Towards an understanding of the endogenous nature of group identification in games

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Abstract
It is commonly assumed that identification with a social group is constant throughout the play of a one-shot game in the absence of feedback. We provide evidence which challenges this assumption. We direct subjects to play one of two versions of the prisoner's dilemma game. These versions are distinguished by the relative attractiveness of the uncooperative action. We refer to the version with a relatively attractive uncooperative action as the Easy Game and the other as the Difficult Game. We find that for the subjects who play the Difficult Game, their change in group identification is significantly related to their action selected. No such relationship exists within the Easy Game. Additionally, we find that the change primarily occurs after the action is selected rather than upon inspection of the game. We discuss the implications of our findings to settings both inside and outside of the laboratory.

Keywords: Group Identification, Experimental Game Theory, Endogenous Preferences, Social Identity, Decision Difficulty

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1. Introduction

When studying a game, an experimenter can divide the subjects into groups and attempt to manipulate the group identity[1] of the subjects. Subsequently, the experimenter will seek to observe whether there are differences in behavior as a result of these interventions. However, researchers often implicitly assume that identification is constant throughout the play of a one-shot game in the absence of feedback.

Here we provide evidence which challenges this assumption. We set up an experiment where players are divided into groups and are directed to play a prisoner's dilemma game. We show that a subject's group identification can change as a result of their action, and that this change depends on the difficulty of the decision.

1.1. Measurement of Group Identification

For some time, researchers have known that allocating people into groups will often induce behavior which favors ingroup members at the expense of outgroup members (Tajfel, Flament, Billig, & Bundy, 1971; Tajfel & Turner, 1986). A typical such experiment would allocate subjects into a group and observe ingroup favoritism or outgroup discrimination. Such behavior was thought to be more pronounced when identification was more effectively manipulated and the imposed categorization more successful. In order to verify the effectiveness of the manipulation and the success of the categorization, experimenters would seek to measure the group identification of the subject.[2]

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[1] For our purposes, we define group identification to be the degree to which the subject feels that she belongs to the group and favorably regards membership in the group.

[2] For instance, see Abrams and Hogg (1999), Brown, Condor, Mathews, Wade, and Williams (1986), Gaertner, Mann, Murrell, and Dovidio (1989), Garcia, Tor, Bazerman, and Miller (2005), Grieve and Hogg (1999), Hogg, Cooper-Shaw, and Holzworth (1993), Hogg and Grieve (1999), Hogg and Hardie (1991,1992), Reid and Hogg (2005), and Swann, Kwan, Polzer, and Milton (2003).

Subsequent identification research sought to clarify which features of the group or the environment would induce such behavior and what motivates subjects to categorize themselves in terms of the group. Research indicates that group distinctiveness (Brewer, 1991), group prestige (Ellemers, Spears, & Doosje, 2002), similarity (Ip, Chiu, & Wan, 2006), common fate (Brown & Wade, 1987), interpersonal interaction (Pettigrew, 1998), and group homogeneity (Vanbeselaere, 1991) can all affect the identification of a person with a social group. A contribution of our research is the finding that the strategic nature of the game should be added to the list.

1.2. Group Identification and Games

There is a growing interest in studying the effects of group identity in games. Within this literature, it is not uncommon for the experimenter to manipulate the group identification of the subject and observe the resulting strategic behavior.[3] We distinguish our paper from this literature in that we do not directly manipulate the group identity of the subjects because we hope to learn whether the strategic setting can affect the group identity of the subjects.

Although manipulating group identity in games is now a common technique, to our knowledge, Güth, Levati, and Ploner (2008) is the only other paper which employs an established measure of group identification in games. The authors investigate the relationship between group identification and behavior in an investment game. Specifically, the authors placed subjects into groups (labeled "X" or "Y") and direct some to play a public goods game. This second step is designed to manipulate the identification of the subjects, which they

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[3] For instance, see Aguiar, Branas-Garza, Espinosa, and Miller (2010), Ahmed (2007), Brewer and Kramer (1986), Charness, Rigotti, and Rustichini (2007), Chen and Li (2009), Dawes, Van de Kragt, and Orbell (1988), Eckel and Grossman (2005), Kramer and Brewer (1984), McLeish and Oxoby (2007,2011), and Wit and Wilke (1992).

subsequently measure.[4] The authors find that subjects who contribute more in the public goods game are significantly more trusting in the subsequent investment game. Despite our experimental differences, we present a result with a similar flavor: those who play cooperatively in a game with a difficult decision have a significantly larger change in group identification than those playing uncooperatively in the game.

Carpenter (2005) is one of the few papers to explicitly investigate the extent to which a competitive strategic environment can affect a fundamental attribute of subjects.[5] Although we address the same general question about the role of games in affecting subjects, we have several methodological differences. Whereas we measure identification, Carpenter measures social preferences and finds that more competitive settings are negatively related to pro-social preferences. Additionally, the subjects in Carpenter receive feedback regarding the action of their opponents. In our paper, there is no feedback therefore the change in identification which we find can only be attributed to the game type and the action selected by the subject.

