

# Reciprocity Outperforms Conformity to Promote Cooperation



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## Abstract

Evolutionary psychologists have proposed two processes that could give rise to the pervasiveness of human cooperation observed among individuals who are not genetically related: reciprocity and conformity. We tested whether reciprocity outperformed conformity in promoting cooperation, especially when these psychological processes would promote a different cooperative or noncooperative response. To do so, across three studies, we observed participants' cooperation with a partner after learning (a) that their partner had behaved cooperatively (or not) on several previous trials and (b) that their group members had behaved cooperatively (or not) on several previous trials with that same partner. Although we found that people both reciprocate and conform, reciprocity has a stronger influence on cooperation. Moreover, we found that conformity can be partly explained by a concern about one's reputation—a finding that supports a reciprocity framework.

## Keywords

reciprocity, conformity, cooperation, culture, evolution, open data, open materials

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Humans cooperate on a grand scale relative to other species. To explain this exceptional ability to cooperate, evolutionary psychologists have suggested that evolutionary processes may have shaped multiple psychological mechanisms that promote identifying opportunities to cooperate and to avoid being taken advantage of by defectors. One theoretical framework to explain the evolution of cooperation is that humans selectively cooperate to acquire direct and indirect benefits (Cosmides & Tooby, 2005; Delton, Cosmides, Guemo, Robertson, & Tooby, 2012; Krasnow, Delton, Cosmides, & Tooby, 2016). Another theory suggests that imitation and conformity enable people to learn group norms of cooperation (Henrich & Boyd, 2016; Richerson et al., 2015). Each theory has acquired evidence in support of these psychological processes that determine when people choose to cooperate. Yet no research has been conducted to examine whether reciprocity or conformity carries more or less influence on cooperation, especially in a situation in which one process promotes cooperation and the other promotes defection.

We examined whether the psychological mechanisms underlying direct and indirect reciprocity influenced

cooperation more than those underlying imitation and conformity to cooperative group norms. To do so, we observed how people behaved in a cooperative decision-making task after learning (a) that their partner had behaved cooperatively (or not) in several previous interactions and (b) that their group members have behaved cooperatively (or not) in previous interactions with that same partner. According to a conformity framework, people's behavior will track group norms of cooperation. According to a reciprocity framework, people will make cooperation contingent on their partner's (expected) behavior. Across three studies, we tested competing predictions about how people decide to cooperate (or not) when reciprocity is set in opposition to conformity. Do people reciprocate a partner's cooperation, even when they perceive that their group has a noncooperative norm? That is, does reciprocity outperform conformity to promote cooperation?

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## Reciprocity and Cooperation

Humans evolved in small-scale hunter-gatherer societies that included dense networks for social exchange (Cosmides & Tooby, 2005). In this environment, humans evolved a capacity for costly cooperation with partners that was contingent on situations that could result in direct or indirect benefits. Indeed, evolutionary models suggest that the mechanisms of direct and indirect reciprocity can enable selection for adaptations for conditional cooperation (Nowak & Sigmund, 2005).

The evolved psychological mechanisms underlying reciprocity identify opportunities to establish and maintain beneficial relationships (Delton et al., 2012). Such mechanisms should identify cooperators and defectors and make cooperation contingent on expectations of cooperation from other people in present or future interactions. Research suggests that people have a specialized ability to identify individuals who have not cooperated in past interactions (Cosmides & Tooby, 2005; Delton et al., 2012). Moreover, people have a strong tendency to cooperate with individuals that they expect will cooperate (Balliet & Van Lange, 2013). This offsets the cost of cooperation by acquiring direct benefits from other people's cooperation.

Indirect reciprocity, on the other hand, occurs via a reputation as a cooperator (Panchanathan & Boyd, 2004). Indeed, when other people observe cooperation and broadcast it to a larger audience, it can be a successful strategy for enhancing one's cooperative reputation, and such a reputation subsequently increases a future partner's tendency to cooperate (Wu, Balliet, & Van Lange, 2016). Across the studies, we investigated indirect reciprocity by testing whether participants' concern about being evaluated by other group members (i.e., reputational concern) would increase participants' conformity to the group members' behavior. In addition, we tested whether reciprocity outperformed conformity across anonymous and public decision-making settings. Anonymity should suppress the role of indirect reciprocity in promoting cooperation.

## Conformity and Cooperation

The ancestral hunter-gatherer groups, mentioned earlier, often competed over scarce resources (Bowles, 2009). According to the *gene-culture coevolutionary theory*, intergroup competition could have created selection pressure for an ability to acquire group norms (especially those promoting cooperation), which led groups to be successful during intergroup competition (Richerson et al., 2015). According to this theory, cooperation among genetically nonrelated individuals can be explained by an ability to follow group norms

(Henrich, Chudek, & Boyd, 2015). Indeed, agent-based models suggest that intergroup competition can lead to the selection of cooperation with in-group members (Henrich & Boyd, 1998).

According to this theory, cooperation arises from group norms, which are acquired via imitation and conformity. A psychology of conformity involves imitating the most common behavior exhibited in a group (Henrich & Boyd, 2001). Much research suggests that people possess exceptional skills for imitating other people and a strong tendency to conform to group norms (Alpizar, Carlsson, & Johansson-Stenman, 2008). For example, people tend to agree with an in-group member's answer to a question, even when they know the answer is inaccurate (Asch, 1956). Richerson and Boyd (2001) suggest that humans evolved a capacity to form subjective commitments to groups that motivate conformity to group norms.

The gene-culture coevolutionary theory also proposes that people follow prestigious members of a group (i.e., learning is biased toward prestige; Henrich & Gil-White, 2001). Indeed, people are more likely to imitate highly prestigious individuals in their group (Cartwright, Gillet, & Van Vugt, 2013). Imitation, conformity, and prestige-biased learning should promote group cohesion and increase the success of groups in intergroup competition (Boyd & Richerson, 2009; Henrich, 2004).

## The Present Research

These two frameworks—reciprocity and conformity—are not mutually exclusive, but the psychological mechanisms posited under each theory may compete for influence when people choose to cooperate. In the current study, we examined how people decide to cooperate when the two theories predict a different cooperative response. Do people generally follow group norms of cooperation, even when reciprocity would promote noncooperation? Do people reciprocate cooperation, even in the presence of a noncooperative group norm?

