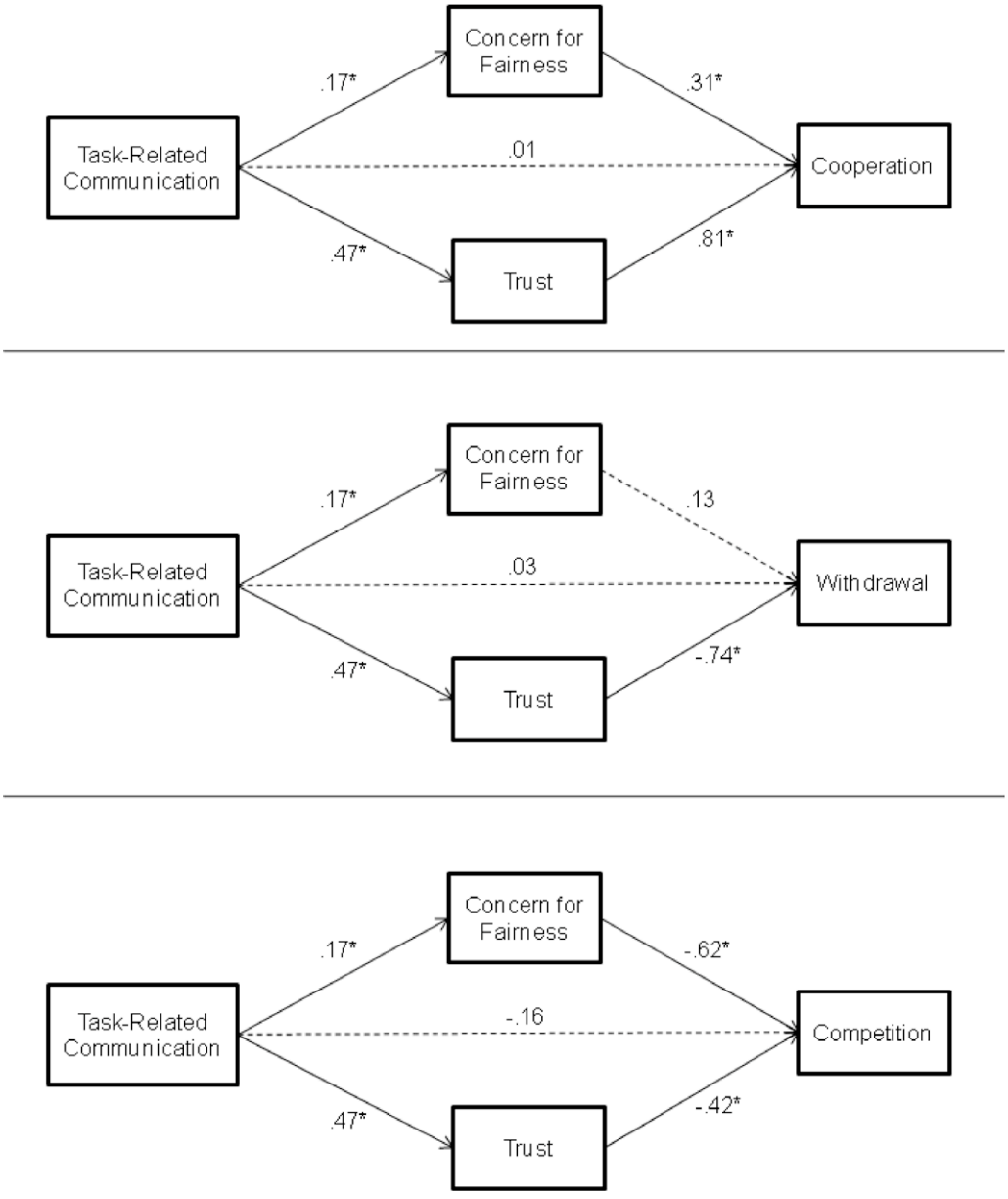

Fig. 2. Study 1: Path models of PDG-Alt choice. Standardized estimates are presented. Separate models were computed for each choice. The top panel shows results for the cooperative choice; the middle panel shows results for the withdrawal choice; the bottom panel shows results for the competitive choice. $^{*}p < .05$.

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task-related communication on competition via trust was significant, $\alpha\beta = -0.46$, $SE = 0.17$, 90% CI: -0.74, -0.18.

To summarize, the effect of task-related communication (compared to the task-unrelated communication and no-communication) on increased cooperation was mediated by increased concern for fairness and increased trust. Meditation analyses for withdrawal and competition revealed a single dissociation: increased concern for fairness mediated the effect of task-related communication on decreased competition, but not withdrawal. We did not, however, find evidence for a double dissociation: increased trust mediated the effect of task-related communication on decreased withdrawal, but it also mediated the effect of task-related communication on decreased competition.