1.3. Decision Difficulty

Despite the commonly applied assumption that actions are a function of stable preferences, researchers have identified nonstrategic settings where the action taken can affect the preferences of subjects (Egan, Bloom, & Santos, 2010; Sharot, Velasquez, & Dolan, 2010). In particular, research has demonstrated that decision difficulty can affect attitudes towards the objects of choice (Festinger & Carlsmith, 1959; Haddock, Rothman, Reber, & Schwarz, 1999; Schwarz et al., 1991). When a subject makes a choice from a set of alternatives, the decision difficulty is related to the post-decision evaluation of the options. Specifically, the research

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[4] Although Guth et al. (2008) use items adapted from Gaertner et al. (1989) rather than, as we do, Grieve and Hogg (1999).
[5] Also see Canegallo, Ortona, Ottone, Ponzaono, and Scacciati (2008) and Vlaev and Chater (2006). Further, Schotter, Weiss, and Zapater (1996) examines the effect of framing on judgements of fairness and is motivated by questions related to endogenous identification. Finally, see Bowles (1998) for more on endogenous preferences.

indicates that more difficult decisions will be associated with a larger post-decision spread in the evaluation of the selected and not selected options (Brehm, 1956; Izuma et al., 2010; Liberman & Forster, 2006; Sharot, De Martino, & Dolan, 2009; Shultz, Leveille, & Lepper, 1996; Shultz & Lepper, 1999; Steffel, 2009).[6]

To make sense of these experimental results, some researchers posit that subjects have an imperfect understanding of their own preferences and make an inference of these preferences based on the previous actions selected (Ariely & Norton, 2008; Bodner & Prelec, 2003). Within this *self-signaling* framework, more difficult decisions provide a better diagnostic for these preferences and are therefore associated with the larger post-decision spread.

1.4. Research Questions

In light of these strands of literature, we now discuss four hypotheses related to changes in group identification in a setting where subjects play a one-shot game. First, recall that Carpenter (2005) finds that the strategic environment itself can affect the social preferences of subjects. Applying this insight to our setting, we conjecture that the strategic environment itself can affect group identification of subjects. In other words, it is possible that subjects who are playing a game in which they face a more difficult decision will have a larger change in identification. Hence, we offer the following hypothesis.

Hypothesis 1 Across games which differ in the difficulty of the decision, there will be differences in the change in group identification.

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[6] Note that some of these papers are often considered to be in the cognitive dissonance rather than decision difficulty literature, despite that they are also cited by decision difficulty papers. The cognitive dissonance literature focuses on the mental discomfort associated with situations in which attitudes and actions do not coincide. Difficult decisions can cause cognitive dissonance, yet these two concepts are distinct. There appears to be nothing written on the relationship between the cognitive dissonance and decision difficulty literature. Further, a complete discussion of this relationship is beyond the scope of this paper.

If the difficulty of a decision among objects is related to the post-decision spread in the evaluation of the selected and not selected options then perhaps a similar effect occurs when subjects make a decision involving group members. If the subject selects an uncooperative action in a difficult decision, perhaps this selfish action will be associated with a reduction in the identification towards the group. Therefore, we posit the following hypothesis.

Hypothesis 2 In a game in which the decision is difficult, there will be a difference in the change in group identification based on the action selected. However, there will be no such difference in a game where the decision is not difficult.

The first hypothesis predicts that the change in group identification will be related to the difficulty of the choice in the game. In other words, Hypothesis 1 predicts that all subjects who play the game with a more difficult decision will experience a different change in group identification than the subjects who play a game with a less difficult decision. By contrast, the second hypothesis predicts that the change will only occur for subjects who are facing a more difficult decision and that the change will be related to the action selected.

If we measure a change in group identification, and we interpret this change in light of the self-signaling literature then we would expect the bulk of the change to occur after the action was taken. Accordingly, we offer the following hypothesis.

Hypothesis 3 The changes in group identification will primarily occur after the action was taken rather than upon the initial inspection of the game.

Again, if we interpret the changes in light of the self-signaling literature then we would expect that actions which are considered to be more competitive and less cooperative would be more informative and hence related to the change in group identification. Therefore, we posit the following hypothesis.

Hypothesis 4 The change in group identification will be related to the cooperativeness and competitiveness of the action selected.

1.5 Experimental Overview

In order to test these hypotheses, we run the following study. Our subjects play one of two possible versions of the prisoner's dilemma game. In both versions, each subject decides to take a cooperative action (C) or an uncooperative action (D). In one version of the game, the uncooperative action is relatively more attractive than in the other version.

