

Running Head: FACTORS AFFECTING GAME CHOICE AND BEHAVIOUR

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What's Best for You Isn't What's Best for Me:

The Effect of Group Membership, Expectations, and Value Orientation on  
Experimental Dilemma Game Choice and Behaviour

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### Abstract

The present research examined two levels of behaviour: The decisions of individuals about which outcome-interdependent situations in which they wished to pursue their goals (locomotion), and the decisions that these individuals made while in these situations. The main factors that were predicted to influence these decisions were the identity of the interaction partner and the social value orientations and expectations of the participants. Participants were 97 students from Carleton University and were between the ages of 18 and 52. They were asked to choose which of three experimental social dilemma games they preferred to play, and were subsequently told that they would be playing all three against either an ingroup or outgroup member which was in reality, a preprogrammed tit-for-tat strategy. The results indicate that identity did not have a strong effect on rates of cooperation or game choice when playing a partner using a tit-for-tat strategy. Furthermore, social value orientations coupled with expectations were found to be good predictors of game choice.

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*An Introduction to Outcome Interdependence*

Situations in which the outcomes are determined both by one's own choices and the choices of others are referred to as situations of interdependence (Dawes, 1980; McClintock & Liebrand, 1988; Komorita & Parks, 1996; Van Lange 1997a, 1999). Social exchange theory provides a useful way to consider these states of interdependence (Komorita & Parks, 1996). Using this approach, social interactions can be represented by a matrix of outcomes. In the simple case of a two person interaction, the rows of the outcome matrix represent all the possible actions of Player 1, where each row corresponds to one of the many possible behaviours Player 1 may choose from their set of all possible strategies. Conversely, the columns represent all the possible actions of Player 2. Cells are formed by the intersection between the rows and columns of the outcome matrix and each cell contains the consequences or outcomes for Player 1 and Player 2. Thus, the outcome matrix describes all possible outcomes that result from the joint actions of Player 1 and Player 2. A mixed-motive outcome matrix is one in which the outcomes for Player 1 and Player 2 are not completely correspondent or noncorrespondent resulting in a conflict between the motive to cooperate and the motive to compete (there is incentive to do both). This quality makes the mixed-motive case very useful in research because it leads to a broader repertoire of actions.

*Subjective Transformations*

In an objective decision environment, the initial outcome matrix is called the given decision matrix and provides all possible outcomes contingent on each individual's strategy played in an outcome-interdependent environment. It is an objective matrix in that the choices and payoffs are specified *a priori*. This matrix is hypothesized to undergo a series of subjective (individually derived) transformations to become the effective decision matrix or the subjective matrix of outcomes as perceived or interpreted by the subject (Kelley & Thibaut, 1978). It is assumed that the effective decision matrix determines the final choices of outcome-interdependent individuals. McClintock and Liebrand (1988) postulated that these matrices are transformed depending on the following:

- 1) The initial objective structure of decision task (what the payoffs are in the given matrix).
- 2) The value orientations of the individual decision makers (the values and goals of the individual that may influence how they transform the given matrix).
- 3) The strategy pursued by the other player (cooperative versus noncooperative or competitive decisions).

*Experimental Games*

The outcome matrix when applied to a research setting creates a paradigm commonly referred to as an experimental game which is defined as a "laboratory task used to study how people behave in an interdependent situation"

(Pruitt & Kimmel, 1977, p. 363). Pruitt and Kimmel (1977) list three defining features of the experimental game:

- 1) Each individual must make one or more decisions that affect his or her own welfare as well as the welfare of others.
- 2) The outcomes of these decisions are expressed in numerical form.
- 3) The numbers that express these outcomes are chosen *a priori* by the experimenter (i.e., the given decision matrix).

Thus, experimental games can provide a useful paradigm for examining various aspects of social decision making. Numerous researchers have used experimental games to study topics such as cooperation, resource depletion, ingroup favouritism, and trust (Dawes, 1980; Brann & Foddy, 1988; Van Lange, 1999; Yamagishi & Kiyonari, 2000; Foddy, Platow, & Yamagishi, 2002; Joireman, Kuhlman, Van Lange, Doi, & Shelley, 2003). In particular, studies of cooperation using experimental games have frequently turned to social dilemmas when determining the outcome or given decision matrices for these games (Pruitt & Kimmel, 1977; Dawes, 1980).

### *Social Dilemmas*

Social dilemmas involve a conflict between the interests of the individual and the interests of the group. Specifically, Dawes (1980) describes social dilemmas as having two properties: 1) each individual is better off if they pursue their 'self-interests' regardless of what others do, but 2) if all individuals pursue their self-interests all are worse off than if all individuals had pursued 'collective

interests'. Komorita and Parks (1996, p. 8) define social dilemmas as situations in which a "group of persons must choose between maximizing selfish interests and maximizing collective interests" where "it is generally more profitable for each person to maximize selfish interests but if all choose to maximize selfish interests, all are worse off than if all chose to maximize collective interests." Thus, mutual competition or noncooperation (self-interested behaviour) is detrimental to all and leads to a lower payoff than if all had cooperated (collective-interested behaviour), whereas mutual cooperation is generally most collectively beneficial. Many examples of social dilemmas exist (cf., Dawes, 1980) involving such things as overpopulation and the provision of public goods.

A famous example coined by Hardin (1968) is called the "Tragedy of the Commons". In this example, individuals share a common pasture where their animals are able to graze. Acting according to self-interests results in the addition of animals to the commons as the owner incurs a minimal cost (i.e., this cost is spread among all the animal owners), but receives all the benefit from the additional animal (i.e., receives all the profit from selling the animal at market). In this situation, all individuals are motivated by self-interest to continually add their animals to a finite resource (i.e., the common grazing area). The tragedy is that if all individuals keep adding animals (a noncooperative choice), then the pasture is overgrazed and rendered useless resulting in all individuals being worse off than if all had followed collective interests and maintained a constant herd size (a cooperative choice).

*Factors that Influence Social, Interdependent Decisions*

A number of factors can influence social decisions reached in settings where outcomes are determined by joint decisions, in this case the behaviour of individuals in experimental social dilemmas. Many researchers are interested in what these factors are in the hopes of promoting cooperation and collective gain and avoiding detrimental collective loss in situations of outcome interdependence. Joireman et al. (2003, p. 414) states “each individual’s evaluation (or ‘construal’) of the available options within a given interdependence structure is likely to be influenced by features of both the situation (i.e., what each option objectively affords) and the person (e.g., the individuals’ values, beliefs, and motives).” Individual decisions are strongly influenced by situational factors such as the level of communication between decision makers (Dawes, 1980), the presence or ability to establish formal and informal sanctioning systems (Yamagishi, 1986, 1988), level of anonymity, magnitude of incentives (Komorita & Parks, 1996), the strategy of the other players including their past behaviour (McClintock & Liebrand, 1988; Van Lange & Visser, 1999), the objective structure of the interdependence task (McClintock & Liebrand, 1988), and the identity of the players involved (Brown, 1980; Brewer & Schneider, 1990; Wit & Wilke, 1992; Karp et al. as cited in Yamagishi, Makimura, Foddy, Matsuda, Kiyonari, & Platow, 2005). Individual factors include the decision maker’s expectations of the other person’s behaviour (McClintock & Liebrand, 1988), the goals and value orientations of the decision maker (McClintock & Liebrand, 1988;

Van Lange, 1997b, 1999; Van Lange & Visser, 1999), and the individuals' knowledge of the jointly rational solution (Foddy, 2001). In this study, the effects of game structure, value orientation, and identity will be examined.

Social dilemmas are frequently presented using outcome matrices characterized by two outcome-interdependent players given the choice between two possible actions. All possible payoffs are provided for each individual contingent on their joint decisions. Rapoport and Guyer (1966) identified 476 different variations of a 2 X 2 payoff matrix in which each cell was given an ordinal ranking from one to four with four having the most desirable payoff and one having the least desirable. Furthermore, they assumed that players would have a strict ordering preference for these amounts (where the most desired cell is preferable to the next most desirable and so on). From this set of dilemma games, three are of particular interest: the Prisoner's Dilemma (PD), Chicken, and Trust. According to Liebrand's (1983) classification of social dilemma games, these games satisfy the former criteria in that they can all be represented by a 2 X 2 matrix and therefore involve two choices for each player. In addition, these three games are symmetric in nature (appear identical from both players' perspectives) and satisfy the properties for a social dilemma (Liebrand, 1983). McClintock and Liebrand (1988) selected PD, Chicken, and Trust games for use in their study for similar reasons. They further qualified their choices stating that each of the three interdependence structures were of interest because they represent a diverse sampling of social dilemma games, are characterized by

interesting psychological decision-making characteristics, and have a clear cooperative and competitive choice from the perspective of the players. In their study as in this one, choices A and X represent cooperative decisions for Player 1 and 2 respectively whereas choices B and Y represent noncooperative decisions for Player 1 and 2 respectively. Each of the game matrices are presented in Table 1. One final point involves the Index of Cooperation (Rapoport, 1967) or K-index of each experimental social dilemma game. The value of K is a mathematically derived constant that reflects the propensity for cooperation given a particular experimental social dilemma payoff structure. For the PD, K is between the values of 0 and 1, but can exceed 1 for other types of experimental games. A higher value indicates that cooperation is more easily attained or more likely to occur in the particular game and a lower value indicates the opposite, cooperation will be less likely to occur. The aforementioned games all have a K-index with PD having the lowest value followed by Chicken and then Trust which has the highest value. Thus, given each games K-index one would expect the greatest amount of cooperation in Trust and the least in PD.

### *The Prisoner's Dilemma*

The PD strictly satisfies the definition of a social dilemma as defined by Dawes (1980). It has a strictly dominant strategy in that choice B yields the best individual payoffs regardless of the other person's choice (of X or Y). Its name refers to a situation in which police are interrogating two criminals separately and simultaneously. If both stay quiet (cooperate with each other) the police will be

unable to convict them and they will be convicted of a lesser crime and receive a light sentence. If one criminal confesses, but the other one does not, then the confessor gets off and the other receives a stern sentence. If both confess, then the police convict them both, but because of their confessions, they receive a moderate sentence. In this case, two rational actors acting in their own self-interest should always choose B (and confess) because freedom is preferable to a light sentence and a moderate sentence is preferable to a stern sentence. The dilemma of this situation is that if both individuals act in their self-interests, choose B (and Y) and confess, then they end up with a result that is detrimental to their collective interests (moderate jail time for both and a promotion for the district attorney) and are worse off than if they had not followed their self-interests (and received a light sentence by both keeping quiet).

### *Chicken*

Chicken and Trust do not follow the strict definition of a social dilemma, but can still be considered social dilemmas if we relax Dawes' first criterion (Liebrand, 1983). That is, we can define a social dilemmas as such if: "1) there is a strategy that yields the person the best payoff in at least one configuration of strategy choices and that has a negative impact on the interests of the other persons involved, and 2) the choice of that particular strategy by all persons results in a deficient outcome" (Liebrand, 1983). A strategy that satisfies the first condition above is referred to as the most-threatening strategy. A rational player would prefer the other player not to play such a strategy because it reduces his

or her possible outcomes regardless of his or her own choice. If both choose their most threatening strategy, they have mutually reduced each other's possible payoffs.