Note that although the path-modeling results are consistent with mediation, this evidence is not definitive. Because we did not want to contaminate the assessment of our key dependent variable (PDG-Alt choice), concern for fairness and trust were assessed after PDG-Alt choice. Therefore, we cannot rule out the possibility that PDG-Alt choice caused concern for fairness and trust, rather than the reverse.

Discussion

Experiment 1 found evidence that task-related communication increases cooperation by activating interpersonal norms related to fairness and trust, but not politeness. If a desire to be polite toward individuals with whom one has become acquainted were an influential reason for cooperation, then both task-unrelated and task-related communication should have increased cooperation. Instead, we found that only task-related communication increased cooperation (compared to no-communication), and that this increased cooperation was mirrored by decreased withdrawal and decreased competition. Task-related communication increased cooperation (and decreased withdrawal and competition) even though the communication was non-binding or "cheap talk" (Farrell & Rabin, 1996).

Mediation analyses revealed results consistent with the possibility that task-related communication (compared to task-unrelated communication and no-communication) increased cooperation via both increased concern for fairness and increased trust. As predicted, increased concern for fairness was linked to decreased greed-based competition (but not to decreased fear-based withdrawal). Increased trust, however, was linked to both decreased fear-based withdrawal and decreased greed-based competition. Whereas the mediating role of trust in accounting for decreased withdrawal was anticipated, its meditating role in accounting for decreased competition was not.

Why might the increased trust stemming from task-related communication lead to decreased greed-based competition? On the one hand, trust, or the expectation that the other player will cooperate, would seem to dictate competition because matching cooperation with competition maximizes outcomes. On the other hand, trust implies that the other individual is vulnerable to exploitation, and such perceived vulnerability may inhibit greed because it is considered inappropriate to exploit a trusting other. We proposed that, to the extent that these opposing forces (greed and reluctance to exploit) would cancel each other out, there would be no association between trust and competition. The finding that there was a negative association between trust and competition indicates that the opposing forces did not, in fact, cancel each other out, but that the reluctance to exploit a trusting other was stronger than greed.

In retrospect, it is obvious that exploiting a trusting other is particularly odious. This is something that we should have anticipated but did not. There is an interesting parallel here with ritualized behavior patterns known as appeasement signals, which serve to inhibit aggression (Lorenz, 2002). The communication of cooperative intent, then, might not only reduce the other person's fear, it may also serve as an appeasement signal that reduces the other person's greed (cf. Insko et al., 2005).

Although the evidence for a link between increased trust and decreased competition is important, such evidence should not distract attention from what we regard as the key findings of Experiment 1: task-related communication increased cooperation, and this increased cooperation was mediated by both increased concern for fairness and trust. These findings are consistent with the idea that task-related communication activates fairness norms that produce expressions of cooperative intent to which most individuals feel compelled to adhere, and trust norms that produce expected cooperation that most individuals feel compelled to reciprocate.

Experiment 1 was limited in at least two important respects. First, we did not identify which components of task-related communication are responsible for increased cooperation (and decreased withdrawal and competition). We propose that the total effect of task-related communication can be partitioned into separate components related, respectively, to sending and receiving task-related messages. In the context of free-flowing task-related communication, individuals perform simultaneously the roles of sender and receiver, but in Experiment 2 these roles were separated. A second limitation of Experiment 1 is that we did not record the content of participants' conversations and therefore do not know if participants in the task-related communication condition indeed made cooperative proposals, or if participants who made cooperative proposals felt compelled to adhere to them. The dearth of evidence on this latter point stands in contrast to the strong evidence we obtained for the idea that individuals feel compelled to reciprocate expected cooperation: Experiment 1 found a robust link between trust and cooperation. In Experiment 2, we addressed this issue by collecting and content analyzing participants' written proposals. A final objective of Experiment 2 was to examine how robust the unexpected link between increased trust and decreased competition is. Could this link be replicated?

Experiment 2

Experiment 2 examined in greater detail why task-related communication increases cooperation and decreases withdrawal and competition. Is it by making a commitment to cooperate, receiving a commitment of cooperation, or both? We sought to answer these questions by manipulating whether participants sent a task-related note to their interaction partner or received a task-related cooperative note from their interaction partner. Our primary focus was on cooperation. We predicted that sending a note and receiving a note would both increase cooperation compared to a condition in which participants did not communicate, but for different reasons. Specifically, we predicted that sending a note (relative to receiving a note) increases cooperation by activating fairness norms. Fairness norms should be relatively more salient to individuals who send a note than to individuals who receive a note because only note senders have to indicate their intentions to the other player. We expect these expressed intentions to be cooperative—akin to proposing a fair distribution of resources. We also predicted that receiving a note (relative to sending a note) increases cooperation by activating trust norms. Trust norms should be relatively more salient to individuals who receive a note than to individuals who send a note because only note receivers have information about the other player's cooperative intentions.

