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INTERGROUP CONFLICT: INDIVIDUAL, GROUP AND COLLECTIVE INTERESTS

by

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Intergroup Conflict: Individual, Group, and Collective Interests

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ABSTRACT: Intergroup conflicts generally involve conflicts of interests within the competing groups as well. This paper outlines a taxonomy of games, called *team games*, which incorporate the intragroup and intergroup levels of conflict. Its aims are to provide a coherent framework for analyzing the prototypical problems of cooperation and competition that arise within and between groups, and to review an extensive research program which has utilized this framework to study individual and group behavior in the laboratory. Depending on the game's payoff structure, contradictions or conflicts were created between the rational choices at the individual, group, and collective levels -- a generalization of the contradiction between individual and collective rationality occurring in the traditional mixed-motive games. These contradictions were studied so as to identify the theoretical and behavioral conditions that determine which level of rationality prevails.

1. Introduction

Realistic group-conflict theory (Coser, 1956; Levine & Campbell, 1972; Sherif, 1966) maintains that intergroup conflicts are rational “in the sense that groups do have incompatible goals and are in competition for scarce resources” (Campbell, 1965, p. 287). Although this assumption of rationality pertains to the competing groups, it has been commonly extended to include the individual group members. Inferring that if it is rational for the groups to compete, it must also be rational for the individual group members to do so, researchers have often portrayed realistic conflict theory as "essentially an economic theory" which presumes "that people are selfish and will try to maximize their own rewards" (Taylor & Moghaddam, 1987, p. 34).

Other researchers, however, have realized that what is best for the group is not necessarily best for the individual group member. For example, Campbell (1965) observed that "group-level territoriality has always required that the soldier abandon for extensive periods the protecting of his own wife, children, and home" (p. 24). Similarly, Dawes (1980) noted that "soldiers who fight in a large battle can reasonably conclude that no matter what their comrades do they personally are better off taking no chances; yet if no one takes chances, the result will be a rout and slaughter worse for all the soldiers than is taking chances" (p. 170). And, more recently, Gould (1999) stated that “all group members benefit if the group acts collectively in defense of its shared interests, but even moderately sensible members might hesitate before joining a possibly fatal fray” (p. 359).

The tension between the collective interest of the group and the interests of its individual members, referred to by these researchers, is unavoidable. It stems from the fact that the benefits associated with the outcome of intergroup conflicts (e.g., territory, political power, status, pride) are *public goods* that are non-excludable to the members of a group, regardless of their contribution to their group’s effort (Rapoport

& Bornstein, 1987). Since contribution entails personal cost (e.g., of time, money, physical effort, and risk of injury or death), rational group members have an incentive to *free-ride* on the contributions of others. The problem, of course, is that if everyone else in the group tries to free-ride as well, the group is bound to lose the competition and the public good will not be provided, or, worse yet, a public "bad" will be provided for contributors and non-contributors alike.

This intragroup problem of public goods provision, and its effects on conflict resolution at the intergroup level, has received surprisingly little attention. As observed by Gould (1999) "the issue of interest [in studies of intergroup conflicts] is typically not how groups overcome internal obstacles to collective action but rather why members of distinct social groups see their interests as conflicting in the first place … the transition from group interest to group action is often treated either implicitly as unproblematic, or explicitly as a function of response to conflict" (p. 356).

The central assertion of this paper is that the inherent tension between group interest and individual interest is, in fact, the key for understanding intergroup conflicts. Most of all, the need to mobilize individual contribution in spite of the incentive to take a free-ride necessitates powerful "solidarity mechanisms" (Campbell, 1965) within the competing groups. Collective group goals and common group identity are emphasized, norms of group-based altruism, or patriotism are fortified, punishment and rejection of defectors are increased, and the shared perception of the outgroup is manipulated (Campbell, 1965; Pruitt & Rubin, 1986; Sherif, 1966; Simmel, 1955; Stein, 1976). Whereas the foremost function of these structural and motivational processes is to facilitate cooperation within the groups, they inevitably contribute to the escalation of the conflict between them.

For example, Gilbert (1988) observed that nuclear arms control activists in the United States were often accused of lack of support for American interests. He argues that the main reason why individuals do not oppose nuclear arms policies is that they would have to defend their commitment to the national interest. The situation is complicated further by the fact that the motivation underlying defection in intergroup conflict is inherently ambiguous. Refusing to take part in a war may reflect one's genuine concern for the collective welfare. However, since it is also consistent with the individual's self-interest, a pacifist is likely to be labeled a coward, in addition to being called a traitor.

The problem of public goods provision in intergroup conflict is fundamentally different from that studied in the single-group case. In the case of a single group, the level of contribution needed for the public good to be provided is determined by Nature. Nature, while often uncertain (e.g., Messick, Allison, & Samuelson, 1988; Suleiman, 1997; Suleiman & Rapoport, 1988), never competes back. In contrast, the provision in intergroup conflict is determined by comparing the levels of contribution made by the competing groups. The existence of another group whose choices also affect the outcome requires each group to make complex strategic considerations in deciding whether to cooperate, compete, or strike a certain balance between cooperation and competition. The group’s choice of strategy and its success in carrying it out depends to a large extent on its ability to mobilize contribution from its individual members, and its perception of the outgroup’s ability to do the same.

Clearly, to understand conflict between groups, the intragroup and intergroup levels of conflict must be considered simultaneously. However, the existing paradigms are too restrictive for this purpose. Two-person games (which have been widely use to model intergroup and international conflicts; e.g., Axelrod, 1984, Brams, 1975, Deutsch, 1973) treat the competing groups as unitary players, thus overlooking the free-rider problem within the groups. On the other hand, traditional N-person games (which have been used to model social dilemmas and problems of public goods provision, e.g., Dawes, 1980, Dawes & Messick, 2000) ignore the competition between the groups.

This paper therefore outlines a broader type of games, called *team games*, which incorporates the intragroup and intergroup levels of conflict and shows how the two levels are interrelated. Its aims are to provide a coherent framework for analyzing prototypical problems of cooperation and competition that arise within and between groups, and to review an extensive program of research which has utilized this framework to study individual and group behavior in the laboratory.

2. Intergroup conflicts as team games

A team game involves a competition between two groups of players. Each player independently chooses how much to contribute toward his or her group effort. Contribution is costly. Payoff to a player is an increasing (or at least non-decreasing) function of the total contribution made by members of her own group and a decreasing (or at least non-increasing) function of the total contribution made by members of the opposing group (Palfrey & Rosenthal, 1983). In other words, a player can only benefit from contribution by another ingroup member and can only lose from contribution by an outgroup member.

As a starting point for a taxonomy of team games, I will focus first on intergroup competition over *step-level* public goods (Bornstein & Horwitz, 1993). The group that wins the competition and receives the public good is the one whose members' total contribution of some relevant input (e.g., effort, money, bravery) *exceeds* that of the other group. Sports competitions and elections, where a margin of even one point or one vote is sufficient to provide the disputed resource in its entirety (e.g., gold medals, public office, group pride), exemplify this type of conflict in its purest form. Many other intergroup conflicts, where the benefits increase rapidly at some critical level of input rather than increasing smoothly with contribution (Hardin, 1982, Taylor, 1987), approximate this step-level property. In an arms race, for example, if one side has greater arms strength than the other, it often gains a decisive diplomatic or military advantage and the opportunity to secure most of the contested resources.

In its simplest, *symmetric* form, a step-level team game is defined as an n-person game with the following characteristics:

(i) The game is played by two groups, A and B, with n members in each group.

(ii) Each member of groups A and B receives an endowment of size e ($e > 0$), and then must decide individually whether or not to contribute her endowment.

(iii) Denote the number of contributors in groups A and B by m_A and m_B, respectively. If $m_A > m_B$ ($m_A < m_B$), each member of group A (B) receives a payoff of r units. Members of the losing group receive no reward, and contributions are not refunded. If $m_A = m_B$, then each of the players in both groups receives a payoff of s ($0 \leq s \leq r$) units.

(iv) The game is played once.

(v) The parameters n, e, r, and s are common knowledge.[1]

The taxonomy of step-level team games is based on the ordinal relationships between the payoff parameters: the cost of contribution (e), the utility of a win (r), and the utility of a tie (s). It is always assumed that r > e, but s, the payoff for a tie, can vary from 0 to r. Intergroup conflicts often end up in a stalemate, with neither side clearly winning nor losing the competition. The utility of such an outcome, however, may differ from one conflict to another. In some conflicts the reward in case of a tie is divided equally between the competing sides. In other conflicts where the competition is particularly fierce a tie may be valued more like a loss (Snidal, 1986). In yet other, milder conflicts, groups may only aspire not to lose and therefore value a tie as if it were a win.

Since player i in group A has to choose between two strategies -- to contribute her endowment (C) or to withhold contribution (D) -- four contingencies obtain, depending on the effect of player i's decision on the game's outcome. In the first contingency, $m_A < m_B-1$, player i's decision does not affect the outcome, as her group loses the competition whether or not she contributes. In the fourth contingency, $m_A > m_B$, it is again the case that player i's decision has no effect on the game outcome, since her group wins whether or not she contributes. In the second contingency, $m_A = m_B-1$, player i can change a loss into a tie by contributing her endowment, and in the third contingency, $m_A = m_B$, she can change a tie into a win.