Chicken can be illustrated by the following anecdote: Two teenagers are driving their roadsters directly at each other in the hopes of attracting the affection of an attractive onlooker. The first one to veer away is the 'chicken' and receives a low payout in the form of embarrassment. The individual who does not swerve gets the highest payout in the form of the affectations of the onlooker. If both veer out of the way, each receives a moderate payout in that they are both uninjured, but do not swoon the eye-catching spectator. If both individuals do not swerve out of the way of one another, their cars crash resulting in death or serious injury to each of them. Consequently, in the Chicken game, choice B (not swerving) is the most-threatening strategy whereby Player 1 prefers that Player 2 not play B regardless of the choice of Player 1. If Player 2 chooses B, the best attainable result by Player 1 is embarrassment (choosing A and swerving) and the worst result is death (choosing B and not swerving as well). In Chicken, there is a non-dominating motive to choose the most-threatening strategy B based on the maximax strategy (a self-interested strategy) to maximize maximum ones own gains. This means that some individuals will opt for B if they want to receive the highest payout. It is a non-dominating strategy because they prefer embarrassment to death. If both players choose the most-threatening

strategy B, both end up with the worst possible outcome, which is a fatal car crash.

### *Trust*

Trust can be illustrated using the following example from Liebrand (1983): Two athletes decide to run a marathon in order to decide who the best long-distance runner is. Both prefer an honest race (choice A) to one in which drugs are involved (choice B). If one individual does take drugs to increase their performance, the other person would rather not be at a disadvantage and would prefer to take drugs as well. In the Trust game, there is a non-dominating motive to choose the most-threatening strategy B according to minimax (minimize maximum losses) and maximin (maximize the minimum payoff) strategies (Liebrand, 1983; McClintock & Liebrand, 1988). That is, some players are motivated to take drugs to avoid being sorely beaten by another runner who is using drugs. If the other runner takes drugs, the first runner can at best hope for a dishonest tie race, or at worst a severe loss while drug-free. If both players choose B, then they are both worse off had they both chosen A because the race is no longer an honest race or a true measure of each runners performance.

### *Social Value Orientations*

An individual's social value orientation represents his or her preference for a specific pattern of outcomes for self and others (in this case, for him or herself and another person) in an outcome interdependent situation that is consistent over time (Messick & McClintock, 1968; McClintock & Liebrand, 1988; Komorita

& Parks, 1996). Social value orientations were conceived as a way of explaining the “irrational” behaviour of participants in experimental game paradigms such as PD (Kuhlman & Marshello, 1975b; McClintock & Liebrand, 1988). Rather than assuming that participants were attempting to maximize their outcomes according to the individual payoffs given to them by the experimenter, it was suggested instead that some individuals may focus on maximizing the gains of both players combined (Messick & McClintock, 1968). Thus, it was theorized that social value orientations represented stable individual differences of how individuals weighted the outcomes to themselves and others in socially interdependent situations such as experimental games like PD (Van Lange, 1997b). The extent to which these orientations guide behaviour in an experimental game is contingent on the particulars of the experimental context.

Social value orientations give rise to an extensive set of possible strategies that an individual may employ based on the weight they ascribe to their own and another's payoff. These weights consequently determine the degree to which an individual cooperates in an experimental game (Kuhlman & Marshello, 1975b; Van Lange, 1999; Van Lange & Visser, 1999). Specifically, individuals can place value on (Messick & McClintock, 1968):

- 1) Maximizing joint gain and are referred to as cooperators.
- 2) Maximizing own gain and are referred to as individualists.

3) Maximizing relative gain or the difference between their payoff and the payoff of another (i.e., maximizing inequality between self and others' payoff) and are referred to as competitors.

Cooperators are also known as prosocials because they value other persons' outcomes as well as their own. Individualists and competitors are known as proselves as they give much less weight to others' outcomes compared to their own outcomes. Consequently, value orientations exist along a continuum (Van Lange & Visser, 1999) with one end representing the greatest emphasis on others' outcomes (prosocials) and the other, the least (proselves).

Two main approaches are used to measure social value orientations, the Ring Measure (Liebrand & McClintock, 1988) and the Triple Dominance Measure of Social Values (Van Lange, Otten, De Bruin, & Joireman, 1997). Both result in a classification of competitor, cooperator, or individualist, or a classification of inconsistent if the pattern of responses does not indicate a particular orientation (as a result of contradictory responses). Each approach involves a series of decomposed matrices – with 24 matrices in the Ring Measure and 9 matrices in the Triple Dominance Measure – in which participants are asked to choose between a series of paired distributions for themselves and another person. The Ring Measure has an integrated method for determining the internal consistency of individuals' value orientations, but the Triple Dominance Measure lacks a specific approach for determining this. Responses from the Triple Dominance Measure can be recoded into an altruism score for each matrix and summed up.

This altruism score ranges from 0.20 for a pure competitor to 1.0 for a pure cooperator where pure denotes that individuals are aligned with only one orientation.

Van Lange et al. (1997) have theorized that these motivational orientations are partially a product of the patterns of social development we are exposed to during our formative years and again as we move from middle to old age (cf., Ostrom, 2003). In support of this, they found that motivational orientations are linked to attachment style; prosocials exhibit greater levels of secure attachment and are more likely to have a higher number of siblings (especially sisters). Furthermore, they found that as individuals move from early adulthood to middle adulthood and old age, the prevalence of prosocials increases whereas the prevalence of individualists and competitors declines. Van Lange et al. (1997) offer possible explanations for this increase including the growing exposure to situations of interdependence in which a prosocials stance is beneficial, the increased reliance on others with age and increased amount of helping behaviour, and the suburbanization and individualization of younger members of the population (in this case, a European sample). No decisive conclusion was reached, but the findings lend credibility to the stance that value orientations are an enduring and socially formed determinant of behaviour.

The stability of social value orientations is moderately constant over time (temporal stability) and across situation (situational stability; Kuhlman & Marshello, 1975a; Bekkers, 2004). Employing a structural equation model,

Bekkers (2004) found an unsatisfactorily small, but significant relationship between individuals' value orientations measured 19 months apart using Van Lange's Triple Dominance Measure of Social Values. Individuals were gathered from Telepanel data at Time 1 and Time 2 (Van Lange, 1999) and the measures only differed in that at Time 2, participants were instructed, "the other is an unknown other." This additional statement was included to avoid confusion associated with questionnaires included before the measure of value orientations at Time 2, but the instructions may have influenced individuals with internally inconsistent value orientations and thus created more movement between them. Specifically, in an anonymous situation, inconsistent value-oriented individuals may rely less on their values as a guide for behaviour and more on situational factors thus creating a greater disparity between social values and behaviour. It is also possible that under anonymity individuals are less affected by norms of fairness and thus become less cooperative creating the inconsistency between Time 1 and Time 2.

Support for the impact of inconsistency on the temporal instability of value orientations is provided by Smeesters (2002) who established that the temporal stability of value orientations increased if their consistency was taken into account. He found that participants who made more choices aligned with a particular value orientation, and thus individuals who were more consistent for that value orientation, were more likely to use their value orientation as a guide in outcome-interdependent situations and demonstrated increased stability of their

orientation over time. Conversely, individuals low in value orientation consistency or those whose choices were weakly aligned to a particular value orientation were more likely to be influenced by situational factors such as perceived honesty or intelligence of the other.

The validity of social value orientations has received further attention. Previous studies have found that value orientations are highly predictive of various behavioural outcomes from experimental social dilemmas to real-world situations when the time lag between the two is small to moderate (Van Lange, Agnew, & Steemers, 1997b; Van Lange, 1999; Bekkers, 2004). When value orientations are measured immediately prior to a two-player, two-choice repeated experimental game they are able to predict whether an individual will play cooperatively or competitively (Kuhlman & Marshello 1975b; McClintock & Liebrand, 1988). Furthermore, value orientations are predictive of cooperative behaviour in real-world settings along continuous dimensions - such as charitable donations - where the investment of time and money is generally greater than laboratory settings (Van Lange, Agnew, & Steemers, 1997a; Bekkers, 2004).

These findings suggest that value orientations are significantly stable over time, but situational and dispositional factors can interfere with their relationship to behaviour especially in those individuals who do not express a consistent orientation. This temporal stability tends to decrease as the time lag increases possibly because of inconsistent orientations and particular patterns of social development. Value orientations are a putative method for ascertaining the

general way in which people ascribe value to their own and others' outcomes and are related to various behaviours that are linked to these valuations. In this study, the time lag is negligible with the measurement of social value orientations occurring in conjunction with the rest of the experiment.

The three types of social values described above, cooperation, individualism, and competition are related to cooperative and competitive behaviour in experimental social dilemma games (Kuhlman & Marshello, 1975b; McClintock and Liebrand, 1988; Van Lange, 1999, Van Lange & Visser, 1999). For example, cooperatively value-oriented individuals are more likely to make cooperative choices in a two-person PD game whereas competitively value-oriented individuals are more likely to make noncooperative choices. Individualists' choices on the other hand depend on the strategy of the person they are playing against and can vary from cooperative to competitive choices. Moreover, prosocials, while inclined to cooperate with a cooperative partner, choose noncooperation in the face of a noncooperative partner (viz., behavioural assimilation: Adopting the behaviour of the other interaction partner), and individualists, while inclined to act in their own self-interest, choose to cooperate when paired with a partner pursuing a tit-for-tat strategy (e.g., Kuhlman & Marshello, 1975b). A tit-for-tat strategy is a well-known reciprocating strategy that begins with a cooperative choice and then mirrors the response the participant made in the previous round (Axelrod, 1981). It is very effective at promoting

cooperation as it is simple to understand, cannot be exploited (will defect if you do), and is forgiving (will cooperate if you do).

### *Value Orientations, Game Structures, and Strategies*

McClintock and Liebrand (1988) examined whether the experimental game structure in conjunction with the other's strategy and the participant's value orientation produced a specific pattern of behaviour. The game structures they used in their study all involved two-player, two choice repeated games and included PD, Chicken, Trust, and Leader. The other player was preprogrammed to play a 100% cooperative strategy, a 100% competitive strategy, or a tit-for-tat strategy. Each participant was randomly assigned to a single game (30 rounds per series) and faced all three strategies (3 series) in a randomized order. Participants were also asked to rate the other on 10 semantic differential items.

McClintock and Liebrand (1988) transformed the outcome matrices of their experimental games according to the three value orientations of cooperation, individualism, and competition. This resulted in three effective matrices representing the motives of cooperators, individualists, and competitors respectively, for each of the four games. Rapoport and Guyer's (1966) two prescriptions for rational choice behaviour were then applied to decisions featuring these effective matrices:

- a) A player will play his or her dominant strategy if one exists (based on their value-transformed outcome or effective matrix)

- b) If a dominant strategy does not exist for the player, but does exist for the other, then the player will adopt whatever strategy maximizes his or her preferred outcome given the other's dominant strategy. We assume that the player can perceive the others dominant strategy and the other plays this strategy.

Liebrand and McClintock (1988) were able to make predictions for participants first round moves assuming that in the first round of each series participants would assign a likelihood of 50-50 to their partners choice of either X or Y. In addition, the researchers calculated participants' dominant strategies (the choices they would likely repeatedly make) given the alternative game structures, the participant's value orientations, and the differences in the other player's strategy. Before making actual choices, participants were asked to rate their order of preference for the four outcome cells in the 2 X 2 games they were about to play. This resulted in predicted proportions of preferred outcome choices corresponding to the AX and BX outcomes for cooperators, individualists, and competitors across all four games.