Our secondary focus was on withdrawal and competition. We predicted that the relative contribution of receiving a note to reduced withdrawal would be stronger than that of sending a note.

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This is because, relative to sending a note, receiving a note should produce a greater increase in trust and, in turn, increased trust should be linked with decreased withdrawal. Relative to receiving a note, sending a note should produce a greater increase in concern for fairness because sending a note entails expressing a proposal regarding one's intended payoff matrix choice. Increased concern for fairness, however, should not decrease withdrawal because withdrawal guarantees an equal outcome distribution regardless of the other player's choice (see Experiment 1). We further predicted that sending a note and receiving a note would both decrease competition, but for different reasons. Relative to receiving a note, sending a note should produce a greater increase in concern for fairness and, in turn, increased concern for fairness should be linked with decreased competition. Relative to sending a note, receiving a note should produce a greater increase in trust and, in turn, increased trust might be linked with decreased competition (see Experiment 1).

Methods

Participants were 48 men and 82 women enrolled in introductory psychology classes at the University of North Carolina ($N = 130$). The procedure and measures used in Experiment 2 were similar to those used in Experiment 1, but communication was written rather than spoken. Participants were informed that they would interact with the participant across the suite from them in a social interaction task involving a payoff matrix (Fig. 1). Following the payoff matrix training, participants in the *sent-note* and *received-note* conditions were informed that they would have an opportunity to communicate with their interaction partners before they made their decisions. Participants in rooms 1–3 ("the note senders") were informed that they would be given an index card and 1 min in which to write "anything they wished to communicate to their interaction partner about the upcoming decision." They were told that their notes would be given to their interaction partners ("the note receivers" in rooms 4–6). After the note senders completed the notes and gave them to the experimenter, the experimenter delivered bogus notes to the note receivers (in handwriting intended to appear gender appropriate). Substituting the bogus note for the actual notes allowed for independent observations of the note senders and note receivers. The bogus note read, "I will choose *X*." Communication with the interaction partner was not mentioned in the no-note condition and participants in this condition did not expect to send or receive notes. Thus, the no-note condition was identical to the no-communication condition in Experiment 1.

After the matrix training and the exchange of notes for those in the sent-note and received-note conditions, participants were given 1 min to look over the payoff matrix and record their decisions. The experimenter collected decisions and distributed a questionnaire containing the same fairness and trust items administered in Experiment 1.

Data analysis

Because there was no actual interaction between the two sides, the unit of analysis was the individual participant. PDG-Alt choices were analyzed with logistic regression and concern for fairness and trust were analyzed with analysis of variance (ANOVA). The note manipulation was partitioned into two planned orthogonal contrasts. The first contrast compared the combined sent-note and received-note conditions (coded "1/2") to the no-note condition (coded "−1"). For the sake of brevity, we refer to this contrast as testing the effect of exchanging notes. We do so in the understanding that either sending or receiving a note is not the same as both sending and receiving a note. The second contrast compared the sent-note condition (coded "1") to the received-note condition (coded "−1"). This contrast tested whether the relative contribution of sending a note was stronger than that of receiving a note (or vice versa).

Mediation analyses for Experiment 2 were conducted with WLSMV estimation in Mplus 5.1 (Muthén & Muthén, 2007) using a 95% *CI* calculated with bias-corrected bootstrapping (MacKinnon et al., 2004). Confidence intervals calculated with bootstrapping (as opposed to the normal distribution) yield more accurate mediation results (MacKinnon & Fairchild, 2009; MacKinnon, Fairchild, et al., 2007; Shrout & Bolger, 2002). We were able to use bootstrapping and a 95% *CI* in Experiment 2 because, unlike in Experiment 1, these data did not have a hierarchical data structure.

Results

Note content

Examining the messages written by the note senders revealed that 75% of the participants in the sent-note condition (33 out of 44 participants) made an offer of cooperation (*X*) similar to the one offered in the bogus note. This finding is consistent with prior research indicating that most people express offers of cooperation when given an opportunity to write a note to their counterpart prior to a mixed-motive interaction (e.g., Insko et al., 2005). Of the 11 participants who did not propose to cooperate, five proposed the withdrawal choice (*Y*), and six made statements that could not be classified as a choice proposal (e.g., "I'll choose whatever option as long as we're both in agreement to it"). Not one participant proposed to select the competitive choice (*Z*). Of the 38 participants whose note could be classified as a choice proposal, 37 adhered to their proposal (97%). Specifically, of the 33 participants who proposed to cooperate, 32 adhered to this proposal and one selected the competitive choice (*Z*). All five participants who proposed the withdrawal choice adhered to their proposal. Recall, with regard to this latter finding, that the withdrawal choice also yields an equal outcome distribution. These results indicate that a large majority of individuals who sent a note made a commitment to cooperate and honored their commitment.