We distinguish between three prototypical step-level team games. The first game satisfies the two inequalities $\boldsymbol{r > (s + e)}$ and $\boldsymbol{s > e}$. Given the first inequality, a rational player should contribute when her contribution is critical for winning the game, and given the second inequality, she should contribute when her contribution is critical for tying the game. We refer to this game as the *Intergroup Public Good* (IPG) game (Rapoport & Bornstein, 1987). The second game satisfies the inequalities $\boldsymbol{r > (s + e)}$ and $\boldsymbol{s < e}$. As in the first game, a rational player should contribute when her contribution is critical for winning, but, in contrast to the first game, she should not contribute when her contribution is critical for tying the game. This game is referred to as the *Intergroup Chicken* game. The third team game is one in which $r < (s + e)$ and $s > e$. For the individual player, contribution is rational only if it is needed to tie the game. This game is called the *Intergroup Assurance* game. Since the games' definitions are based on the *ordinal* relationships between the payoffs, one can generate many different games that fit each category. However, the simplest and most straightforward way to satisfy the defining inequalities is to set s=r/2 for the IPG game, s=0 for the Chicken game, and s=r for the Assurance game (the experiments described in this paper used these parameters to operationalized the step-level games).[2]

There is one more permutation of the two inequalities that has not been considered, namely $r < (s + e)$, and $s < e$. In a team game under these constraints, a rational player should not contribute under any circumstances. If we additionally stipulate that the player's group also never benefits from her contribution, the resulting game is without interest; since the value for which the groups compete is smaller than the minimal cost of competition, there is no conflict of interests between groups and no need for collective action within groups.[3] If we relax this constraint, however, while maintaining the requirement that each group member is always better off withholding contribution, an interesting and important team game results.

This fourth game, called the *Intergroup Prisoner's Dilemma* (IPD) game, involves competition for a *continuous* rather than a step-level public good. That is, the reward is divided between the two groups based on the margin (and not merely the direction) of victory, so that members of the group with more contributors receive a higher payoff, whereas those in the group with fewer contributors receive a lower payoff. Intergroup conflicts (e.g., labor-management negotiations, political disputes, wars), as modeled by the IPD game, can end up in a compromise which reflects the relative amounts of effort expended by the competing groups. In the IPD game, as in the step-level games above, each player receives an endowment of *e* and has to decide whether or not to contribute her endowment. The reward to player i in group A is given by the following function: $\boldsymbol{r/2n\ (m_A - m_B) + r/2}$, with $\boldsymbol{r/2n < e < r/2}$.

Since by contributing a group member increases her payoff by r/2n but pays e (which is defined to be larger), a rational player should never contribute, regardless of what the other (ingroup and outgroup) members do. That is, defection is the *dominant* individual strategy in the IPD game. However, since by contributing a player produces a total benefit of r/2 for the ingroup (r/2 > e), the payoff for a player when all ingroup members contribute is higher than her payoff when none contribute, regardless of the number of outgroup contributors. Table 1 illustrates the payoff for an individual group member in the IPG, Chicken, Assurance, and IPD team games with $n_A = n_B = 3$, e= 2, and r=6. Since the games are symmetric, the table displays the payoff to a member of team A as a function of that player's decision to contribute (C) or not contribute (D) and m_A-m_B, the difference between the number of ingroup and outgroup contributors.

<Insert Table 1 about here>

3. Specifying individual, group, and collective rationality

For each team game we consider three cases: the *noncooperative* case, where binding and enforceable agreements among players are impossible (Colman, 1995) and each player makes her decision independently of the other (ingroup and outgroup) players; the *semi-cooperative* case, in which the members of each group can make a binding decision concerning a collective strategy vis-a-vis the outgroup; and the *fully* *cooperative* case, where all members of *both* groups can bind themselves to an agreement for a collective strategy.

Solving for the noncooperative, semi-cooperative, and fully cooperative cases allows choices that are consistent with individual, group, and collective rationality to be specified concurrently and compared to one another. *Individual* rationality is defined in terms of the optimal individual strategy in the noncooperative game against all other (ingroup and outgroup) players; *group* rationality refers to a group adopting an optimal strategy vis-a-vis the other group in the context of the semi-cooperative game; and *collective* rationality is defined in terms of the collectively optimal strategy -- the one maximizing the total payoff of all members of both groups -- in the fully cooperative game.

As will be shown below, the solutions for the noncooperative, semi-cooperative, and fully cooperative cases do not always coincide. Depending on the game's payoff structure, contradictions or conflicts can arise between the rational choices at the individual, group, and collective levels -- a generalization of the contradiction between individual and collective rationality occurring in the traditional mixed-motive games. Studying these contradictions so as to identify the theoretical and behavioral conditions that determine which level of rationality predominates is the heart of our research program.

4. Individual and group rationality

This section reviews team-game experiments in which members of each group were allowed to conduct a face-to-face discussion to decide on a collective strategy vis-a-vis the other group. If group decisions were made, however, they were neither binding nor enforceable. While this type of communication has no direct bearing on the situation's reward structure (and hence is often referred to as “cheap talk”), it does serve two important functions. First, discussion enables group members to agree on a collective strategy. Second, discussion provides the group with an opportunity to mobilize the individual contributions necessary for carrying out its strategy of choice (e.g., Dawes, McTavish & Shaklee, 1977; Orbell, van de Kragt & Dawes, 1988; Kerr & Kaufman-Gilliland, 1994).

These two functions are inseparable. Having to deal simultaneously with the external conflict and the internal dilemma, the group faces the challenge of selecting a strategy that is effective in the game against the outgroup and, at the same time, provides a stable solution to the group’s internal dilemma. As will be shown below, the group’s choice of strategy and its success in implementing it depend largely on the strategic structure of the intergroup and intragroup games and the interaction between the two levels.

4.1 The effect of within-group communication in the IPG and IPD games

From the point of view of the competing *groups*, the IPD and IPG games are practically identical. In both team games the optimal strategy for each group is to compete by having all of its members contribute. This strategy maximizes the group’s security level by guaranteeing at least a tie and a payoff of r/2 per player. It is also the best response against a rational opponent in the sense that neither group can benefit from having fewer than n contributors when the n members of the other group all contribute.[4] But the outcome resulting from mutual competition is collectively deficient; if both groups compete by having all their members contribute, each player receives r/2, whereas if both groups cooperate by having none of their members contribute, each player ends up with r/2 + e. The *intergroup* conflict (i.e., the semi-cooperative case) in the IPG and IPD games has the properties of a two-person Prisoner's Dilemma game -- when both sides choose their optimal strategies, the outcome is collectively deficient (Dawes, 1980).

Rational choice theory prescribes that when the game is played only once the groups in both the IPG and IPD games should use the opportunity for discussion to designate all group members as contributors. However, the consequence of such a decision on the subsequent individual choice is hypothesized to be different in the two games. In the absence of coercion (i.e., side-payments), a narrowly rational player should contribute if and only if her contribution is critical in affecting the outcome of the competition, and her personal gain from changing the game's outcome exceeds the cost of contribution. In other words, under rational-choice assumptions, a group agreement is self-enforcing only if it renders the contribution of each designated contributor individually rational.

This is indeed the case in the IPG game. Designating all group members as contributors, while assuming that the outgroup has done the same, makes each member's contribution critical for tying the game. And, since the reward for a tie is defined to be larger than the cost of contribution ($r/2 > e$), the incentive to free ride is removed. In the terminology of van de Kragt, Orbell, & Dawes (1983) such a decision constitutes a minimal contributing set.[5] In contrast, the decision to designate all group members as contributors in the IPD game does not change the fact that withholding contribution is the dominant individual strategy, and therefore such a decision is vulnerable to defection by self-interested individuals. Based on this structural difference, it is hypothesized that groups will be more successful in solving the free-rider problem in the IPG than in the IPD game. Specifically, it is predicted that groups playing the IPG game will be more likely to choose the competitive strategy, and individual group members will be more likely to abide by the group's decision.

An experiment by Bornstein (1992) which compared the effects of within-group discussion in the two team games (played between two 3-player groups) clearly confirms these predictions. Although in both team games discussion increased contribution rates as compared with a no-communication control condition, it was much more effective in solving the free rider problem in the IPG game. Of the groups playing the IPG game, 90% agreed to designate all group members as contributors, and when such an agreement was made it was violated by fewer than 2% of the individual players. In contrast, only 60% of the groups playing the IPD game agreed to designate three contributors, and the defection rate was about 17%. As a result, 85% of the groups managed to carry out the optimal group strategy in the IPG game, as compared with only 45% of the groups who managed to do so in the IPD game.

Implications: The finding that groups are much more efficient in solving the internal problem of free riding in the step-level IPG game than in the continuous IPD game provides a valuable insight as to why intergroup conflicts are often portrayed in "all or nothing" terms ("It's either victory for them or victory for us"). Framing the conflict as a step-level game (Pruitt & Rubin, 1986) has clear advantages from the perspective of the group, as it makes it rational for group members to contribute when they believe this is critical for their group's success (Kerr, 1992).

