Unbounded indirect reciprocity: Is reputation-based cooperation bounded by group membership?

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HIGHLIGHTS

- Reputational concern is not restricted to interacting with ingroup members, but can also promote cooperation with outgroup members
- Social identification did not affect cooperation with ingroup members
- Reputational concern is a psychological mechanism operating also with outgroup members

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ABSTRACT

Bounded generalized reciprocity (BGR) predicts that people cooperate to maintain a positive reputation with ingroup, but not outgroup, members—and this explains ingroup favoritism in cooperation. We propose that the benefits of maintaining a positive reputation are not limited by group boundaries and so people may cooperate to maintain a good reputation among outgroup members when they will meet and interact with members of that group again. According to this unbounded indirect reciprocity perspective, reputation can promote cooperation with both ingroup and outgroup members. Alternatively, social identity theory (SIT) favors social identity versus reputation as an explanation for cooperation among ingroup members. We test these hypotheses across five studies ($Ns = 619, 607, 613, 360,$ and 615) that manipulate reputation, social identification, and partner's group membership in a cooperative decision making task. Across our studies, people were more cooperative with both ingroup and outgroup members when their reputation was at stake (Studies 1–5), and reputational concern mediated the effect of cues of gossip on cooperation in interactions with ingroup and outgroup members (Studies 1–4). Social identification did not affect cooperation with ingroup members. We discuss the theoretical and practical implications of the indirect benefits of cooperation that can transcend group boundaries.

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People often enact costly behaviors that benefit others (i.e., cooperate), even when these behaviors don't obviously benefit themselves. Nonetheless, some possible benefits of cooperation can be far removed from the actual behavior. For example, an evolutionary perspective suggests that humans can condition cooperation on cues that costly cooperation may result in either direct or indirect benefits (Cosmides & Tooby, 2005). Indeed, people tend to cooperate with others they will interact with again, and so situations that contain potential direct benefits (Delton, Krasnow, Cosmides, & Tooby, 2011). Importantly, people can

also cooperate in situations that lead to indirect benefits—when current cooperation is observed and gossiped about to future interaction partners (Wu, Balliet, & Van Lange, 2016). Such indirect benefits can be immense and highly rewarding, since gossip and reputation can spread far and wide and reach the ears of many potential future interaction partners.

Bounded generalized reciprocity (BGR) hypothesizes that the indirect benefits from cooperative behavior (and so a positive reputation) come from ingroup, but not outgroup, members (Yamagishi, Jin, & Kiyonari, 1999). From this perspective, people cooperate more with ingroup members, because cooperation enhances their reputational standing in the group, and a good reputation will later translate into benefits received from ingroup members. According to BGR, the indirect benefits of reputation are group-bounded, so people behave to enhance their reputation only when interacting with ingroup members. We suggest that the indirect benefits of a good reputation can extend beyond

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group boundaries and so people respond to cues that their behavior carries reputational consequences with ingroup and outgroup members. Here, we advance an *unbounded* indirect reciprocity perspective and extend previous research on reputation-based cooperation by (a) testing whether the cooperation-enhancing effects of reputation are group bounded, and (b) comparing reputation-based accounts of ingroup favoritism in cooperation with a social identity approach.

1. Bounded or unbounded generalized reciprocity?

Bounded generalized reciprocity (BGR) proposes that humans have evolved a tendency to cooperate with ingroup members, because cooperation results in indirect benefits and reduces the potential cost of being excluded from the group.[1] When interacting with ingroup members, people may be more likely to meet, interact with, and receive indirect benefits from other ingroup, compared to outgroup, members (Yamagishi et al., 1999). Thus, BGR states that (a) people have expectations of indirect reciprocity from ingroup members, (b) people cooperate with ingroup members to maintain a positive reputation in their group, and (c) group membership cues activate a heuristic to cooperate with ingroup members (Yamagishi et al., 1999). According to BGR, reputational concern is a core psychological mechanism of ingroup favoritism in cooperation (Mifune, Hashimoto, & Yamagishi, 2010).

One implication of BGR is that reputational concern only matters during interactions with ingroup members rather than outgroup members. To test this hypothesis, Yamagishi and Mifune (2008) manipulated common and unilateral knowledge of group membership (i.e., whether an ingroup or outgroup interaction partner knows one's group membership) in cooperative interactions. Behavior can only influence reputation when group membership is common knowledge. Indeed, people were more cooperative with ingroup than with outgroup members in the common (versus unilateral) knowledge condition—a finding replicated across several studies (Guala, Mittone, & Ploner, 2013; Yamagishi & Mifune, 2008). These findings suggest that ingroup favoritism is a strategy to enhance reputation within a group.

BGR assumes that reputation is *bounded* in groups. Yet, previous common knowledge studies do not confirm that reputation is bounded in groups or that people only care about their reputation among ingroup members. First, these studies often involve one-shot interactions with no future interdependence (Everett, Faber, & Crockett, 2015). Second, these studies did not test reputational concern as a psychological mechanism explaining why people cooperate more with ingroup than with outgroup members. Third, the common versus unilateral knowledge manipulation also made salient social identity concerns (cf. Mifune et al., 2010). We propose that the psychology underlying concern for reputation and the acquisition of indirect benefits may not be limited by group boundaries (Milinski, Semmann, Bakker, & Krambeck, 2001; Wu, Balliet, & Van Lange, 2015; Wu et al., 2016).

According to an unbounded indirect reciprocity perspective, people may condition their behavior on multiple cues that identify when behavior can lead to indirect benefits (Panchanathan & Boyd, 2004). Cues of indirect benefits include whether future interaction partners know about one's previous behavior via observation or gossip, which would subsequently affect reputation (Wu et al., 2015, 2016). So, people may even cooperate with outgroup members to promote a positive reputation, if intergroup interactions involve cues of indirect benefits. Indeed, people cooperate to enhance their reputation when interacting with others who could gossip to their future partners (Beersma & Van Kleef, 2011; Feinberg, Willer, & Schultz, 2014; Feinberg, Willer, Stellar,

& Keltner, 2012; Sommerfeld, Krambeck, Semmann, & Milinski, 2007). Moreover, cues of indirect benefits tend to enhance a concern about the collective beliefs that others have about oneself, and this reputational concern enhances cooperation (Wu et al., 2015, 2016). Importantly, previous research did not investigate whether cues of indirect benefits (e.g., gossip) are *independent* of knowledge about partner group membership, and so did not inform if people only cooperate to maintain a good reputation with ingroup members.