PDG-Alt choices

Table 2 presents the means for each PDG-Alt choice, concern for fairness, and trust. Results of the significance tests are presented below.

There was more cooperation in the sent-note and received-note conditions pooled than in the no-note condition, $\chi^2(1, N = 130) = 26.31$, $p < .001$, and the sent-note and received-note conditions did not differ, $\chi^2(1, N = 130) = 0.00$, $p = 1.00$. There was less withdrawal in the sent-note and received-note conditions pooled than in the no-note condition, $\chi^2(1, N = 130) = 25.88$, $p < .001$, and there was less withdrawal in the received-note than in the sent-note condition, $\chi^2(1, N = 130) = 4.27$, $p < .001$. Finally, although there was descriptively less competition in the sent-note and received-note conditions pooled than in the no-note condition, this difference was not statistically significant, $\chi^2(1, N = 130) = 2.14$, $p = .15$, nor was the difference between the sent-note and received-note conditions, $\chi^2(1, N = 130) = 2.68$, $p = .11$.

With one exception, these results are consistent with predictions. The exchanging of notes increased cooperation, and the relative contributions of sending and receiving a note did not differ significantly. Furthermore, the exchanging of notes reduced withdrawal, but the relative contribution of receiving a note was stronger than that of sending a note. Finally, we found no significant difference between the relative contributions of sending and

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Table 2
Study 2: Means of PDG-Alt choices, concern for fairness and trust.

Note	PDG-Alt choice			Fairness and trust	
	Cooperate (*X*)	Withdraw (*Y*)	Compete (*Z*)	Fairness	Trust
No-note	.33	.45	.21	4.46	35.34
Sent-note	.80	.14	.07	5.74	55.73
Received-note	.80	.02	.18	4.77	75.02

Note: $N = 130$. Values for PDG-Alt choices are the observed proportion of participants in each condition making each PDG-Alt choice. Concern for fairness ranged from 1 (*not at all*) to 7 (*very much*). Trust is the reported likelihood (0–100) that the other party would choose *X*.

receiving a note to reducing competition. This finding is consistent with the idea that both sending and receiving a note can reduce competition. However, results did not confirm the prediction that competition would be lower in the sent-note and received-note conditions pooled than in the no-note condition.

Concern for fairness

As shown in Table 2, there was greater concern for fairness in the sent-note and received-note conditions pooled than in the no-note condition, $F(1, 127) = 4.31$, $p = .04$, and concern for fairness was greater in the sent-note than in the received-note condition,