To address these questions, we revisited the Asch Conformity Paradigm (Asch, 1956) by observing how people behaved in a cooperative decision-making task with another person after they learned how that person behaved on previous trials with other group members. As in the Asch paradigm, individual group members had a consistent behavioral response (i.e., cooperate or defect) toward their partner. However, our methods differed from those used by Asch in that they involved a social interaction that could affect the participant's outcomes. Moreover, participants observed consistent behavior from the partner on several previous trials

(i.e., cooperate or defect). In Study 3, we added a prestigious member to the group to increase conformity, and we also manipulated the anonymity of the participants' decisions to reduce the impact of indirect reciprocity.

If conformity outperformed reciprocity, individuals would imitate group members' behavior, regardless of their partner's cooperation on previous trials. However, if reciprocity outperformed conformity, then people would base their decisions on their partner's previous behavior, regardless of their group members' behavior. We also tested whether cooperation was better explained by psychological mechanisms of imitation and conformity (e.g., subjective commitment and group norms) or the direct or indirect benefits of reciprocity (e.g., expectations of partners' cooperation and reputational concern).

## Study 1

### Method

**Participants and procedure.** Across all the studies, an a priori power analysis (G\*Power; Faul, Erdfelder, Buchner, & Lang, 2009) revealed a required sample size of 704 to achieve statistical power of .80 to detect an effect size ( $d$ ) of 0.30. Participants ( $N = 704$ ; 329 women; mean age = 36.54 years,  $SD = 11.32$ ) were recruited using Amazon Mechanical Turk (MTurk). They were paid \$1.20 to complete the online study. Moreover, participants earned lottery tickets on the basis of their decisions, and 20 participants won a \$2 prize.

MTurk provides reliable and valid data that are comparable with those from lab experiments (Casler, Bickel, & Hackett, 2013), but it has the advantage of providing relatively heterogeneous samples (e.g., socioeconomic and ethnic diversity; Paolacci & Chandler, 2014). Moreover, previous research has used MTurk to successfully study the social processes we observed in our research (Bostyn & Roetz, 2016; Laporte, van Nimwegen, & Uyttendaele, 2010; Nook, Ong, Morelli, Mitchell, & Zaki, 2016). We required participants to be located in the United States and to have a successful HIT rate of at least 85%. The study used a 2 (group's behavior: cooperative vs. noncooperative)  $\times$  2 (partner's behavior: cooperative vs. noncooperative) between-subjects design.

Participants provided informed consent and were told that they were online with 5 other participants. Then they were told that the experiment was divided in two parts. The first part required participants to interact with 5 other participants in a task (labeled the survival task), which was intended to form a cohesive group among the 6 participants. In the second part, participants interacted with a new participant who had

not participated in the survival task (Person B) in a prisoner's-dilemma (PD) task. Before participants made their decision in the PD, they observed how group members behaved with Person B in the PD and how Person B behaved with the other group members.

**Survival task.** In the first part of the study, participants played an activity called the survival task, which we used to increase participants' cohesiveness as a group (Zaccaro & McCoy, 1988). This type of task has been widely used to promote group cohesion (for meta-analyses, see Beal, Cohen, Burke, & McLendon, 2003; Evans & Dion, 1991). In this task, participants imagined that their spaceship, directed to the moon, had crashed and that they had to travel 200 miles to reach the rendezvous point. However, they could not bring all their equipment and had to make some tough decisions to survive. For this reason, they had to prioritize a list of 15 items according to their survival value. The goal was to match their ranking with the one provided by survival experts (Carpenter & Radhakrishnan, 2002). They were told that their score would be combined with those of the other 5 participants who were ostensibly online. Next, they were asked to imagine a conversation with the crew about the best strategy in this situation (Meleady, Hopthrow, & Crisp, 2013).

We first conducted a pilot study to test whether this task also promoted cohesion in online groups. In this study, cohesiveness was measured with six items, with responses given using a 7-point Likert scale ( $\alpha = .95$ ; Chin, Salisbury, Pearson, & Stollak, 1999). We recruited 150 participants via MTurk and randomly assigned participants to one of three conditions: interaction with six members of the crew, interaction with two members of the crew, and no interaction with the other members. In the last condition, participants were told that there were 5 other participants online, but that they were independent and making decisions that affected only their own survival. Then, in this condition, participants imagined a discussion about the task with a stranger. There was significantly more group cohesion when participants interacted with all group members ( $M = 5.43$ ,  $SD = 1.24$ ) than when they interacted with no group members ( $M = 3.79$ ,  $SD = 1.59$ ),  $t(97) = 5.75$ ,  $p < .001$ ,  $d = 1.16$ . There was no significant difference between the interaction with 6 members and that with 2 members ( $p = .21$ ).

**Prisoner's dilemma.** Participants interacted in a PD task (Van Lange & Kuhlman, 1994). In the PD task, participants and their partner were each endowed with 100 tickets, and each had to decide how many tickets to give to his or her partner (from 0 to 100). Each ticket represented a 0.01% chance to win a \$2 bonus. Each lottery ticket given to a partner was doubled (i.e., one ticket

became two tickets). This is a PD because the best outcome for a participant (i.e., having 300 tickets) occurs when the participant keeps all of his or her 100 tickets and the partner gives away all his or her 100 tickets. However, if both the participant and the partner give away all their tickets, each ends up with 200 tickets. If the participant and the partner both decide to keep all their tickets, they each end up with only 100 tickets. Finally, the worst outcome for a participant (i.e., having no tickets) occurs if that participant gives away 100 tickets but receives no tickets in return.

### **Group members' behavior and partner's behavior.**

Before making their decisions in the PD, participants were told that they (and all the other group members and Person B) had the possibility of observing the previous actions of each group member with Person B. Before making their decisions, participants could observe a screen with two columns: One column listed decisions from each group member, and the other column listed each decision that Person B made while interacting with each group member. Participants were always the last person in their group to make a decision. The information about group members' behavior and Person B's behavior was presented to participants with an average of 9 s between decisions.