To summarize, we have outlined two competing perspectives on reputation-based cooperation. BGR hypothesizes that reputation-based cooperation is group bounded—cues of indirect benefits only promote cooperation with ingroup members (*Hypothesis 1a*). Moreover, BGR predicts that people will only care about their reputation when interacting with ingroup members, and so reputational concern mediates the relation between cues of indirect benefits and cooperation when interacting with ingroup, but not outgroup, members (*Hypothesis 1b*). Alternatively, an unbounded indirect reciprocity perspective predicts that cues of indirect benefits (e.g., gossip and public monitoring) will promote cooperation independent of partner group membership (*Hypothesis 2a*). Additionally, this approach predicts that people care about their reputation when interacting with both ingroup and outgroup members, and that reputational concern will mediate the relation between cues of indirect benefits and cooperation (*Hypothesis 2b*).

2. Social identity versus reputational approaches to ingroup favoritism

The perspectives mentioned above are in stark contrast with social identity theory—a dominant theoretical perspective that emphasizes the role of social identification and self-esteem as explanations for ingroup favoritism (Tajfel & Turner, 1986; Turner, Brown, & Tajfel, 1979). Seminal experiments used minimal group paradigms to divide individuals into groups according to a trivial category, and then asked them to allocate valuable resources to anonymous ingroup and/or outgroup members (e.g., Tajfel, Billig, Bundy, & Flament, 1971). These experiments showed that the mere categorization into different groups was sufficient to promote ingroup favoritism (Billig & Tajfel, 1973; Turner et al., 1979; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). Notably, individuals' choices in these situations were not driven by self-interest, previous interactions, or shared values, but by social identity—ingroup favoritism serves to increase a positive self-esteem (Billig & Tajfel, 1973). A crucial process for ingroup favoritism is *social identification*—how important a group is in defining the self (Leonardelli & Brewer, 2001). Previous studies support the hypothesis that higher social identification can promote ingroup favoritism in cooperation (*Hypothesis 3*; Brewer & Kramer, 1986; De Cremer & Van Vugt, 1999).

Nonetheless, several criticisms have been raised about SIT as an explanation of ingroup favoritism. First, the minimal group paradigms (MGP; Tajfel et al., 1971) also presented some degree of interdependence with ingroup, but not with outgroup, members (Yamagishi & Mifune, 2016). In fact, although participants in the MGP had to allocate money to ingroup and outgroup members, behaviors that favored ingroup members could actually enhance one's chance to be reciprocated in future interactions. Indeed, studies demonstrate that ingroup favoritism disappears when ingroup members cannot reciprocate (e.g., Rabbie, Schot, & Visser, 1989). Second, studies using common knowledge manipulations demonstrated that individuals cooperate with ingroup members only when their reputation is at stake (Balliet, Wu, & De Dreu, 2014; Yamagishi et al., 1999). Despite these critiques, SIT still remains one of the most influential theories to explain ingroup favoritism. The few studies that compare SIT and BGR focus on social identification and expected reciprocation, but not on reputational concern (Stroebe, Lodewijkx, & Spears, 2005; Velez, 2015). Here we compare how social identification and reputation promote ingroup favoritism.

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[1] Here, we retain the original term "generalized reciprocity", which proposes that people expect to receive benefits from other in-group members, especially if they have a positive reputation (Yamagishi et al., 1999). Thus, generalized reciprocity in the context of BGR is the same as reputation-based "indirect reciprocity".

3. Overview of studies

We conducted five studies to (a) examine whether the cooperation-enhancing effects of reputation are group bounded, and (b) compare reputation-based accounts with a social identity perspective on ingroup favoritism in cooperation. Studies 1 and 2 manipulated partner's group membership (ingroup versus outgroup versus unclassified stranger) and social identification (high versus low) in a cooperative decision making task. In these studies, we also manipulated cues of indirect benefits by making their decisions public or anonymous among others (ingroup members, outgroup members, or unclassified strangers) whom they would interact with again. BGR predicts that reputation will interact with group membership to predict cooperation, such that people will only cooperate to manage their reputation when interacting with ingroup members (*H1a*). An unbounded indirect reciprocity perspective, however, predicts greater cooperation in the public, compared to anonymous, situation (main effect), without an interaction with partner's group membership (*H2a*). SIT predicts that social identification will interact with group membership, such that people will display stronger ingroup favoritism when they have high, compared to low, social identification (*H3*).

Studies 3 to 5 generalize results by using a different manipulation of cues of reputation: gossip to future interaction partners. We also generalize our findings from experimentally created "minimal" groups to interactions between natural groups (i.e., two political coalitions in the U.S., Republicans and Democrats). Across these three studies, we employ a between-participants manipulation of partner group membership in the cooperative decision making task, which allows us to measure reputational concern when interacting with ingroup or outgroup members. BGR predicts an interaction between gossip and future partner's group membership in predicting cooperation—people are more cooperative with others who can gossip to their ingroup members, but not outgroup members (*H1a*). Conversely, an unbounded indirect reciprocity perspective would predict that gossip promotes cooperation regardless of their future partner's group membership (main effect), but no interaction with future partner's group membership (*H2a*). The gossip manipulation we use in these studies also allows us to test whether people have greater reputational concern when interacting with ingroup (vs. outgroup) members, and whether this explains why gossip enhances cooperation (*H1b* vs *H2b*).