--------------------INSERT FIGURE 1 ABOUT HERE --------------------

These were selected because in both games the accruing payoffs when both players play C (both receive 100) and when both players play D (both receive 50) are identical. Despite these similarities, there are differences between the games which imply differences in the difficulty of the decision to play C or D.

In the Easy Game, the decision to play D rather than C results in an increase of the subject's own payoffs by 50 and reduces the opponent's payoff by 100. Therefore, the relative price of cooperation in the Easy Game is 1/2 (or 0.5). In the Difficult Game, the decision to play D rather than C results in an increase of the subject's own payoffs by 5 and reduces the opponent's payoffs by 55. Therefore, the relative price of cooperation in the Difficult Game is 1/11 (or 0.09). In other words, the material incentives to play uncooperatively in the Difficult Game are smaller in that the uncooperative action is associated with a smaller gain in relation to the reduction in payoffs imposed on the other player.

In order to gain additional insight into the differences between the games, we also note a game index discussed by Rapoport (1967).[7] Rapaport suggests an index associated with each variation of the prisoner's dilemma game in order to characterize the relative attractiveness of the

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[7] See Rapoport and Chammah (1965) for more on this.

uncooperative action. Specifically, the index is decreasing in the attractiveness of the uncooperative action. In order to calculate the index, first take the difference between the payoffs where both players play cooperatively and that when both players play uncooperatively. In both of our games, this difference is 50. Next, take the difference between the payoffs attained by playing uncooperatively when the other player cooperates and that obtained by playing cooperatively when the other player does not cooperate. In the Easy Game this difference is 150 and in the Difficult Game this difference is 60. The index takes the ratio of these differences. The Easy Game has an index of 0.33 and the Difficult Game has an index of 0.83. These relative amounts suggest that the Difficult Game has a less attractive uncooperative action.

In order to give the subjects a group with which to identify, we place subjects into groups based on a superficial criterion. We then measure the extent to which the subject internalizes this categorization by measuring their group identification. We study whether this conceptualization changes in the course of play and how these changes are related to aspects of the strategic setting. Each subject plays one of two versions of a prisoner's dilemma game mentioned above. Before the subjects are aware of the strategic setting, we take a baseline measure of group identification. Subjects are then presented with either the Easy or Difficult Game. Before the subjects decide on an action, their group identification is again measured. The subjects then make a choice of action in the game and we take final group identification measure.

The study provides a test of Hypotheses 1 and 2. If we find evidence for either hypothesis then we have identified a setting where group identification is affected by the strategic setting. To our knowledge, we are the only paper to measure group identification multiple times throughout the experiment. This design feature allows us to test Hypothesis 3. Further, we elicit

measures of the cooperativeness and competitive of the actions selected in the game, and this allows us to test Hypothesis 4.

The first contribution of this paper entails evidence that group identification is not constant throughout the interaction and that it is affected by the game specification. Specifically, we observe that in the Difficult Game, the change in group identification is significantly related to the action selected. However, there is no such relationship for the subjects who play the Easy Game. Therefore, we find evidence in support of Hypothesis 2. On the other hand, we do not find differences in the changes in group identification between the games, and so we do not accept Hypothesis 1.

The second contribution is the specification of the timing of the change. We present evidence that the change in group identification which does occur, does not happen upon initial inspection of the game but rather largely after the action choice has been made. Therefore we find some evidence in support of Hypothesis 3. The third contribution involves evidence regarding the cause of this change. We find that group identification is enhanced by actions which are considered to be less competitive and more cooperative. As a result, we find evidence in support of Hypothesis 4.

In this paper, we describe the change in group identification as *endogenous* because the changes are occurring exclusively as a result of play in a one-shot game in the absence of feedback. We only vary the form of the game. Despite these limited manipulations, we still find that subjects exhibit a change in group identification.

2. Description of the Experiment

2.1. Method

A total of 130 undergraduate students at a public university in the northeast United States participated in the experiment for course credit and entry into a lottery for a cash prize. The trials were conducted in six undergraduate economics classes of 19, 34, 37, 10, 11 and 19 students. In each trial, the same experimenter provided the instructions to the subjects. The instructions were presented via power point slides and in written form.[8] In accordance with the minimal group literature, we placed students into groups labeled "X" and "Y" (Oakes & Turner, 1980), where the allocation was based on the last digit of the student's identification number. Students with digits 0-4 were placed into group X and students with digits 5-9 were placed into group Y.

Before the subjects were given the experimental material, we familiarized the subjects with 2×2 games. In particular, we instructed the subjects that they were to select one of two actions which were indicated by the two rows in the game matrix. We also informed the subjects that their opponent would select one of two actions which were indicated by the columns in the game matrix. Additionally, these joint actions would imply an outcome which is represented by payoffs, where the subject's payoffs are to the left of the comma and the other's payoffs are to the right of the comma.