The group members' behavior and the partner's behavior were manipulated to be either cooperative or noncooperative. In the cooperative-group/cooperative-partner condition, each group member gave all or nearly all of his or her endowment to Person B (99, 91, 91, 96, and 100 tickets); and Person B gave similarly large amounts to group members (97, 93, 92, 100, and 95 tickets). In the noncooperative-group/noncooperative-partner condition, each group member consistently gave almost nothing to Person B (5, 3, 6, 4, and 2 tickets), and Person B gave similarly low amounts to group members (4, 3, 7, 1, and 5 tickets). In the cooperative-group/noncooperative-partner condition, the five group members gave nearly all of their endowments to Person B (99, 91, 91, 96, and 100 tickets), whereas Person B gave each group member almost nothing (5, 3, 6, 4, and 2 tickets). In the noncooperative-group/cooperative-partner condition, these payoffs were simply reversed. Therefore, we created a situation in which group members gave almost nothing to Person B, whereas Person B continued to be cooperative and gave their entire endowment to group members. We referred to this as the *reciprocate-to-cooperate condition*, because cooperation in this condition would be influenced by reciprocating partner's expected behavior. Conversely, we created a situation in which all group members decided to cooperate, but Person B was consistently noncooperative. We referred to this as the *conform-to-cooperate condition* because cooperation in this condition would

be influenced by conformity to group members' behavior. These two *reciprocity/conformity conditions* enabled a test of competing predictions, whereas the other two conditions involved both the group members and Person B always cooperating or not cooperating.

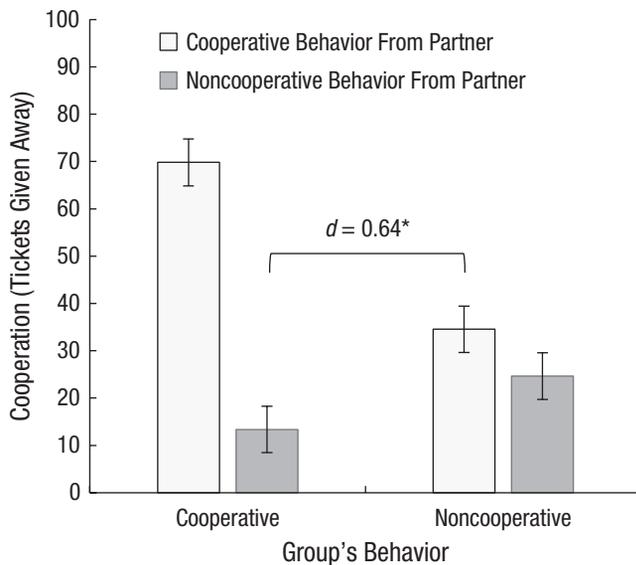
## **Results**

We conducted a 2 (group members' behavior)  $\times$  2 (partner's behavior) analysis of variance (ANOVA) on cooperation. The results of this analysis revealed a main effect of group members' behavior,  $F(1, 700) = 22.88$ ,  $p < .001$ ,  $d = 0.36$ . Participants cooperated more when group members were cooperative ( $M = 41.28$ ,  $SD = 42.52$ )<sup>1</sup> than when group members were not cooperative ( $M = 29.61$ ,  $SD = 34.97$ ). In addition, participants cooperated more with a cooperative partner ( $M = 51.98$ ,  $SD = 41.44$ ) than with a noncooperative partner ( $M = 18.99$ ,  $SD = 28.92$ ),  $F(1, 700) = 174.99$ ,  $p < .001$ ,  $d = 0.98$ . The group members' behavior and the partner's behavior had a significant interactive effect on cooperation,  $F(1, 700) = 86.01$ ,  $p < .001$ ,  $\eta_p^2 = .11$ . Of course, people were more cooperative when both their group and their partner were cooperative during previous interactions ( $M = 69.82$ ,  $SD = 36.45$ ), compared with when neither their group nor their partner was cooperative ( $M = 24.64$ ,  $SD = 30.22$ ),  $t(347) = 12.62$ ,  $p < .001$ ,  $d = 1.35$ . We tested whether reciprocity or conformity was relatively more influential by examining how people cooperated in the conditions in which the group members' behavior deviated from the partner's behavior. People were more cooperative in the condition with a noncooperative group and a cooperative partner ( $M = 34.55$ ,  $SD = 38.57$ ) than in the condition with a cooperative group and a noncooperative partner ( $M = 13.37$ ,  $SD = 26.48$ ),  $t(352) = 6.02$ ,  $p < .001$ ,  $d = 0.64$ . Therefore, we observed greater cooperation in the reciprocate-to-cooperate condition, than the conform-to-cooperate condition (see Fig. 1). This is initial evidence that reciprocity outperforms conformity when these two processes conflict to influence how people decide to cooperate.

## **Study 2**

### **Method**

We modified the study design to further test the conformity and reciprocity accounts of cooperation. First, we manipulated whether or not participants knew about the partner's prior behavior with group members (*partner-knowledge condition*). If people conform in our paradigm, then the lack of information about the partner's behavior should result in an even stronger



**Fig. 1.** Results from Study 1: mean cooperation in cooperative and noncooperative groups, presented separately for participants with cooperative and noncooperative partners. Error bars indicate 95% confidence intervals. The asterisk indicates a significant difference between the cooperative-group/noncooperative-partner condition and the noncooperative-group/cooperative-partner condition ( $p < .05$ ).

influence of group members' behavior on decisions to cooperate. Second, we measured and tested two competing psychological processes that are hypothesized to affect people's decision to cooperate: expectations of the partner's cooperation and perceived group norms. Finally, we tested the moderating role of reputational concern and subjective commitment to the group. According to an indirect-reciprocity framework, people may cooperate according to group expectations because the other members of the group are aware of their behavior, which could lead to indirect benefits (Wu, Balliet, & Van Lange, 2015). According to a conformity framework, people follow group norms of cooperation only when they have high levels of subjective commitment to the group (Richerson & Boyd, 2001). But when people have low subjective commitment to the group (or do not care about their reputation in the group), they will be less likely to conform to group norms of cooperation and will be relatively more inclined to reciprocate the partner's cooperation.