The results of McClintock and Liebrand's study indicated that participants correctly identified what games they had been playing, that is they knew they had played Chicken, Trust, PD, or Leader, and therefore were aware of the differences in the objective structures between the games. Moreover, there was a main effect for the participants' value orientation, a significant interaction between other's strategy and value orientation, and a significant interaction

between the other's strategy and game structure. Specifically, cooperators made a smaller number of noncooperative choices compared to competitors. Competitors were found to be most likely to exploit someone using a 100% cooperative strategy and were the least sensitive to variations in the other's strategy whereas individualists and cooperators were likely to cooperate rather than compete with a tit-for-tat partner and were likely to increase the number of their competitive choices against a strictly competitive partner. Depending on the strategy, there were variations in the number of noncooperative choices across game structures. A strategy of 100% cooperation elicited the highest number of competitive choices in the Leader game unlike the other game structures which when coupled with a strictly cooperative strategy elicited lower levels of competition. The preferences of participants across value orientation and game structure for the AX and BX outcomes (expressed as proportions) were highly related to predicted choice behaviour. Lastly, the personality ratings of the other player revealed that 100% competitive players were seen as less fair and honest, whereas tit-for-tat players were seen as more intelligent and powerful.

#### *Social Identity, Trust, and Cooperation*

Trust is an important factor in social interaction and exists in many facets of group interaction. Trust is essential to supporting efficient market transactions (Arrow, 1970 as cited in Frey & Meier, 2001) as well as facilitating relations between individuals, within economies and among nations. In other words, trust acts as a social lubricant. Brann and Foddy (1988) define trust as expectations of

beneficent reciprocity from others in uncertain or risky situations and thus, trust reflects a belief that another's acts will benefit (or not harm) us, before we know the outcome of their behaviours.

This is especially relevant among interactions between strangers due to the inherent uncertainty involved in these relationships when compared to more secure associations. This social uncertainty arises when your interaction partner has an incentive to do you harm (as in a social dilemma) and you do not have enough information to predict whether he or she will choose to do so (Yamagishi, Cook, & Watabe, 1998).

When people find themselves facing social uncertainty, the decision to trust may be based on a number of factors. In the case of social uncertainty, trust may arise from the nature of the relationship between them. One aspect of this relationship could be shared group membership. Although you may not know another individual personally, you might know that the individual belongs to the same club, organization, or even nationality that you do. This in itself can be a basis for the formation of trust.

There are two mechanisms that lead to trust based on group membership. One is referred to as stereotype-based trust and is based on the tendency for individuals to positively evaluate their own ingroup (Brown, 2000). "We may trust ingroup members simply because we think they have positive qualities per se – the ingroup stereotype is globally positive and contains an array of specific traits which are positively construed, and which usually outnumber the negative"

(Foddy, Platow, & Yamagishi, 2002). This positive evaluation leads to increased cooperation and trust of the ingroup in certain cases (Foddy et al., 2002; Yamagishi et al., 2005; Yamagishi & Kiyonari, 2000). Some consequences of this view are that individuals may be less likely to trust and cooperate with ingroup or outgroup members if they hold more negative stereotypes of that group or more likely to trust a positively stereotyped outgroup.

The other mechanism of group-based trust is referred to as the group heuristic (Foddy et al., 2002; Kiyonari, Tanida, & Yamagishi, 2000) and mirrors the theory of Yamagishi and Kiyonari (2000) which states that the group acts as a “container of generalized reciprocity.” This reciprocity heuristic is due to a naïve theory of groups that individual’s hold wherein they believe they should act in a way that favours members of their ingroup in the hopes that their own interests will benefit. This is largely independent of the valence of ingroup evaluations as demonstrated by Foddy et al. (2002). In other words, despite what an individual may think of their group, they will still choose to trust a member of their group more than a member of another group from which they do not belong.

Whatever the reasons for group-based trust, there is much evidence that it leads to ingroup bias. Individuals have been shown to allocate more money to a member of their own group than to a member of an outgroup and exhibit higher cooperation rates in a PD game with ingroup members as opposed to outgroup members (Yamagishi et al., 2002; Haslam, 2001). Similarly, in experiments designed to measure group-based trust, there is a strong preference for

individuals to trust a member of the ingroup as opposed to an outgroup member and to expect to receive more money from the ingroup compared to the outgroup (Foddy et al., 2001, Yamagishi & Kiyonari, 2000).

Trust is closely related to cooperation. Kiyonari et al. (2000) demonstrated that individuals who were more likely to cooperate in a sequential PD game did so regardless of whether they were the first or second player. A level of trust exists between players in this situation whereupon the first player chooses to cooperate, trusting the second player to observe their decision and act honestly to reciprocate and cooperate to maximize joint gain. This trust-based reciprocity is viewed as an important precursor to cooperation in social dilemmas (Dawes, 1980) and is based on an expectation of goodwill and benign intent (Yamagishi & Yamagishi, 1994). Without the expectation that others will reciprocate, even cooperatively oriented individuals may find it difficult to justify self-restraint on their part in a resource depletion game (Kramer & Goldman, 1999). This idea is consistent with the study by Brann and Foddy (1987) in which individuals were divided into high truster and low trusters using the Rotter Interpersonal Trust Scale (ITS). As they had predicted, Brann and Foddy found that "high trusters took fewer resources from the simulated commons than low trusters when feedback indicated the resource was being overused" (Kramer & Goldman, 1999). Frank, Gilovich, and Regan (1993) found that when individuals were allowed to make contracts before a one-shot PD game, they cooperated at a

much higher rate than when not allowed any contact; trusting others to not renege on their contract leads to higher rates of cooperation.

The amount of cooperation can also arise from identification with a group, but does not explicitly involve ingroup versus outgroup distinctions. This process of identification involves the creation of a group versus a personal level of categorization. Factors likely to enhance this group identification are similarity, proximity or common fate (Wit & Wilke, 1992). Thus, having your identity as a Carleton student made salient should create a collective level of identification with other Carleton students with whom you are similar, proximal and share a common fate. This in itself can lead to increased cooperation in a collective social dilemma (Brewer & Schneider, 1990; Wit & Wilke, 1992). "Social dilemmas involve a discontinuity between self-interest defined at the level of the individual and at the level of social group" (Brewer & Schneider, 1990, p. 170), but the effect of instilling a collective identity can make self-interested behaviour give way to group-interested behaviour as the self becomes an interchangeable exemplar of the relevant social category (i.e., a Carleton student). Both Brewer and Schneider (1990) and Wit and Wilke (1992) demonstrated a positive effect of group categorization on levels of cooperation in iterated resource and one-shot dilemmas. The latter study involved one-shot games that were designed to be real-life examples of experimental social dilemmas and followed the game structures: PD, Chicken and Trust. They found that priming a collective and individual identity using common fate resulted in greater cooperation in the group

compared to the individual condition. Furthermore, this effect was the least for Trust where cooperation levels were high in both between conditions (Wit & Wilke, 1992). What Wit and Wilke did not include was a measure of each participant's value orientation in order to determine whether group categorization equally affects cooperators, competitors and individualists.

The evidence on the effect of identity indicates that players who share a meaningful group identity (ingroup-ingroup) are more likely to make and reciprocate cooperative choices with one another. Conversely, individuals that have different identities (ingroup-outgroup) exhibit an equal or lower level of cooperation (Brewer & Schneider, 1990).

#### *Locomotion: Changing the Name of the Game*

In many experiments featuring experimental social dilemma games such as PD, individuals are presented with a static 2 X 2 matrix containing the consequences of their joint decisions; generally a choice to cooperate or defect. In this case, individuals are a captured audience and must play according to the rules set out by the experimenter.

"Thus, in almost all social psychological laboratory experiments, in one way or another, we force our subjects to do something (mark correct answers on a test, rate the attractiveness of something on a 5-point scale, press a button) and to not leave the experiment before its end. Subjects' freedom of choice is violated in two ways. First, they are not free in choosing the experimental situation and

they are not free in leaving. Second, they can react only within the range of reactions provided by the experimenter" (Grzelak, 1997, p. 411).

Making choices based on a 2 X 2 matrix is uncommon (for most people I imagine) in real life where "in many situations, individuals are not slaves to their circumstances, but are able to alter the situation in ways that allow them to pursue their goals in a more effective manner" (Van Lange & Visser, 1999). Experimental games are useful when investigating rationality and cooperative behaviour, but they may not allow for the richness of behavioural repertoires that exist in real life. Individuals may wish to give a radical meaning to the word "win" (or achieve ones goals). As Hardin (1968) surmises, individuals could hit their opponent over the head, drug them, or falsify records. These actions all involve abandoning the game structure, as it exists, and creating a new one. In many cases, participants can abandon the game altogether and refuse to play it (Hardin, 1968; Yamagishi, 1988).

In the majority of situations, individuals have the ability to decide with whom they will interact and how this interaction will occur (i.e., the extent of interdependence between oneself and others). People are likely to engage in joint activities with others with whom they have had "pleasant interaction experiences" and avoid those with whom they have had unpleasant experiences (Van Lange & Kissner, 1999). When an individual seeks to change the features of a situation through their behaviour, they are engaging in locomotion. This

concept involves “goal-directed activity” with the intent to change the interdependence structure of a given situation that involves two or more individuals (Van Lange & Kissner, 1999). Van Lange and Kissner (1999) found that individuals paired with a noncooperative partner are unlikely to cooperate and will locomote to lower levels of interdependence whereas individuals locomote to higher levels of interdependence if facing a 100% cooperative partner. Furthermore, individualists and cooperators move to higher levels of interdependence when facing a tit-for-tat strategy. Locomotion to lower interdependence represents an attempt by the individual to minimize the fate control that the other player has over them and therefore reduce the effect of the other’s decisions on their outcomes. Locomotion to higher interdependence increases the “impact a partner has on an individual’s outcomes, with cooperative choices yielding very good outcomes and noncooperative choices yielding very bad outcomes” (Van Lange & Kissner, 1999).

Locomotion is determined by the goals of the individual and whether those goals are being satisfied in a particular situation. A goal successfully achieved in an outcome-interdependent situation leads an individual to pursue higher levels of interdependence with their game partner. Cooperators who interact with a tit-for-tat strategy can achieve their goal of mutual cooperation and enhanced joint outcomes and thus are willing to enter into situations of greater interdependence with their partner in the future. Conversely, competitors are unable to achieve their goal of relative gain against a tit-for-tat strategy and move to lower levels of

interdependence presumably to avoid further loss from deficient outcomes (in this case, very poor joint outcomes).

Allowing individuals to choose the situation in which to pursue their goals gives them the ability for locomotion; they can examine the structure or rules of multiple situations or games and decide which one best allows them to reach their goals. In this sense, "locomotion is a useful concept because it emphasizes not only change or movement from one situation (or location) to another but also the distinction between means and ends, thus focusing on the interpersonal routes (e.g., playing with another) one can take in relation to the goals one seeks to accomplish" (Van Lange & Kissner, 1999). A computer simulation done by Watanabe and Yamagishi (1996) demonstrated the evolution of various strategies in a fixed interaction space. They found that populations of certain strategies eventually sort themselves into distinct groupings within the interaction space which was dominated by relatively large clusters of tit-for-tat agents interspersed with lone defectors (these lone defectors were hypothesized to be remaining because they no longer interacted with any other agents; i.e., hermit defectors). The applications of this to real life are relevant; as people interact in the world they may locomote to situations that enable them to achieve their goals and form groups based on their interaction style. Because value orientations are related to strategies employed in experimental games, it is plausible that individuals of differing social values may locomote to different populations, individuals, situations, or locations that enable them to achieve their goals. Given

this theory, cooperators and competitors who act openly according to their value orientations may form separate groups in which to interact (Komorita & Parks, 1996). Conversely, in society competitors may occasionally act cooperatively to avoid stigmatization (Komorita & Parks, 1996) and thus they can obtain interaction partners and payoffs (in a large tit-for-tat group). Likewise, cooperators may pursue a tit-for-tat strategy as they engage in behavioural assimilation or the adoption of varied strategies that suit the circumstances (i.e., make noncooperative choices against competitors). A clear picture of the relative number of competitors or cooperators in a particular population is likely obscured by these factors, but enabling one to choose the situation in an experimental setting provides insight into how individuals approach situations in which to pursue their goals and whether this is influenced by factors such as value orientation or identity.