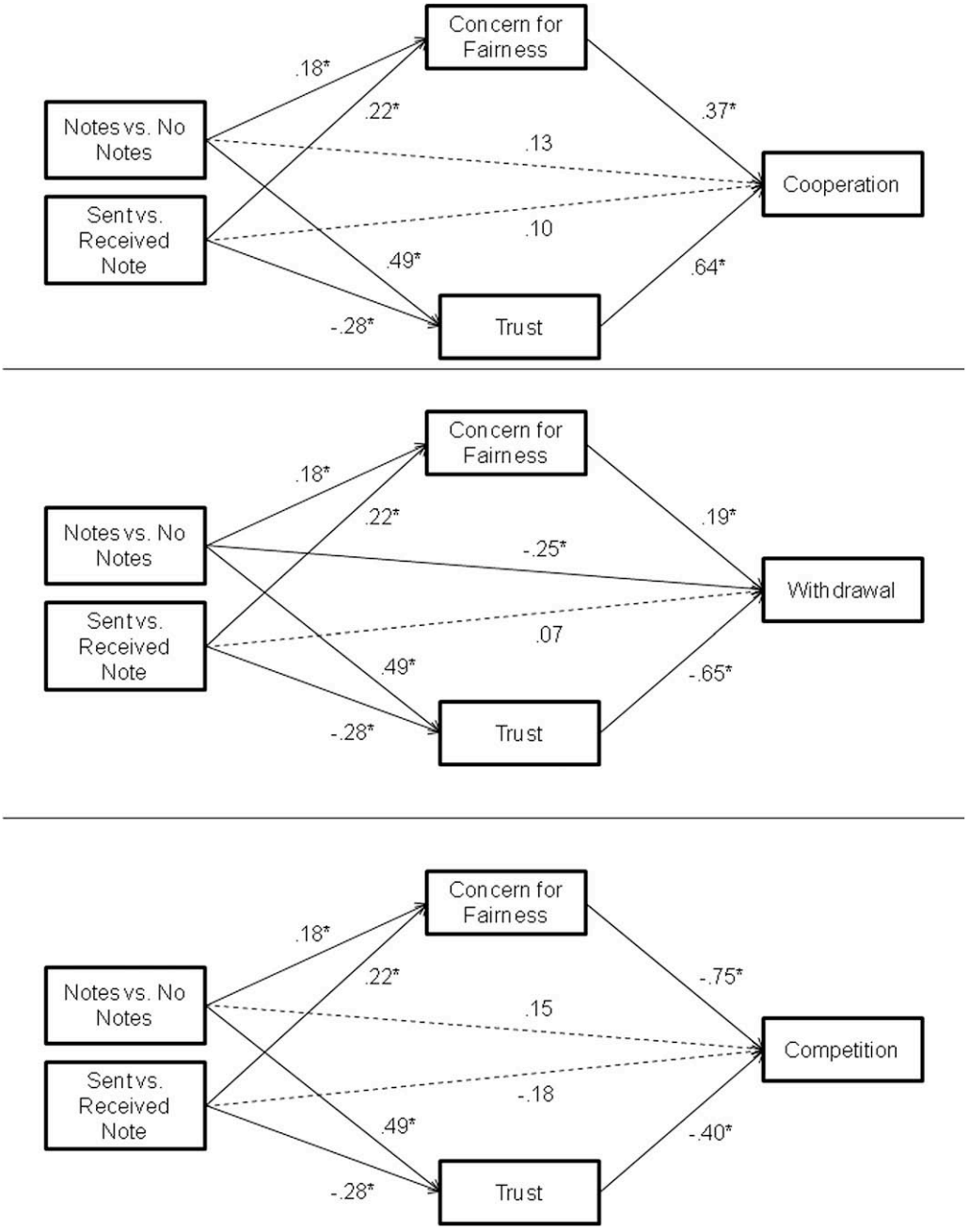

Fig. 3. Study 2: Path models of PDG-Alt choice. Standardized estimates are presented. Separate models were computed for each choice. The top panel shows results for the cooperative choice; the middle panel shows results for the withdrawal choice; the bottom panel shows results for the competitive choice. $^{*}p < .05$.

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$F(1, 127) = 6.43$, $p = .01$. The exchanging of notes increased concern for fairness, but the relative contribution of sending a note was stronger than that of receiving a note.

Trust

As shown in Table 2, expected cooperation was greater in the sent-note and received-note conditions pooled than in the no-note condition, $F(1, 127) = 44.88$, $p < .001$, and expected cooperation was greater in the received-note than in the sent-note condition, $F(1, 127) = 14.32$, $p < .001$. The exchanging of notes increased trust, but the relative contribution of receiving a note was stronger than that of sending a note.

Mediation analyses

Mediation results are presented in Fig. 3. The top panel of Fig. 3 depicts the model for cooperative choice. The effect of exchanging notes was mediated by both trust and concern for fairness. There were significant indirect effects of exchanging notes on cooperation via trust, $\alpha\beta = 0.78$, $SE = 0.16$, 95% *CI*: 0.51, 1.11, and via concern for fairness, $\alpha\beta = 0.16$, $SE = 0.09$, 95% *CI*: 0.03, 0.40. The model also shows why the relative contributions of sending and receiving a note did not differ significantly. Whereas sending a note had a relatively stronger impact on concern for fairness, receiving a note had a relatively stronger impact on trust. In turn, both increased concern for fairness and increased trust were linked with increased cooperation. This pattern of results yielded significant, but directionally opposite indirect effects of sending a note (relative to receiving a note) on cooperation via trust, $\alpha\beta = -0.50$, $SE = 0.16$, 95% *CI*: −0.82, −0.22, and via concern for fairness, $\alpha\beta = 0.23$, $SE = 0.10$, 95% *CI*: 0.06, 0.46. The mediation findings for cooperation are consistent with the idea that exchanging notes increased cooperation because it increased concern for fairness (which flowed more from sending than from receiving a note) and trust (which flowed more from receiving than from sending a note).

The middle panel of Fig. 3 depicts the model for withdrawal choice. The effect of exchanging notes was mediated by trust only. The indirect effect of exchanging notes on withdrawal via trust was significant, $\alpha\beta = -0.86$, $SE = 0.16$, 95% *CI*: −1.24, −0.57. The indirect effect of exchanging notes via concern for fairness was nonsignificant, $\alpha\beta = 0.09$, $SE = 0.08$, 95% *CI*: −0.02, 0.29. The model also shows why receiving a note had a relatively stronger impact on withdrawal than did sending a note. Relative to sending a note, receiving a note increased trust and, in turn, trust reduced withdrawal, $\alpha\beta = 0.55$, $SE = 0.17$, 95% *CI*: 0.26, 0.93. The indirect effect of sending versus receiving a note via concern for fairness was nonsignificant, $\alpha\beta = 0.12$, $SE = 0.11$, 95% *CI*: −0.02, 0.41.