**Participants and procedure.** Participants ( $N = 701$ ; 342 women; mean age = 35.07 years,  $SD = 11.33$ ) were recruited from MTurk and completed the study for \$1.20. Twenty participants won a \$2 prize. We excluded 3 participants from the final sample. These participants had taken part in the previous study, which we found by matching their MTurk IDs with the IDs from the previous study. The study consisted of a  $2 \times 2$  between-subjects

design. The participants were randomly assigned to either a reciprocate-to-cooperate condition (i.e., group members were not cooperative, but the partner was cooperative) or a conform-to-cooperate condition (i.e., group members were cooperative, but the partner was not cooperative). Participants were also randomly assigned to one of two partner-knowledge conditions: the known-behavior condition, in which they had information about their partner's previous behavior (as in Study 1), or the unknown-behavior condition, in which they had no information about their partner's previous behavior (but continued to have information about the behavior of the members of their group).

The procedure was similar to that in Study 1. Participants (a) were told that they were interacting with a group of people currently online, (b) completed the survival task to increase group cohesion, and (c) interacted in a PD with an additional person (Person B) who did not participate in the survival task. However, participants were randomly assigned to either (a) observe how each group member and Person B behaved in the PD or (b) observe how each group member behaved but not how Person B behaved in the PD. After participants decided how much to give Person B, we administered the following measures:

- *Expectations of the partner's cooperation:* Participants estimated how many lottery tickets they expected Person B to give them (from 0 to 100).
- *Perceived group norm of cooperation:* We asked participants how many lottery tickets their group members would expect them to give to Person B. We asked a general question about the perceived group norm (e.g., "How many lottery tickets do your group members think you should give to Person B?") and also a single question for each of the members of the group (e.g., "How many lottery tickets does Participant 1 think you should give to Person B?"). The  $\alpha$  for all items measuring perceived group norms was .99.
- *Reputational concern:* Participants completed a measure of reputational concern (see Wu et al., 2015). In this measure, participants used a Likert scale from 1 (*totally disagree*) to 5 (*totally agree*) to rate four items (e.g., "During the decision-making task, I thought about how the other group members would think about me";  $\alpha = .88$ ). Higher scores indicate higher reputational concern.
- *Subjective commitment:* Subjective commitment to a group involves the sense of belonging and concern for a group (Richerson & Boyd, 2001). Therefore, we had participants complete a perceived-cohesion scale as a proxy of subjective commitment to the group (Chin et al., 1999). Participants responded to six items (e.g., "I am happy

to be part of this group,” “I see myself as part of this group”;  $\alpha = .95$ ) using a Likert scale from 1 (*strongly disagree*) to 8 (*strongly agree*). Higher scores indicate higher subjective commitment.

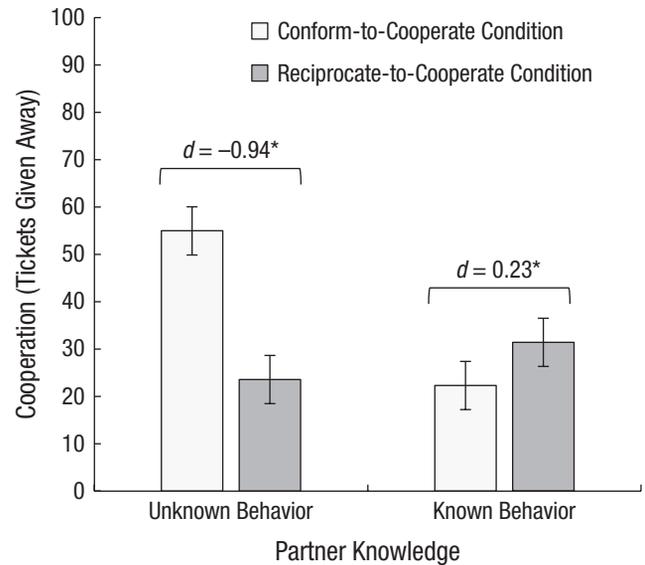
## Results

**Manipulation checks.** When participants knew of Person B’s behavior during the previous interactions, they expected more cooperation from Person B when Person B had been cooperative ( $M = 74.87$ ,  $SD = 31.92$ ) than when Person B had not been cooperative ( $M = 12.98$ ,  $SD = 22.34$ ),  $t(343) = 20.83$ ,  $d = 2.24$ . In fact, even when participants did not know of Person B’s behavior, they expected more cooperation from Person B in the cooperative group condition ( $M = 53.47$ ,  $SD = 33.30$ ) than in the noncooperative group condition ( $M = 21.64$ ,  $SD = 26.76$ ),  $t(346) = 9.81$ ,  $d = 1.05$ .

The manipulation of group members’ cooperation affected whether participants perceived the group as having a cooperative or noncooperative norm. Participants thought that greater cooperation was expected by the group when group members were cooperative ( $M = 77.04$ ,  $SD = 32.66$ ) than when group members were not cooperative ( $M = 10.86$ ,  $SD = 16.38$ ),  $t(699) = 33.89$ ,  $d = 2.56$ . Because both manipulations were associated with strong effect sizes, we concluded that participants accurately perceived when their group and partner were cooperative or noncooperative.

**Cooperation.** We conducted a 2 (reciprocity/conformity: reciprocate to cooperate vs. conform to cooperate)  $\times$  2 (partner knowledge: known behavior vs. unknown behavior) ANOVA predicting cooperation. In the results most relevant to our hypotheses, we found that reciprocity/conformity and partner knowledge had a significant interactive effect on cooperation,  $F(1, 697) = 59.90$ ,  $p < .001$ ,  $\eta_p^2 = .079$ . As in Study 1, when participants knew of Person B’s prior behavior, they were more cooperative in the reciprocate-to-cooperate condition ( $M = 31.41$ ,  $SD = 36.00$ ) than in the conform-to-cooperate condition ( $M = 23.57$ ,  $SD = 33.25$ ),  $t(346) = 2.11$ ,  $p = .03$ ,  $d = 0.23$  (see Fig. 2). However, when participants did not know of Person B’s prior behavior, they were more cooperative with a cooperative group ( $M = 54.98$ ,  $SD = 39.63$ ) than with a noncooperative group ( $M = 22.34$ ,  $SD = 28.54$ ),  $t(351) = -8.87$ ,  $p < .001$ ,  $d = -0.94$ .