In the present study, we allowed individuals the choice of what game they would play. Presumably, given free locomotion, individuals would choose the game that allowed them to attain their goals most effectively. Participants were presented with three of the objective game structures used in McClintock and Liebrand's (1988) study and asked to choose which game they would like to play, PD, Chicken, or Trust, with another person for money. They were told that they were playing their chosen game with either a Carleton University student (ingroup-ingroup) or a University of Ottawa student (ingroup-outgroup). Once they had made their choice of game, they played all three games against a

preprogrammed tit-for-tat partner. A tit-for-tat strategy will help maximally separate the behavioral choices of the three classes of value orientations allowing a clear comparative analysis between value orientations while remaining comparable with previous studies on the subject (McClintock & Liebrand, 1988; Kuhlman & Marshello, 1975b; Van Lange & Visser, 1999).

### *Hypotheses*

*Choice of game:* The decision to enter a situation of outcome-interdependence. The predictions for game choice are based on value orientation transformations derived in a similar way to the method used by McClintock and Liebrand (1988). These transformations are summarized in Table 1. Table 2 provides a framework for determining the goal-success of the various game structures given each value orientation (Van Lange & Visser, 1999). Cooperators are expected to choose the Trust game as it allows the highest joint outcome across trials while preserving equality of outcomes. Competitors are expected to choose the Prisoner's Dilemma as it allows them to maximize the difference between outcomes across trials. Lastly, all three games when transformed by individualists yield the same outcome. The Trust game allows them to maximize their own as well as joint outcomes so there is a possibility that we will see a greater proportion choosing this game, but overall their choices are expected to be much more variable.

Making an ingroup identity salient for the participant is hypothesized to activate a group heuristic or make salient a collective ingroup identify and

enhance group norms of reciprocity and collective interest. If this effect is strong enough, individuals may transform their effective game matrix in such a way that more weight is given to joint outcomes or they may expect more cooperative choices from their partner. This could result in a movement from PD and Chicken to the Trust game where joint outcomes as well as individual outcomes are simultaneously maximized given cooperative choices. Competitors and cooperators may be insensitive to identity and treat the ingroup and outgroup as equivalent, and instead focus on their goals of relative gain and joint gain respectively (e.g., competitors may ignore reciprocity norms and cooperators may be keen to cooperate regardless of the identity of their partner). The majority of cooperative individuals are expected to choose Trust regardless of the other player's identity. Likewise, the majority of competitive individuals are expected to choose the PD regardless of the other player's identity. We expect individualists to be affected most by the identity of the other player with ingroup membership decreasing the likelihood of choosing PD and this is will result in an interaction between value orientation and partner identity..

*Choices within game: Number of noncooperative choices.* The decisions of participants in each of the games in addition to recording their choices of game are of interest, but the former is a secondary consideration. A main effect for value orientations is anticipated with competitors expected to make more noncooperative choices overall and cooperators expected to make the least.

Individualists are expected to behave similar to cooperators given the tit-for-tat strategy of the interaction partner.

One aim of this study is to examine whether choosing the situation in which you pursue your goals may influence how you pursue those goals (i.e., if you choose the arena for goal pursuit, does this influence the subjective approach to that pursuit?). In a strictly exploratory vein, we wish to investigate whether individuals exhibit the greatest level of goal-prescribed rationality within the game they choose. For example, competitors choosing the PD may make the highest proportion of noncooperative choices compared to the other two games. The tit-for-tat strategy being employed as well as floor or ceiling effects might attenuate this effect. Competitors may choose the most competitive game and play all three games competitively especially when facing a strategy that reciprocates defection. Conversely, cooperators and individualists will likely cooperate more when faced with a tit-for-tat strategy and thus achieve highly desirable and similar outcomes across all three games.

Overall, individuals who are told they will play a game with an ingroup member are expected to be more cooperative across all games. This may not be the case for two reasons: Competitors demonstrate strategy immobility and maintain steady levels of noncooperation when faced with a tit-for-tat strategy (Komorita & Parks, 1996; McClintock & Liebrand, 1988), and cooperators and individualists maintain a high rate of cooperation regardless of identity when playing a reciprocating tit-for-tat partner. Cooperators playing an ingroup member

should display maximal cooperation and competitors playing an outgroup member should display maximal noncooperation, but this difference may be insignificant given their goal-motivation (to compete and cooperate) as each group reaches a ceiling and floor for cooperation and noncooperation respectively. Thus, the difference between cooperators and competitors when facing shared versus non-shared group membership may not be significantly different if they feel that the structure of the situation is more important to the success of their goals rather than the identity of their interaction partner. Consequently, they may have similar expectations of ingroup and outgroup members or simply do not weight these expectations very heavily when making their decisions.

*First and last moves.* Table 3 presents predictions for likely first and last moves as well as the dominant choices (given tit-for-tat) for each of the game structures and value orientations. Individuals are expected to conform to these predictions given McClintock and Liebrand's (1988) similar approach and subsequent results. No formal hypothesis exists surrounding the effects of ingroup and outgroup identity, but given the uncertainty of the first round, it is plausible for participants to make more cooperative choices with an ingroup member.

*Expectations of others.* There is evidence that competitors expect others to be competitive whereas cooperators expect others to be more heterogeneous in orientation (McClintock & Liebrand, 1988). Studies have also demonstrated a

strong egocentric bias with individuals expecting others to behave as they do (Komorita & Parks, 1996). Given the opposing nature of this evidence, no formal hypothesis is presented. Expectations may play a role in choice of game and choices within each game with expectations of cooperative (noncooperative) behaviour in a particular game increasing (decreasing) the likelihood of choosing that game. Furthermore, these same expectations may influence the rates of cooperation during rounds. Lastly, these expectations may differ for individuals with different value orientations.

*Ratings of partner.* Based on McClintock and Liebrand's (1988) approach, individual's opinions of the tit-for-tat strategy will be examined.

## Method

### *Participants*

Fifty-nine female and 39 male participants between the ages of 18 and 52 years ( $M = 23.23$ ,  $SD = 5.27$ ) were recruited at Carleton University from Carleton's undergraduate participant pool as well as through a campus wide participant recruitment program.

### *Apparatus*

Participants were seated at desks separated by dividers. Each desk had a personal computer and displayed an introductory demographic screen. Participants were informed that the study was concerned with decision making

and they would be required to complete a series of computer administered tasks. The instructions for each task appeared on the relevant screen.

*Identity Questionnaire.* The extent to which Carleton students identified with their university was ascertained using a Social Identity Scale (Appendix A) similar to the one used in Foddy et al. (2002). Participants were asked questions such as "I feel good about being a Carleton student" and asked to rate how much they agreed with the statement using a seven-point scale ranging from 'I strongly disagree' (1) to 'I strongly agree' (7) with neutral having a rating of four. We found the internal validity of this scale to be acceptably high ( $\alpha = .90$ ).

*Matrix Questionnaire.* The purpose of this questionnaire was to introduce participants to the structure and application of outcome matrices in experimental games. It also served as a check of understanding of these two elements of the outcome matrix. Participants were given questions asking them to locate the correct payoffs to them and the other person given hypothetical choices from both parties. A score of four correct answers out of five was required to continue with the experiment. Not one participant failed the matrix test and the average score was 97% indicating that participants understood the matrix layout of the games and how to determine payoffs to self and others given in this form.

*Choice Questionnaire.* The choice questionnaire presented the three experimental games to the participants and asked them to choose one. It was emphasized that they would be playing their chosen game for money with another person. Depending on the condition, they were told that the other player

was either a Carleton University student or a University of Ottawa student. Once they had made their choice, they were asked to: 1) explain their choice, 2) estimate the likelihood that the other player would choose A during any given round, 3) estimate the likelihood that the other player would choose B during any given round, 4) choose what they thought the other player would play in the first round of their chosen game, and 5) estimate the likelihood that the other player made the specified first round move.

*Triple Dominance Measure of Social Values.* Differences in social value orientations were assessed using the Triple Dominance Measure of Social Values (Van Lange, 1997a). Participants were presented with nine decomposed games that presented three options, each representing a distribution of payoffs between self and other. Each option corresponded to a particular preference for outcomes to self and other. For example, Option A: 480 points for the self and 80 points for the other, Option B: 540 points for the self and 280 points for the other, and Option C: 480 points for the self and 480 points for the other. In this example, Option A represents the competitive orientation because it maximizes the difference between outcomes, Option B represents the individualistic orientation because it maximizes one's own payoff, and Option C represents the cooperative orientation because it maximizes joint gain and equality of outcomes to self and other. Participants were asked to imagine that the points were meaningful to themselves and to the other person and that the more points accumulated by both parties, the better off each party was. The other person was

presented as an anonymous individual that the participant had never met nor would ever meet in the future. These instructions were given because a general attitude towards the pattern of outcome valuation was being assessed based on one's general attitudes towards an anonymous other where the outcomes were meaningful and desirable to both.

If participants selected six out of nine options that followed a particular value orientation, they were classified as such. For example, seven choices that represent cooperative choices would result in being classified as a cooperator regardless of the remaining two choices. In order to account for the consistency of value orientations, an altruism parameter was calculated for each participant's choices by taking the ratio of other outcomes to self outcomes for each of the nine decomposed games. These were summed and the mean was calculated. Thus, a purely consistent cooperator would have an altruism score of 1.0, a purely consistent individualist would score 0.53 and a purely consistent competitor would score 0.20. Highly consistent value orientations should exist within a specified range of each of the three altruism scores. Low consistency value orientations would exist between them. One drawback is the inability to determine some high (versus low) consistency individualists from the altruism score alone as a pattern of choices can give a misleading score, e.g., strictly cooperative and competitive choices can result in an individualist altruism score near 0.53. Thus, the altruism scores were used in conjunction with the pattern of choices from the value measure. Liebrand's Ring Measure (1988) is designed to

determine choice consistency internally, but the Triple Dominance Measure was preferred because it is: 1) short in duration and easy for participants understand, 2) easy to administer and score, and 3) able to classify value orientations for a moderate timescale with reliability and validity.

*Generalized Trust Scale.* In order to obtain trust levels, participants completed a short questionnaire similar to the one used in Foddy et al. (2002). They rated their agreement with six items such as "I am trustful" or "most people are basically honest" using a seven-point scale ranging from 'I strongly disagree' (1) to 'I strongly agree' (7) with neutral having a rating of four. We found the internal validity of this scale to be acceptably high ( $\alpha = .79$ ).

