# "In-Group Love" and "Out-Group Hate" in Repeated Interaction Between Groups

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ABSTRACT

Costly individual participation in intergroup conflict can be motivated by "in-group love" — a cooperative motivation to help the in-group, by "out-group hate" — an aggressive or competitive motivation to hurt the out-group, or both. This study employed a recently developed game paradigm (Halevy, Bornstein, & Sagiv, 2008) designed specifically to distinguish between these two motives. The game was played repeatedly between two groups with three players in each group. In addition, we manipulated the payoff structure of the interaction that preceded the game such that half of the groups experienced peaceful coexistence and the other half experienced heightened conflict prior to the game. Enabling group members to express in-group love independently of out-group hate significantly reduced intergroup conflict. Group members strongly preferred to cooperate within their group, rather than to compete against the out-group for relative standing, even in the condition in which the repeated game was preceded by conflict. Although both "in-group love" and "out-group hate" somewhat diminished as the game continued (as players became more selfish), choices indicative of the former motivation were significantly more frequent than choices indicative of the latter throughout the interaction. We discuss the implications of these findings for conflict resolution. Copyright © 2011 John Wiley & Sons, Ltd.

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From the individual's perspective, participation in large-scale intergroup conflicts (e.g., war) is plainly irrational. The cost of participation (e.g., risk of injury or death) is high, the effect it can possibly have on the conflict's outcome is negligible, and, if one's group does win the conflict, the benefits (e.g., territory) are public goods shared by all group members regardless of whether they have paid the cost of participation (Bornstein, 1992, 2003; Dawes, 1980; Gould, 1999).

Nevertheless, individual participation in intergroup conflicts is rational, indeed essential, from the group's point of view. Since "the probability that a group wins a conflict depends on the difference in the number of fighters in the two groups" (Choi & Bowles, 2007, p. 637), a group that fails to mobilize sufficient individual participation will most likely lose the competition, and its members, participants and nonparticipants alike, will bear the costs of defeat. To overcome this fundamental gap between the collective interest of the group and the interests of its individual members, groups employ powerful "solidarity mechanisms" (e.g., Campbell, 1965, 1972; Levine & Campbell, 1972), designed, or evolved through cultural group selection (e.g., Bernhard, Fischbacher, & Fehr, 2006; Boyd, Gintis, Bowles, & Richerson, 2003), to uphold individual willingness to "fight and die" for the in-group.

Regrettably, the more effective groups are in mobilizing individual participation, the more destructive is the conflict between them. As noted by Baron (2001), war is "zero sum except for the effort expended in competition itself" (p. 85), and all individuals on both sides would be better off if they all refused to take any part in it. From the collective point of

view universal defection (and the ensuing peace) is clearly the best state of affairs.

To model these relations between individual, group, and collective interests, Bornstein (1992, 2003) introduced the Intergroup Prisoner's Dilemma (IPD) game (see also Baron, 2001; Bornstein & Ben-Yossef, 1994; Probst, Carnevale, & Triandis, 1999). The IPD game is exemplified here as a competition between two groups, with three members in each group. Each player receives an endowment of two money units (MUs) and can either keep the endowment or contribute it to a common pool. For each contribution, each in-group member, including the contributor, gains 1 MU and each out-group member loses 1 MU.

This simple game captures the key strategic properties of large-scale intergroup conflicts as described above. Because the individual's return from contributing a 2 MU endowment is only 1 MU, the unconditionally best (i.e., dominant) *individual* strategy is to withhold contribution (i.e., defect). However, because contribution generates a total of 3 MUs for the in-group while costing it only 2 MUs, the dominant *group* strategy is for all group members to contribute. Finally, since the in-group's gain from contribution is exactly offset by the out-group's loss, contribution is a net waste of 2 MUs from the *collective* point of view. The collectively optimal strategy, the one that maximizes the payoff of both groups and all players, is for all players to defect.[1]

What motivates individual behavior in intergroup conflict as modeled by the IPD game, where "action in favor of one's group is beneficial for the group but costly to both the individual and the world" (Baron, 2001, p. 285)? Individual contribution (i.e., participation) can be motivated