This does not mean that free riding is no longer a problem if a conflict is perceived as step-level. For example, an experiment by Bornstein, Rapoport, Kerpel and Katz (1989) allowed participants in the IPG game to conduct both within and between-group discussions before choosing individually whether or not to contribute. It showed that communication with the outgroup interferes with the group's ability to solve the internal free rider problem. This can perhaps explain why groups tend to restrict contact with the outgroup in times of conflict.

Another important factor is group size. When the groups become larger, the probability that a particular player's contribution will affect the game's outcome becomes smaller and the temptation to take a free ride increases. Groups often try to overcome the sense of dispensability that comes with large numbers by propagating narratives of a single individual or a small group of individuals who "saved the battle" by an act of heroism. Similarly, the individual's sense of criticalness is affected by the perceived symmetry between the groups (Rapoport & Bornstein, 1987). Individual criticalness is maximized, and consequently the incentive to free ride is minimized, when the competing groups are perceived as equal in size, strength, and cohesion. This is indeed why soccer team coaches and political campaign managers are rather careful not to create a sense of overconfidence (or defeatism either, for that matter) among the members of their groups.

4.2 The effects of within-group communication in the Chicken and Assurance team games

Next we examine the effect of within-group discussion in the Assurance and Chicken team games. The game of Assurance models a relatively benign version of the security dilemma where the temptation to defect for defensive reasons is balanced by the strong preference of both sides for mutual cooperation (Jervis, 1978). The game of Chicken models conflicts involving bilateral threat, such as military confrontations and disputes between management and workers, where a failure of either group to yield, leads to an outcome, such as war or strike, that is disastrous to both sides.

In the Assurance game, as in the IPG and IPD games, if a group fears that the other group might compete, it best response is also to compete by designating all n group members as contributors. Designating n contributors is the safest (i.e., maximin) strategy which protects the group against the possibility of losing the competition and guarantees a reward of r for each member. But, unlike the IPG and IPD games, if a team expects the outgroup to behave cooperatively (i.e., to designate no contributors), its best response is also to cooperate. Choosing to compete in this case will not increase the team's payoffs (since the payoffs for winning and tying the game are identical) but will reduce its endowments. The mutually cooperative outcome of designating no contributors yields a payoff of r+e per player – the highest payoff possible in the game.[6] The intergroup conflict (i.e., the semi-cooperative game) is thus a generalization of the two-person Assurance game (Jervis, 1978), where it is rational for each side to compete if it fears that the other side will compete, and to cooperate if it expects that the other side will cooperate.

The strategic considerations in the Chicken game are virtually reversed. If a group fears that the other group will compete (i.e., designate n contributors), its best response is to cooperate or yield (i.e., designate no contributors). However, if both groups play it safe, the outcome is not stable as each group can exploit the other team's caution to compete and win the game. Of course, if both groups are greedy and try to win the game, the resulting outcome is the worst possible. When all players in both groups contribute, everyone loses their endowment and no one gets paid. The (i.e., semi-cooperative) Chicken game has the defining characteristics of a two-person game of Chicken (Schelling, 1960). If each side assumes that the other side will "chicken out", both are exposed to the risk of a mutually disastrous outcome (i.e., a "collision").

An experiment by Bornstein, Mingelgrin, & Rutte (1996) compared the effect of within-group communication in the Assurance and Chicken games (operationalized as a competition between two teams with three players in each). The experimental results show that, following within-group communication, the majority of the groups in both the Assurance and Chicken team games (83% and 72%, respectively) chose the competitive strategy of designating all group members as contributors, and practically all players abided by the group decision. As a result, 75% of the participants in both team games contributed their endowment, as compared with a contribution rate of about 40% (in both team games) in a no-communication control condition.

Whereas the structural difference between the Assurance and Chicken games had little effect on (either group or individual) choice behavior, it did have profound effects on the intragroup processes leading to these decisions. In particular, the rationale for choosing the competitive strategy (as coded from group discussions) and the beliefs of individual subjects following discussion (as reflected in the post-decision questionnaire) differed systematically as a function of game type.

The choice of the competitive group strategy in the Assurance game was based on distrust or fear of the opponent. Ingroup members expected the outgroup to compete by designating all of its members as contributors and decided to protect themselves against losing the game by making the same choice. This “playing it safe” scenario was evident in the group discussions, which included risk-avoidance arguments (e.g., "If we all contribute we are assured of at least a tie") and symmetric expectations for the ingroup and the outgroup (e.g., "They must be thinking exactly the same way"). It was also clear in the post-decision questionnaire where the participants predicted that ingroup and outgroup members would be about equally likely to contribute, and consequently expected the game to be tied.

In contrast, the decision to compete in the Chicken game was motivated by greed. Group discussions contained risk-taking arguments (e.g., "If we all contribute, it's either all or nothing") and asymmetric ingroup/outgroup expectations. Specifically, participants expected the outgroup to be less likely to compete (i.e., designate all group members as contributors), and if the outgroup did decide to compete, they expected individual outgroup members to be less likely to keep the decision (e.g., "Let's all contribute, at least one of them is bound to defect."). Following within-group discussion, participants estimated the contribution rate of the outgroup as almost 20% lower than that of the ingroup, and consequently assessed the ingroup’s chances of winning as much higher than the outgroup’s.

Implications: We found that in both the Assurance and Chicken team games group members decided on the most competitive strategy of designating all group members as contributors. However, they did so for very different reasons. In the Assurance game, group members decided to compete because they perceived the outgroup as competitive and dangerous. In the Chicken game, they decided to compete because they perceived the outgroup as vulnerable and likely to "chicken out".

Agreeing to compete is not enough, though. To execute this strategy all group members have to actually contribute their endowment. Since they have no way of enforcing the agreement, the ingroup members use the opportunity for discussion to tailor their beliefs about the “enemy” so as to rationalize individual contribution in the particular game. In the Assurance game, ingroup members assume that the outgroup members are as smart and as “patriotic” as they are. This perceived symmetry between the two groups is highly functional in solving the internal dilemma since, given the strategic structure of this game, it renders the contribution of each group member critical for a tie. Any other scenario can undermine collective action within the group, as it increases the temptation for individual group members to take a free ride. In the Chicken game, on the other hand, group members form differential beliefs about ingroup and outgroup behavior. While inconsistent with the notion of mutual rationality, this ingroup/outgroup bias is again functional in solving the internal problem of free-riding. The shared belief that the ingroup will win the game, but only by a small margin, makes each member's contribution seem critical for winning.

The most intriguing implication of these findings is that ingroup/outgroup bias is not merely a result of group categorization, nor is it a simple consequence of mixed-motive relations between the groups. Rather, ingroup/outgroup perceptions play a major role in upholding collective group action, and thus vary predictably with the specific structure of the two-level game Evidently, given the negligible defection rates in our experiment, these shared group perceptions were highly effective in solving the intragroup dilemma. The inevitable result, however, is that nearly half (45%) of the sessions resulted in full scale "war" – the outcome least efficient for both groups.

5. Individual and collective rationality

Stimulated by problems of resource depletion, pollution, and overpopulation, much of the research on social dilemmas has been concerned with how to get people to cooperate (e.g., consume less energy, buy recyclable products, have fewer children). However, while cooperation is a good thing in these single-group dilemmas (van de Kragt, Dawes, & Orbell, 1988), in intergroup conflicts cooperation is typically bad from the collective point of view. Reconsidering Dawes's battle example (page 3) can help clarify this point. Taking the perspective of one side, Dawes (1980) describes the battle situation as a social dilemma with defection being the individually rational but collectively deficient choice. However, taking a wider perspective, which includes all soldiers on both sides, defection is both individually rational and collectively optimal. All soldiers in the battle will be better off if they all act selfishly and take no chances. As will be shown below, communication between the groups can facilitate a peaceful (i.e., collectively optimal) solution to the intergroup conflict. However, its effectiveness depends to a large extent on the strategic properties of the two-level game.

5.1 The effect of between-group communication in the IPG and IPD games

First, let us examine the effects of cheap talk between groups in the IPG and IPD games. These two PD-like team games are similar in the sense that the collectively optimal solution is for all players in both groups to withhold contribution. The games are different, however, in the sense that the collective interest and the individual interest coincide in the IPD game, whereas they oppose each other in the IPG game. Recall that the dominant individual strategy in the IPD game is to withhold contribution, and if all players make the rational choice the resulting outcome is collectively optimal. In contrast, if player I believes that all other players will withhold contribution in the IPG game, player i can single-handedly win the game by contributing her endowment. It is therefore hypothesized that a “peace” agreement to designate no contributors will be more stable (more resistant to individual violation) in the IPD than in the IPG game.

An experiment by Bornstein (1992) which compared the effects of between-group communication in the IPG and IPD team games (operationalized, as usual, as a competition between two teams with three players in each) supports this hypothesis. Although between-group discussion reduced contribution rates in both games (as compared with the no-communication control condition), its effectiveness in resolving the intergroup conflict was considerably lower in the IPG than the IPD game. Following between-group communication, 30% of the individual players contributed their endowments in the IPG game as compared with a contribution rate of only 8% in the IPD game. When the two groups managed to reached a cooperative (non-contribution) agreement, individuals were more likely to violate it in the IPG than the IPD game (violation rates were 12% and 4%, respectively). And, most importantly, the groups playing the IPG game were less successful in negotiating a "peace" agreement to begin with, and whenever negotiation failed, contribution reached a highly inefficient rate of over 70%.