#### *Procedure*

*Overview.* Participants were randomly assigned to the ingroup-other or outgroup-other condition by the computerized task. Each session involved up to four participants simultaneously and lasted approximately 45 minutes. Participants were given the informed consent in writing after which they began the first stage of the experiment. An online application presented all the questionnaires and ordered them accordingly. Participants initially had their identity primed with an identity scale. The use of matrices in presenting choice dependent joint outcomes was explained to participants, after which they were tested on their understanding and application of an outcome matrix. Following this, their social value orientations were assessed using the Triple Dominance Measure of Social Values. The choice questionnaire was administered which

included an illustrative explanation of the given outcome matrix for each of the three game structures (the names of the games structures were replaced by the letters P, R, and S). Participants were told that they would play their chosen game with another student and the points they accumulated would be converted to money (\$0.25 for every 100 points; cf. McClintock & Liebrand, 1988). Depending on the identity condition of ingroup or outgroup partner, participants were informed that they were playing against either another Carleton University student or a University of Ottawa student. Once they had chosen a game, participants were presented with the Generalized Trust Scale.

*Experimental games.* Once all the questionnaires had been completed, participants entered the second stage of the experiment involving a three-game paradigm. This stage involved each of the three games discussed earlier, PD, Chicken, and Trust. Participants played each game 20 times, for a total of 60 rounds, against a non-existent second player who played a preprogrammed tit-for-tat strategy. Each game was presented in random order and the participants were led to believe that the second player was in an adjacent room. This deception was necessary so that participants felt the other person was real and thus there was a true situation of interdependence.

Participants were initially presented with a dialog box telling them that the program is "searching for University of Ottawa (Carleton University) players". They then received computer-displayed general instructions explaining the computerized task and were reminded about the exchange rate for points and

that they would be playing all three games for money instead of only their chosen game. Before each game began, game-specific instructions informed participants about what game they were about to play as well as its structure. During game play, participants were provided with the current game's outcome matrix, on-screen feedback of the current round number, and the total number of rounds. After each choice of A or B, a dialog screen appeared with a status bar that took a variable amount of time to fill with text that read "waiting for partner". This was done to make participants believe that they were indeed playing with another person. Participants were also provided feedback telling them the results of each round including their choice, the choice of their game partner, and the payoffs to each as a result of these joint decisions. Once all three games had been played, the total number of points accumulated across all three games was displayed for payment purposes.

After the three-game task, the participants were asked to complete a short questionnaire asking them to rate the other player along several semantic dimensions which included powerful-weak, fair-unfair, and intelligent-unintelligent. They were also asked to give their opinion of the other player and discuss whether they still agreed with their choice of game or would prefer to play another (i.e., a measure of locomotion). After completing this, participants were debriefed orally and in writing. Payment was calculated from the sixty rounds and given along with a payment for participation or an experimental credit depending on the situation.

## Results

### *Preliminary Data Analysis*

Of the 96 participants in the study, 16 had value orientations that were inconsistent given the Triple-Dominance Measure of Social Values. An altruism score was calculated using the ratios of the distributions to other and distributions to self for each of the items from the value measure. This allowed the value orientations of participants to be scored for consistency with highly consistent competitors, individualists and cooperators having altruism scores of exactly .20, .53 and 1.0 respectively. Of the 16 participants without a clear value orientation, two were classified as individualists because they had altruism scores no higher than .69 and responded with a combination of cooperative or individualistic choices on the Triple-Dominance Measure. Ten participants were classified as cooperators because their altruism scores were no lower than .73 and they responded with a combination of cooperative or individualistic choices as well. The four unclassified participants remained inconsistent because their responses covered all three value categories.

Twelve participants chose not to play any of the three games and their responses were excluded from further analysis involving the choice of game variable. Participants believed that another player was present during the study, although one participant did express the belief that the other player may have just been a computerized simulation, but did so in an optional comment section at the end of the study.

Due to higher levels of last round competition in the PD, Chicken, and Trust game structures, the last round (of twenty) was dropped for each when calculating the total number of noncooperative (B) choices. This increased competition likely occurred because participants were aware that they were playing the last round in a particular game, a round in which the other player was unable to retaliate, effectively negating one of the primary benefits of a reciprocating tit-for-tat strategy.

Lastly, two variables, the expected first move by the other player and the estimated probability of that move were combined to create a new variable of the first move expectation weighted by the expected move probability. For example, if a participant expected the first move to be choice X (coded as 0) and expected this with a likelihood of .90, then these two items were combined to form a new score of .10 (a 90% chance of choice X coded as 0). This was done to provide a more descriptive variable that included not only their expected choice, but this choice weighted by the participant's estimated likelihood of its occurrence.

### *Main Data Analysis*

*Choice of game.* A two-way multinomial logistic regression analysis was performed to determine what effect group identity and social value orientation had on choice of game (a polytomous variable). The derived model significantly explained the association among the variables,  $\chi^2(6)=16.61, p < .05$ , and included the main effect of value orientation as a significant contributor to the model and predictor of game choice,  $\chi^2(4)=13.31, p < .05$ .

The proportions for each choice are shown in Table 4 and the multinomial regression coefficients are shown in Table 5. Cooperators and Individualists both preferred to play Trust or Chicken rather than PD compared with competitors.

Given the commonality between the choices of cooperators and individualists, these two groups were collapsed together. Chicken and Trust were collapsed into one group for similar reasons. This allowed a logistic regression to be performed on a binary choice between PD and non-PD (Chicken or Trust). Furthermore, participants' estimates of the overall probabilities of the other player making a noncooperative (B) choice in each of the three games were included as possible predictors of choice along with value orientation and identity. The resulting model significantly explained the association between the choice variable and its predictors,  $\chi^2(6)=17.17, p < .01$ , and included a significant effect of social values and expectations on game choice (Table 6). The effect of identity and the Identity X Value Orientation interaction were both insignificant. Competitors were more likely to choose the PD compared to Chicken or Trust than non-competitors (cooperators and individualists). Furthermore, those expecting a high probability of noncooperation in the PD were less likely to choose that particular game.

*Choice of game and locomotion.* After playing each game, participants were again asked what game they would prefer to play if given the opportunity. A Chi-squared test was performed to see if the distribution of choices was significantly different from a distribution representing indifference to the games.

A large number of participants switched from their original choice to the Trust game (Table 4) and this locomotion led to an overall preference for that game structure,  $\chi^2(2, N = 72) = 30.33, p < .001$ . Moreover, although individuals of all value orientations switched to Trust, the greatest proportions of those who switched were competitors and cooperators.

*Choices within game: Number of noncooperative choices.* The participants' total number of noncooperative (B) choices across each of the three game's twenty rounds was evaluated using a repeated-measures ANOVA with game structure as the within-subject factor and social value orientation, partner identity, game choice, and game order as between-subject factors. There was no main effect for value orientation, and although the differences between the groups was not very large, the mean number of noncooperative choices was ordered according to value orientation (for each game and aggregated across games) with competitors making the most noncooperative choices followed by individualists and then cooperators who made the fewest noncooperative choices (Table 7).

Depending on the game being played, participants tended to make the greatest number of B choices in the game that they were randomly assigned to play first, resulting in a significant interaction between game and game order,  $F(3, 72) = 3.221, p < .05$ . This effect was only significant for PD with individuals who played it first making more B choices than they did in the subsequent games Chicken and Trust, but this was expected for all individuals regardless of game

order given the noncooperative nature of PD. No other significant comparisons across game order were found.

There was a significant interaction between game and partner identity, but this effect was subsumed by a significant three-way interaction between game, value orientation and partner identity,  $F(3, 72) = 3.253, p < .05$ . Depending on the game and identity of the partner being played, participants with different value orientations made a different number of noncooperative (B) choices. The results of post-hoc pairwise Tukey tests are presented in Table 8.

*First and last moves.* Separate logistic regressions of value orientation, partner identity, and trust score on first round and last round choices in each of the three games produced five models that significantly explained the first game choices in PD, Chicken, and Trust and the last game choices in PD and Chicken. The last game choices in Trust were explained by a marginally significant model. The coefficients are presented in Table 9.

Overall, the analysis revealed no effect for partner identity and a significant main effect for value orientation, with cooperators and individualists more likely to make a cooperative first round choice than competitors (Table 10). Furthermore, those scoring higher on the generalized trust scale were more likely to make a cooperative first round choice in PD regardless of value orientation. Last round choices were only affected by value orientation in PD with individualists more likely to cooperate and by levels of generalized trust in

Chicken with more trusting individuals more likely to make a cooperative last round move.

The regression findings support the predictions from Table 3 for PD, somewhat for Chicken, and the least for Trust wherein competitors preferred a noncooperative choice contrary to cooperators who preferred the opposite. Individualists did not fit the predictions as well and preferred cooperation during the first rounds. The last round predictions were correct for competitors, but cooperators did not prefer a cooperative choice. This last round finding may have been caused by the knowledge that participants had that they were playing the last round in a particular game.

*Expectations of others.* Do expectations influence behaviour? The expected first round moves of a partner were not correlated with the first round decisions of the participants in any of the game structures except for those choosing the Trust game, in which case, individuals who expected a cooperative first round move were more likely to cooperate in the first round themselves,  $r(28) = .45$ ,  $p < .05$ .

When extending this to the number of overall B choices in each of the games, linear regression did not produce a model that could predict total number of B choices for each game using any of the overall expected probabilities of the other player choosing B during each particular game. Furthermore, a logistic regression split by game choice, with first game move as the binary dependent variable and expected first game move, value orientation and identity as

explanatory variables yielded an insignificant effect of expected first game moves of the partner on actual first game moves of self.

A series of six Bonferroni-adjusted ttests showed that individualists had expected probabilities of noncooperation in the PD that were significantly higher than the midpoint of 50% ( $M = 66.75$ ,  $SD = 22.29$ ),  $t(55) = 6.42$ ,  $p < .05$ , and Cooperators had expected probabilities of noncooperation in Chicken that were significantly lower ( $M = 31.39$ ,  $SD = 21.69$ ),  $t(15) = 3.01$ ,  $p < .05$ .

Do expectations vary across groups? A MANOVA with value orientation, game choice, and identity as between-subject factors was performed on the expected probabilities of noncooperative choices in each game as well as on partners' expected first round moves. A significant main effect was found for Value Orientation on expected first round moves,  $F(2, 57) = 4.744$ ,  $p < .05$ , with cooperators expecting significantly more cooperative first round moves than competitors (cooperators:  $M = .70$ ,  $SD = .29$  vs. competitors:  $M = .51$ ,  $SD = .30$ ;  $p < .05$ ).

*Ratings of partner.* The three personality ratings of the game partners as well as their likeability were analyzed using a two-way MANOVA with three levels of value orientation, two levels of identity.

One significant main effect was found between the ratings of morality and fairness for ingroup and outgroup game partners,  $F(4, 75) = 2.868$ ,  $p < .05$ , with outgroup partners being perceived as more moral, fair, and just than ingroup

partners (outgroup:  $M = 6.14$ ,  $SD = .99$  vs. ingroup:  $M = 5.37$ ,  $SD = 1.34$ ;  $p < .05$ ).

### Discussion

*Choice of game: The decision to enter a situation of outcome-interdependence.* As expected, individuals chose to participate in different games representing different structures of outcome-interdependence depending on their value orientation. Competitors expressed a preference for PD whereas cooperators and individualists preferred Chicken and Trust. Although social value measures are mathematically equivalent to experimental social dilemma games like PD, Chicken and Trust, in the former participants simply fill out a questionnaire that has little impact on their outcomes or the outcomes of others while in the latter, participants engage in a very real situation of outcome interdependence with another individual. The previous finding clearly demonstrates that individuals who hold different values actually locomote to different situations of interdependence which allow them to effectively pursue their value determined goals (Table 2). Thus, competitors who value competition chose the situation which would enable them create the greatest self-favouring outcome disparity. Cooperators, who value joint gain and equality of outcomes, chose the situation that allowed them to maximize those aspects. Lastly, individualists preferred situations that allowed them to maximize their own gain. Also, 12% of participants chose not to play any of the games and of these individuals, more than half were cooperators.