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[1]The first and second properties of the IPD game define the game within each group as an *N*-person (three-person in our example) PD game. The second and third properties define the game between the two groups as a two-person PD game.

by in-group love—a cooperative desire to help the in-group. But it can also result from out-group hate—an aggressive motivation to hurt the out-group, or a competitive motivation to increase the in-group's advantage over the out-group (Brewer, 1999; cf. Arrow, 2007; Bernhard et al., 2006). In the IPD game where one must hurt the out-group to help the in-group (and *vice versa*), in-group love and out-group hate are indistinguishable.[2] The motivation underlying individual defection is similarly ambiguous. Defection can be motivated by narrow self-interest, but it can also reflect a true concern for the collective welfare of all players in both groups. In the IPD game, as in the social reality that it models, free riding and pacifism (or universalism) are impossible to tell apart.

To remove these ambiguities, Halevy et al. (2008) devised a variation of the IPD game, called the Intergroup Prisoner's Dilemma—Maximizing Difference (IPD-MD) game. In the IPD-MD game, group members can direct their contributions to either of two pools: A "between-group" pool, which, as in the IPD game, increases the payoffs to each in-group member by 1 MU and decreases the payoff to each out-group member by 1 MU; and a "within-group" pool which increases the payoffs to each in-group member by 1 MU but has no effect on the out-group (see also: De Dreu et al., 2010; Halevy, Chou, Cohen, & Bornstein, 2010).

Providing group members with the option of helping the in-group without hurting the out-group reveals the social preferences underlying their potential choices. Defection is now plainly selfish and can no longer be confused with a concern for the collective welfare. Contribution to the within-group pool (pool W) is a clear indication of in-group love—the cooperative motivation to increase the in-group's payoff. Contribution to the between-group pool (pool B) can only be motivated by out-group hate—the aggressive motivation to hurt the out-group (or the competitive motivation to increase the in-group's relative payoff). Strictly speaking, if players care only about their in-group's welfare and completely disregard that of the out-group, they should be indifferent between the two pools. We make the reasonable assumption, however, that players will choose to hurt the out-group (by contributing to pool B) if and only if they derive some positive utility from doing so. Players who gain nothing from the out-group's losses will intentionally refrain from contributing to the competitive pool.

## The dynamics of intergroup interaction

Studying the one-shot IPD-MD game, Halevy et al. (2008) found substantial evidence for in-group love but little indication of out-group hate. On average, players in their experiment contributed about 50% of their endowment to pool W, and only 6% to pool B. Moreover, when in-group members were allowed pre-play communication, contribution to pool W increased to almost 70%, while contribution to pool B remained at a low 4%. Clearly, group members, both alone and as a group, chose to maximize the group's absolute outcome rather than its outcome relative to that of the out-group. They chose to do so even though in the one-shot setting they could disadvantage the out-group at no additional cost or risk of retaliation.

The present experiment extends Halevy et al.'s study by studying repeated interaction in the IPD-MD game. In reality, intergroup relations are rarely static and typically involve numerous interactions between the same parties over a (possibly long) period of time. This is the case, for example, with rivalry between fans of different sport teams, members of rival political parties, or the citizens of neighboring countries engaged in hostilities (e.g., the Israeli–Palestinian conflict). Repeated play is profoundly different from one-shot play as it enables the players to employ contingent or reciprocal strategies—strategies that depend on earlier choices of the other players (e.g., tit-for-tat, Axelrod, 1984; Heide & Meiner, 1992; Murnighan & Roth, 1983). As a result, behavior that is irrational in the one-shot game may be rational when the game is repeated and the set of mutually rational (i.e., equilibrium) outcomes becomes larger. Since in the two-level (Putnam, 1988) IPD-MD game reciprocation can take place both within and between the groups, three distinct outcomes of this dynamic process are theoretically possible.

One potential outcome—*intragroup cooperation*—is characterized by a high level of cooperation within the groups and little or no competition between the groups. This outcome is the best from the collective point of view of both groups and all individuals. When all players contribute to pool W and no one contributes to pool B, each earns 3 MUs. Another possible outcome—*intergroup competition*—involves a high level of competition between the groups. This is the worst possible result from the collective point of view. When all the players contribute to pool B they each earn nothing. The escalation of intergroup conflict to a full scale "war" can result, as it often does in reality, from group members treating even small contributions to pool B made by the out-group (contributions that might very well be errors due to a "trembling hand") as provocative acts of aggression, and retaliating in kind (Gould, 1999).