The bottom panel of Fig. 3 depicts the model for competition. There were significant indirect effects of exchanging notes on competition via trust, $\alpha\beta = -0.43$, $SE = 0.19$, 95% *CI*: −0.82, −0.10, and via concern for fairness, $\alpha\beta = -0.30$, $SE = 0.15$, 95% *CI*: −0.61, −0.01. The model also shows why the relative contributions of sending and receiving a note did not differ significantly. Whereas sending a note had a relatively stronger impact on concern for fairness, receiving a note had a relatively stronger impact on trust. In turn, both increased concern for fairness and increased trust were linked with decreased competition. This pattern of results yielded significant, but directionally opposite indirect effects of sending a note (relative to receiving a note) on competition via trust, $\alpha\beta = 0.28$, $SE = 0.14$, 95% *CI*: 0.07, 0.61, and via concern for fairness, $\alpha\beta = -0.41$, $SE = 0.17$, 95% *CI*: −0.75, −0.08. The mediation findings for competition are at least partially consistent with the idea that sending and receiving a note can both decrease competition, but for different reasons.

Although we did not find a significant direct effect of exchanging notes on competition, we did find significant indirect effects of exchanging notes on competition via concern for fairness (which flowed more from sending than from receiving a note) and trust (which flowed more from receiving than from sending a note). The link between increased trust and decreased competition is particularly notable because it replicates the unanticipated link found in Experiment 1. The cumulative evidence thus supports the idea that trust reduces both greed and fear in interpersonal interactions.

Discussion

We proposed that two important norms are activated by task-related communication: fairness norms that produce expressions of cooperative intent to which most individuals adhere, and trust norms that produce expected cooperation that most individuals feel compelled to reciprocate. Whereas fairness norms should be rendered salient by sending a task-related message (relative to receiving a message), trust norms should be rendered salient by receiving a cooperative task-related message (relative to sending a message). Experiment 2 corroborated these ideas.

The primary objective of Experiment 2 was to examine the relative contributions of sending a task-related message and receiving a cooperative task-related message to increasing cooperation (and decreasing withdrawal and competition). With one exception, results were consistent with predictions. Both sending and receiving a note increased cooperation but for different reasons. Sending a note (relative to receiving a note) increased cooperation by activating fairness norms, and receiving a note (relative to sending a note) increased cooperation by activating trust norms. The fact that cooperation was as high in the sent-note condition as in the received-note condition is a testament to the importance of concern for fairness. Unlike participants who received notes, those who sent notes had no information regarding how the other player would behave. Sending a note led participants to cooperate even though they had no reassurance that the other player would do the same.

As predicted, withdrawal was decreased more by receiving than by sending a note. The stronger contribution of receiving a note (relative to sending a note) to decreased withdrawal was mediated by increased trust. Our results did not, however, confirm the predicted direct effect of exchanging notes on competition. Yet, we did find evidence for the hypothesized indirect effects of exchanging notes on competition via trust and concern for fairness. Moreover, results for the comparison of sending versus receiving notes confirmed hypothesized indirect effects for competition: whereas sending a note (relative to receiving a note) decreased competition by increasing concern for fairness, receiving a note (relative to sending a note) decreased competition by increasing trust.[3]

A second objective of Experiment 2 was to address the fact that, in Experiment 1, we did not record the content of participants' conversations and therefore could not ascertain if individuals who engaged in task-related communication indeed expressed, and then adhered to, cooperative proposals. Inspection of notes written by participants in the sent-note condition revealed that, indeed, a vast

[3] This pattern of results for competition raises the question whether it is appropriate to test indirect effects when the direct effect is not significant. Whereas in Baron and Kenny's (1986) causal-steps approach a significant direct effect is a sine qua non for examining mediation, more recent approaches (e.g., product-of-coefficients approach, MacKinnon et al., 2002) take a different view. MacKinnon and Fairchild (2009, p. 17) described the differences between these approaches as follows:

> The requirement of a significant overall relation between *X* and *Y* is the central difference between the causal-steps approach and other methods for testing mediation. Some researchers have treated this test of the overall relation between *X* and *Y* as a perfect test of the relation, failing to recognize that it is a fallible statistical test that is subject to error, and arguing that if there is not a significant overall effect then mediation should not be examined. The requirement that *X* is significantly related to *Y* is an important test in any research study, but mediation can exist even in the absence of such a significant relation. The statistical test of the effect of *X* on *Y* can have less power than the test of the links in the mediation model.

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majority contained cooperative proposals, whereas the remaining contained proposals to select withdrawal. Not a single participant proposed to compete. Remarkably, all but one participant adhered to their choice proposal when it came time to make their choice. So, not only did Experiment 2 provide further evidence that individuals feel compelled to reciprocate expected cooperation (i.e., trust predicted cooperation), it also provided clear evidence that individuals feel compelled to adhere to their cooperative proposals. This helps explain why participants in the sent-note condition cooperated at such high rates despite having no reassurance that the other player would do the same.