Implications: The collective or universal interest in both the IPG and IPD games is for all players to withhold contribution. Nonetheless, we found that players are more successful in achieving this collectively optimal outcome in the continuous IPD than the step-level IPG game. This finding suggests that framing intergroup conflict as a "win-some-lose-some" rather than an "all-or-nothing" game, and downplaying the impact of individual contribution, can contribute to a peaceful resolution. Peace initiatives that stress the futility of individual contribution (given the high personal cost and negligible effect on the outcome) have a good chance to succeed, as they have "the temptations of selfishness on their side" (Campbell, 1972, p. 34). By taking into account the interest of the individual group members, and not only that of the group, the IPD game brings forth the possibility of basing peace between groups on a direct appeal to individual rationality (bolstered, perhaps, by the argument that what is in the individual's interest is in everyone's interest) rather than on rationality at the group level.

5.2 The effect of between-group communication in the Assurance and Chicken games

Previous research has produced inconsistent results concerning the effect of intergroup communication on conflict resolution. Insko & Schopler (1987; Schopler & Insko, 1992) found that communication between groups is relatively ineffective as a means for resolving the conflict. Their research employed the two-person Prisoner's Dilemma (PD) game, and allowed group members (or group representatives) to discuss the game with their opponents before each group (as a whole) made its choice of a strategy. Insko & Schopler found that group decisions were highly competitive – much more so than individual decisions under the same conditions (see Schopler and Insko, 1992, for a review).

Insko & Schopler offer two explanations for the observed competitiveness of groups. The "schema-based distrust" hypothesis explains group competitiveness in terms of *fear*. It postulates that group members compete because they expect the outgroup to behave competitively and want to defend themselves against the possibility of being exploited. The "social support for shared self-interest" hypothesis explains group competitiveness in terms of *greed*. It argues that groups are competitive because group members provide each other with support for acting in an exploitative, ingroup-oriented way.

In the Prisoner's Dilemma game either fear or greed is sufficient to motivate a competitive choice (Coombs, 1973; Dawes, 1980). Therefore, to distinguish between these two motives for competition, Insko et al. (1990, 1993) devised a version of the PD game, called the PD-alt game, which includes a third option of withdrawal for both players. Withdrawal is a safe option which guarantees each side a payoff higher than the payoff for mutual defection, so that a player who fears that the other player will defect should withdraw rather than defect. Defection, in other words, is rational only if a player believes that the opponent will cooperate, and is therefore indicative of greed.

Studying the effect of communication between players in the *one-shot* PD-alt game, Insko et al (1993) found that, while communication enhanced cooperation between two individuals, it did not improve cooperation between two groups (as compared with a no-communication control condition). Different results were reported by Majeski & Fricks (1995), who compared the effect of communication on intergroup cooperation in the *repeated* PD and PD-alt games. These researchers found that, in general, communication enhanced intergroup cooperation, and that the option of withdrawing also had a positive effect.

The present experiment uses a different approach to separate fear and greed. Rather than studying the PD-alt game where the groups have a safe withdrawal option (which is seldom available in real-life conflicts), we compared the game of Assurance, where there is no incentive to win (rather than tie) the competition, with the game of Chicken, where there is no incentive to tie (rather than lose) the competition. Thus, with respect to the monetary payoffs, greed is eliminated from the first game and fear from the second.

We have already seen that the majority of the groups in both the Assurance and Chicken team games, when allowed only within-group communication, chose to compete. Can communication between the groups help them reach a cooperative solution to the intergroup conflict? In the Assurance game the answer is a definite yes. The cooperative solution in this game, namely for all members of both groups to withhold contribution, is symmetric and stable. It is symmetric as it allows both groups to 'not lose' the competition, and not losing in the Assurance game (when s=r) is as good as winning. It is stable, since no group can benefit from unilaterally reneging on a no-contribution agreement.[7] Recall that the only rational reason to compete in the Assurance game is fear of a competitive or irrational opponent (or fear of the opponent's fear, etc). Communication between the groups can diffuse such fears by reassuring each group of the other group's rationality (its intention to maximize absolute, rather then relative, payoffs). Communication can also be used to verify a common understanding of the game's payoff structure, and enhance trust through an explicit agreement of mutual cooperation (Majeski & Fricks, 1995).

In the game of Chicken, on the other hand, since winning is all that matters, between-group communication is expected to be practically useless. The collectively optimal outcome in this game is for one group to have a single contributor and the other group to have none. This solution is asymmetric however and thus inherently unstable. Assume that the groups agreed that the single contributor will be in B. If the members of group A believe that group B will keep the agreement and designate only one contributor, they are tempted to win the game by designating two. Knowing that, group A should designate all three group members as contributors, and group B should respond by designating none. However, given the expectation that all members of B will withhold contribution, a single contributor is again sufficient to win the game for A, and so on.[8] This state of affairs renders any non-enforceable agreement between the groups rather futile.

An experiment by Bornstein & Gilula (unpublished) tested these predictions. The team games in this experiment were operationalized as a competition between two teams with three players in each. The participants were allowed to discuss the game with other ingroup members, after which they met with the members of the outgroup for a between-group discussion, and finally they had separate within-group discussions before deciding individually and privately whether to contribute their endowment.

In the Assurance game *all* between-group discussions resulted in the collectively optimal (i.e., 0:0) agreement and *all* of the agreements were fully kept. In the Chicken game, only 40% of the discussions resulted in the collectively optimal (i.e., 0:1) agreement, 20% resulted in a no contribution (0:0) agreement, and 40% did not end in an agreement. Moreover, *none* of the agreements reached were kept. In fact, most of the intergroup agreements were already violated in the subsequent within-group discussions. For example, following a 0:1 between-group agreement in one session, both groups designated three contributors. Following a 0:1 agreement between groups A and B in another session, group A reneged by designating three contributors and, since group B kept its side of the agreement, group A ended up winning the game.

Thus, while communication between the groups invariably led to the collectively optimal outcome of zero contribution in the Assurance game, communication between the groups in the Chicken game resulted in a highly inefficient contribution rate of over 78%. This contribution rate was, in fact, as high (and as inefficient) as that found in a previous experiment (Bornstein et al., 1996) where communication between the groups was altogether prohibited. Furthermore, between-group communication did little to change the biased ingroup/outgroup perceptions; group members still saw themselves as more determined and more cohesive than their rivals and were still confident about their chances to win the game.

Implications: We found that the strategic structure of the game dramatically modified the effect of between-group communication on conflict resolution. In the Assurance game, where competition is motivated by mutual fear, communication was highly effective in bringing about a peaceful resolution. In the Chicken game, where competition is motivated by mutual greed, communication was practically useless. In many real-life conflicts the definition of the "game" is rather flexible, in the sense that changes in the subjective utilities attached to the outcomes can transform one game into another (e.g., Jervis, 1978; Oye, 1986). The same objective situation can be perceived as a game of Assurance, where both sides can 'not lose', or as a game of Chicken, where one side must win. Clearly, the way the participants perceive or frame the conflict is bound to affect their chances of negotiating a peaceful resolution.

6. The effect of intergroup conflict on intragroup cooperation

The most recurrent hypothesis of the intergroup conflict literature is that intergroup conflict increases intragroup cooperation (Rabbie, 1982; Stein, 1976; Tajfel, 1982, Campbell, 1965, 1972). Stated this way, however, the hypothesis is not sufficiently well-defined to be subjected to a meaningful test. Most critically, the hypothesis fails to specify the relevant control condition with which the level of cooperation in intergroup conflict should be compared. Modeling intergroup conflicts as team games enables us to rephrase the hypothesis in a way that makes more sense. Since the intragroup payoff structure in these games is a problem of public goods provision, we can ask whether people are more likely to contribute toward a public good when it is embedded in an intergroup conflict than when it is not.

6.1 Cooperation in intergroup and single-group Prisoner's dilemmas

Intergroup conflict can increase cooperation in two qualitatively different ways: It can change the *motivation* of individual group members toward a greater concern with the collective group goal, and it can modify the *actual incentives* so that selfish individuals are induced by consideration of their private interest to act in accordance with the collective interest of their group (Messick & Brewer, 1983). The intergroup conflict literature has typically highlight the motivational effect, attributing the observed increase in cooperation to "… an increase in solidarity and cohesion of the ingroup [such that] the group and the people in it come to matter more to the group members" (Brown, 1988, p. 200). However, this literature also recognized that intergroup conflict has profound effects on the actual payoff structure within the group (Campbell, 1965,1972; Coser, 1956; Stein, 1976; Sherif, 1966).

In intergroup conflicts outside the laboratory, these motivational and structural effects are utterly confounded. To distinguish between group-based altruism (or "patriotism") and narrow self-interest as reasons for individual contribution, the intragroup payoff structure must be kept constant. The IPD game provides an ideal setting for this comparison. This team game is structured so that the intragroup payoff structure is a an n-person PD game or a social dilemma, *regardless* of what the outgroup does. This property of the IPD game was used by Bornstein and Ben-Yossef (1984) to assess the net effect of intergroup conflict on intragroup cooperation. Specifically, we compared the IPD game (with three players in each group) to a single-group (three-person) PD game with identical payoffs. In addition, to exclude the possibility that the classification of players into groups rather than the conflict of interests between the groups (Rabbie, 1982; Tajfel & Turner, 1979) is responsible for potential effects, we included two groups in the PD control condition as well. This ensures that the only difference between the two conditions is that in the IPD game the two groups were in competition against each other, while in the PD game each group was engaged in a separate (independent) game.