3.1. Study 1

3.1.1. Method

3.1.1.1. Participants and design. Across all studies, an a-priori power analysis (G*Power; Faul, Erdfelder, Buchner, & Lang, 2009) revealed a required sample size of 620 to achieve a statistical power $(1-\beta)$ of 0.80 to detect an effect size of $d = 0.32$ retrieved from a recent meta-analysis on ingroup favoritism (Balliet et al., 2014).[2] One participant responded the same to most questions (e.g., estimating 1 dot in all the dot estimation tasks) and was excluded from the analyses. Participants ($N = 619$, 253 women; $M_{age} = 32.15$ years, $SD = 10.31$) recruited from Amazon Mechanical Turk (MTurk) completed the study for US\$0.50. The study was a 2 (social identification: high, low) $\times$ 2 (reputation: public, anonymous) $\times$ 3 (partner's group membership: ingroup, outgroup, stranger) mixed design. Partner's group membership was a within-participant, counter-balanced, manipulation.

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[2] The a-priori power estimates refer to the main effect of group membership at each level of the reputation manipulation. The a-priori power analysis for the interaction estimated a lower sample size (476 participants for a 2 × 3 design and 500 for a 2 × 2 design).

3.1.1.2. Procedure. Participants provided their informed consent and were told to be simultaneously playing online with several other participants. They were led to believe they were interacting with real partners. The experiment was divided into two parts. In the first part, we categorized participants into different groups through a dot estimation task (Tajfel et al., 1971), and then randomly assigned them into either *high* or *low identification* condition through a filler questionnaire. In the second part, participants were provided instructions about the dictator game and answered four comprehension questions before making their decisions. They were randomly assigned to either a public or an anonymous condition in the dictator game. Finally, we measured their social identification and reputational concern.

3.1.1.2.1. Minimal group paradigm and social identification. Partner's group membership was manipulated using the minimal group paradigm (Tajfel et al., 1971). We based our methods on previous online experiments that have successfully used this paradigm to study ingroup favoritism (e.g., Cikara, Bruneau, Van Bavel, & Saxe, 2014; Summerville & Chartier, 2013). In a perception task, participants estimated the number of dots presented in eight pictures (Leonardelli & Brewer, 2001), and then received a bogus feedback that they belonged to the group of *overestimators*. Group membership of the other participants was also manipulated by bogus feedback.

Next, participants completed a personal characteristics questionnaire. They first learned that overestimators share some lifestyle characteristics and that this questionnaire was designed to understand the proportion of these shared habits. The procedure was adapted from prior research on SIT (Leonardelli & Brewer, 2001; Stroebe et al., 2005). To manipulate social identification, participants received different feedback after completing the questionnaire: They share 95% (*high-identification*) or 45% (*low-identification*) of lifestyle characteristics with overestimators.

3.1.1.2.2. Dictator game. Participants interacted with another fictitious participant and received an endowment of 100 lottery tickets. They could freely distribute any of these tickets to their interaction partner (Forsythe, Horowitz, Savin, & Selton, 1994). They played three one-shot dictator games with different partners (counter-balanced): an ingroup member (overestimator), an outgroup member (underestimator), and an unclassified participant. Participants were told that they would interact with a new partner on each trial, and did not know the total number of decision-making tasks. The number of lottery tickets they gave to their partner in this dictator game was the measure of cooperation.

3.1.1.2.3. Reputation. Participants learned that their choice was revealed to other participants with whom they would interact in a future decision making task (*public*) or that their choice was anonymous (Van Vugt & Hardy, 2010). They were informed about the public or anonymity condition in the instructions and reminded in each of their decision tasks.

3.1.1.2.4. Social identification and reputational concern. For manipulation checks, we measured participants' social identification (six items, $\alpha = 0.75$; Leonardelli & Brewer, 2001) and reputational concern (four items, $\alpha = 0.81$; adapted from Wu et al., 2015) after the dictator game. Both the social identification (e.g., *"I feel that this group is an important reflection of who I am"*) and reputational concern (e.g., *"it is important that others will accept me"*) scales were rated on a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*).

3.1.2. Results and discussion

3.1.2.1. Manipulation checks. Participants in the high-identification condition ($M = 2.33$, $SD = 0.69$) reported greater identification with their group than those in the low-identification condition ($M = 2.03$, $SD = 0.66$), $t(618) = 5.55$, $p < 0.001$, $d = 0.45$. Moreover, participants in the public condition ($M = 3.20$, $SD = 1.21$) reported greater reputational concern than those in the anonymous condition ($M = 2.84$, $SD = 1.19$), $t(618) = 3.74$, $p < 0.001$, $d = 0.30$. Thus, the manipulations of social identification and reputation were successful.

3.1.2.2. Cooperation. We conducted a 2 (social identification) × 2 (reputation) × 3 (partner's group membership) mixed ANOVA predicting cooperation. Participants were slightly more cooperative with ingroup members ($M = 31.78$, $SD = 23.07$), than with outgroup members ($M = 31.04$, $SD = 22.78$), or strangers ($M = 31.10$, $SD = 22.68$), but the difference did not meet traditional standards of statistical significance, $F(2, 615) = 2.62$, $p = 0.07$, $\eta_p^2 = 0.009$. We created two hypothesis-relevant orthogonal contrasts of partner's group membership: Contrast 1 (*ingroup vs outgroup and stranger* contrast) and Contrast 2 (*outgroup vs stranger* contrast).[3] Planned comparisons revealed a significant Contrast 1, $F(1, 615) = 5.29$, $p = 0.02$, $\eta_p^2 = 0.009$, indicating more cooperation toward an ingroup member, compared to an outgroup member and a stranger. Contrast 2 was not significant, suggesting no significant difference in cooperation with outgroup members and strangers, $F(1, 615) = 0.008$, $p = 0.93$. BGR predicts that ingroup favoritism in cooperation would only occur in the public condition, but not in the private condition (*H1a*). Testing this interaction hypothesis using Contrast 1 revealed that Contrast 1 did not significantly interact with public/anonymous decisions in predicting cooperation, $F(1, 615) = 0.325$, $p = 0.57$.

Supporting an unbounded indirect reciprocity perspective, participants were more cooperative in the public condition ($M = 34.57$, $SD = 22.76$) than in the anonymous condition ($M = 28.00$, $SD = 22.54$), $F(1, 615) = 13.88$, $p < 0.001$, $d = 0.30$. Social identification did not affect cooperation, $F(1, 615) = 0.57$, $p = 0.45$. Additionally, social identification and partner's group membership did not interact to predict cooperation, $F(2, 615) = 0.02$, $p = 0.49$. The three-way interaction between social identification, reputation, and partner's group membership was also not significant, $F(2, 615) = 1.25$, $p = 0.29$.