Finally, a third outcome that has to be considered is *universal defection*. A consistent finding in public-good experiments is that cooperation declines with time. This decay of cooperation is often attributed to a breakdown of trust, where "strong reciprocators" (Gintis, 2000)—group members who are willing to cooperate with cooperative others—are dragged by a minority of free-riders to the equilibrium of zero cooperation. A decline in cooperation can also be a result of individual learning—another process made possible by the dynamic nature of the repeated game. The learning hypothesis assumes that not all players immediately grasp the strategic properties of the stage game and some only learn to play the dominant, free-riding, strategy as they gain more experience. Since different players

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[2]Individual participation in intergroup conflict modeled by the IPD game was found to be higher than that in a single-group PD game with an identical payoff structure (Baron, 2001; Bornstein & Ben-Yossef, 1994; Probst et al., 1999). This increased willingness to contribute in the intergroup game as compared with the single-group game reflects "parochial altruism"—self-sacrificial behavior that benefits in-group members while hurting out-group members (De Dreu et al., 2010).

learn at different speeds, the average contribution is predicted to decline over time (e.g., Camerer, 2003). In the IPD-MD game, the payoffs associated with universal defection are not the best possible, as players do not benefit from intragroup cooperation, but they are also not the worst, as players do not lose their initial endowment.

Whether group members compete against the out-group or cooperate in solving their internal dilemma is likely to depend on the history of relations between their groups. To examine how "history" or starting conditions affect the course and outcome of intergroup interaction, we included in our experiment a condition where the participants played the more competitive IPD game before playing the IPD-MD game. Specifically, subjects first played multiple rounds of the IPD game, where contribution is restricted to pool B, then the option to contribute to pool W was introduced, and the same players played additional rounds of the IPD-MD game. This condition (labeled IPD) was compared with a baseline condition, in which the participants played the IPD-MD game throughout their interaction (labeled IPD-MD).

This form of "history" is undoubtedly stripped of many important aspects of real-world interactions between groups (e.g., enduring social identities, powerful solidarity mechanisms, and conflict-legitimizing worldviews). Nonetheless, since, based on previous findings (Bornstein, Erev, & Goren, 1994; Bornstein, Winter, & Goren, 1996; Goren & Bornstein, 2000), we hypothesize that the participants in the IPD condition will make substantial contributions to pool B, while those in the IPD-MD condition will not, this manipulation allows us to examine how the dynamics in the repeated IPD-MD game are affected by the different starting conditions.

Halevy et al.'s (2008; 2010) research with the one-shot IPD-MD game found that group members *do not initiate* intergroup competition in this environment. The present study enables us to examine whether this peaceful coexistence between the groups, and the fairly cooperative relations within them, will persist when the interaction is repeated. Will group members become more selfish, more cooperative, or perhaps more competitive over time? Will this depend on the history of the relations between the groups?

Competing predictions are derived from two prominent theories of intergroup relations. Realistic conflict theory (Campbell, 1965; Sherif, 1966) posits that intergroup competition is driven by incompatible group interests and that when, as in the IPD-MD game, there are no structural reasons to compete, group members would maximize absolute rather than relative group gains (even following a period of intergroup competition in an environment where absolute and relative gains are confounded). In contrast, social identity theory (Tajfel & Turner, 1979, 1986) proposes that intergroup competition is driven by group-level social comparison, and consequently, that group members are motivated to maximize relative, rather than absolute, group gains. In the IPD-MD game, where maximizing relative group gain is costless, group members are clearly predicted to choose the competitive course of action.

## METHOD

### Participants
One hundred and forty-four undergraduate students participated in the experiment (54.9% female; Mean age = 24, $SD = 2$ years). Students signed up for a subject pool and were recruited by e-mails offering a monetary incentive for participation in a group decision-making experiment.