The results of the Bornstein and Ben-Yossef (1994) experiment clearly support the intergroup conflict-intragroup cooperation hypothesis as stated above. The level of contribution in the IPD game was twice as high as that in the single-group PD game. Specifically the average rate of contribution was 55% in the IPD game, as compared with only 27% in the PD game. Since there were two groups of players in both conditions, the higher contribution rate in the IPD game can be attributed to the real conflict of interests between the groups rather than the mere classification of players into groups. Moreover, since the intergroup conflict did not change the payoff structure within the group (that is, group members were faced with exactly the same intragroup dilemma in both conditions) its effect on the contribution level can be unequivocally construed as motivational rather than structural.

One explanation for this effect is that real intergroup conflict serves as a unit-forming factor that enhances group identification beyond classification and labeling alone (Campbell, 1965; Rabbie, Schot, & Visser, 1989). Group identification, in turn, increases cooperation, as it leads individual group members to substitute group regard for egoism as the principle guiding their choices (Brewer & Kramer, 1986; Kramer & Brewer, 1984; Dawes & Messick, 2000; Hardin, 1995). Consistent with this interpretation, we found that participants in the IPD condition viewed themselves as motivated less by self-interest and more by the collective group interest than those in the PD control condition. We also found that the decision to contribute was negatively correlated with the motivation to maximize one's own payoffs and positively correlated with the motivation to maximize the collective payoffs of the ingroup. Intergroup competition also increased subjects' motivation to distinguish themselves positively from the outgroup (Turner, Brown, & Tajfel, 1979). The participants in the IPD condition reported a higher motivation to maximize the relative ingroup advantage than those in the PD condition, and this competitive orientation was positively correlated with their contribution behavior.

A somewhat different explanation was recently offered by Baron (2001). Baron conducted a World Wide Web experiment using the IPD-PD design. Like Bornstein and Ben-Yossef (1994), Baron found that ingroup contribution was higher in the IPD than the PD condition. Baron attributes this "two-groups vs. one group parochialism effect" to the "illusion of morality as self-interest" (Baron, 1997) -- the tendency of people to believe that self-sacrificial behavior on behalf of one's group is in fact in one's self-interest. Baron hypothesized that the self-interest illusion is greater when an ingroup is in competition with an outgroup. Indeed, he found that participants in the IPD (two-group) condition were more likely than those in the PD (one-group) condition to believe that contribution was in their self-interest and that they would earn more money acting this way. Moreover, contribution decisions were strongly correlated with beliefs in self-interest. That is, individuals who showed a greater tendency to cooperate with their group in competing against the other group also indicated a greater self-interest illusion.

Another recent study that employed the IPD-PD design was conducted by Probst, Carnevale, & Triandis (1999). Probst, Carnevale, & Triandis were interested in the relations between the players' decision to cooperate or defect and their values. Their main hypothesis involved the distinction between vertical individualists -- competitive people who want to do better than others -- and vertical collectivists -- cooperative people who tend to sacrifice their own interest for the interests of the group. Vertical individualists are predicted to defect in the single-group (PD) dilemma, where the relative payoff is maximized by defection, and to cooperate in the intergroup (IPD) dilemma, where winning is achieved by cooperating with one's own group to defeat the other group. Vertical collectivists, on the other hand, are predicted to cooperate in the single-group dilemma, where contribution serves the collective interest, and to withhold contribution in the intergroup dilemma, where all the participants are better off if none contributes. Consistent with this hypothesis, Probst, Carnevale, & Triandis (1999) found that vertical individualists were least cooperative in the PD game and most cooperative in the IPD game. Vertical collectivists showed the opposite pattern, being most cooperative in the PD game and least in the IPD game. Baron (2001) suggests an alternative explanation. He argues that vertical individualists, who value both pursuit of self-interest and competition against others, are especially vulnerable to the illusion of self-interest. These participants are willing to sacrifice their self-interest on behalf of their group when in competition against another group since, in this context, they do not perceive what they are doing as self-sacrifice.

Implications: The IPD and PD games present subjects with identical *intragroup* social dilemmas. Nevertheless, the experiments described above show that participants are more likely to contribute to their group's effort when it is competing against another group than when it is playing an isolated, single-group game. This greater willingness to sacrifice on behalf of the group when its gain comes at the expense of the outgroup is obviously disturbing from the perspective of the larger society (which includes all members of both groups). Whereas contribution is collectively optimal in single-group dilemmas, it is collectively deficient in intergroup dilemmas.

Baron (2001) pinpoints the problem when he writes: “We might think of actions as potentially affecting the self, the group, and the world … some action helps the group but hurts both the self and the world. Other actions might hurt the self and help the world, and still others might help the self only. One question for future research is what sorts of interventions might reduce parochialism without seriously harming altruistic behavior toward the world” (p.295).

It should be emphasized that the increased cooperation in intergroup conflict does not mean that the internal problem of free-riding is inconsequential and can therefore be ignored. For example, an experiment by Bornstein, Winter, and Goren (1996) investigated whether the difference between the IPD and PD games observed in the context of one-shot games persists when the games are played repeatedly. The results show that participants were initially more likely to contribute in the intergroup than the single-group game. However, the difference in contribution rates decreased as the games progressed until it eventually disappeared. Thus, while this study reconfirms that individuals have a higher propensity to contribute in the intergroup, it also shows that this “patriotism” dwindles with time. Other variables such as group size, cost of contribution, and the utility of the public good, are also expected to affect the magnitude of the free-rider problem.

It should be also stressed that intergroup competitions are not always destructive. In some cases increasing individual contribution through competition between groups is beneficial for both the group and the society at large. Constructive competition regularly takes place between different organizations (e.g., firms) as well as subgroups within the same organization (e.g., R&D teams). The groups that win the competition are those whose members are *more* cooperative and *better* coordinated with one another than members of the competing groups. Several experiments (Bornstein, Erev & Rosen 1990; Erev, Bornstein, & Galili, 1993; Bornstein & Erev, 1994; Bornstein, Gneezy, & Nagel, in press) demonstrated that, by decreasing free riding and enhancing coordination within the competing groups, intergroup competition can improve overall performance as compared with the single-group case.

6.2 Cooperation in intergroup and single-group games of Chicken

Bornstein, Budescu, and Zamir (1997) conducted an experiment which compared the intergroup Chicken game with a single-group (n-person) game of Chicken. Both games involved four players, each of whom received an endowment of e units and had to decide between keeping the endowment and contributing it. In the single-group Chicken game, a reward of r/2 (r/2 > e) was provided to each of the four players if at least one of them contributed. If no one contributed, the players received no reward. In the intergroup Chicken game the four players were divided into two dyads. The members of the dyad with more contributors were paid a reward of r units each, while the members of the losing dyad were paid nothing. In case of a tie, all four players were paid nothing. In both games, a player who did not contribute her endowment kept it.

The single-group and intergroup variants of the Chicken game, as operationalized here, are comparable in an important aspect. The highest joint outcome is achieved when a single player contributes while the other three do not. Thus, as a collective, all four players have an interest in coordinating their actions on this outcome. However, because any player can assume the role of the single contributor, each game has four such outcomes, and the players have to solve the problem of how to coordinate on one of these alternatives.[9]

The participants in our experiment were provided with two coordination devices: The games were played repeatedly and each repetition was preceded by a pre-game period in which players could signal their intentions to contribute or not. Given the opportunity and the means of coordination, we compared the two games for collective efficiency and fairness (i.e., equality of payoffs). In the single-group Chicken game more than 60% of the rounds resulted in the collectively optimal outcome of a single contributor, and turn-taking among players was quite common. In contrast, only 26% of the rounds resulted in the collectively optimal outcome in the intergroup Chicken game, and practically all of the other rounds resulted in a higher (and hence less efficient) rate of contribution. Most notably, 12% of the rounds ended up in a full-scale "collision" of all players contributing (and each making a profit of zero). In addition, there was little indication of turn-taking within groups or between the groups.

Implications: The intergroup and the single-group games of Chicken present players with essentially the same problem -- to maximize collective payoffs a single player should contribute on each round of the game, and to obtain fair outcomes the players should alternate in taking this role. Yet, as our results indicate, interaction in the intergroup game was both less efficient and less fair than that in the single-group game. Clearly, the intergroup game was played out much more competitively than the intragroup game.