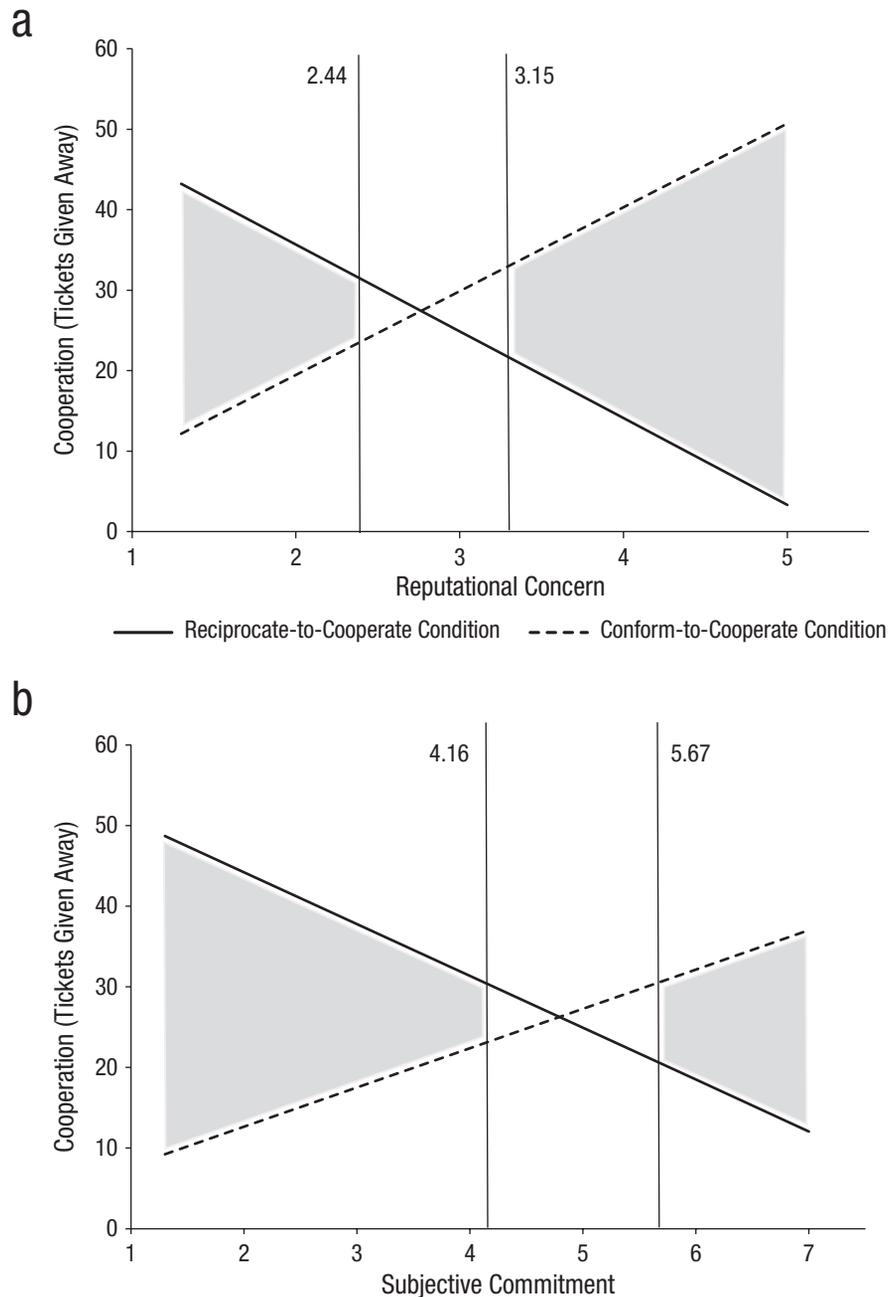
**Reputational concern and subjective commitment.** We constructed a multiple regression model in which cooperation was regressed on reciprocity/conformity condition (0 = conform to cooperate; 1 = reciprocate to cooperate), partner-knowledge condition (0 = unknown



**Fig. 2.** Results from Study 2: mean cooperation in the two partner-knowledge conditions, presented separately for the conform-to-cooperate and reciprocate-to-cooperate conditions. Error bars indicate 95% confidence intervals. The asterisks indicate significant differences between conditions ( $p < .05$ ).

behavior; 1 = known behavior), reputational concern, subjective commitment, the two-way interactions of reciprocity/conformity condition with reputational concern and subjective commitment, and the three-way interactions of reciprocity/conformity condition and partner-knowledge condition with reputational concern and subjective commitment. All predictors were mean centered. Reputational concern and subjective commitment did not have a significant main effect on cooperation (for the complete results of the model, see the Supplemental Material available online).

The reciprocity/conformity condition and reputational concern had a significant interactive effect on cooperation,  $b = 14.63$ ,  $t(689) = 5.87$ ,  $p < .001$  (see Fig. 3). We further examine this interaction in the condition that was used in all three studies (i.e., the condition in which participants had information about their partner’s behavior) to facilitate the comparison of results across the studies. At low levels of reputational concern (1  $SD$  below the mean), people were more inclined to reciprocate than to conform,  $t(347) = 6.52$ ,  $p < .001$ ,  $d = 0.70$ . But for high levels of reputational concern (1  $SD$  above the mean) people were more inclined to conform than to reciprocate,  $t(347) = -3.35$ ,  $p < .001$ ,  $d = -0.36$ . The same pattern of interaction was found between the reciprocity/conformity condition and levels of subjective commitment,  $b = 5.56$ ,  $t(689) = 2.96$ ,  $p = .003$  (Fig. 3). At low levels of subjective commitment (1  $SD$  below the mean), people were more inclined to reciprocate



**Fig. 3.** Results from Study 2: floodlight analysis showing the regions (gray areas) of (a) reputational concern and (b) subjective commitment for which there was a statistically significant effect of reciprocity/conformity condition on cooperation. The vertical lines indicate the exact values at which significance began and ended.

than to conform,  $t(347) = 4.99$ ,  $p < .001$ ,  $d = 0.54$ , but at high levels of subjective commitment (1 *SD* above the mean) people were more inclined to conform than to reciprocate,  $t(347) = -2.01$ ,  $p = .04$ ,  $d = -0.22$ .