### Design and Procedure
Participants arrived at the laboratory in cohorts of 12 and were randomly assigned to one of two conditions: "IPD" or "IPD-MD". Participants in both conditions received written instructions concerning the rules and the payoff structure of the relevant game. The instructions were phrased in neutral language with no mention of either cooperation or competition. The experimenter read the instructions aloud, answered any questions, and verified that all the participants responded correctly to a short quiz that tested their understanding of the game.

Each participant was seated in a private cubicle facing a computer terminal. A main server randomly assigned the participants to four three-person groups and matched each group with another group. Group composition and group matching were kept constant across all the rounds of the game, and this was common knowledge. Two independent games (each involving two three-person groups) took place simultaneously. The participants did not know who was in their group and who was in the other group. All the decisions in the game were made in full privacy using the computer. The participants knew that their decisions involved real money, and that they would remain confidential even after the experiment was over.

The participants first played 30 rounds of either the IPD or the IPD-MD game, depending on the experimental condition. After 30 rounds, a notice appeared on all screens asking the participants to wait for further instructions. The participants in the IPD-MD condition were told that this interruption was introduced automatically by the software and were asked to resume making decisions as before. The participants in the IPD condition received new instructions for the remainder of the experiment—this time for the IPD-MD game. The participants were told that group composition and group matching remained the same, and that their payoffs in subsequent rounds would be added to those already obtained in previous rounds. The participants in both conditions played the IPD-MD game for 30 additional rounds, for a total of 60 rounds. The participants knew in advance that the game would be played for multiple rounds. They did not know, however, exactly how many rounds there would be.

At the beginning of a round, each participant was given 10 tokens worth 2 MUs each. Each token contributed to pool W added 1 MU for each in-group member, including the contributor; while each token contributed to pool B also subtracted 1 MU from each out-group member. The relevant pools were presented on the screen using color codes (i.e. participants had to distribute their resources among the red,

blue, and green pools). Each pool was initially set at zero tokens and the participants had to determine the number of tokens they wished to invest in each of the available pools. Their investments had to add up to 10 before they could continue. The computer subsequently requested the participants to confirm their decision and wait for all the other participants to make their decisions.

Once all 12 participants had submitted their decisions, the main server pooled all the decisions and provided each participant with feedback on the round that had just ended. The players were informed about the decisions of the other two in-group members, the decision of the three out-group members, and their payoff for that round. An additional window at the top of all screens (including both the decision and the feedback screens) displayed the participant's cumulative payoff in MUs. At the end of the experiment MUs were cashed at a rate of 30 MUs = 1 NIS (New Israeli Shekel; approximately $0.25 at the time of the experiment). The experiment lasted about 1 hour, and the average payment per participant across the two conditions was 41 NIS (approximately $10; $SD = \$1.75$). Payments were made individually, and the participants were debriefed, thanked, and released one at a time.

## RESULTS

Since the same six players (in two groups of three) interacted repeatedly, we treated all six as a single observation in our analysis. We had 24 such independent observations, 12 in each of the two experimental conditions. Figure 1 presents the proportion of tokens these subjects kept, contributed to pool W and contributed to pool B as a function of the experimental condition and game round. Furthermore, since we are not interested in round-to-round fluctuations in behavior, but rather in more general time trends, especially as they may vary between experimental conditions, we computed, for each six-person group, the mean allocation of tokens to each pool in each of four 15-round blocks, and the analysis is mostly based on these averages, rather than on

the allocations in each of the 60 rounds. Table 1 presents the proportion of tokens kept, contributed to pool W, and contributed to pool B in each of these blocks.

First, we looked at the results pertaining to the IPD-MD condition. In each decision round in this condition players could divide their contributions between pool W, which increases their group's payoff, and pool B which, in addition, decreases the out-group's payoff. As can be seen in Figure 1, participants contributed on average 31.54% ($SD = 12.80\%$) of their endowment to pool W, as compared with only 5.25% ($SD = 5.35\%$) to pool B. The rest of the endowment (63.20%, $SD = 12.87$) was kept for private use. By and large, this pattern of results with considerable intragroup cooperation and little intergroup competition is similar to that observed in the one-shot game (Halevy et al., 2008; Halevy et al., 2010).