This finding can be explained by the dynamics of the interaction between and within the competing groups. Assume that the members of group A are the first to commit themselves to the competitive strategy. To the extent that this commitment is perceived as credible by the members of group B, they should rationally yield by withholding contribution. Thus, victory for A can result from its display of the intention to win and the collective resolve to follow through on that intention. However, the expectation that the members of group B will back down creates a conflict of interests within group A. Since only one contributor is now needed to win the game, the members of group A find themselves in a (two-person) game of Chicken, as each prefers to free-ride rather than pay the cost of contribution. Of course, if the members of group B suspect that group A's solidarity may unravel, they might then decide to compete in the hope of winning. Yet the possibility of their implementing this strategy depends on their ability to solve their own intragroup Chicken game, and so on. Clearly, the intragroup dilemma makes it difficult for either group to emit a credible signal of solidarity. This makes the intergroup situation very precarious. As observed by Gould (1999), "the general awareness … that … groups may fail to act together contributes to the likelihood of escalation to violence, and to the extent of the harm that ensues" (p. 357).

The importance of group solidarity is illustrated by the dynamics observed in one of our experimental sessions. In this (rather atypical) session, group A established its dominance quite early in the game. After a few "collisions" with group B, group A began to win one round after another. The scenario became quite predictable; at the beginning of the period all four players signaled their intention to contribute, but before long one of the players in B changed her signal from C to D and the other immediately followed. The two members of A, however, did not use this opportunity to "free-ride". Rather than getting involved in the internal game of Chicken, both contributed their endowments at the end of each period. While this display of solidarity can be considered wasteful (since only one contributor was needed to win the game), it was rather effective in deterring the other group (and preventing a "war") for the duration of the game.

7. Team games and the study of intergroup relations

Intergroup conflicts are complex -- more complex than any other form of social interdependence. The research reviewed in this paper attempts to gain valuable insights into this complexity by replacing it with a simplified and well-defined model and using the model, rather than the actual social situation, as the object of investigation. To the extent that the model preserves the essential features of the actual situation (and, not less importantly, excludes the non-essential details), investigating it can increase our understanding of the real situation in some important ways (Colman, 1995).

First, a game model whose elements – players, strategies, and payoffs – are explicitly defined is a powerful conceptual tool. It increases our understanding of the underlying logical structure of the situation and, by applying principles of rational choice to this structure, can illuminate the functional bases of motivational and behavioral processes that take place in the social situation. Another important advantage of using a game model is generality. An abstract model can be used to represent manifold social interactions and thus generalizes our understanding in a way that transcends specific examples. Consequently, a general model greatly facilitates interdisciplinary exchange and cross-facilitation (Kollock, 1998). Recent reviews of the literature on social dilemmas (or the free-rider problem, or the problem of public good provision, or the problem of collective action) in psychology (Komorita & Parks, 1995; Dawes & Messick, 2000), sociology (Kollock, 1998), economics (Ledyard, 1995), and political science (Ostrom, 1998) all use the prisoner’s dilemma and other game models as their primary paradigm. Finally, a game is an effective experimental tool. Using monetary incentives, it enables researchers to create an actual conflict in the laboratory, consistent with the structural abstraction of the relevant situation so as to study under controlled conditions variables that affect behavior in natural circumstances (Dawes, Orbell, Simmons, & van de Kragt, 1986).

It would be difficult, indeed impossible, to imagine the study of cooperation and competition in dyadic relations (e.g., Axelrod, 1984; Kelley & Thibaut, 1978; Rapoport & Chammah, 1965) without the clarity and generality provided by two-person games. N-person games have served a similar role in the study of social dilemmas and problems of public goods provision (e.g., Dawes, 1980; Hardin, 1982). I believe that team games which incorporate these two paradigms can similarly further the study of intergroup conflict and competition.

The team-game research, with its primary emphasis on the structure of interdependence in intergroup conflict, is firmly rooted in the "realistic" group conflict tradition. Realistic conflict theory, however, as initially formulated by Sherif (1966), Campbell (1965) and others (e.g., Coser, 1956), was rather crude. It drew only a general distinction between competitive and cooperative intergroup relations, failing to specify the payoff structure between and within the competing groups. As this paper clearly demonstrates, the strategic properties of the intergroup and intragroup "games" and the conditions of "play" have profound effects on people's behavior and how they perceive the others with whom they are interdependent.

Unfortunately, the current literature on intergroup relations pays little attention to the structure of these relations. This markedly cognitive literature (Messick & Mackie, 1989) focuses instead on people's tendency to perceive themselves and others in terms of distinct social categories, attributing behavior to people's perception of group "entitativity" rather than the nature of their interdependence. A series of so-called minimal group experiments demonstrated that dividing people into distinct social categories affects the way they behave toward each other. However, our own research, as well as research by others (e.g., Rabbie, Schot, & Visser, 1989; Gaertner & Insko, 2000; Yamagishi & Kiyonari, 2000), shows that much of the variability in behavior is accounted for by the nature of the (explicit or implicit) interdependence between and within these categories and the functional challenges it presents for groups and individuals.

Another difference in emphasis between the team game approach and social identity theory involves the dependent variables of interest. Social identity theory (Tajfel & Turner, 1986) focuses on prejudice, discrimination, and negative stereotyping intended to maintain or achieve positive group distinctiveness. Team-game research, on the other hand, focuses primarily on individuals' willingness to act on behalf of the collective group goal. Obviously, the cognitions and behaviors considered by the social identity literature are consequential for understanding intergroup relations. But, it is "the willingness to fight and die for the ingroup … which makes lethal war possible" (Campbell 1965, p. 293). Campbell (1965) was absolutely right in arguing that "the altruistic willingness for self-sacrificial death in group causes may be more significant than the covetous tendency for hostility toward outgroup members" (p. 293).

It should be stressed that a positive group identity is in itself a public good. In fact, it is a rare example of a *pure* public good, which, in addition to being non-excludable, is also *indivisible* in that one person's enhancement of self-esteem following the group's success does not reduce the ability of other group members to enjoy the same "resource". If our own group is perceived as superior to another group then "we, too, can bask in that reflected glory" (Brown 2000, p. 312), regardless of whether or how much we contributed to the group's success. Whenever excluding group members from consuming a public good is impossible, there is a temptation to free-ride on the efforts of others. In that sense, “social” competition (Turner, 1975) for symbolic resources such as rank, status, and prestige is not different in any fundamental way from “objective” competition for concrete resources such as land, money, and power. Team games, like other game models, are defined in terms of utilities, or personal values (Dawes, 1988), which are quantitative representations of *whatever* is truly important for the decision makers, and are thus equally applicable to either type of conflict.

8. Directions for future research

The team-game experiments described above operationalized the competing sides as non-cooperative groups whose members cannot reach binding agreements (although in some experiments they are allowed “cheap talk”). There is, however, an important line of social-psychological research that has operationalized the competitors in bilateral conflict as unitary groups (groups that make a joint, single decision) and compared the behavior of such groups with that of individual players.

Rational choice theory does not distinguish between groups and individuals as decision makers, as long as it can be assumed that the members of a group can make a binding agreement concerning a collective strategy (and can thus be considered a unitary player). Nevertheless, Insko and his colleagues (Schopler and Insko, 1992) have demonstrated that interaction between two unitary groups is dramatically more competitive than interaction between two individuals. This tendency of unitary groups to behave more competitively than individuals was termed the *discontinuity* effect. A similar phenomenon was documented in experiments on ultimatum bargaining where unitary groups made consistently less generous offers than individuals (Robert & Carnevale, 1997; Bornstein & Yaniv, 1998).

The team-game and "discontinuity" lines of research taken together point to the importance of distinguishing between three *basic* types of decision-makers or players in the study of strategic interaction. These are no cooperative groups (G), whose members act independently without the ability to make binding agreements; cooperative or unitary groups (U), whose members can reach a binding agreement on a collective strategy; and individuals (I). Pitting these types of players against one another for a (non-cooperative) two-player game, and adding Nature as a potential "opponent", generates the 3 (type of player) X 4 (type of opponent) matrix depicted in Table 2.

<Insert Table 2 about here>

This matrix provides a rather useful tool for mapping the existing (strategic and non-strategic) decision-making literature, and pointing out the gaps that currently exist in this literature. The I cell contains the vast literature on individual decision-making, or one-person "games" against Nature (e.g., Camerer, 1995). The U cell includes the literature on group-decision making (e.g., Davis, 1992). There is also a substantial social-psychological literature which compares and I and U cells (e.g., Kerr, MacCoun, & Kramer, 1996; Hill, 1982). The G cell contains the literature on non-cooperative n-person games and in particular the social-dilemma and public-good literature (e.g., Dawes & Messick, 2000; Ledyard, 1995). The I-I cell encompasses the literature on two-person games (e.g., Komorita, & Parks, 1995). Insko and his colleagues have studied the U-U case, using the inter-individual or I-I game as a control.[10] The research described in this paper focuses primarily on the G-G case, often using the single-group case, G, as a control.

Little research has been done so far to directly compare the I-I and G-G games, or the U-U and G-G games (see, however, Insko et al., 1994; Bornstein, Budescu, & Zamir, 1997). Moreover, I know of no research on the asymmetric cases, where the competition is between agents of different types (i.e., G-U, G-I, and U-I). Examples of such asymmetric competitions are abundant. A strike of an unorganized group of workers against an individual employer or a unitary board of directors, a standoff between a democratic state and a dictatorship, or a clash between a scattered group of demonstrators and a cohesive police force are only few of the examples that come to mind. What type of player has the advantage? How does this depend on the strategic structure of the game? These are important questions that future research needs to address.