Our experimental manipulation was the nature of the prisoner's dilemma game. Roughly half of each session was given the Easy Game and half the Difficult Game. The subjects were given the game in matrix form, as specified in the appendix. The subjects were not aware of our names for the games.[9] Subjects were told to make a single choice in the game in which they were given. The subjects were told that they would play the game against every subject in their group, who also received the same game (Difficult or Easy). The subjects were notified that the points

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[8] The written instructions are provided in the appendix. The power point slides are available from the corresponding author upon request.

[9] The subjects were not aware of our names for the games (ie. Difficult Game and Easy Game) as this label could affect behavior. For instance, Liberman, Sammuels, and Ross (2004) show that referring to a prisoner's dilemma game as the "Wall Street Game" induces less cooperative behavior than referring to it as the "Community Game."

attained in these interactions would be converted into an average which would go towards a lottery for a prize of $50.

Note that the expected payoff for each subject is affected by interactions in which they do not participate and that the subject can only affect the likelihood of winning the prize, not the size of the prize. Despite these features, the individual incentives work in the same manner as if we paid subjects based on their individual earnings. An advantage of our method is the relative straightforward means of rendering payment.

Also note that the subjects select a single action to be played against several opponents. Incentives work in the same direction as if we used the result of a single interaction, as the expected value of both the single and multiple interaction procedures are identical. However, we expected the calculation of the multiple interaction case to be more straightforward for the subjects and therefore we expected better decisions. In part, we expected this because the multiple interaction procedure is less risky than the procedure whereby the subjects are paired with a particular subject. The single interaction procedure would produce outcomes with either high (if opponent played C) or low payoffs (if opponent played D), however the multiple interaction procedure would produce payoffs which are a weighted average of these two extremes. Finally, by not matching each subject to a single opponent, we avoid a discussion of the matching procedure if there were an odd number of subjects to be matched.

2.2. Timeline

We refer to Time 1 as the period in which the subject has been allocated into a group, but does not know the form of the game to be played. In Time 1 we seek a baseline measurement of group identification, competitiveness, and cooperativeness. We refer to Time 2 as the period in which the subject has seen the game to be played but before a choice of action has been made. In

Time 2 we measure group identification. In the beginning of Time 3, the subject selects an action for the game. Thereafter, we take a competitive and cooperative measure of the perception of the action by using an appropriate adaptation of the items. Additionally, in Time 3 we measure group identification a final time.

Each response was entered on paper. In order to minimize biasing the subjects towards previous answers, we collected each sheet after its completion. Additionally, we color coded the pages so that we could verify that the subjects adhered to the procedure.

2.3. Measures

2.3.1. Group Identification

Our measure of group identification was adapted from Grieve and Hogg (1999). We asked the subjects, "How much do you like being a member of the group?", "How much do you feel that you belong to the group?", "How strong are your ties to the group?", "How pleased are you to belong to the group?", "How important is the group to you?" and "How much do you identify with the group?" These 6 questions were asked on a scale of 1 to 7, where 1 indicated a negative preference, 4 indicated "no opinion," and 7 indicated a positive preference. We used these items as they are standard in the literature and appropriate in a minimal group setting. The average of these 6 questions forms our measure of group identification.

2.3.2. Competitive and Cooperative Measures

We also seek a measure of the competitive and cooperative nature of the subjects and their assessment of the competitive and cooperative nature of their action. The items of our competitiveness measure were adapted from Beersma and De Dreu (1999). After selecting an action in the game, the subjects were provided with the following statements, "I selected my action only considering my own welfare," and "I selected my action so that my outcome is

relatively better than the outcome for my opponents." The subjects were asked to respond to these 2 statements on a scale of 1 to 7, where 1 indicated "strongly disagree," 4 indicated "neither agree nor disagree," and 7 indicated "strongly agree." Prior to selecting an action in the game, the subjects were presented with these questions which were phrased in terms of the general disposition of the subject. As a result, we have a baseline measure of the competitiveness of the subject and a measure of the perception of the competitiveness of the action taken.

Likewise, the items of our cooperation measure were adapted from Beersma and De Dreu (1999). After selecting an action in the game, the subjects were provided with the following statements, "I selected my action so that my opponents can depend on me", "I selected my action considering how my decisions affect the welfare of my opponents," and "I selected my action so that my opponents and I received the best joint outcome." The subjects were asked to respond to these 3 statements on a scale of 1 to 7, where 1 indicated "strongly disagree," 4 indicated "neither agree nor disagree," and 7 indicated "strongly agree." Prior to selecting an action in the game, the subjects were presented with these questions which were phrased in terms of the general disposition of the subject. As a result, we have a baseline measure of the cooperativeness of the subject and a measure of the perception of the cooperativeness of the action taken.