The data in Table 1 suggest that the proportion of contributions to both pools W and B tended to decrease over time, and that the proportion of tokens kept for private use tended to increase. These observations are confirmed by repeated measures analysis of variances (ANOVAs), with block as a within-subject variable and the contribution to each pool (in the IPD-MD condition) as the dependant variable. The decline in contributions to both pools W and B was statistically significant ($F(3,33) = 4.14$, $p = .014$, $F(3,33) = 7.01$, $p < .001$, respectively), as was the increase in the number of tokens kept ($F(3,33) = 9.68$, $p < .001$). This decline in contribution rates is consistent with the dynamics observed in previous experiments on iterated public good games (e.g., Camerer, 1995), and the IPD game in particular (Bornstein et al., 1994; Bornstein et al., 1996; Goren & Bornstein, 2000).

Next, we examined the IPD condition. Recall that in the first 30 rounds of this condition contributions were restricted to pool B; then pool W was added and the same participants played additional 30 game rounds. In the first (IPD) part of the interaction, the rate of contribution to pool B was 26.50% ($SD = 12.05\%$). In the second (IPD-MD) part, this rate dropped to 5.72% ($SD = 5.19\%$). A repeated measure ANOVA with block as a within-subject variable and contribution to pool B as the dependent variable found a
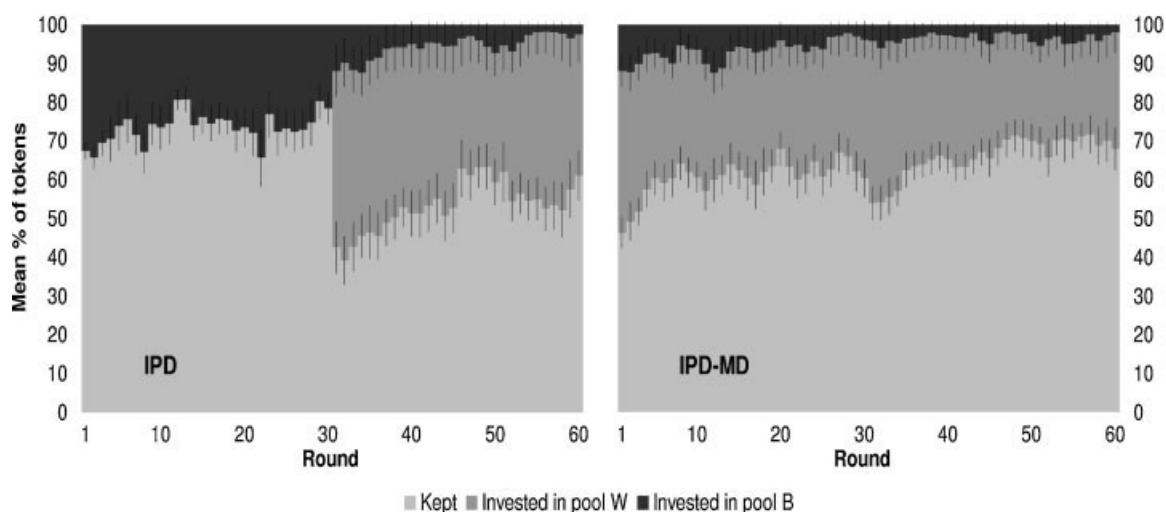


Figure 1. Proportion of tokens kept, contributed to pool W and contributed to pool B as a function of experimental condition and game round.

Table 1. Mean percentage (and *SD*s) of tokens kept, contributed to pool W, and contributed to pool B by block

| Game | Behavior | Rounds 1–15 | Rounds 16–30 | Rounds 31–45 | Rounds 46–60 |
|------|----------|-------------|--------------|--------------|--------------|
| IPD | Kept | 72.97 (11.73) | 74.02 (15.20) | 48.50 (18.83) | 57.91 (17.51) |
| | Contributed to pool W | — | — | 43.89 (17.74) | 38.26 (18.61) |
| | Contributed to pool B | 27.03 (11.73) | 25.98 (15.20) | 7.62 (6.20) | 3.83 (5.51) |
| IPD-MD | Kept | 58.35 (13.67) | 62.69 (15.64) | 62.09 (11.14) | 69.68 (13.77) |
| | Contributed to pool W | 32.80 (13.04) | 32.26 (15.41) | 34.24 (12.08) | 26.88 (13.86) |
| | Contributed to pool B | 8.85 (6.95) | 5.05 (7.35) | 3.67 (4.94) | 3.44 (4.46) |