3.1.2.3. Mediation analysis. We tested whether the public versus anonymous decisions influenced cooperation through the mediation of reputational concern using the bootstrapping method for mediation (5000 bootstrap samples, model 4, Preacher & Hayes, 2008). The results showed that reputational concern had a significant indirect effect, $b = 1.24$, 95% CI [0.56, 2.26]. Moreover, the relation was partially mediated because the total effect of public/anonymous decisions (total effect = 6.56, $p < 0.001$) on cooperation was still significant when the mediator was included in the model (direct effect = 5.32, $p = 0.002$).

In sum, people cooperated more when their reputation was at stake, regardless of their partner's group membership or their own level of social identification. Moreover, reputational concern mediated the effect of public versus anonymous decisions on cooperation across interactions with ingroup members, outgroup members, and unclassified strangers. The experimental design does not permit a test of the BGR hypothesis that this mediation model would be restricted to interactions with ingroup members (*H1b*), and we test this hypothesis in Studies 3 to 5. These initial findings provide support for the unbounded indirect reciprocity perspective, and fail to support predictions from either BGR or SIT.

3.2. Study 2

Study 2 replicates Study 1 using an interdependent decision making task in which each person's outcome depends on their partner's actions. Previous research has found that higher degree of outcome interdependence tends to increase ingroup favoritism in cooperation (Balliet et al., 2014). The dictator game used in Study 1 does not contain mutual interdependence, and so in Study 2 we observed ingroup favoritism in cooperation in an outcome-interdependent situation (i.e., a one-shot public goods game).[4]

3.2.1. Method

3.2.1.1. Participants and design. After excluding 13 participants who had participated in the previous study, 607 participants (297 women; $M_{age} = 33.64$ years, $SD = 11.57$) recruited from MTurk completed the study for US$0.50. The study involved a 2 (social identification: high, low) × 2 (reputation: public, anonymous) × 3 (partner's group membership: ingroup, outgroup, stranger) mixed design. Partner's group membership was a within-participant, counter-balanced, manipulation.

3.2.1.2. Procedure. The procedure, as well as the measures of social identification ($\alpha = 0.75$) and reputational concern ($\alpha = 0.73$), was the same as Study 1.

3.2.1.2.1. Public goods game. Participants learned that they would interact with five participants simultaneously online. They had to contribute any amount out of 100 lottery tickets to a common pool (Meleady, Hopthrow, & Crisp, 2013). The total contribution was then multiplied by 1.5 and divided equally among all members, regardless of individual contributions. Participants completed three rounds of the public goods game, each with a different group: five ingroup members, five outgroup members, and five undefined strangers. Cooperation was measured as the number of lottery tickets invested in the common pool.

3.2.2. Results and discussion

3.2.2.1. Manipulation checks. Participants in the high-identification condition ($M = 2.31$, $SD = 0.84$) reported significantly greater identification with their group than those in the low-identification condition ($M = 2.13$, $SD = 0.76$), $t(605) = 2.72$, $p = 0.007$, $d = 0.14$. Moreover, participants reported greater reputational concern in the public condition ($M = 2.58$, $SD = 0.95$) than in the anonymous condition ($M = 2.38$, $SD = 0.83$), $t(605) = 3.12$, $p < 0.001$, $d = 0.22$. Thus, the manipulations of social identification and reputation were successful.

3.2.2.2. Cooperation. We conducted a 2 (social identification) × 2 (reputation) × 3 (partner's group membership) mixed ANOVA predicting cooperation. Participants cooperated more with ingroup members ($M = 49.92$, $SD = 32.43$), compared to outgroup members ($M = 46.18$, $SD = 31.16$) and strangers ($M = 47.87$, $SD = 31.68$), $F(2, 603) = 13.40$, $p < 0.001$, $\eta_p^2 = 0.04$. Similar to Study 1, we created two orthogonal contrasts of partner's group membership (i.e., Contrast 1 and Contrast 2). Planned comparisons revealed significant Contrast 1, $F(1, 603) = 19.50$, $p < 0.001$, $\eta_p^2 = 0.03$, and Contrast 2, $F(1, 603) = 6.04$, $p = 0.013$, $\eta_p^2 = 0.01$, indicating more cooperation with ingroup members, compared to outgroup members and strangers, and also more cooperation with strangers than with outgroup members. Failing to support BGR (*H1a*), Contrast 1 did not significantly interact with public/anonymous decisions in predicting cooperation, $F(1, 615) = 0.22$, $p = 0.64$.

In support of an unbounded indirect reciprocity perspective (*H2a*), participants cooperated more in the public condition ($M = 50.93$, $SD = 31.20$) than in the anonymous condition ($M = 45.05$, $SD = 32.31$), $F(1, 603) = 5.80$, $p = 0.02$, $d = 0.20$. Social identification did not affect cooperation, $F(1, 603) = 1.33$, $p = 0.25$. Failing to support SIT (*H3*), social identification did not interact with partner's group membership predicting cooperation, $F(2, 603) = 0.26$, $p = 0.77$. The

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[3] Contrast 1 can test for a motivation to benefit ingroup members (ingroup > outgroup & stranger), while Contrast 2 tests for a motivation to derogate outgroup members (outgroup < stranger) (see Balliet et al., 2014).

[4] In Studies 1 and 2, we also measured perceived entitativity for exploratory purposes. In Studies 4 and 5, we also included a measure of partner's expected cooperation.

three-way interaction on cooperation was also not significant, $F(2, 603) = 0.32$, $p = 0.72$.

3.2.2.3. Mediation analysis. We tested whether public versus anonymous decisions influenced cooperation through the mediation of reputational concern using the bootstrapping method for mediation (5000 bootstrap samples, model 4, Preacher & Hayes, 2008). Reputational concern had a significant indirect effect, $b = 0.60$, 95% CI [0.09, 1.60]. The relation was partially mediated since the total effect of public/anonymous decisions (total effect = 5.76, $p = 0.02$) on cooperation remained significant when the mediator was included in the model (direct effect = 5.16, $p = 0.04$).