2.4. Results

2.4.1. Overview of Data and Manipulation Check

Here we provide an overview of the data, and perform a manipulation check. First we note the distribution of play in the games: 54 % (37 of 68) of the subjects who were given the Difficult Game selected C and 32% (20 of 62) of the subjects who were given the Easy Game played C, χ^2 (1,129)=6.47, p=.011. Hence, we find a significant difference in the distribution of

actions between the games. We also note that there is not a relationship between choice in the game and the session in which it was observed.

Our Cronbach alphas for identification in Time 1, Time 2, and Time 3 are 0.810, 0.858 and 0.885, respectively. Our Cronbach alphas for competitiveness in Time 1 and Time 3 are 0.55 and 0.76, respectively. Our Cronbach alphas for cooperativeness in Time 1 and Time 3 are 0.74 and 0.74, respectively. As a result, we conclude that of our measures, with the exception of Time 1 competitiveness, can be considered to be reliable.

In order to provide a baseline for what follows, in Table 1 we list the mean measures of group identification by time.

---------------------INSERT TABLE 1 ABOUT HERE --------------------

In order to better understand the action taken, we investigate perceptions of the actions taken. We subtract the cooperative measure at Time 1 from the cooperative measure at Time 3. Across both games, playing C is considered to be more cooperative (M=-1.004, SD=1.55) than playing D (M=-2.003, SD=1.45), t(116)=3.75, p<0.001. Additionally, we subtract the competitive measure at Time 1 from the competitive measure at Time 3. Also across both games, playing C (M=-0.249, SD=1.32) is considered to be less competitive than playing D (M=1.114, SD=1.21), t(115)=-6.06, p<0.001. Therefore, we find evidence that the subjects regard the choice of C as more cooperative and less competitive than the choice of D.

2.4.2. Changes in Group Identification (Hypotheses 1 and 2)

In our investigation into the changes in group identification, we begin by noting that the action choice affects the group identification of subjects. Across both games, the Time 3 measure group identification is significantly different for those who played C (M=4.30, SD=1.05) and those who played D (M=3.93, SD=1.10), t(128)=1.94, p=0.054. However, there are no

significant differences in our measure of group identification at Time 1 or Time 2 for those playing C or D. We also note that there are no significant differences in the measure of group identification at Time 1, Time 2, or Time 3 of the subjects who were given the Difficult or Easy Game.

We run a 3-way ANOVA of the measure of group identification with action, time, game version, and action-game version interaction as independent variables. This model is significant $(F(389)= 2.28, p=0.046)$, as are the action $(p=0.0015)$ and the action-game version interaction $(p=0.052)$ coefficients. However, no other coefficients are significant and we therefore do not accept Hypothesis 1.

As a further investigation into the changes in group identification, we run a paired t-test of Time 1 and Time 3 measures of group identification. There is some evidence of a difference in group identification across all subjects $(M=-0.120, SD=0.776)$, $t(129)=1.76$, $p= 0.08$. Although there is no difference when we restrict attention to those who selected C, there is a significant change in the measure of group identification for the subjects who selected D $(M=-0.210, SD= 0.850)$, $t(72)=2.11$, $p=0.038$.

Although there are no significant differences in identification across game treatments, significant relationships emerge when we consider both the action and the game treatment. Figure 2 below shows mean group identification within the Difficult Game across time according to the action selected in Time 3.

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For those who received the Difficult Game, there is a significant difference between the Time 3 measure of group identification of those playing C $(M=4.40, SD=1.00)$ and those playing D $(M=3.75, SD=1.12)$, $t(66)=2.49$, $p=0.015$.

As we are investigating changes in group identity, here we also account for the group identification measure in Time 1. We run three regressions where the measure of group identity at Time 3 is the dependent variable.[10] In this analysis we employ the measure of group identity at Time 1 and the action selected as the independent variables. The Action variable assumes a value of 1 if action C was selected and 0 otherwise. In the first regression, we include subjects who received the Difficult Game and the subjects who received the Easy Game. In the second regression, we restrict analysis to the subjects given the Difficult Game. In the third regression, we restrict analysis to the subjects given the Easy Game. See Table 2 for a summary of this analysis.

---------------------INSERT TABLE 2 ABOUT HERE --------------------

Table 2 shows that the action is significant in the regression which is restricted to the subjects who played the Difficult Game. Specifically, we find that for those who received the Difficult Game, the subjects who played C had a significantly different change in the measure of group identification than those who played D. This evidence supports Hypothesis 2. However, for those who received the Easy Game, there was no significant difference in the change in the measure of group identification for those who played C or D.

2.4.3. Timing of the Changes in Group Identity (Hypothesis 3)

A natural question is then, when do these changes in group identification occur. Does the change occur between Time 1 and Time 2? Or does the change occur between Time 2 and Time 3? If the change occurs between Time 1 and Time 2 then it would seem that the subjects correctly anticipated their subsequent choice and the act of executing the choice did not

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[10] These regressions are not qualitatively different from the corresponding ordered multinomial logistic regressions. The results of the ordered multinomial logistic regressions are available from the corresponding author upon request.

significantly affect their group identification. However, if the change occurs between Time 2 and Time 3 then the act of executing the choice significantly affected their group identification.