A third objective of Experiment 2 was to examine whether trust would be negatively associated with competition, as it had been in Experiment 1. On the one hand, trust should increase competition because matching cooperation with competition maximizes outcomes. On the other hand, trust should reduce competition because matching cooperation with competition involves exploitation of another person's weakness. Experiment 2 provided further evidence that these opposing forces do not cancel each other out but, rather, reluctance to exploit a vulnerable other overpowered greed (i.e., trust was negatively associated with competition).

General discussion

Summary of findings

According to game theory, mutual competition is the rational and stable solution in the PDG (Colman, 1995; Poundstone, 1992; Von Neumann & Morgenstern, 1944). Yet, our experiments, like many previous studies, found that most people did not compete, even though the interaction was for just one trial. When task-related communication was introduced, the majority of participants cooperated. We proposed that task-related communication renders salient fairness norms that produce expressions of cooperative intent to which most individuals feel compelled to adhere, and trust norms that produce expected cooperation that most individuals feel compelled to reciprocate. We further proposed that, whereas fairness norms should be rendered salient by sending a task-related message (relative to receiving a message), trust norms should be rendered salient by receiving a cooperative task-related message (relative to sending a message).

Consistent with these ideas, Experiment 1 found that task-related communication increased both concern for fairness and trust. Moreover, Experiment 2 found that whereas sending a task-related message (relative to receiving a message) increased concern for fairness, receiving a task-related message (relative to sending a message) increased trust. Both experiments provided evidence that concern for fairness was associated with increased cooperation and reduced greed-based competition, and that trust was associated with increased cooperation, reduced fear-based withdrawal, and reduced greed-based competition. The latter finding indicated that participants were highly reluctant to exploit another person whom they expected to cooperate, even when it was in their immediate self-interest to do so.

Before discussing some of the broader implications of these findings, we should acknowledge that, based on the available data, we can conclude only that concern for fairness and trust were associated with PDG-Alt choices. We cannot establish direction of causality because concern for fairness and trust were measured rather than manipulated. Future research should manipulate directly the salience of fairness and trust norms to assess their causal impact on social behavior in mixed-motive situations.

Why be moral?

What incentive do individuals have to adhere to their cooperative proposals, knowing that they can earn more money by either selecting competition (if they expect that other player to cooperate) or withdrawal (if they expect the other player to compete)? What incentive do individuals have to give credence to another player's cooperative proposal and even reciprocate it? From a rational, short-term, economic standpoint, the answer to both questions is simply: none. Clearly, then, participants in our experiments were concerned not just with short-term advantage. Our findings indicated that they were also concerned with following moral norms relating to fairness and trust. But why be moral? This question can be traced through centuries of intellectual history and we do not profess any unique insight. We can, however, speculate that perhaps norms evolve in any cultural context, at least partially, because they allow for long-term individual and collective benefit.

Many everyday situations resemble a prisoner's dilemma. As pointed out by Ridley (1996), "broadly speaking any situation in which you are tempted to do something, but know it would be a great mistake if everybody did the same thing is likely to be a prisoner's dilemma" (pp. 55–56). Examples include accommodative dilemmas in close relationships (Arriaga & Rusbult, 1998), harvesting and conservation of limited natural resources (Raiffa, Richardson, & Metcalfe, 2002; Van Vugt, 2009), the provision of public goods (Biel, Eek, & Garling, 1997), and resource distribution within social groups (Kramer, 1991). The utility of moral concern, then, may reside in helping individuals to navigate the challenges inherent to social life (Barkow, Cosmides, & Tooby, 1992; Frank, 1988; Rawls, 1999; Trivers, 1985; Wilson, 1993).

Communication in interpersonal versus intergroup contexts

The present findings have important implications for the program of research on interindividual–intergroup discontinuity, or the tendency in mixed-motive situations for interactions between individuals to be more cooperative (and less competitive) than interactions between groups (for reviews see Cohen, Meier, Hinsz, & Insko, in press; Wildschut & Insko, 2007; Wildschut et al., 2003). Research contrasting interpersonal and intergroup interactions in PDG contexts has found that the salutary effect of communication on cooperation is stronger for individuals than for groups (Insko et al., 1993; Wildschut et al., 2003). For instance, Insko et al. (1993) manipulated communication by comparing PDG-Alt interactions in which 1 min audio–intercom communication was allowed between the two parties (either two individuals or two three-person groups) with interactions that did not involve communication between the two parties. Individuals who communicated cooperated more than individuals who did not communicate. However, communication did not significantly affect cooperation between groups. Why is that? One possible explanation, based on the present results, is that, whereas communication between individuals activates moral norms related to fairness and trust, communication between groups does not.