The team-game paradigm is sufficiently broad to include the different cells in the matrix. In their most elaborated, G-G, form, team games model conflict and competition between non-cooperative groups. By compelling the members of one or both groups to make a binding decision, team games can be adapted to cover the U-G and U-U cases, respectively. In the degenerate cases, where there is no competing group or each "group" consists of a single individual, a team game has the form of an N-person game (G) or a 2-person game, (I-I), respectively. Finally, when there in no outgroup and the "ingroup" is of size one, a "team game" is reduced to a one-person (I) game against Nature.

References

Axelrod, R. (1984). The evolution of cooperation. New York: Basic Books.

Baron, J. (1997). The illusion of morality as self-interest: A reason to cooperate in social dilemmas. Psychological Science, 8, 330-335.

Baron, J. (2001). Confusion of group-interest and self-interest in parochial cooperation on behalf of the group. Journal of Conflict Resolution, 45, 283-296.

Bornstein, G. (1992). The free rider problem in intergroup conflicts over step-level and continuous public goods. Journal of Personality and Social Psychology, 62, 597-606.

Bornstein, G., & Ben-Yossef, M. (1994). Cooperation in intergroup and single-group social dilemmas. Journal of Experimental Social Psychology, 30, 52-67.

Bornstein, G., Budescu, D., & Zamir, S. (1997). Cooperation in intergroup, two-person, and n-person games of Chicken. Journal of Conflict Resolution, 41, 384-406.

Bornstein, G., & Erev, I. (1994). The enhancing effect of intergroup competition on group performance. International Journal of Conflict Management, 5, 271-284.

Bornstein, G., Erev, I., & Rosen, O. (1990). Intergroup competition as a structural solution to social dilemmas. Social Behavior, 5, 247-260.

Bornstein, G., Gneezy, U., & Nagel, R. (in press). The effect of intergroup competition on intragroup coordination: An experimental study. Games and Economic Behavior.

Bornstein, G., & Horwitz, R. (1993). Team games as models of intergroup conflicts. Discussion Paper #27. Center for the Study of Rationality and Interactive Decision Theory, The Hebrew University.

Bornstein, G., Mingelgrin, D. & Rutte, C. (1996). The effects of within-group communication on group decision and individual choice in the assurance and chicken team games. Journal of Conflict Resolution, 40, 486-501.

Bornstein, G., Rapoport, A., Kerpel, L. & Katz, T. (1989). Within and between group communication in intergroup competition for public goods. Journal of Experimental Social Psychology, 25, 422-436.

Bornstein, G., Schram, A., & Sonnemans, J. Do democracies breed chickens? Forthcoming in R. Suleiman, D. V. Budescu, I. Fischer, & D. Messick. (Eds.), Contemporary psychological research on social dilemmas. Cambridge: Cambridge University Press.

Bornstein, G., & Yaniv, I. (1998). Individual and group behavior in the ultimatum game: Are groups more “rational” players? Experimental Economics, 1, 101-108.

Bornstein, G., Winter, E., & Goren, H. (1996). Experimental study of repeated team games. European Journal of Political Economy, 12, 629-639.

Brewer, M. B., & Kramer, R. M. (1986). Choice behavior in social dilemmas: Effects of social identity, group size, and decision framing. Journal of Personality and Social Psychology, 50, 543-549.

Brams, S. (1975). Game theory and politics: International relations games. (1st edition) New York: The Free Press.

Brown, R. (1998). Group processes: Dynamics within and between groups. (2nd edition). New York: Basil Blackwell.

Brown, R. (2000). Group processes: Dynamics within and between groups. Oxford: Blackwell.

Camerer, C. (1995). Individual decision making. In A. Roth & J. Kagel (Eds.), Handbook of experimental economics. Princeton: Princeton University Press.

Campbell, D.T. (1965). Ethnocentric and other altruistic motives. In D. Levine (Ed.), Nebraska symposium on motivation. Lincoln: University of Nebraska Press.

Campbell, D. T. (1972). On the genetics of altruism and the counter-hedonic components in human culture. Journal of Social Issues, 28, 21-37.

Colman, A. M. (1995). Game theory and its applications. Oxford, England: Butterworth-Heinemann.

Coombs, C. A. (1973). A reparameterization of the prisoner's dilemma game. Behavioral Science, 18, 424-428.

Coser, L. A. (1956). The function of social conflict. Glenco, IL: Free Press.

Dawes, R.M. (1980). Social dilemmas. Annual Review of Psychology, 31, 169- 193.

Dawes, R. M. (1988). Rational choice in an uncertain world. Orlando, FL: Harcourt Brace.

Dawes, R. M., McTavish, J., & Shaklee, H. (1977). Behavior, communication assumptions about other people's behavior in a common dilemma situation. Journal of Personality and Social Psychology, 35, 1-11.

Dawes, R. M., Orbell, J. M., Simmons, R. T., & van de Kragt, A. J. C. (1986). Organizing groups for collective action. American Political Science Review, 80, 1171-1185.

Dawes, R. M., & Messick, D. M. (2000). Social dilemmas. International Journal of Psychology, 35, 111-116.

Davis, J.H. (1992). Some compelling intuitions about group consensus decisions:

Theoretical and empirical research, and interpersonal aggregation phenomena: Selected examples, 1950-1990, Organizational Behavior and Human Decision Processes, 52, 3-38.

Deutsch, M. (1973). The resolution of conflict. New Haven: Yale University Press.

Gaertner L., & Insko C. A. (2000). Intergroup discrimination in the minimal group paradigm: Categorization, reciprocation, or fear? Journal of Personality and Social Psychology, 79, 77-94.

Gilbert, R. K. (1988). The dynamics of inaction: Psychological factors inhibiting arms control activism. American Psychologist, 43, 755-768.

Gould, R. V., (1999) Collective violence and group solidarity: Evidence from feuding society. American Sociological Review, 64, 356-380.

Erev, I., Bornstein, G., & Galili, R. (1993). Constructive intergroup competition as a solution to the free rider problem: A field experiment. Journal of Experimental Social Psychology, 29, 463-478.

Hardin, R. (1982). Collective action. Baltimore: Johns Hopkins University Press.

Hardin, R. (1995). One for all: The logic of intergroup conflict. Princeton, NJ: Princeton University Press.

Hill, G. W. (1982). Group versus individual performance: Are n + 1 heads better than one? Psychological Bulletin, 91, 517-539.

Insko, C. A., & Schopler, J. (1987). Categorization, competition, and collectivity, in C. Hendrick (Ed.), Group processes (Vol. 8, pp. 213-251). New York: Sage.

Insko, C. A., J. Schopler, R. Hoyle, G. Dardis, & Graetz, K. (1990). Individual-group discontinuity as a function of fear and greed. Journal of Personality and Social Psychology, 58, 68-79.

Insko, C. A., J. Schopler, S.M. Drigotas, K.A. Graetz, J. Kennedy, C. Cox, and G. Bornstein. (1993). The role of communication in interindividual-intergroup discontinuity. Journal of Conflict Resolution, 37, 108-138.

Insko, C., Schopler, J., Graetz, K., Drigotas, S., Currey, D., Smith, S., Brazil, D., & Bornstein, G. (1994). Interindividual-intergroup discontinuity in the Prisoner's Dilemma Game. Journal of Conflict Resolution, 38, 87-116.

Jervis, R. (1978). Cooperation under the Security Dilemma. World Politics, 30, 167-186.

Kelly, H. H., & Thibuat, J. W. (1978). Interpersonal relations: A theory of interdependence. New York: Wiley.

Kerr, N. L. (1992). Efficacy as a causal and moderating variable in social dilemmas. In W. Liebrand, D. Messick, & H. Wilke (Eds.), A social psychological approach to social dilemmas. New York: Pergamon Press.

Kerr, N.L. & Kaufman-Gilliland, C.M. (1994). Communication, commitment, and cooperation in social dilemmas. Journal of Personality and Social Psychology, 66, 513-529.

Kerr, L.N., MacCoun, R.J. & Kramer, G.P. (1996). Bias in judgment: Comparing individuals and groups. Psychological Review, 103, 687-719.

Kollock, P. (1998). Social dilemmas: The anatomy of cooperation. Annual Review of Sociology, 24, 183-214.

Komorita, S., & Parks, C. (1995). Interpersonal relations: Mixed-motive interaction. Annual Review of Psychology, 46, 183-207.

Kramer, R. M., & Brewer, M. B. (1984). Effects of group identity on resource use in simulated social dilemmas. Journal of Personality and Social Psychology, 46, 1044-1057.

Ledyard, J. O. (1995). Public goods: A survey of experimental research. In A. Roth & J. Kagel (Eds.), Handbook of experimental economics. Princeton: Princeton University Press.

Levine, R., & Campbell, D. (1972). Ethnocentrism: Theories of conflict, ethnic attitudes and group behavior. New York: John Wiley.

Majeski, S., & Fricks, S. (1995). Conflict and cooperation in international relations. Journal of Conflict Resolution, 39, 622-646.

Messick, D. M., Allison, S. T., & Samuelson, C. D. (1988). Framing and communication effects on group members' responses to environmental and social uncertainty. In S. Maital (Ed.), Applied Behavioral Economics: Vol. 2 (pp. 677-700). New York: New York University Press.