We run the following three regressions involving group identification as measured in two different periods for subjects in the Difficult Game. In each of the three regressions, we also account for the action taken. In the first, we compare the measure of group identity at Time 3 with that at Time 1. In the second, we compare the measure of group identity at Time 2 with that at Time 1. In the third, we compare the measure of group identity at Time 3 with that at Time 2. In this way, we hope to determine whether the changes are occurring between Time 1 and Time 2, or between Time 2 and Time 3. See Table 3 for a summary of this analysis.[11]

---------------------INSERT TABLE 3 ABOUT HERE --------------------

The result of the first regression indicates that group identity changed for the Difficult Game subjects on the basis of their action selected. However, the second regression suggests that this change was not significant between Time 1 and Time 2. On the other hand, the results of the third regression suggest that the change was significant at the 0.1 level.

On the basis of the above, we infer that the bulk of the group identification changes occur between Time 2 and Time 3. Therefore, the evidence supports the contention that the act of making the selection affects identification and that the subjects do not correctly anticipate their choice. As a result, we find some evidence in support of Hypothesis 3. In other words, we find evidence that the change in group identification which did occur, happened primarily between Time 2 and Time 3 rather than between Time 1 and Time 2.

2.4.4. Competitiveness and Cooperativeness (Hypothesis 4)

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[11] Note that the first regression in Table 3 is identical to the second regression in Table 2. We include the regression in both tables in order to facilitate the comparisons to the other regressions in the tables.

Recall that at Time 1, we took a baseline measurement of competitiveness and cooperativeness. Later at Time 3 we made a measurement of the perception of the competitiveness and cooperativeness of the action taken. We take the difference between these Time 3 and Time 1 measurements to better understand how the subject considers the action selected. Figure 3 demonstrates this measure of competitiveness by action and game type, with standard error bars. Figure 4 demonstrates corresponding relationship for cooperativeness, also with standard error bars.

--------------------INSERT FIGURES 3 & 4 ABOUT HERE --------------------

Within the Easy Game, playing C was considered to be more cooperative (M=-1.33, SD=1.49) than playing D (M=1.85, SD=1.37), although this result is barely significant, t(35)=1.31, p=0.099. Also in the Easy Game, playing C was considered to be less competitive (M=-0.017, SD=1.34) than playing D (M=0.88, SD=1.13), t(32)=-2.59, p=0.0071. However, these effects are stronger in the Difficult Game. In the Difficult Game, playing C was considered to be more cooperative (M=-0.83, SD=1.57) than playing D (M=-2.22, SD=1.54), t(64)=3.66, p<0.001. In the Difficult Game, playing C was considered to be less competitive (M=-0.37, SD=1.31) than playing D (M=1.43, SD=1.24), t(65)=-5.80, p<0.001. Within each game, playing C was considered to be more cooperative and less competitive than playing D, however in the Difficult game these differences were more pronounced.

As a result we find evidence in support of Hypothesis 4. We find that the difference in the perception of the competitiveness and cooperativeness of playing C and playing D was larger in the Difficult Game.

3. Discussion

We do not observe a significant difference in the average group identification between the Easy Game and Difficult Game treatments, and therefore we do not accept Hypothesis 1. This lack of significance is due to the fact that, within the Difficult Game the increase in the group identification of those playing C is offset by the decrease in group identification of those playing D. Further, there is no such difference between those playing C and those playing D in the Easy Game. As a result, there is not a significant difference between the group identification across games.

On the other hand, we find evidence in support Hypothesis 2. Specifically, we find that subjects in the Difficult Game who play C have a significantly different change in group identification than the Difficult Game subjects who play D. This evidence is consistent with the contention that subjects have an imperfect understanding of their own preferences and make an inference of these preferences based on the action selected. The differential effect is consistent with the literature as the choice in the Difficult Game is more difficult than that in the Easy Game and is therefore a better diagnostic.

Additionally we see that the change in group identification primarily occurs only after the action is selected. Therefore we find some evidence in support of Hypothesis 3. When considering the significance of the evidence in support Hypothesis 3, note that essentially we ask the same sets of questions three times, and Hypothesis 2 notes a difference between the first and third responses. The analysis of the evidence regarding Hypothesis 3 attempts to identify whether this occurred between the first and second responses or between the second and the third responses. So while the evidence used to support Hypothesis 3 did not obtain the standard level of statistical significance, it should be striking that we even approach significance. Additionally, the evidence regarding Hypothesis 3 offers further support for our contention that the subject has

an imperfect understanding of their own preferences and therefore an imperfect understanding of an action to be taken in the immediate future. For this reason, we view the evidence supporting Hypothesis 3 as supporting our interpretation of Hypothesis 2.