highly significant block effect ($F(3,33) = 25.80$, $p < .001$).[3],[4] The same analysis restricted to the first two blocks revealed that contributions to pool B were rather stable in this first part of the game ($F(1,11) = 0.08$, $p = .78$). However, during the second, IPD-MD part of the IPD condition, contributions to pool B decreased significantly between blocks 3 and 4 ($F(1,11) = 5.73$, $p = .036$).

Finally, we also compared intergroup behavior in the two conditions. We conducted three mixed-design ANOVAs, with the experimental condition (IPD or IPD-MD) as a between-subject variable, block (one-two or three-four) as a within-subject variable, and the rate of free-riding, intergroup competition, and intragroup cooperation as dependent variables. We conducted separate analyses for the first (blocks one and two) and second (blocks three and four) parts of the repeated games. The analysis of the first part focuses on the differences between the repeated IPD and IPD-MD games; the analysis of the second part addresses the effect of history on allocations in the repeated IPD-MD game.

We first compared the effects of condition and block on free-riding—the number of tokens kept. In blocks one and two participants kept significantly more tokens in the IPD condition (73.50%, $SD = 12.05\%$) than in the IPD-MD condition (60.52%, $SD = 14.41\%$; $F(1,22) = 5.72$, $p = .026$), indicating perhaps that some individuals in the IPD game were reluctant to hurt the out-group in order to help the in-group, and as a result, withheld contribution. The block effect and the interaction were not significant ($F(1,22) = 1.85$, $p = .19$, $F(1,22) = 0.69$, $p = .41$, respectively).

In blocks three and four the picture is reversed. More tokens were kept in the IPD-MD condition (65.88%, $SD = 12.22\%$) than in the IPD condition (53.20%, $SD = 17.54\%$; $F(1,22) = 4.22$, $p = .052$), indicating that the "history of conflict" in the first two blocks of the IPD condition might have had a positive effect on participants' willingness to contribute in the subsequent IPD-MD game. In both conditions more tokens were kept for private use in block four than in block three; there was a significant effect for block ($F(1,22) = 28.56$, $p < .001$), and a non-significant block by condition interaction effect ($F(1,22) = 0.33$, $p = .57$), indicating that free-riding increased from block three to four in both conditions.

Next, we analyzed the effect of condition on the degree of intergroup competition (allocation to pool B). As expected, in the first two blocks contribution rates to pool B in the IPD condition (26.50%, $SD = 12.05\%$) were significantly higher than those observed in the IPD-MD condition (6.95%, $SD = 6.58\%$; $F(1,22) = 24.33$, $p < .001$). The block and interaction effects were not significant ($F(1,22) = 1.51$, $p = .23$, $F(1,22) = 0.49$, $p = .49$, respectively).

In the last two blocks, the difference in intergroup competition between the conditions somewhat diminished and was no longer significant (IPD: 5.72%, $SD = 5.19\%$; IPD-MD: 3.56%, $SD = 4.62\%$; $F(1,22) = 1.17$, $p = .29$). There were, however, significant block ($F(1,22) = 5.84$, $p = .024$) and interaction effects ($F(1,22) = 4.61$, $p = .043$), which indicated that intergroup competition subsided with time in the IPD condition. This observation was supported by two Wilcoxon Rank-Sum tests (WRS) that compared the rates of intergroup competition in the two conditions in blocks three and four separately. These tests yielded a marginally significant effect of condition in block three ($Z = 1.92$, $p = .055$) but an insignificant effect in block four ($Z = 0.56$, $p = .58$), suggesting that after the option to invest in pool W was introduced, intergroup competition gradually subsided to the same level as in the IPD-MD condition.[5]