**Mediation model.** We tested whether the reciprocity/conformity condition influenced cooperation through the

mediation of perceived group norms and expectations of partner cooperation using the bootstrapping method for multiple mediation (Preacher & Hayes, 2008). We tested this model in the condition in which participants were aware of Person B's behavior to allow comparisons with Study 1. The results showed significant indirect effects of both expectations of partner cooperation,  $b = 13.55$ , 95%

confidence interval (CI) = [4.84, 22.98], and perceived group norms,  $b = -12.07$ , 95% CI = [-17.48, -7.04]. The total effect of the reciprocity/conformity condition on cooperation became nonsignificant when the mediators were included in the model—total effect = 7.84,  $p = .037$ , 95% CI = [0.47, 15.20]; direct effect = 6.36,  $p = .31$ , 95% CI = [-5.90, 18.61].

We also tested the same model for conditions in which participants had no information about their partner's behavior. The results showed significant indirect effects of expectations of partner cooperation,  $b = 22.79$ , 95% CI = [17.61, 28.75], and perceived group norms,  $b = 17.16$ , 95% CI = [3.30, 31.91]. The total effect of reciprocity/conformity on cooperation became nonsignificant when the mediators were included in the model—total effect = 33.14,  $p < .001$ , 95% CI = [25.85, 40.44]; direct effect = -6.80,  $p = .34$ , 95% CI = [-20.77, 7.17]. These results suggest that people were using the group members' behavior to infer the partner's behavior, which influenced cooperation.

### Study 3

#### Method

Although participants displayed conformity to group norms of cooperation in both Studies 1 and 2, we found that they were more inclined to reciprocate partner cooperation than to conform to group norms of cooperation. Nonetheless, the previous studies lacked an important feature of learning group norms—a prestigious group member. Therefore, in Study 3, we replicated the paradigm applied in the previous studies but included a prestigious member in the group. The implementation of the prestigious member was not a manipulated variable in this study; rather, it was used to create a situation that would produce even stronger group conformity.

In Study 2, we also found that reputational concern influenced people's conformity to group norms of cooperation. Thus, people may be cooperative in groups to acquire indirect benefits of cooperation—a finding more aligned with a reciprocity framework than with a gene-culture coevolutionary framework. Therefore, to reduce the possibility of reputational concern, we also manipulated the anonymity of cooperation decisions. According to a reciprocity framework, anonymity should not provide an opportunity for indirect reciprocity, so anonymity should reduce the influence of group members' behavior on cooperation. A gene-culture coevolutionary framework, however, would not predict that anonymity will affect how individuals conform to group norms of cooperation.

**Participants and procedure.** Participants ( $N = 699$ ; 407 women; mean age = 35.96 years,  $SD = 11.21$ ) were recruited from MTurk and completed the study for \$1.20. Twenty participants won a \$2 prize. Five participants were excluded from the original sample because they had participated in one of the previous studies. The study was a 2 (reciprocity/conformity: reciprocate to cooperate vs. conform to cooperate)  $\times$  2 (choice: public vs. anonymous) between-subjects design.

The procedure was the same as in the previous studies, with two exceptions: (a) the addition of a prestigious member to the group and (b) the manipulation of anonymity. Participants first completed the survival task (where we establish a prestigious member of the group; see next section) and then interacted with someone who was not a member of the group (Person B) in the PD. Participants were told that they could observe how each member of the group and Person B behaved in the previous interactions. After that, participants were randomly assigned to one of two conditions: (a) public choice, in which other people could observe their choice (i.e., the same as in the previous studies) or (b) anonymous choice. Finally, participants completed the measures of expected partner cooperation, perceived group norm of cooperation, reputational concern ( $\alpha = .88$ ) and subjective commitment to the group ( $\alpha = .95$ ).

**Prestigious member.** Prestigious group members usually have some particular skills within the group and are considered the most important members (Henrich et al., 2015). In the current study, the prestigious group member was determined by successful decisions in the survival task that benefitted the group survival. Participants were told that their survival depended on their own and group members' choices and that group members would be ranked by how well their decision benefitted the survival of the group. The top-ranked individual was the prestigious member. As a manipulation check, we asked participants to select who they thought was the most important member of the group. As expected, 92% of participants considered the top-ranked individual the most important member in the group. The other group members' decisions followed the same structure as in previous studies. However, the prestigious member always made the fourth decision with Person B and always gave away either 0 or 100 tickets. Participants observed how the prestigious member behaved toward Person B

**Public and anonymous conditions.** In the public condition, participants were told that although they were the last to make a choice in the PD task, the other 5 members of their crew would observe how they behaved

toward Person B. By contrast, in the anonymous condition, participants were told that because they were the last to make a choice in the PD task, the other 5 members could not observe their behavior.

## Results

**Manipulation checks.** After observing several previous trials, participants expected greater partner cooperation when their partner cooperated previously ( $M = 74.64$ ,  $SD = 30.47$ ) than when their partner did not cooperate previously ( $M = 13.81$ ,  $SD = 23.76$ ),  $t(697) = 29.39$ ,  $d = 2.22$ . In addition, people perceived a cooperative group norm when their group members were consistently cooperative ( $M = 63.09$ ,  $SD = 39.36$ ) rather than noncooperative ( $M = 18.32$ ,  $SD = 24.96$ ),  $t(697) = -17.98$ ,  $d = -1.35$ .

**Cooperation.** A  $2 \times 2$  ANOVA showed a main effect of the reciprocity/conformity condition,  $F(1, 695) = 4.24$ ,  $p = .04$ ,  $d = 0.16$ . Participants cooperated more in the reciprocate-to-cooperate condition ( $M = 32.45$ ,  $SD = 36.79$ ) than in the conform-to-cooperate condition ( $M = 26.62$ ,  $SD = 35.71$ ). There was no significant main effect of anonymity,  $F(1, 695) = 1.20$ ,  $p > .25$ . There was also no significant interaction between the reciprocity/conformity condition and anonymity,  $F(1, 695) = 0.16$ ,  $p > .25$ .