Thus, Study 2 replicates the results of Study 1. People were more cooperative when their reputation was at stake, regardless of their partner's group membership (i.e., unbounded indirect reciprocity hypothesis, H2a). Additionally, reputational concern mediated the effect of public versus anonymous decisions on cooperation across interactions with ingroup members, outgroup members, and unclassified strangers (H2b). Study 2 did not support the BGR prediction that reputation would interact with partner's group membership to predict cooperation (H1a). Again, we did not find support for the SIT prediction that social identification would interact with group membership to promote cooperation (H3).

3.3. Study 3

In Study 3, we further compare BGR and the unbounded indirect reciprocity perspective by manipulating gossip (i.e., reputation transmission) during a cooperation task. Previous research has found that people are more cooperative with others who can gossip to their future interaction partners (Wu et al., 2015, 2016). Here, we investigate whether people are more cooperative with someone who can gossip to their future partners, regardless of these future partners' group membership. Additionally, in the remaining studies we utilize a between-participant manipulation of future partner's group membership. This method allows for testing whether the effect of gossip on cooperation is mediated by reputational concern, and whether this mediation effect varies when the gossip recipient is an ingroup or outgroup member (i.e., a moderated mediation model, see Fig. 1).

3.3.1. Method

3.3.1.1. Participants and design. After excluding seven participants who had participated in previous studies, 613 participants (310 women; $M_{age} = 33.88$ years, $SD = 11.69$) recruited from MTurk completed the study for US$0.50. The study was a 2 (future partner's group membership: ingroup, outgroup) × 2 (gossip: to a future partner, to an unrelated person) between-participants design.

3.3.1.2. Procedure. Study 3 had a similar structure with previous studies. Participants were first categorized as *overestimators* through the dot-estimation task and led to believe they were interacting with real participants. Then, they engaged in two decision making tasks—a dictator game (Task 1) and a trust game (Task 2). They first read the instructions, answered six comprehension questions, and then started making decisions. Participants' reputational concern was measured right after the trust game. Based on their decisions, they earned lottery tickets to win a 2-dollar bonus (1 ticket = 0.01% chance of winning).

3.3.1.2.1. Dictator game and gossip. Participants interacted with another fictitious participant who was an ingroup member. They received an initial endowment of 100 lottery tickets, and could freely distribute any amount of tickets to their partner, who had no initial endowment (Forsythe et al., 1994). To manipulate gossip, participants were told that their partner could send a message to either (a) their future interaction partner (i.e., an ingroup or outgroup member) in Task 2 or (b) a person with whom they would not interact in Task 2 (i.e., an unrelated person). The number of lottery tickets they gave to their partner was the measure of cooperation.

3.3.1.2.2. Trust game. Participants then interacted with a different person (i.e., ingroup or outgroup member) in the trust game (Berg, Dickhaut, & McCabe, 1995). In this game, participants acted as the investor, and their partner was the responder. The investor first decided to send any amount (range: 0 to 100) of an initial endowment of 100 lottery tickets to the responder. While the amount sent to the responder was tripled, any amount kept for oneself remained the same. Then, the responder had to return back some of the tripled amount to the investor. Participants learned that they would receive feedback about their own and others' decisions at the end of the experiment.

3.3.1.2.3. Reputational concern. Similar with Studies 1 and 2, we measured participants' reputational concern on a 5-point Likert scale (1 = totally disagree, 5 = totally agree), using an extended six-item scale that includes two gossip-related items after the trust game ("During the decision making task, I did not expect others to talk about me behind my back"; "I did not consider what others would say about me during the decision making task") ($\alpha = 0.63$; adapted from Wu et al., 2015).

3.3.2. Results and discussion

3.3.2.1. Cooperation. A 2 (future partner's group membership) × 2 (gossip) ANOVA revealed support for *Hypothesis 2a*: People were more cooperative toward a partner who could gossip to their future partner ($M = 38.52$, $SD = 24.77$) than a partner who could gossip to an unrelated person ($M = 31.69$, $SD = 25.68$), $F(1, 609) = 11.34$, $p = 0.001$, $d = 0.28$. Future partner's group membership, $F(1, 609) = 0.23$, $p = 0.63$, and its interaction with gossip predicting cooperation, $F(1, 609) = 1.01$, $p = 0.32$, were not statistically significant.

3.3.2.2. Mediation analysis. Next, we tested whether gossip influenced cooperation through reputational concern, and whether future
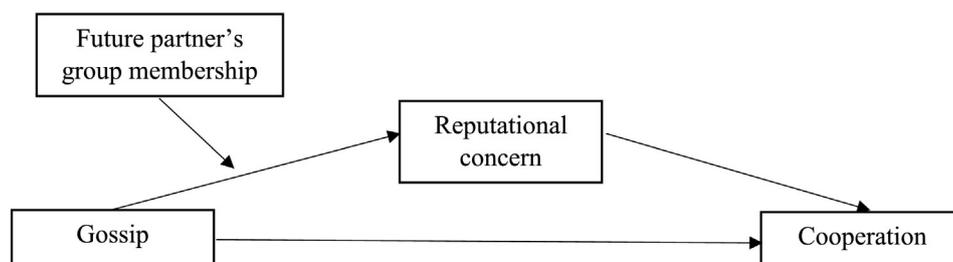

Fig. 1. The moderated mediation model tested in Studies 3–5.

partner's group membership moderated this mediation. To do so, we applied a bootstrapping method for testing multiple moderated mediation (5000 bootstrap samples, model 7, Preacher & Hayes, 2008, see Fig. 1).[5] The indirect effect of gossip on cooperation was consistently significant through reputational concern when one's future interaction partner was an ingroup member, $b = 1.73$, 95% CI [0.61, 3.36], or an outgroup member, $b = 3.74$, 95% CI [2.10, 5.95]. The total effect of gossip on cooperation (total effect = 6.83, $p < 0.001$) became nonsignificant when the mediator was included in the model (direct effect = 3.81, $p = 0.06$).