Messick, D. M., & Brewer, M. B. (1983). Solving social dilemmas: A review. In L. Wheeler and P. Shaver (Eds.), Review of personality and social psychology (Vol. 4, pp. 11-44). Beverly Hills, CA: Sage.

Messick D. M., & Mackie, D. M. (1989). Intergroup relations. Annual Review of Psychology, 40, 45-81.

Orbel, J. M., van de Kragt, A. J. C., & Dawes, R. M. (1988). Explaining discussion induced cooperation. Journal of Personality and Social Psychology, 54, 811-819.

Ostrom, E. (1998). A behavioral approach to rational choice theory of collective action. American Political Science Review, 92, 1-22.

Oye, K. A. (1986). Explaining cooperation under anarchy: Hypotheses and strategies. In K. A. Oye (Ed.), Cooperation under Anarchy. (pp. 1-24). Princeton: Princeton University Press.

Palfrey, T., & Rosenthal, H. (1983). A strategic calculus of voting. Public Choice, 41, 7-53.

Probst, T., Carnevale, P., & Triandis, H. (1999). Cultural values in intergroup and single-group social dilemmas. Organizational Behavior and Human Decision Processes, 77, 171-191.

Pruitt, D. G., & Rubin, J. Z. (1986). Social conflict: Escalation, stalemate, and settlement. New York: Random House.

Rabbie, J. M. (1982). The effects of intergroup competition on intragroup and intergroup relationships. In V. J. Derlega & J. Grzelak (Eds.), Cooperation and helping behavior: Theories and research. New York: Academic Press.

Rabbie, J. M., Schot, J. C., & Visser, L. (1989). Social identity theory: A conceptual and empirical critique from the perspective of behavioral interaction model. European Journal of Social Psychology, 19, 171-202.

Rapoport, A., & Almadoss, W. (1999). Social dilemmas embedded in between-group competitions: Effects of contest and distribution rules. In M. Foddy, M. Smithson, S. Schneider, & M. Hogg (Eds.), Resolving Social Dilemmas: Dynamic, Structural, and Intergroup Aspects. Philadelphia: Psychology Press.

Rapoport, A., & Bornstein, G. (1987). Intergroup competition for the provision of binary public goods. Psychological Review, 94, 291-299.

Rapoport, A. & Bornstein, G. (1989). Solving public goods problems in competition between equal and unequal size groups. Journal of conflict resolution, 33, 460-479.

Rapoport, A., Bornstein, G., & Erev, I. (1989). Intergroup competition for public goods: Effects of unequal resources and relative group size. Journal of Personality and Social Psychology, 56, 748-756.

Rapoport, A., & Chammah, A. M. (1965). Prisoner's dilemma: A study in conflict and cooperation. Ann Arbor: University of Michigan Press.

Robert, C., & Carnevale, P. J. (1997). Group choice in ultimatum bargaining. Organizational Behavior and Human Decision Processes, 72, 256-279.

Schelling, T. (1960). The strategy of conflict. Cambridge, MA: Harvard University Press.

Schopler, J., & Insko, C. A. (1992). The discontinuity effect in interpersonal and intergroup relations: Generality and mediation, in W. Strobe & M. Hewstone (Eds.), European review of social psychology (Vol. 3, pp. 121-151). Chichester: John Wiley.

Simmel, G. (1955). Conflict and the web of group affiliations. Glenco, IL: Free Press.

Sherif, M. (1966). In common predicament: Social psychology of intergroup conflict and cooperation. Boston: Houghton Mifflin.

Snidal, D. (1986). The game theory of international politics. In K. Oye (Ed.), Cooperation under Anarchy. Princeton: Princeton University Press.

Stein, A. A. (1976). Conflict and cohesion: A review of the literature. Journal of Conflict Resolution, 20, 143-172.

Suleiman, R. (1997). Provision of step-level public goods under uncertainty: A theoretical analysis. Rationality and Society, 9, 163-187.

Suleiman, R., & Rapoport, A. (1988). Environmental and social uncertainty in single trial resource dilemmas. Acta Pcychologica, 68, 99-112.

Tajfel, H. (1982). Social psychology of intergroup relations. Annual Review of Psychology, 33, 1-39.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. In W. G. Austin, & S. Worchel (Eds.), The social psychology of intergroup relations. Monterey, CA: Brooks/Cole.

Takacs, K. (2001). Structural embeddedness and intergroup conflict. Journal of Conflict Resolution, 45, 743-769.

Taylor, M. (1987). The possibility of cooperation. Cambridge: Cambridge University Press.

Taylor, D.M., & Moghaddam, F.M. (1987). Theories of intergroup relations: International social psychological perspectives. New York: Praeger.

Turner, J. C., Brown, R. J., & Tajfel, H. (1979). Social comparison and group interest in intergroup favoritism. European Journal of Social Psychology, 9, 187-204.

Turner, J. C. (1975). Social comparison and social identity: Some prospects for intergroup behavior. European Journal of Social Psychology, 5, 5-34.

Yamagishi T, Kiyonari, T. (2000). The group as a container of generalized reciprocity. Social Psychology Quarterly, 63, 116-132.

van de Kragt, A. J. C., Dawes, R. M., & Orbell, J. M. (1988). Are people who cooperate 'rational altruists'? Public Choice, 56, 233-247.

van de Kragt, A.J.C., Orbell, J. M., & Dawes, R. M. (1983). The minimal contributing set as a solution to public goods problems. American Political Science Review, 77, 112-122.

Table 1: The Four Prototypical Team Games

The Intergroup Public Goods (IPG) game

	m_A-m_B						
	3	**2**	**1**	**0**	**-1**	**-2**	**-3**
C	6	6	6	3	0	0	-
NC	-	8	8	5	2	2	2

The Intergroup Chicken game

	m_A-m_B						
	3	**2**	**1**	**0**	**-1**	**-2**	**-3**
C	6	6	6	0	0	0	-
NC	-	8	8	2	2	2	2

The Intergroup Assurance game

	m_A-m_B						
	3	**2**	**1**	**0**	**-1**	**-2**	**-3**
C	6	6	6	6	0	0	-
NC	-	8	8	8	2	2	2

The Intergroup Prisoner's Dilemma (IPD) game

	m_A-m_B						
	3	**2**	**1**	**0**	**-1**	**-2**	**-3**
C	6	5	4	3	2	1	-
NC	-	7	6	5	4	3	2

Table 2: A Taxonomy of Games by Type of Players

Opponent Player	Nature	Individual (I)	Unitary Team (U)	Non-cooperative Group (G)
Individual (I)	I	I-I	I-U	I-G
Unitary Team (U)	U	U-I	U-U	U-G
Non-cooperative Group (G)	G	G-I	G-U	G-G

Notes

[1] For simplicity, I discuss the case where the competing groups are of equal size, all the players have identical endowments, and each has to decide between contributing the whole endowment and withholding contribution. The team game paradigm can be adapted to allow for groups of unequal size (e.g., Rapoport,& Bornstein, 1989), unequal endowments (both within each group and between the groups, e.g., Rapoport, Bornstein, & Erev, 1989) and continuous contribution.

[2] This taxonomy by no means exhaust the universe of step-level team games. For example, Bornstein, Kugler, & Zamir (unpublished) have studied an asymmetric team game, where, to provide the public good, one group must strictly win the game, while the other must only not lose (that is s = r for one group and 0 for the other group). Other variations of intergroup games were recently formulated by Rapoport & Almadoss (1999), and Takacs (2001).

[3] The constraint that a non-critical contribution does not benefit the group was implicit in the discussion of the step-level team games above. Formally, this constraint is expressed in the following inequalities: $e > 0$, for the IPG, $e > ns$ for the Chicken game, and $e > n(r-s)$ for the Assurance game.

[4] Contribution by all members of both groups is the unique Nash equilibrium (in pure strategies) in both the IPG and IPD games. In the IPD game, contribution by all group members is the dominant group strategy which maximizes the ingroup's payoffs *regardless* of what the outgroup does, whereas in the IPG game there is no dominant strategy. .

[5] More formally, since no individual player can benefit from unilaterally changing her strategy, the outcome of all players contributing is the (unique) Nash equilibrium

in the noncooperative game among the 2n players in addition to being the equilibrium in the two-person game between the two groups.

[6] Unlike the IPD and IPG games, all the cases in which the Assurance game is tied are Nash equilibria, meaning that the best response for each group is to match the number of contributors in the outgroup.

[7] The outcome, in other words, is a Nash equilibrium in the semi-cooperative Assurance game. Moreover, it is also an equilibrium in the non-cooperative game since no individual player can benefit from contributing when all other players do not.

[8] In other words, there is no pure-strategy equilibrium in the (semi-cooperative) competition between groups A and B.

[9] These outcome are also the Nash equilibria in pure strategies in the intergroup and single-group games.

[10] Insko et al. have studied "natural" groups – groups whose members can talk freely among themselves and share information and ideas. However, unitary groups can also be operationalized as nominal groups – groups whose members arrive at a group decision by some imposed public choice (i.e., voting) mechanism (e.g., majority rule, dictator choice) without an opportunity for face-to-face discussion (e.g., Bornstein, Schram, & Sonnemans, forthcoming).