Participants did not always choose according to what their value orientations would predict. Not all competitors chose the PD, not all cooperators chose Trust, and although individualists were hypothesized to be indifferent to each of the games, they preferred the more cooperative games of Trust and Chicken. This last result may have resulted from the significantly higher expected probabilities of noncooperation that individualists attributed to the PD. Moreover, cooperators had significantly lower expected probabilities of noncooperation for Chicken, possibly tempting some cooperators to choose the Chicken game rather than Trust when pursuing their goals of joint gain. These two findings indicate that situational factors (such as expectations) and their environmental contingencies can have a powerful influence on the decisions of participants. If an individual takes into consideration their expectations of the other person's behaviour then his or her value-transformed effective matrix may face further subjective transformations resulting in a new effective matrix (Kelley & Thibaut, 1978). This may lead them to prefer to enter a situation that is different from one prescribed by social values alone and which they now believe will allow them to better pursue their goals. In addition, expectations of the other player at this pre-behavioural point of game choice involve uncertainty about the strategy that will be used by the other player and uncertainty about their reputation (Ostrom, 2003) and these expectations in conjunction with a person's social values, seem to influence strongly the situations in which individuals choose to place themselves.

In the present study, we sought to create group identification or collective categorization among the ingroup with the aim of determining if there was an ingroup-bias in participants' choices of game and across their game behaviour. As Brewer and Schneider (1990, p. 178) state "Once group identification has been established, intragroup orientations are characterized by the best of human motivations: perceived mutuality, cooperation and willingness to sacrifice individual advantage for the sake of group goals. In addition to ingroup identification, an outgroup partner should have promoted more self-interested behaviour because "when ingroup identity is achieved through differentiation from other groups at the same level of organization, intergroup orientations are characterized by just the opposite [or the worst of human motivations]: perceived conflict of interests, social competition and willingness to sacrifice joint welfare for the sake of ingroup advantage" (Brewer & Schneider, 1990).

An effect of partner identity on a participant's choice of game was not evident in this study. This may have been because factors that are likely to enhance group identification such as similarity, proximity and common fate (Brewer & Schneider, 1990; Wit & Wilke, 1992) were not equally present in this study. Given that pre-existing social boundaries were used to demarcate the ingroup and outgroup, the outgroup identity may have contained elements of the aforementioned factors rendering it ineffective in making a group categorization salient for the ingroup. For example, not only are Ottawa and Carleton University students both classes of students, but they share the same area of habitation,

same nationality, and in many cases the same age and socioeconomic level. Rather than a clear separation between the two, it is possible that participants were looking at a superordinate encompassing identity of 'University student' rather than the intended subordinate identities of Carleton or Ottawa student. This would create a global ingroup categorization and lead to equally cooperative responses in both conditions. In previous studies, personal versus group categorization was created using an experimental manipulation of common fate (Brewer & Schneider, 1990; Wit & Wilke, 1992) and this likely resulted in a much more stringently defined notion of group identity (group categorization is made salient if you find yourself sharing your fate with others).

Second, identity may not have been the most important dimension considered by participants (and perhaps was not considered at all) when deciding which situation to enter. Instead, participants' social values and expectations may have been the primary deciding factors for game choice. Participants were assigned to either an ingroup or outgroup partner, but this did not seem to result in any subjective transformations of their effective matrices leading them to view an alternative game as more attractive than the one that originally allowed them to pursue their value-orientation-based goals. For example, cooperators still preferred the Trust game as it allowed the most joint gain regardless of whether they played an ingroup outgroup member.

*Locomotion and Second Game Choice.* Another interesting finding was that after playing all three games, when participants were asked what game they

would like to play if given the opportunity to play again, the overwhelming majority chose to play Trust. Not coincidentally, this game is what allows Individualists and Cooperators to achieve their goals successfully with the best outcomes possible when facing a reciprocating strategy. Furthermore, it is preferable to Chicken for competitors who have already played the PD and experienced the poor outcomes that can be expected if playing a partner using a tit-for-tat strategy. This is further evidence that individuals locomote to situations that enable them to best pursue their goals.

Moreover, if we consider the experimental social dilemmas in this study as part of a single situation that has several interdependence structures, then clearly participants' choice of game was goal-directed as they 'changed' the underlying interdependence structure of the interaction situation (Van Lange & Visser, 1999) by choosing a different game structure. Individuals may not immediately know the best situation to be in, but locomotion enables them to seek out one which maximizes their goal achievement.

Another interesting implication of this is that not only can individuals seek out joint activities with others with whom they wish to interact, but they can seek out situations in which to interact with these same individuals. Thus, given a particular game structure, individuals may have had more or less success pursuing their goals with a static strategy or partner. Rather than discarding this partner for one that would improve their goal achievement, they have the option

of inserting themselves and that partner into a situation of interdependence that is more conducive to personal goal achievement (Van Lange & Visser, 1999).

*Choices within game: Number of noncooperative choices.* Individualists and cooperators were indistinguishable concerning noncooperative choices given a tit-for-tat strategy which agrees with the predicted dominant strategies (Table 3) for each value orientation. Once individualists were able to play and learn their opponent's tit-for-tat strategy, they behaved like cooperators because this allowed them to maximize their own outcomes.

There was no clear effect of identity expressed through game behaviour. Individualists were not the most susceptible to the identity manipulation as we originally hypothesized and in the case of cooperators and individualists, there was no straightforward positive ingroup-bias or negative outgroup-bias demonstrated by their game behaviour. Again, there are reasons why this might have been the case. First, as with the choice of game, a salient superordinate identity may have established group identification among both groups. In particular, rather than our identity manipulation creating a separation between the in game choice data for those that played against and ingroup member versus those that played against an outgroup member, it may have simply raised the overall levels of cooperation with both partner identities. With nothing in the current study with which to compare the levels of cooperation, the percentage amounts of noncooperative choices from McClintock and Liebrand's (1988) study might serve as a relevant comparison group that lacks any manipulations of

identity. When comparing the rates of cooperation across their identical three games, the participants from the present study did indeed cooperate at a higher level, sometimes twice as much depending on the social values involved (Table 7). Although this conclusion is tenuous, it does offer the tempting possibility of a superordinate effect of identification.

Second, it is again possible that identity had little influence on the decision-making within an experimental social dilemma game. This lack of influence might result from the strong effect that value orientations and norms of reciprocity have for producing cooperation. Moreover, the strategy of the other player may also be partly to blame. A tit-for-tat strategy is effective in fostering high levels of cooperation (McClintock & Liebrand, 1988) largely independent of the type of game structure or value orientation. The correspondence of cooperation levels between ingroup and outgroup conditions may indicate the strength that tit-for-tat possesses in fostering intergroup cooperation. Thus, the effect of identity was attenuated as individuals took advantage of a reciprocating partner to achieve their goals (except in the case of competitors who did not achieve their goals because of this particular strategy).

Despite the lack of a clear identity effect, there was a high rate of noncooperation by competitors when playing Trust against an ingroup member which was significantly different from competitors who played Trust against an outgroup member.

Is there something about the subjective or objective game structure of Trust that promotes competition with the ingroup or are competitors simply being relatively more cooperative with the outgroup in Trust? In the former, competitors may transform the outcome matrix in some way reducing the viability of cooperation. This transformation may occur because competitors feel more comfortable competing with the ingroup, but this does not explain why it is restricted to the most cooperative game structure. In the latter case, to a competitor, the value-transformed matrix of Trust is very similar to the PD and like the PD, promotes noncooperation, therefore it is possible that competitors were behaving more cooperatively when playing an outgroup member relative to their ingroup behaviour. Outgroup favouritism may have occurred because of the tit-for-tat strategy that competitors encountered when playing Trust. Perhaps facing an outgroup that employed a 'fair' and reciprocal strategy persuaded competitors to perform benevolent gestures through cooperative behaviour with this non-threatening reciprocating outgroup. Otherwise, explaining why competitors would behaved very competitively in the most cooperative game against a member of their own ingroup, a group that should promote ingroup favouritism and cooperation, is untenable at this point in time. This finding may be a spurious or chance result.

Lastly, the hypothesis that a participant's choice of game may influence how they behave when playing that game was not supported, but this result was anticipated. Individuals who chose a particular game did not make decisions in

that game that were significantly different from their decisions in other games. This was likely due to the fact that individualists and cooperators, when faced with a reciprocal strategy like tit-for-tat, have a dominant strategy of cooperation in all three games thus eliminating any differences between games for those groups. Moreover, competitors tend to make noncooperative choices in each game despite the tit-for-tat strategy. In the end, those who chose Trust were generally quite cooperative (and were largely cooperators), whereas those that chose the PD were less cooperative (and were mostly competitors).

*First and last moves.* There is further evidence that social values influence the decisions that individuals make in outcome-interdependent situations. Levels of generalized trust played a role with more trusting individuals more likely to make cooperative first round decisions. The iterated nature of each game made the effect of trust only important in the first round in which uncertainty is the greatest and reliance on trust is necessary. Before the participant has had any interaction with the other player, they must make a decision on whether to put ones self at risk or not. Expecting beneficent reciprocity is one of the important conditions for making a first round cooperative move in a situation of outcome-interdependence (Kramer & Goldman, 1999; Brann & Foddy, 1987).

*Expectations of others.* General expectations of behaviour in situations of interdependence are not perfect predictors of actual situational behaviour. Expectations did play a role in whether participants chose PD and may have influenced whether cooperators chose Chicken and individualists avoided PD,

but the relationship between their expectations and their actual within game behaviour was somewhat untenable. Interestingly, cooperators did expect significantly more cooperative first round moves compared to competitors and were more likely to make cooperative first round choices (Ostrom, 2003).

It is not surprising that the expected overall probabilities of noncooperative (B) choices of the other player for each game did not predict the overall number of noncooperative (B) choices made by the participant in each game. Individuals were required to estimate the probabilities before they had any information about the other player's strategy (greater uncertainty), but once they had engaged with a partner and learned their strategy their overall expectations had much less predictive ability for their actual choice behaviour.

*Ratings of partner.* Unlike the differences in ratings of strategy McClintock and Liebrand (1988) found across strategy, the present study had participants rate a single strategy that they believed an ingroup or outgroup member had been using. The ratings findings contradict the stereotype-based theory of ingroup trust formation; participants did not hold any positive beliefs or endorse positive views of the ingroup relative to the outgroup. In fact, the outgroup players were rated as more moral, fair and just. There is one potential explanation for this that may indicate some effect of identity, namely that participants may have expected fair play (in the form of a reciprocal tit-for-tat strategy) from an ingroup member, but when facing an outgroup member who exhibited fair play, may have been surprised by this behaviour and thus

overcompensated when rating them moral and fair compared to the 'competitive' outgroup member that they expected.

*An integrative summary of conclusions.* Individuals are motivated by their goals when engaging in locomotion to situations in which to pursue these goals (Van Lange and Visser, 1999). Their value orientations dictate what these goals are and consequently determine their choice of situation, but their expectations of others' behaviour also influenced their decisions. Once they engage in a situation, they largely behave according to their value prescribed goals. Moreover, when uncertainty is high such as the case of first round moves, initial generalized trust plays a more important role in participants' decisions. Furthermore, a reciprocal strategy can build trust in later trials leading to a greater likelihood of reciprocity and cooperation (Ostrom, 2003).