Thus, we find support for an unbounded indirect reciprocity perspective (H2a)—people were more cooperative in response to gossip to a future partner, regardless of this future partner's group membership. As additional support for this perspective (H2b), reputational concern mediated the relation between gossip and cooperation regardless of whether one's future interaction partner was an ingroup or outgroup member. We failed to support the BGR hypotheses that gossip and reputational concern would only affect cooperation with ingroup members (H1a, H1b). Therefore, Study 3 replicates and extends the conclusions of the previous studies.

3.4. Study 4

In Study 3, participants interacted with an ingroup member in Task 1 (dictator game) who could or could not gossip to an ingroup or outgroup member in Task 2 (trust game). In Study 4, we replicate the procedure of Study 3, with three modifications. First, we simultaneously manipulate the group membership of the participant's partner in Task 1 and 2. This captures many real-life situations in which people interact with outgroup or ingroup members, who can gossip to other outgroup or ingroup members, respectively. Second, people can often gossip to many others and so we increased the number of gossip recipients. Third, to simplify the experimental design for participants, we used the same paradigm for Task 1 and Task 2, i.e., the prisoner's dilemma.

3.4.1. Method

3.4.1.1. Participants and design. Participants ($N = 360$; 172 women; $M_{age} = 34.96$ years, $SD = 10.53$) recruited from MTurk completed the study for $1.50. The study was a 2 (partner's group membership: ingroup vs outgroup) × 2 (gossip vs no gossip) between-participants design. The sample size was determined after a-priori power analysis requiring a sample size of 360 to achieve a statistical power (1-β) of 0.80 and to detect an effect size of $d = 0.42$. The effect size was obtained from a recent meta-analysis on ingroup favoritism in cooperation in social dilemmas, such as the prisoner's dilemma (Balliet et al., 2014).

3.4.1.2. Procedure. Study 4 has a similar structure with previous studies. Participants were first categorized as *overestimators* through the dot-estimation task. Then, the manipulation of gossip was introduced. Participants could interact with either a partner who could gossip to other 8 participants or a partner who could not gossip. After answering six comprehension questions, they interacted in two prisoner's dilemmas, each with a different partner. After the prisoner's dilemmas, participants responded to items that measured reputational concern ($\alpha = 0.77$) and social identification ($\alpha = 0.90$) used in the previous studies.

3.4.1.2.1. Prisoner's dilemma and gossip. Participants interacted in two prisoner's dilemma (PD) tasks (Van Lange & Kuhlman, 1994). In each PD task, they were endowed 100 tickets and had to decide how many tickets to give to their partner. Each ticket that the participant and the partner gave to the other was doubled. Participants interacted with a different partner in each PD. However, their partners' group membership was manipulated as a between-participants factor. In Task 1, participants interacted with an individual categorized as either an ingroup or outgroup member. Importantly, partner's group membership was the same across Task 1 and 2.

In the *gossip condition*, participants were told that their partner could send a message to eight ingroup or outgroup members, and participants would then interact with one of these people in Task 2. In the *no gossip condition*, the ingroup or outgroup member could not communicate with the others online, so participants would then interact with either an ingroup or outgroup member who did not receive any message from their partner in Task 1. Participants earned lottery tickets during the experiment based on their decisions. Each ticket represented a 0.01% chance to win a 2-dollar bonus.

3.4.2. Results and discussion

3.4.2.1. Cooperation. In support of *Hypothesis 2a*, people cooperated more with partners who could gossip to their future interaction partners ($M = 43.61$, $SD = 31.67$), compared to partners who could not gossip ($M = 32.11$, $SD = 30.66$), $F(1, 356) = 12.20$, $p = 0.001$, $d = 0.38$. There was no main effect of partner's group membership on cooperation, $F(1, 356) = 0.48$, $p = 0.48$. Failing to support *Hypothesis 1a*, there was no significant interaction between partner's group membership and gossip on cooperation, $F(1, 356) = 0.02$, $p = 0.89$.

3.4.2.2. Mediation analysis. We tested whether gossip influenced cooperation through the mediation of reputational concern conditionally for ingroup and outgroup members using the bootstrapping method for multiple moderated mediation (5000 bootstrap samples, model 7, Preacher & Hayes, 2008). Reputational concern had a significant indirect effect when interacting with ingroup members, $b = 2.16$, 95% CI [0.17, 5.05], or outgroup members, $b = 2.34$, 95% CI [0.25, 5.54]. The relation was partially mediated since the total effect of gossip (total effect = 11.49, $p < 0.001$) on cooperation remained significant when the mediator was included in the model (direct effect = 9.24, $p = 0.008$).

Thus, Study 4 continued to find support for an unbounded indirect reciprocity perspective (H2a, H2b)—people were more cooperative in response to gossip to a future partner regardless of this future partner's group membership, and reputational concern mediated this effect. Again, we failed to support the BGR hypotheses that gossip and reputational concern would only affect cooperation with ingroup members (H1a, H1b).

3.5. Study 5

Across all previous studies, we analyzed whether cues of indirect benefits increased cooperation with ingroup and outgroup members using a minimal group paradigm. While the use of minimal groups provides strong internal validity to our studies, a limitation is that the findings may not generalize to natural groups. To address this issue, Study 5 extends our paradigm to interactions between members of two political coalitions in the U.S.: Republicans and Democrats. Previous research has found that both Republicans and Democrats display ingroup favoritism in cooperation (Balliet, Tybur, Wu, Antonellis, & Van Lange, 2016). We conducted the study on the following day after the Inaugural Presidential Address of Donald Trump (January 21, 2017). This event marked the completion of a bitter competition between these coalitions.

3.5.1. Method

3.5.1.1. Participants and design. After excluding five participants who had participated in previous studies, 615 participants (351 women; $M_{age} = 38.12$ years, $SD = 12.43$) recruited from MTurk completed the study for $1.20. The study was a 2 (partner's group membership: ingroup vs outgroup) × 2 (gossip vs no gossip) between-participants design.

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[5] We also tested whether gossip influenced cooperation through the mediation of reputational concern without considering the moderation of group membership (5000 bootstrap samples, model 4; Preacher & Hayes, 2008). The indirect effect of gossip on cooperation was significant through reputational concern, $b = 3.01$, 95% CI [1.77, 4.62].