The evidence above also suggests that taking an action which is considered to be less competitive or more cooperative tends to be associated with a larger positive change in identification. As playing C is considered to be more cooperative and less competitive than playing D, we see the former exhibiting a stronger identification than the latter. As a result, we find evidence in support of Hypothesis 4.

Our results have implications for the study of experimental games. Research has suggested that, in settings similar to our experiment, there is a link between group identification and behavior such as ingroup favoritism and outgroup discrimination.[12] For instance, Perrault and Bourhis (1999) find that subjects who identify more strongly with a group, treated ingroup members more favorably and outgroup members less favorably.[13] Therefore, to the extent that we can interpret the measure of group identification as related to social preferences, the results presented here suggest that social preferences might not be constant throughout a one-shot game in the absence of feedback.

The results of our experiment also have implications beyond the laboratory. Our findings suggest that uncooperative actions, where the personal gain is relatively small, can cause a larger change in identification than uncooperative actions where the personal gain is large. To the extent that this change in group identification will affect future behavior, our evidence suggests that the implementation of punishments for relatively small offenses could be necessary in order

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[12] Although the relationship between identification and such biased behavior is well understood in settings similar to ours, there is no consensus on the relationship in general settings. See Turner (1999) and Brown (2000) for a spirited discussion on the matter.
[13] Also see Ando (1999), Branscombe and Wann (1994), and Voci (2006).

to dissuade future uncooperative behavior. By way of example, consider the optimal size of the fine for littering. Our results suggest that, subsequent to littering, the person will have a change in identification away from other residents of the community, which is likely to be associated with more littering in the future. Our results suggest that a large fine for littering, or any such small offense, might be required in order to maintain cooperative behavior in social dilemma settings. However, additional studies must be conducted in order to verify this conjecture.

It is worth reflecting on the limitations of the present study and the possibilities for future work. It is unclear how feedback, or the anticipation of feedback, would affect the change in identification. Also, the experiment only contained a single play of a game. It is unclear how the endogenous identification described in this experiment would affect future behavior in a repeated setting. It is possible that the new identification would revert back to its original form and thus not affect behavior or perhaps the endogenous group identification would have a lasting influence on behavior.[14] It is also not clear how the results of this study apply to other standard games. Additionally, it is unclear how the results apply to groups which are not minimal. It is possible that minimal group members display either a more or less malleable identification than members of less trivial groups. Moreover, since our paper was conducted on paper, we are not able to record the length of the decision time. As our paper relates to the difficulty in the decision, and more difficult decisions are associated with longer decision times, it would be interesting to run a similar study in Mouselab or z-Tree. This would allow the decision time to be measured and it could provide additional evidence regarding decision difficulty.[15] Hopefully, future work can clarify these issues.

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[14] Although the results of Sharot et al. (2009) suggest that these effects are lasting, Liberman and Forster (2006) find that difficult decisions can have the opposite effect when the decision is repeated.
[15] We thank a reviewer for this suggestion.

We have shown that the game specification is related to changes in group identification. Specifically, we showed that the difficulty of the decision affects group identification. However, we showed this using two specific prisoner's dilemma games. Future research will have to determine which aspects of our specification are related to the changes which we found.

In sum, we have provided evidence related to the endogenous nature of the measurement of group identification in games. We have found that the group identification of a subject is affected by the action taken and the strategic setting in which the action was taken. Those subjects who received the Difficult Game and played C had a significantly stronger change in group identification than those who received the Difficult Game and played D. Additionally, we have found that the change in group identification which does occur happens primarily after the subject selects an action. Finally, we presented evidence that the change in group identification is strengthened by actions which are considered to be less competitive and more cooperative. We view the evidence presented here as challenging the assumption that the subject's conceptualization of a one-shot game without feedback is unchanged.

References

Abrams, D., & Hogg, M. (1999). *Social identity and social cognition*. Blackwell Publishers: Walden MA.

Aguiar, F., Branas-Garza, P., Espinosa, M.P., & Miller, L. (2010). Personal identity: A theoretical and experimental analysis. *Journal of Economic Methodology*, 17(3), 261-275.

Ahmed, A. (2007). Group identity, social distance and intergroup bias. *Journal of Economic Psychology*, 28, 324-337.

Ariely, D., & Norton, M. (2008). How actions create-not just reveal-preferences. *Trends in Cognitive Science*, 12(1), 13-16.

Ando, K. (1999). Social identification and a solution to social dilemmas. *Asian Journal of Social Psychology*, 2, 227-235.

Beersma, B., & De Dreu, C. (1999). Negotiation processes and outcomes in prosocially and egoistically motivated groups. *International Journal of Conflict Management*, 10(4), 385-402.

Bodner, R., & Prelec, D. (2003). Self-signaling and diagnostic utility in everyday decision making. In I. Brocas & J. Carrillo (Eds.), *The psychology of economic decisions*, Oxford University Press, New York.