To complete the comparison, we ran a similar ANOVA with the rate of intragroup cooperation—investment in pool W—as the dependent variable. This analysis is only relevant to the second part of the repeated games, in which both conditions included the possibility to invest in pool W. Contributions to pool W in blocks three and four were somewhat higher in the IPD condition (41.07%, $SD = 17.16\%$) as compared with the IPD-MD condition (30.56%, $SD = 12.71\%$); however, the effect was not statistically significant ($F(1,22) = 2.91$, $p = .10$). Still, it is noteworthy that if anything, the history of conflict in the IPD condition had a positive rather than negative effect on the magnitude of intragroup cooperation compared to the

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[3] A similar ANOVA taking into account two 30-round (rather than four 15-round) blocks as two levels of the within-subject variable also yielded a highly significant block effect ($F(1,11) = 46.45$, $p < .001$).

[4] In fact, contribution to pool B decreased immediately after pool W was introduced. In round 30, the last IPD round, the mean contribution was 21.67%. In round 31, the first IPD-MD round, it was already 11.93% (Wilcoxon Signed Rank Test: $S = 27.5$, $p = .029$).

[5] One could argue that re-starting the game in the IPD condition with an option of contributing to pool W hinted the participants that we expected them to use this new option. To test this "demand characteristics" explanation we included another control condition ($n = 72$; 12 independent 6-person games). In this condition, which was otherwise identical to the other two, contributions in the first 30 rounds were restricted to pool W (that is, each group played an independent 3-person PD game without the ability to affect the out-group's outcome). Then pool B was introduced, and the same players played additional 30 rounds of the IPD-MD game. The fact that players in this condition contributed only a small fraction of their endowment (2.3%) to pool B indicates that they were not simply using any newly available strategy. In particular, it attests against the possibility that the players in the second part of the IPD condition contributed to pool W merely because it was new.

relatively peaceful history in the IPD-MD condition. The block effect was significant ($F(1,22) = 11.59$, $p = .003$), and the interaction was not ($F(1,22) = 0.21$, $p = .654$), indicating that contributions to pool W decreased in a similar fashion in both conditions.

## DISCUSSION

This study, employing the repeated IPD-MD game, replicated and extended the results observed by Halevy et al. (2008) in the one-shot IPD-MD game. It demonstrated once again that individual group members are not competitive or aggressive per se, and, when given the choice, they strongly prefer to cooperate so as to maximize their absolute group gains, rather than compete against the out-group for relative gains. Although in-group love somewhat diminished as the game progressed (as players became more selfish), contributions to the within-group pool were a great deal more frequent than contributions to the between-group pool throughout the entire interaction.

Particularly notable is the finding that in-group love prevails over out-group hate even following a period of conflict between the groups. In the first part of the IPD condition, when increasing the in-group's gain was necessarily at the expense of the out-group, group members competed to a considerable extent. However, in the second part, when it became possible to benefit the in-group without hurting the out-group, intergroup competition quickly subsided, indicating that it was indeed fueled by in-group love rather than out-group hate (Brewer, 1999). The fact that group members refrained from escalating the conflict suggests that they attributed out-group members' competitive choices in the IPD game to the structure of the situation rather than a competitive or aggressive motivation (Halevy et al., 2010). Attributing competitive choices to in-group love rather than out-group hate enabled the groups to effectively decrease intergroup competition when the structure of the situation changed to an IPD-MD game. Clearly, enabling group members to display in-group love independently of out-group hate can *reduce* an on-going intergroup conflict.

These results are generally in line with previous findings, which suggest that in-group love shapes intergroup relations more than out-group hate (Buhl, 1999; Hewstone, Rubin, & Willis, 2002; Lowery, Unzueta, Knowles, & Goff, 2006; Mummendey & Otten, 1998; Yamagishi & Mifune, 2009). The present research adds to this literature by studying, for the first time, the dynamics of in-group love and out-group hate over time in repeated interactions. It is also the first to show that in-group love prevails over out-group hate even following a history of intergroup conflict, and that disentangling these two motivations can effectively serve to *reduce* intergroup conflict. It seems that Campbell (1965) was right in asserting that "the altruistic willingness for self-sacrificial death in group causes may be more significant than the covetous tendency for hostility toward out-group members" (Campbell, 1965, p. 293). Finally, our findings clearly favor the fundamental premise of realistic conflict theory (Sherif, 1966) over that of social identity theory (Tajfel & Turner, 1979): Group members in our experiment competed when the situation was characterized by negative outcome interdependence (in the IPD game), but chose to maximize absolute group outcomes rather than relative group outcomes when given the choice (in the IPD-MD game).