3.5.1.2. Procedure. Study 5 had a similar structure with Studies 3 and 4 except for the use of natural groups. Participants were asked which political party they most identified with (Republicans or Democrats).[6] Then they read instructions about the Prisoner's Dilemma (PD) task and learned that they would interact with different people in several PD tasks. Similar to the previous studies, participants interacted twice. They were randomly assigned to interact with partners who were always Republican or Democrat. Participants were also randomly assigned to conditions in which their partner in Task 1 could or could not gossip to their partner in Task 2. Same as Study 4, their partner in Task 1 and Task 2 always shared the same group membership. After reading instructions of the PD, participants responded to six comprehension questions, and made decisions in two prisoner's dilemmas. At the end of the prisoner's dilemmas, they completed the measures of reputational concern ($\alpha = 0.76$) and social identification ($\alpha = 0.88$).

3.5.2. Results and discussion

3.5.2.1. Cooperation. In support of *Hypothesis 2a*, people were more cooperative with partners who could gossip to their future interaction partners ($M = 45.35$, $SD = 29.43$), compared to partners who could not gossip ($M = 40.74$, $SD = 29.21$), $F(1, 611) = 4.10$, $p = 0.04$, $d = 0.16$. People also cooperated more with ingroup members ($M = 45.84$, $SD = 29.43$), compared to outgroup members ($M = 40.12$, $SD = 29.21$), $F(1, 611) = 6.01$, $p = 0.01$, $d = 0.20$. Failing to support *H1a*, there was no interaction between partner's group membership and gossip predicting cooperation, $F(1, 611) = 0.22$, $p = 0.64$.

3.5.2.2. Mediation analysis. We tested whether gossip influenced cooperation through the mediation of reputational concern conditionally for ingroup and outgroup members using the bootstrapping method for multiple moderated mediation (5000 bootstrap samples, model 7, Preacher & Hayes, 2008). Reputational concern did not have a significant indirect effect when interacting with ingroup members, $b = -0.15$, 95% CI $[-1.14, 0.48]$, or outgroup members, $b = -0.28$, 95% CI $[-1.70, 0.95]$.

Therefore, in a study using natural groups, we continued to find some support for an unbounded indirect reciprocity perspective (*H2a*)—people were more cooperative in response to gossip to a future partner, regardless of this future partner's group membership. However, Study 5 did not replicate the findings from the previous four studies that supported the hypothesis (*H2b*) that reputational concern mediates the relation between gossip and cooperation regardless of one's future partner's group membership. Study 5 also did not support the BGR hypotheses that gossip and reputational concern would only affect cooperation with ingroup members (*H1a*, *H1b*).

4. General discussion

Do people care about their reputation, and behave in ways to manage their reputation, when interacting with outgroup members? Answers to this question carry both theoretical and practical implications. From a theoretical point of view, people should be cooperative in situations when their behavior can affect their reputation and lead to potential indirect benefits (Panchanathan & Boyd, 2004). However, some theory has suggested that indirect benefits are limited to social exchange with ingroup members. Specifically, BGR predicts that reputation promotes cooperation among ingroup, but not outgroup, members (Yamagishi & Kiyonari, 2000). Yet, the indirect benefits of social interactions may transcend group boundaries and so reputational concern may promote cooperation with both ingroup and outgroup

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6   We also included three items that measured political ideology: (a) left vs. right (Balliet et al., 2016), (b) an item that asked people who they voted for in the last presidential election, and (c) one item about which political party they identified with (Republican, Democrat, or other), along with a measure of outgroup hate (Duckitt, 2006).

members (Milinski et al., 2001; Panchanathan & Boyd, 2004; Wu et al., 2015, 2016). From this unbounded indirect reciprocity perspective, people should increase cooperation in response to cues that their behavior can carry reputational consequences, regardless of whether they are interacting with ingroup or outgroup members. The primary objective of this work was to test these competing predictions from BGR and this unbounded indirect reciprocity perspective.

Across five studies, we manipulated (a) cues that cooperation could have reputational consequences (or not) and (b) if people were interacting with an ingroup or outgroup member in a cooperative decision making task. Across our studies, we operationalized reputation and group membership differently. Studies 1 and 2 manipulated reputational consequences by making participants' choice public or anonymous to their future partner. Studies 3 to 5 manipulated reputational consequences through gossip, such that participants' current interaction partner could gossip to their future partner who was an ingroup or outgroup member. Studies 1 to 4 used a minimal group paradigm to create groups, while Study 5 used natural groups—two competing political coalitions in the United States (Republicans and Democrats). Moreover, our studies employed several different measures of cooperation (dictator game, prisoner's dilemma, and public goods dilemma). One resounding message is clear from our findings: people always cooperated more when their reputation was at stake, even when their reputation was transmitted to a future interaction partner who was an outgroup member.

These studies provide evidence in support of an unbounded indirect reciprocity perspective. According to this approach, people condition their cooperation on cues that an interaction may result in future indirect benefits (see Wu et al., 2016). This ability can rely on several cues of indirect benefits, such as observability, monitoring, and others' social network connections (e.g., the potential to gossip). Such cues may lead to an explicit concern for the collective beliefs about oneself (i.e., reputational concern), which motivates cooperation. This approach predicts that cues of reputation will affect cooperation, independent of any effect of group membership. Indeed, a random effects meta-analysis also found support for a main effect of reputation on cooperation independent of group membership across all studies ($k = 5$, $N = 2814$, $d = 0.26$, 95% CI $[0.17, 0.35]$). Studies 1 and 2 found that reputational concern positively relates to cooperation across interactions with ingroup members, outgroup members, and unclassified strangers. In these studies, partner's group membership was a within-participant manipulation, and so we could not test how reputational concern was affected by interacting with either an ingroup or outgroup member. Studies 3 to 5 used a between-participants manipulation of group membership and subsequently measured reputational concern after the interaction with an ingroup or outgroup member. Studies 3 and 4 found that the positive effect of cues of gossip on cooperation was mediated by reputational concern when interacting with ingroup and outgroup members. Although we did not replicate this finding in Study 5, a random effects meta-analysis across all five studies ($k = 5$, $N = 2814$) clearly suggests that cues of indirect benefits enhance reputational concern independent of partner group membership, $d = 0.42$, 95% CI $[0.27, 0.58]$. Thus, across our studies, we find that people care about their reputation, and behave in ways to promote a positive reputation, even when reputation is being transmitted to future interaction partners who are outgroup members. Indeed, reputation matters across group boundaries and indirect reciprocity is unbounded by group membership.