### Reputational concern and subjective commitment.

We constructed a multiple regression model in which cooperation was regressed on reciprocity/conformity condition (0 = conform to cooperate condition; 1 = reciprocate to cooperate condition), choice condition (0 = anonymous condition; 1 = public condition), reputational concern, subjective commitment, the two-way interactions of reciprocity/conformity condition with reputational concern and subjective commitment, and the three-way interactions of reciprocity/conformity condition and choice condition with reputational concern and subjective commitment. All the predictors were mean centered. Reciprocity/conformity and reputational concern had a significant interactive effect on cooperation,  $b = -12.00$ ,  $t(692) = -4.64$ ,  $p < .001$  (Fig. 4). When we examined the simple effects, we found that at low levels of reputational concern (1  $SD$  below the mean), people were more inclined to reciprocate than to conform,  $t(697) = 6.14$ ,  $p < .001$ ,  $d = 0.46$ . However, at high levels of reputational concern (1  $SD$  above the mean), people were more inclined to conform than to reciprocate,  $t(697) = -3.09$ ,  $p < .001$ ,  $d = -0.23$ . We observed a similar interactive effect of reciprocity/conformity and subjective commitment on cooperation,  $b = -5.23$ ,  $t(692) = -2.84$ ,  $p = .005$  (Fig. 4). At low levels of subjective commitment (1  $SD$  below the mean), people were more inclined to reciprocate than

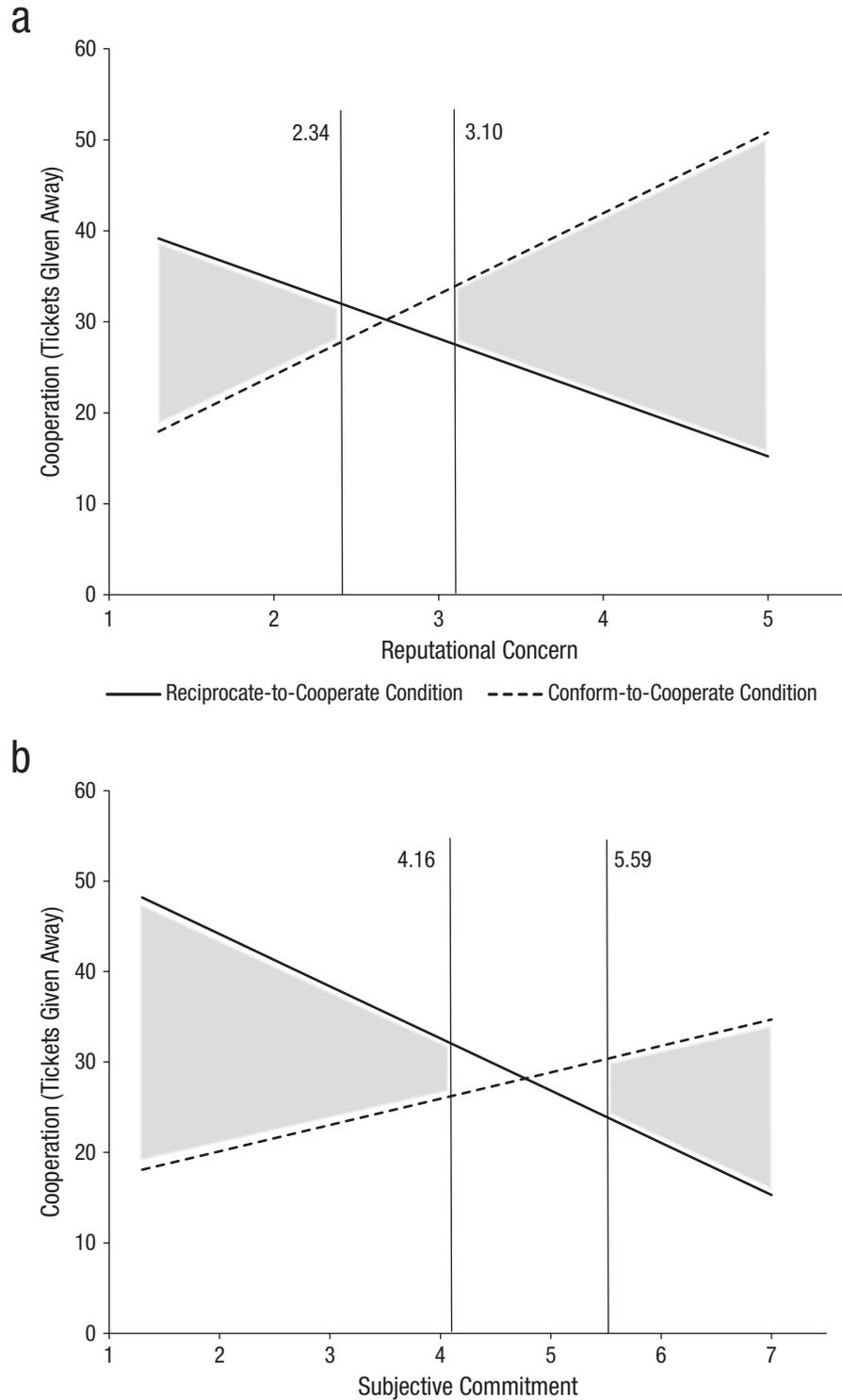
to conform,  $t(697) = 5.05$ ,  $p < .001$ ,  $d = 0.38$ . However, at high levels of subjective commitment (1  $SD$  above the mean), people were more inclined to conform than to reciprocate,  $t(697) = -2.17$ ,  $p = .03$ ,  $d = -0.16$ .

**Mediation analysis.** We tested whether the reciprocity/conformity condition influenced cooperation through the mediation of group norms and expectations of partner cooperation using the bootstrapping method for multiple mediation (Model 4; Preacher & Hayes, 2008). We replicated the results of Study 2, finding a significant indirect effect of expectations of partner cooperation,  $b = 12.97.12$ , 95% CI = [6.33, 19.51], and perceived group norms,  $b = -9.94$ , 95% CI = [-13.84, -6.01]. The total effect of reciprocity/conformity on cooperation became nonsignificant when the mediators were included in the model—total effect = 5.82,  $p = .03$ , 95% CI = [0.43, 11.21]; direct effect = 2.79,  $p = .53$ , 95% CI [-5.89, 11.46].