The notion that interpersonal and intergroup interactions are governed by different sets of norms has been elaborated in the theory of two moralities (Cohen, Montoya, & Insko, 2006; Insko et al., 2005; Pinter et al., 2007; Wildschut & Insko, 2006, 2007). Norms for interpersonal interactions emphasize fairness, honesty, trust, and reciprocity—a category of norms referred to as individual morality. Individual morality can be contrasted with group morality, which comprises norms encouraging group members to benefit the in-group, even if out-groups suffer as a consequence. Group morality encourages in-group love (Brewer, 1999), parochialism (Baron, 2001; Baron, Bazerman, & Shonk, 2006; Schwartz-Shea & Simmons, 1991) and parochial altruism (Bernhard, Fischbacher, & Fehr, 2006; Choi & Bowles, 2007). The idea that in-group-favoring behavior arises from moral motivation is consistent with Haidt's

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(2007) proposal that in-group loyalty is one of the five foundations of morality (Graham, Haidt, & Nosek, 2009).

Whereas there is compelling evidence for the role of group morality in producing intergroup competition (Cohen et al., 2006; Insko et al., 2005; Pinter et al., 2007; Wildschut & Insko, 2006, 2007; Wildschut, Insko, & Gaertner, 2002), previous discontinuity research has provided only limited evidence for the link between individual morality and interpersonal cooperation. The present findings fill this gap and, by so doing, suggest that groups are more competitive than individuals not simply because the intergroup context (and not the interpersonal context) renders salient group morality but because each context renders salient its own unique moral code, with group morality producing competition in intergroup interactions and individual morality producing cooperation in interpersonal interactions.

Communication in prisoner's dilemma versus negotiation contexts

The PDG is considered a mixed-motive context because it involves a mixture of incentives to cooperate or not cooperate. Negotiation is also considered a mixed-motive context because it involves balancing desires to cooperate to create value and to compete to claim value (Lax & Sebenius, 1986). Our findings are particularly intriguing when juxtaposed with research on communication and negotiation. Moore, Kurtzberg, Thompson, and Morris (1999) tested whether students who negotiated with an out-group member (a student at a different university) would be more likely to reach an agreement (less likely to reach impasse) if they were given an opportunity to communicate via email prior to the start of the negotiation. Negotiators in the communication condition were given a photograph of their interaction partner and instructed to communicate via email in order to get to know one another prior to the start of the negotiation. These participants were specifically instructed that they should not discuss the negotiation during this initial conversation; that is, they were instructed to engage in strictly social conversation. Negotiators in the no-communication condition were not given a photograph of their interaction partner nor were they given the opportunity to communicate with them prior to the start of the negotiation. Dyads in the communication condition were more likely to reach agreement than were dyads in the depersonalized condition. Moore et al.'s (1999) results imply that in negotiation contexts, task-unrelated communication promotes cooperative behavior.

What is the source of this seeming inconsistency between Moore et al.'s (1999) findings and our present findings, and the similar commons dilemma findings of Dawes et al. (1977)? Although there are a number of differences between the two mixed-motive contexts, one important distinction is that, in the PDG, people must choose whether to cooperate or compete, but in negotiations people can simultaneously cooperate and compete throughout the interaction. Being forced to choose between cooperation and competition may make trust and distrust more influential in PDG interactions than negotiations. In negotiations, each party can test the other party's trustworthiness throughout the interaction. However, there is no opportunity to test for trust in single-trial PDG interactions. Task-unrelated communication may not be sufficient to evoke trust in the PDG and commons dilemmas because in these situations trust cannot be tested without making oneself vulnerable to being exploited.

It is also possible that concern for fairness is more influential in PDG interactions than in negotiations. In negotiations, it is generally assumed that each party's primary goal is to maximize his or her own outcomes. However, the present results suggest that in "social interactions" in the PDG fairness norms are more influential than self-interest and greed.

The limits of communication

Although we found that task-related communication increased cooperation (and reduced withdrawal and competition) in the PDG-Alt, one can imagine situations in which communication has no effect on the outcome of social interactions or may even be detrimental. For instance, research on intragroup communication indicates that communication within groups promotes norms of group unity (Postmes, Haslam, & Swaab, 2005; Swaab, Phillips, Diermeier, & Medvec, 2008; Swaab, Postmes, van Beest, & Spears, 2007). Norms of group unity can be helpful or harmful depending on the situation. When two groups experience a conflict of interest, for example, intragroup communication could increase competition between groups by activating in-group favoring norms (Wildschut et al., 2002). Or consider the role of communication in purely competitive, zero-sum contexts, such as sports competitions. In such situations, opportunities for task-related communication might increase competitive behavior (e.g., taunting, intimidation) instead of cooperative behavior. An important task for future research, then, is to delineate boundary conditions for the salutary effect of communication in social relations.

Conclusion

Our findings provide insight into why game theory provides a better description of group behavior than individual behavior (Bornstein, Kugler, & Ziegelmeyer, 2004). Individual behavior is governed by powerful interpersonal norms related to fairness and trust. These interpersonal norms are activated by task-related communication and overpower self-interest and greed.

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