Considering results from earlier studies, the strategy of the other player is strongly implicated as a cause of post-game locomotion and within game decisions with the reciprocating strategy tit-for-tat fostering high levels of cooperation and locomotion to more cooperative games (McClintock & Liebrand, 1988; Van Lange and Visser, 1999). Clearly, tit-for-tat is successful at promoting cooperation as well as developing stable cooperative relationships. Individuals learn to recognize trustworthy and untrustworthy individuals and cooperate with individuals who are expected to be trustworthy reciprocators (Ostrom, 2003). Thus, tit-for-tat is a good example of a trustworthy reciprocator and this develops a positive reputation for the strategy increasing levels of cooperation.

After experiencing the situation, individuals stay in the situation if they experience goal success. Otherwise, they engage in further locomotion to a situation that will yield better goal-prescribed outcomes. Identity of the other player does not seem to affect this if:

- a) there is a single shared identity among those in the situation with you or;
- b) the outgroup is engaging in a 'fair' strategy such as tit-for-tat

Competitors did express some sensitivity to identity, but the reasons for this are unclear. What is clear is that identity was either not an important consideration for most participants, or was attenuated by their value-based goals and the reciprocating strategy that they faced.

*Future Research and Recommendations.* Because a large body of research has found that collective identity can lead to group favouritism, and this study failed to find a clear effect, future research should consider including more strategies than tit-for-tat especially given the possibility that this strategy may have attenuated the effect of identity. Perhaps a 'noisy' tit-for-tat strategy that has a probability of a noncooperative choice in any given round would be more effective in separating the groups. Furthermore, collective identity can be made salient without the inclusion of an outgroup. Using the method of common fate employed by Brewer and Schneider (1990) or Wit and Wilke (1992) is a viable alternative. Furthermore, the effect of different strategies on how individuals perceive partners of differing identities would be of interest. If participants play

against a 100% competitive outgroup and ingroup member, they may construe the results of play differently depending on each partner's identity.

Identity has been found to be a basis for positive and negative expectations (Wit & Wilke, 1992) as well as expectations of trust (Foddy et al., 2002), but did not affect what situations individuals chose to enter. Future research should attempt to analyze if different levels or degrees of identity such as nationality, faculty, or club membership can influence locomotion (choice of outcome-interdependent situations) and cooperation given different value orientations. Letting participants choose the game structure and the identity of their interaction partner would be illuminating as well as including more diverse or creative examples of social dilemmas other than the 2 player games based on 2 x 2 matrices we had chosen.

Lastly, a differential effect of identity on those of different value orientations was not evident in this study. Because group identity is still an important factor especially when advocated as a solution to social dilemmas (Brewer & Schneider, 1990), it is possible that a superordinate identity increased the levels of cooperation in this study for all groups. Ensuring that ingroup and outgroup identities do not overlap should be considered carefully in future research.

When administering a social value measure, the majority of individuals are usually classified as cooperators, a smaller proportion as individualists, and the smallest proportion as competitors (Van Lange, 1999; Bekkers, 2004). Thus, in a

large sample of individuals, you can expect almost half to be cooperators, over a quarter to be individualists and less than a quarter to be competitors. In the present study, the sample size was 97 with only 15 of those being competitors. This strongly affects any analysis done with this group especially if splitting into numerous sub-groups (loss of power). In the future, a greater amount of participants would be advisable to ensure a large enough sample of competitors. Furthermore, pre-testing and selection of individuals based on their value orientation may be an option in order to save time and effort.

*Implications.: A country of cooperators with pockets of competitive resistance?* The current research has very important implications even though further research is required. Understanding cooperation especially in the context of social dilemmas is a topic that many understand as key to the long-term survival of our species (Hardin, 1968) or at least to a more optimal and efficient use and provision of resources in many instances (Dawes, 1980). The current study suggests that people locomote to situations that enable them to best pursue their goals and generally behave according to their social values when in those situations and facing a tit-for-tat strategy. A superficial analysis of the situation is usually insufficient to determine what these goals are as individuals in one situation may have entirely divergent goals, e.g., individuals may join a sports team for the competition and personal achievement or for the camaraderie and teamwork. Social value orientations provide a useful tool for determining several global values that determine ones goals and behaviour resulting from

these goals. Together, these ideas enable us to begin to understand the shifting pattern of cooperation in society as individuals with different values move between and within different groups, either changing the situations around them or moving to new situations entirely. How do people choose with whom to interact, where to interact, and for how long? Moreover, how do they actually behave once these decisions have been made?

As in Watanabe and Yamagishi's (1999) computer simulation, competitors were effectively isolated and were unable to locomote. In real life, it seems more probable that individuals adopt strategies such as tit-for-tat that while not aligned with how they might wish to play, enable them to interact with a wider variety of individuals. Behavioural assimilation by cooperators demonstrates that although they would prefer to cooperate with another cooperator and maximize joint gain, they are more than ready to deal with noncooperative individuals by adopting a competitive strategy. So how come competitors are not loners? They too must have some strategic mobility and show restraint in a world dominated by cooperators, where in certain arenas competition is frequently stigmatized (Komorita & Parks, 1996).

The finding that individuals generally behaved the same across each of the games does in no way imply that choosing your situation is unimportant. We asked participants to choose one game to play, but had them play all three. This would not be the case in the real world where an individual's choice of situation frequently precludes his or her participation in other situations. Perhaps a short

thought experiment will serve to illustrate why this is the case and why locomotion is an important topic: Imagine that participants who had chosen PD in our study were all placed in one room whereas those who chose Trust were positioned in another. Now, imagine that we had the participants in each room play the game they had chosen with one another, a reasonable request given that everyone in a particular room preferred that particular game or situation in which to pursue their goals. This represents the case of individuals interacting together in a situation they chose in much the same way that like-minded people join certain clubs or donate to certain charities. Given our findings, what you would now have is a room full of mostly competitors about to play the least cooperative game and a room full of mostly cooperators about to play the most cooperative game. Things are usually not this clear in many situations, but as you can imagine, locomotion can lead to a selection effect for outcomes based on value-based goals where certain groups locomote to their preferred situations and as a consequence of this, achieve poor or excellent outcomes. Thus, imagine a stream of participants leaving the Trust room, their pockets full of change they have collected from the experiment as a result of their maximization of joint outcomes in Trust. Contrast this with a group of competitors leaving the PD room, their pockets turned out because they focused on relative gain in a situation that ensures by its very structure that this is not a viable approach.

### References

- Axelrod, R. (1981). The evolution of cooperation. *Science*, 211, 1390-1396.
- Brann, P., & Foddy, M. (1988). Trust and the consumption of a deteriorating common resource. *Journal of Conflict Resolution*, 31, 615-630.
- Bekkers, R. (Submitted for publication, June 2004). Stability, reliability and validity of social value orientations. *Unpublished Manuscript*. Retrieved June 26, 2005, from <http://www.fss.uu.nl/soc/homes/bekkers/svo04.pdf>
- Brewer, M.B., & Schneider, S.K. (1990) Social identity and social dilemmas: A double-edged sword. In D. Abrams, & M.A. Hogg (Eds.), *Social Identity Theory: Constructive and critical advances*. Harvester, Wheatsheaf.
- Brown, R. (2000). Social identity theory: Past achievements, current problems and future challenges. *European Journal of Social Psychology*, 30, 745-778.
- Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, 31, 169-193.
- Frank, R. H., Gilovich, T.D., & Regan, D.T. (1993). Does studying economics inhibit cooperation? *Journal of Economic Perspectives*, 7, 159-171.
- Frey, B. S., & Meier, S. (2003). Selfish and Indoctrinated Economists? [Electronic version]. *IEW - Working Papers iewwp103, Institute for Empirical Research in Economics - IEW*.
- Foddy, M., Platow, M., & Yamagishi, T. (2002). Group-based trust in strangers. *Unpublished manuscript*.

- Grzelak, J. (1997). Walking through interaction. Comments on Harold H. Kelley's: 'Expanding the analysis of social interactions by reference to the sequential-temporal structures of situations'. *European Journal of Social Psychology*, 27, 405-413.
- Hardin, G. (1968). The tragedy of the commons. *Science*, 162, 1243-1248.
- Haslam, S. A. (2001). Psychology in organizations: *The social identity approach*. London, UK: Sage.
- Joireman, J. A., Kuhlman, D. M., Van Lange, P. A. M., Doi, T., & Shelley, G. P. (2003). Perceived rationality, morality, and power of social choice as a function of interdependence structure and social value orientation. *European Journal of Social Psychology*, 33, 413-437.
- Kelley, H. H. and Thibaut, J. (1978). *Interpersonal relations: A theory of interdependence*. New York: Wiley
- Kramer, R. M., & Goldman, L. (1995). Helping the group or helping yourself? Social motives and group identity in resource dilemmas. In D. A. Schroeder (Ed.), *Social dilemmas* (pp. 49-67). Westport, CT: Praeger.
- Komorita, S. S., & Parks, C. D. (1996). *Social dilemmas*. Boulder, CO: Westview Press.
- Kuhlman, D. M., & Marshello, A. (1975a). Individual differences in the game motives of own, relative and joint gain. *Journal of Research in Personality*, 9, 240-251.

- Kuhlman, D. M., & Marshello, A. F. J. (1975b). Individual differences in game motivation as moderators of preprogrammed strategic effects in prisoner's dilemma. *Journal of Personality and Social Psychology*, 32, 922–931.
- Kiyonari, T., Tanida, S., & Yamagishi, T. (2000). Social exchange and reciprocity: Confusion or a heuristic? *Evolution and Human Behavior*, 21, 411-427.
- Liebrand, W.B. (1983). A Classification of Social Dilemma Games. *Simulation and Games*, 14, 123-138.
- Liebrand, W.B.G., & McClintock, C.G. (1988). The ring measure of social values: A computerized procedure for assessing individual differences in information processing and social value orientation. *European Journal of Personality*, 2, 217-230.
- McClintock, C. G., & Liebrand, Wim B.G. (1988). Role of interdependence structure, individual value orientation, and another's strategy in social decision making: a transformational analysis. *Journal of Personality and Social Psychology*, 55, 396-409.
- Messick, D.M., & McClintock, C.G. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology*, 4, 1-25.
- Ostrom, E. (2003). Toward a Behavioral Theory Linking Trust, Reciprocity, and Reputation. In Elinor Ostrom and James Walker (Eds.), *Trust and Reciprocity: Interdisciplinary Lessons from Experimental Research*, 19–79. New York: Russell Sage Foundation.

- Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. *Annual Review of Psychology*, 28, 363-92.
- Rapoport, A., & Guyer, M. (1966). A taxonomy of 2 X 2 games. *General Systems*, 11, 203-214.
- Smeesters, D. Warlop, L. Van Avermaet, E. (2002). Exploring the role of consistency of social value orientations: temporal stability, reciprocal cooperation, and forgiveness. *DTEW Research Report 0238*, K.U.Leuven, 40 pp. Retrieved June 26, 2005, from  
<http://www.econ.kuleuven.ac.be/tew/academic/market/members/Luk/papers/smeesters-warlop-van%20avermaet-2003.pdf>
- Tullock, G. (1999). Non-prisoner's dilemma. *Journal of Economic Behavior & Organization*, 39, 455–458.
- Van Lange, P. A. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology*, 77, 337-349.
- Van Lange, P. A. M., & Visser, K. (1999). Locomotion in social dilemmas: How people adapt to cooperative, tit-for-tat, and noncooperative partners. *Journal of Personality and Social Psychology*, 77, 762-773.