## General Discussion

An emerging consensus between the social and biological sciences is that humans evolved to cooperate—and so to engage in costly behaviors that benefit other people. Yet how humans evolved to cooperate is still intensely debated. One framework stresses the importance of direct and indirect benefits of reciprocity in small hunter-gatherer societies (Cosmides & Tooby, 1992). Another framework emphasizes how people learn norms, including norms to cooperate (Henrich, 2004). Perhaps people evolved both to reciprocate and to learn norms of cooperation, and each mechanism competes for influence over decisions to cooperate. The primary goal of the present research was to test whether either psychological mechanism (i.e., reciprocity or conformity) would constrain the influence of the other to affect cooperation.

To examine this issue, we placed people in a group and then had them interact with someone who was not a group member in a cooperation task. Before participants made their own decisions, they observed their group members cooperate with the same person (who was not a group member), who then defected, or they observed their group members defect to the same person, who then cooperated. Across the three studies, when the partner's behavior deviated from the group's behavior, people adjusted their behavior to match their partner's behavior. That is, people displayed a stronger tendency to reciprocate a partner's (expected) cooperation than to conform to group norms of cooperation (random-effects meta-analysis of 1,401 participants across three studies:  $d = 0.34$ , 95% CI = [0.05, 0.64]). In fact, reciprocity outperformed conformity even in Study



**Fig. 4.** Results from Study 3: floodlight analysis showing the regions (gray areas) of (a) reputational concern and (b) subjective commitment for which there was a statistically significant effect of reciprocity/conformity condition on cooperation. The vertical lines indicate the exact values at which significance began and ended.

3, in which prestige-biased social learning could have enhanced learning of social norms and anonymity could have decreased the role of indirect reciprocity.

A few additional findings support the claim that reciprocity can have a relatively stronger influence than conformity in regulating how people cooperate. First,

conformity in our studies can be partly explained by reputation-based indirect reciprocity. People tended to conform when they had high reputational concern, but when they did not care about how group members would evaluate their behavior, they reciprocated the partner's behavior. Second, we observed the largest amount of cooperation when both the group and the partner were cooperative on previous trials. So, norms of cooperation were much easier to arise and to be maintained when they corresponded with what would be promoted by a psychology that evolved to reciprocate. Third, people did not behave differently across public and anonymous situations in responding to reciprocity opportunities, which suggests that cues of reciprocity can regulate cooperation in the absence of the threat of social evaluations and sanctions (Delton, Krasnow, Cosmides, & Tooby, 2011). Finally, even when we did not provide information about the partner's behavior (Study 2), people tended to use group members' behavior to infer the partner's expected behavior and then made their own behavior contingent on those expectations—further supporting a reciprocity account.

In support of a gene-culture coevolutionary framework, our results showed that variation in subjective commitment to the group influenced people's conformity to the group. At high levels of subjective commitment to the group, people tended to conform to the group rather than reciprocate partner cooperation. Thus, a gene-culture coevolutionary theory might predict behavior at sufficiently high levels of subjective commitment. Future research can examine the factors that give rise to sufficient levels of subjective commitment (e.g., intergroup competition, group success, and high interdependence among group members). Although there was a medium-sized correlation between subjective commitment and reputational concern (random-effects meta-analysis:  $r = .43$ , 95% CI = [0.39, 0.48]), each motivation explained unique variation in people's conformity to the group compared with reciprocated partner cooperation. Future research can further examine these two motivations underlying people's conformity to norms of cooperation.

Our studies used online methods, which might fail to elicit the emotional and motivational responses that would promote conformity during interactions with group members who are present and visible—as they were in the original Asch studies (1956). The same is true for reciprocity—when interaction partners are present (and visible), people can use many cues to predict a partner's behavior, and this can promote reciprocity and cooperation (Drolet & Morris, 2000). In our studies, we had a total of 5 group members who all behaved similarly, a situation that is known to elicit strong conformity (Asch, 1956). Indeed, we observed

conformity to group norms of cooperation in our online task, especially in Study 2 when participants did not know about the partner's previous behavior. Our use of an online experimental environment provides a clean, replicable methodology that can harness the statistical power of larger sample sizes.

Numerous adaptive problems involve cooperation, such as selecting and maintaining beneficial relationships, increasing reputational standing in a group, and success during intergroup competition. Thus, evolution may have shaped numerous psychological processes that affect when and how people cooperate. These psychological processes would operate in parallel and could potentially compete for influence over when people cooperate. In these studies, we constructed a decision environment in which reciprocity and conformity predicted a different cooperative or noncooperative response. We found that people were more inclined to reciprocate than to conform. Thus, the relatively phylogenetically ancient psychological mechanisms of cheater detection and reciprocity may claim relatively greater influence over decisions to cooperate. Such evidence enlightens us about the conditions under which specific psychological mechanisms apply to explain cooperation.

#### Action Editor

Steven W. Gangestad served as action editor for this article.

#### Author Contributions

A. Romano and D. Balliet developed the study concept. A. Romano and D. Balliet contributed to the study design. Testing and data collection were performed by A. Romano. A. Romano performed the data analysis and interpretation under the supervision of D. Balliet. A. Romano drafted the manuscript, and D. Balliet provided critical revisions. All the authors approved the final version of the manuscript for submission.

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The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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#### Supplemental Material

Additional supporting information can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797617714828>

## Open Practices



All data and materials have been made publicly available via Open Science Framework and can be accessed at <https://osf.io/pfuyq>. The complete Open Practices Disclosure for this article can be found at <http://journals.sagepub.com/doi/suppl/10.1177/0956797617714828>. This article has received badges for Open Data and Open Materials. More information about the Open Practices badges can be found at <https://www.psychologicalscience.org/publications/badges>.

## Note

1. The unit of measure for cooperation was the number of tickets given away.

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