These studies do not support BGR's hypothesis that people would cooperate more with ingroup members than outgroup members only when their reputation was at stake. Across five studies that employed different manipulations of group membership (minimal and natural groups), multiple cues of reputation (anonymity and gossip), and several measures of cooperation (dictator game, prisoner's dilemma, and public goods game), we found that cues of reputation continued to affect cooperation independent of partner's group membership. Moreover, these studies were sufficiently powered to detect a small effect

of group membership at each level of the reputation manipulation. Applying a Bayesian approach to analyze support for the null hypothesis about the interaction between group membership and reputation on cooperation, we can infer moderate to strong levels of support for the null hypothesis.[7] Taken together, these studies do not support the hypothesis that reputation is group bounded or that people only cooperate to promote their reputation among ingroup members.

The results of this research and the unbounded indirect reciprocity perspective may be used to explain previous findings that outcome interdependence could increase cooperative behavior with outgroup members (Stroebe et al., 2005). Indeed, future interdependence with outgroup members can be a cue of possible indirect benefits of current behavior. Moreover, the present findings extend previous research that found that direct reciprocity opportunities can promote cooperation with outgroup members (Yamagishi & Kiyonari, 2000). Here we show that even indirect benefits can promote cooperation with outgroup members. This is important, because direct and indirect benefits do not always shape behavior in the same way or via the same psychological mechanisms. Indirect reciprocity raises unique adaptive problems, such as the promotion and maintenance of large-scale cooperation in social networks, and may require specialized cognitive and motivational abilities to address these problems. For example, Wu et al. (2016) found that, contrary to direct reciprocity opportunities, people do not condition their behavior on explicit expectations of indirect benefits. Thus, there may be different psychological mechanisms operating to promote direct and indirect reciprocity, and future research should further examine how these different mechanisms can promote cooperation with outgroup members.

Across several of our studies we continued to observe that people were more cooperative with ingroup than outgroup members. Previous theoretical accounts of this phenomenon have been social identity theory and bounded generalized reciprocity (see Balliet et al., 2014). In Studies 1 and 2, we manipulated participants' level of social identification with their group. Despite the fact that this manipulation successfully varied levels of social identification, people did not display greater ingroup favoritism when they had high (vs. low) identification with their group. These results are consistent with recent research that did not support SIT relative to reputation-based accounts of ingroup favoritism in cooperation (Balliet et al., 2014; Yamagishi & Mifune, 2016; Yamagishi et al., 1999). That said, we also did not find support for the BGR hypothesis that ingroup favoritism can be explained by reputation-based cooperation.

Considering the evidence presented here, it seems as though any cognitive and motivational processes operating to detect and respond to situations that present possible indirect benefits are different from psychological mechanisms regulating social exchange between groups. Evolutionary theories of coalitional psychology and cooperation posit functionally specialized mechanisms that evolved to solve specific adaptive problems (Cosmides & Tooby, 2005). Theory suggests that humans may possess specialized psychological mechanisms that enable people to learn from groups in a local environment and that this is associated with different outputs, such as cooperation, aggression, and conformity (Henrich & Boyd, 1998; Kurzban, Tooby, & Cosmides, 2001). It may be that a functionally specialized coalitional psychology is operating independent of any ability to infer when to condition behavior to acquire indirect benefits or that these mechanisms can operate when reputational cues are absent. Thus, ingroup favoritism in cooperation may serve a different function, or if it serves the function to acquire indirect benefits, it might operate through a different set of psychological mechanisms, such as a coalitional safety index (Boyer, Firat, & van Leeuwen, 2015), or an ability to capture multiple network externalities

in clusters (Levine & Kurzban, 2006). Future research could benefit from a closer scrutiny of the different possible functions underlying intergroup discrimination in cooperation and the proximate mechanisms operating to make it happen.

Reputation-based cooperation may provide some insight into reducing intergroup conflict, discrimination, and promoting intergroup harmony. Our results suggest that reputation-based cooperation can be a solution to promoting cooperation with ingroup and outgroup members. Applying reputation mechanisms (e.g., public monitoring, evaluation, and information sharing) can be efficient solutions to promote cooperation across group boundaries (Feinberg, Cheng, & Willer, 2012), but only when people understand their future interdependence with both ingroup and outgroup members. Such a solution to reducing discrimination can be strengthened by future research that examines additional cues that inform when behavior can lead to indirect benefits. For example, cues of social network properties that describe a current interaction partner's position in a social network, such as centrality and density, may impact when people cooperate to maintain a positive reputation (Apicella, Marlowe, Fowler, & Christakis, 2012; Curry & Dunbar, 2011; Gallo & Yan, 2015). Indeed, such cues may promote cooperation both within and between groups.

To conclude, our studies clearly demonstrate that people respond to cues of reputation with an increase in cooperation, regardless of whether they are interacting with an ingroup or outgroup member. Such findings address competing theoretical perspectives that indirect benefits are restricted to ingroup members or also extend to interactions with outgroup members. Future research needs to shed light on the complex mechanisms underlying why people tend to discriminate in favor of their ingroup members, even when reputational cues are not at stake. One existing theory stresses the role of social identity and self-esteem, but we did not find evidence in support of that theory. Attempts to provide an ultimate explanation of ingroup favoritism may be useful in generating hypotheses about the proximate psychological processes underlying this phenomenon.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jesp.2017.02.008.

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[7] We used the Bayes Factor (*BF*) to quantify the evidence in support of the null hypothesis (Morey, Rouder, & Jamil, 2015). Results from these analyses show moderate to very strong support for the null hypothesis ($BF_{study1} = 0.02$, $BF_{study2} = 0.03$, $BF_{study3} = 0.15$, $BF_{study4} = 0.11$, $BF_{study5} = 0.10$) (Jeffreys, 1961).

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