Van Lange, P. A. M., Agnew, C. R., & Steemers, G. E. M. (1997a). From game theory to real life: How social value orientation affects willingness to sacrifice in ongoing close relationships. *Journal of Personality and Social Psychology*, 73(6), 1330-1344.

Van Lange, P. A. M., Otten, W., De Bruin, E.M.N., & Joireman, J.A. (1997b). Development of prosocial, individualistic and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, 73(4), 733-746.

Van Lange, P. A. M., & Kuhlman, D.M. (1994). Social value orientations and impressions of partner's honesty and intelligence: A Test of the might versus morality effect. *Journal of Personality and Social Psychology*, 67, 126-141.

Watanabe, Y., & Yamagishi, T. (1999). Emergence of Strategies in a Selective Play Environment with Geographic Mobility: a computer simulation. In M. Foddy (Ed.), *Resolving social dilemmas: dynamic, structural, and intergroup aspects*. Edwards Brothers, Ann Arbor, MI, pp. 55-66.

Wit, A.P. & Wilke H.A.M. (1992). The effect of social categorization on cooperation in three types of social dilemmas. *Journal of Economic Psychology*, 13, 135-151.

Yamagishi, T., Makimura, Y., Foddy, M., Matsuda, Kiyonari, T., & M., Platow, M.

J. (2005). Contextualized and decontextualized use of social categories: comparisons of Australians and Japanese on group-based trust and cooperation. *Asian Journal of Social psychology*, 8 (2), 173-190.

Yamagishi, T., & Kiyonari, T. (2000). The group as a container of generalized reciprocity. *Social Psychology Quarterly*, 63 (2), 116-132.

Yamagishi, T., Cook, K. S., & Watabe, M. (1998). Uncertainty, trust, and commitment formation in the United States and Japan. *American Journal of Sociology*, 104 (1), 165-194.

Yamagishi, T., & Yamagishi, M. (1994). Trust and commitment in the United States and Japan. *Motivation and Emotion*, 18, 9–66.

Yamagishi, T. (1988). Exit from the group as an individualistic solution to the free rider problem in the United States and Japan. *Journal of Experimental Social Psychology*, 24, 530-542.

### Appendix A. Social Identity Questionnaire

Note: 1 = strongly disagree; 7 = strongly agree. When the relevant ingroup was psychology, Carleton student(s) was replaced with it.

1. I feel good about being a Carleton student.
2. In general, others think that Carleton students are unworthy.
3. Generally speaking, I am a typical Carleton student.
4. In general, others respect Carleton students.
5. Generally speaking, I am very much like other Carleton students.
6. I often regret that I am a Carleton student.
7. Overall, Carleton students are considered good by others.
8. I feel I identify with other Carleton students.
9. Most people consider Carleton students, on the average, to be more ineffective than other students.
10. Generally speaking, I fit in well with other Carleton students.
11. In general, I'm glad to be a Carleton student.
12. Overall, I often feel that being a Carleton student is not worthwhile.
13. In terms of how I think and behave, I am very similar to the average Carleton student.
14. Generally speaking, I feel strong ties with other Carleton students.
15. I feel a strong sense of belonging with other Carleton students.

*Table 1*

*Given (objective) and Transformed Effective (subjective) Matrices for Each Game Structure and Value Orientation*

Objective game structures and value orientation transformed payoff structures					
Prisoner's Dilemma					
a. Given Matrix			c. Individualistic Matrix		
	X	Y		X	Y
A	40, 40	0, 50	A	40	0
B	50, 0	20, 20	B	50	20
b. Cooperative Matrix			d. Competitive Matrix		
	X	Y		X	Y
A	80	50	A	0	-50
B	50	40	B	50	0
Chicken					
a. Given Matrix			c. Individualistic Matrix		
	X	Y		X	Y
A	40, 40	20, 50	A	40	20
B	50, 20	0, 0	B	50	0
b. Cooperative Matrix			d. Competitive Matrix		
	X	Y		X	Y
A	80	70	A	0	-30
B	70	0	B	30	0
Trust					
a. Given Matrix			c. Individualistic Matrix		
	X	Y		X	Y
A	50, 50	0, 40	A	50	0
B	40, 0	20, 20	B	40	20
b. Cooperative Matrix			d. Competitive Matrix		
	X	Y		X	Y
A	100	40	A	0	-40
B	40	40	B	40	0

*Table 2*

*Goal Achievement and Outcomes Given Game Structure, Value Orientations, and Tit-for-tat Strategy*

		Tit-for-tat strategy		
		Game structures		
Social value orientation		PD	Chicken	Trust
<b>Cooperators</b>				
Choice		Cooperation	Cooperation	Cooperation
Goal Success Rank	3	2	1	
Goal experience	Success	Success	Success	
Participant's outcomes	Good	Good	Very good	
Collective outcomes	Good	Good	Very good	
<b>Individualists</b>				
Choice		Cooperation	Cooperation	Cooperation
Goal Success Rank	Indifferent	Indifferent	Indifferent	
Goal experience	Success	Success	Success	
Participant's outcomes	Good	Good	Very good	
Collective outcomes	Good	Good	Very good	
<b>Competitors</b>				
Choice		Noncooperation	Noncooperation	Noncooperation
Goal Success Rank	1	3	2	
Goal experience	Failure	Failure	Failure	
Participant's outcomes	Poor	Very poor	Poor	
Collective outcomes	Poor	Very poor	Poor	

*Table 3*

*Predicted Outcome Cell Preferences, Expected First Game Moves and Dominant Choices for Row Players Given Alternative Structures, Differences in Value Orientations, and a Tit-For-Tat Strategy*

Game structure and value orientation	Outcome cell preference	First game move	Last game move <sup>a</sup>	Dominant Strategy
<b>Prisoner's Dilemma</b>				
Cooperative	AX	A	A	A
Individualistic	BX	B	B	A
Competitive	BX	B	B	B
<b>Chicken</b>				
Cooperative	AX	A	A	A
Individualistic	BX	A	B	A
Competitive	BX	B	B	B
<b>Trust</b>				
Cooperative	AX	A	A	A
Individualistic	AX	B	A	A
Competitive	BX	B	B	B

<sup>a</sup>This may only be accurate for the last round of the last game because individuals can punish defection in trials of the subsequent games.

*Table 4**Game Choice by Value Orientation in Percentages Before and After Playing*

Before Playing				
	Competitor	Individualist	Cooperator	Total
PD	61.5	17.7	15.7	23.5
Chicken	30.8	52.9	39.2	40.7
Trust	7.7	29.4	45.1	35.8
After Playing				
	Competitor	Individualist	Cooperator	Total
PD	41.7	29.4	10.3	20.6
Chicken	8.3	23.5	12.8	14.7
Trust	50.0	47.1	76.9	64.7

*Table 5**Multinomial Logistic Regression for Choice of PD, Chicken, or Trust*

	Chicken	Trust
Intercept	-.921 (.689)	-2.665* (1.146)
Individualists	1.610* (.746)	3.138** (1.152)
Cooperators	1.909* (.926)	2.865* (1.322)
Outgroup Identity	.491 (.640)	1.088 (.682)

Total N = 81

Reference category for the equation is PD.

Standard errors in parentheses.

\*  $p < .05$  \*\*  $p < .01$  (two-tailed tests).

*Table 6**Logistic Regression for Choice of PD versus Chicken or Trust*

	Coefficient
Intercept	1.024 (.762)
Probability of partner choosing B in PD	.033* (.016)
Probability of partner choosing B in Chicken	-.006 (.015)
Probability of partner choosing B in Trust	-.025 (.015)
Competitors (vs. Non-Competitors)	-1.866* (.939)
Outgroup (vs. Ingroup Identity)	.647 (.738)
Outgroup X Competitor	-1.389 (1.441)

Total N = 75

Reference category for the equation is PD (coded as 0).

Standard errors in parentheses.

The probabilities of choosing B in each game are only moderately correlated.

\*  $p < .05$

*Table 7*

*Mean Percentage of Total Noncooperative (B) Choices Across Game Type and Value Orientation versus Mean Percentage of Total Noncooperative (B) Choices Across Game Type and Value Orientation in McClintock and Liebrand (1988)*

	PD	Chicken		Trust		Overall	
Comp	63	83 <sup>a</sup>	35	60 <sup>a</sup>	53	73 <sup>a</sup>	50
Indiv	33	83 <sup>a</sup>	31	33 <sup>a</sup>	36	27 <sup>a</sup>	33
Coop	24	77 <sup>a</sup>	21	13 <sup>a</sup>	19	20 <sup>a</sup>	19
Overall	32		25		28		23 <sup>a</sup>

<sup>a</sup> These are values from McClintock and Liebrand's (1988) study which used identical game structures and measured value orientations using the Ring Measure.

*Table 8**Means of total B choices Across Game, Value, and Identity*

Value	Identity of Partner	Game	Mean	
Competitor	Outgroup	PD	13.400 <sup>a</sup>	(2.595)
		Chicken	7.200	(2.055)
		Trust	4.100 <sup>a,b</sup>	(2.368)
	Ingroup	PD	9.333	(2.390)
		Chicken	5.583	(1.894)
		Trust	14.500 <sup>b</sup>	(2.181)
Individualist	Outgroup	PD	2.000 <sup>a</sup>	(3.223)
		Chicken	3.167 <sup>a</sup>	(2.553)
		Trust	5.000 <sup>b</sup>	(2.941)
	Ingroup	PD	6.738	(1.921)
		Chicken	6.571	(1.522)
		Trust	7.238	(1.753)
Cooperator	Outgroup	PD	4.620 <sup>b</sup>	(1.341)
		Chicken	5.396 <sup>b</sup>	(1.062)
		Trust	4.005 <sup>a,b</sup>	(1.223)
	Ingroup	PD	4.942	(1.368)
		Chicken	4.321 <sup>a,b</sup>	(1.083)
		Trust	4.679	(1.248)

<sup>a,b</sup> Cell means which share a common index are significantly different from one another ( $p < .05$ ). Standard deviations in parentheses.

*Table 9*

*Logistic Regression Coefficients for the Effect of Selected Variables on First and Last Round Choices in Each of the Three Games*

First Round Choice			
	PD	Chicken	Trust
	Coefficient	Coefficient	Coefficient
Individualist	2.303** (.853)	1.538* (.769)	1.030 (.753)
Cooperator	2.498** (.750)	2.362** (.686)	2.210** (.705)
Trust Score	.746* (.305)	.595 (.308)	-.003 (.314)
Constant	-5.048** (1.679)	-3.656* (1.615)	-.644 (1.547)
Last Round Choice			
	PD	Chicken	Trust
	Coefficient	Coefficient	Coefficient
Individualist	1.287 (.809)	-.269 (.725)	.921 (.740)
Cooperator	1.987** (.731)	.926 (.627)	1.177† (.624)
Trust Score	.416 (.270)	.657* (.277)	.520† (.277)
Constant	-3.141* (1.468)	-3.058* (1.419)	-2.686† (1.428)

Total N = 91

Reference category for the equation is a noncooperative choice (coded as 0).

Standard errors in parentheses.

†  $p < .1$  \*  $p < .05$  \*\*  $p < .01$  (two-tailed tests).

*Table 10*

*Mean Percentage of First Round and Last Round B Choices Across Game Type  
and Value Orientation*

	First Round			Last Round		
	PD	Chicken	Trust	PD	Chicken	Trust
Competitor	80.0	66.7	53.3	80.0	53.3	53.3
Individualist	30.0	30.0	30.0	50.0	55.0	30.0
Cooperator	25.9	15.5	10.3	37.9	31.0	24.1