### Future directions and implications for real-world intergroup conflicts

The importance of the present experiment is in establishing that out-group hate does not evolve spontaneously in interaction between randomly composed groups, not even after a period of intergroup conflict. Having established this fact, future investigations can introduce into the laboratory setting various factors—derived from the reality of intergroup relations—that may instigate spiteful intergroup behavior (Mummendey & Otten, 2001). Indeed, a recent study (Halevy et al., 2010) has shown that when group members are put at a disadvantage relative to out-group members, either by previous actions of the out-group or by random misfortune, they contribute substantially more to the competitive between-group pool in the IPD-MD game. Relative deprivation is thus one factor that provokes competitive intergroup behavior.

Another factor that is likely to prompt conflict between groups is the presence of competitive individuals. This can be tested by incorporating into the IPD-MD game players whose strategy set preclude the option to contribute to pool W. These players (who will essentially be playing the IPD game) are likely to make substantial contributions to pool B, which may affect the dynamics of the relations between the groups. Systematically manipulating the proportion of the competitive players in each group, their distribution across the two groups, and whether or not the other players are aware of the nature of their choice set, can provide valuable insights into the conditions that instigate intergroup conflict and potentially push groups away from "peaceful coexistence" towards "war". For example, it can help understand the circumstances under which acts of terrorism, which are typically carried out by a few, can affect the course and outcome of the relations among large-scale political, ethnic, and religious groups.

Finally, the IPD-MD game can also be used to gauge the level of out-group hate among members of real groups with a history of rivalry, supported by ideological beliefs and principled competitive worldviews. This well-defined experimental game, which requires people to make costly, "put your money where your mouth is" decisions, provides a much-needed behavioral measure that can complement the self-report, attitudinal measures typically used to study intergroup relations.

The IPD and IPD-MD games used in this paper model different kinds of intergroup environments. The IPD game is a model of on-going war, in which in-group love and out-group hate converge to promote individual participation and are thus behaviorally indistinguishable (to researchers as well as to the participants). An all-out war, however, is a rare event even within highly hostile intergroup relations

(Bowles, 2008; Choi & Bowles, 2007; Schelling, 1980). Most of the time the relations look more like the IPD-MD game, where the members of each group, both individually and as a collective, face the constant choice between intragroup cooperation and intergroup competition. For example, in some countries young people are given a choice between military service and contribution to society through civil national service (e.g., working in hospitals). Governments must decide how to divide a limited budget between military and civil needs (e.g., improving health care for its citizens). Similarly, to increase their market share companies often have to choose between targeting new clients and trying to steal their competitor's clients. It is in these contexts that the distinction between intragroup cooperation (i.e., in-group love) and intergroup competition (i.e., out-group hate) becomes relevant.

There is evidence that lay persons are sensitive to the difference between these two descriptions of social reality. A recent online survey with U.S. adults found that the tendency to perceive the American military involvement overseas as an IPD game, rather than as an IPD-MD game, correlated positively with respondents' self-reported political conservatism and right-wing authoritarianism (Halevy, unpublished data; see also Halevy, Chou, & Murnighan, forthcoming; Halevy, Sagiv, Roccas, & Bornstein, 2006).

Whether an intergroup conflict is construed as an IPD or an IPD-MD game has important implications for conflict resolution. In the IPD game, "peace" can be achieved only if all the members of both groups act selfishly and defect. To eradicate war, in-group love must be eliminated as well. In the IPD-MD game, groups can avoid "war" while still maintaining their ability to mobilize costly individual contributions to public goods. If out-group hate is restrained by both groups, and in-group love is harnessed to promote intragroup cooperation in the service of worthy group causes (Arrow, 2007), the individuals, the groups, and the "world" (Baron, 2001) would benefit greatly.

## ACKNOWLEDGEMENTS

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