Bowles, S. (1998). Endogenous preferences: The cultural consequences of markets and other economic institutions. *Journal of Economic Literature*, 36, 75-111.

Branscombe, N., & Wann, D. (1994). Collective self-esteem consequences of outgroup derogation when a valued social identity is on trial. *European Journal of Social Psychology*, 24, 641-657.

Brehm, J. W. (1956). Post-decision changes in the desirability of choice alternatives. *Journal of Abnormal and Social Psychology*, 52, 384-389.

Brewer, M. (1991). The social self: On being the same and different at the same time. *Personality and Social Psychology Bulletin*, 17(5), 75-82.

Brewer, M., & Kramer, R. (1986). Choice behavior in social dilemmas: Effects of social identity, group size and framing. *Journal of Personality and Social Psychology*, 50(3), 543-549.

Brown, R. (2000). Social identity theory: Past achievements, current problems and future challenges. *European Journal of Social Psychology*, 30, 745-778.

Brown, R., Condor, S., Mathews, A., Wade, G., & Williams, J. (1986). Explaining intergroup differentiation in an industrial organization. *Journal of Occupational Psychology*, 59, 273-286.

Brown, R., & Wade, G. (1987). Superordinate goals and intergroup behavior: The effect of role ambiguity and status on intergroup attitudes and task performance. *European Journal of Social Psychology*, 17(2), 131-142.

Canegallo, C., Ortona, G., Ottone, S., Ponzaono, F., & Scacciati, F. (2008). Competition versus cooperation: Some experimental evidence. *Journal of Socio-Economics*, 37, 18-30.

Carpenter, J. (2005). Endogenous social preferences. *Review of Radical Political Economics*, 37(1), 63-84.

Charness, G., Rigotti, L., & Rustichini, A. (2007). Individual behavior and group membership. *American Economic Review*, 97(4), 1340-1352.

Chen, Y., & Li, X. (2009). Group identity and social preferences. *American Economic Review*, 99(1), 431-457.

Dawes, R., Van de Kragt, A., & Orbell, J. (1988). Not me or thee but we: The importance of group identity in eliciting cooperation in dilemma situations: Experimenal manipulations. *Acta Psychologica*, 68, 82-97.

Eckel, C., & Grossman, P. (2005). Managing diversity by creating team identity. *Journal of Economic Behavior and Organization*, 58(3), 371-392.

Egan, L., Bloom, P., & Santos, L. (2010). Choice-induced preferences in the absence of choice: Evidence from a blind two choice paradigm with young children and capuchin monkeys. *Journal of Experimental Social Psychology*, 46, 204-207.

Ellemers, N., Spears, R., & Doosje, B. (2002). Self and social identity. *Annual Review of Psychology*, 53, 161-186.

Festinger, L., & Carlsmith, J. (1959). Cognitive consequences of forced compliance. *Journal of Abnormal and Social Psychology*, 59, 203-210.

Gaertner, S., Mann, J., Murrell, A., & Dovidio, J. (1989). Reducing intergroup bias: The benefits of recategorization. *Journal of Personality and Social Psychology*, 57(2), 239-249.

Garcia, S., Tor, A., Bazerman, M., & Miller, D. (2005): "Profit maximization versus disadvantageous inequality: The impact of self-categorization," *Journal of Behavioral Decision Making*, 18(3), 187-198.

Grieve, P., & Hogg, M. (1999). Subjective uncertainty and intergroup discrimination in the minimal group situation. *Personality and Social Psychology Bulletin*, 25(8), 926-940.

Güth, W., Levati, M., & Ploner, M. (2008). Social identity and trust: An experimental investigation. *Journal of Socio-Economics*, 37, 1293-1308.

Haddock, G., Rothman, A. J., Reber, R., & Schwarz, N. (1999). Forming judgments of attitude certainty, intensity, and importance: The role of subjective experiences. *Personality and Social Psychology Bulletin*, 25, 771-782.

Hogg, M., Cooper-Shaw, L., & Holzworth, D. (1993). Group prototypicality and depersonalized attraction in small interactive groups. *Personality and Social Psychology Bulletin*, 19, 452-465.

Hogg, M., & Grieve, P. (1999). Social identity theory and the crisis of confidence in social psychology: A commentary, and some research on uncertainty reduction. *Asian Journal of Social Psychology*, 2, 79-93.

Hogg, M., & Hardie, E. (1991). Social attraction, personal attraction and self-categorization: A field study. *Personality and Social Psychology Bulletin*, 17, 175-180.

Hogg, M., & Hardie, E. (1992). Prototypicality, conformity and depersonalized attraction: A Self-Categorization Analysis of Group Cohesiveness. *British Journal of Social Psychology*, 31, 41-56.

Ip, G., Chiu, C.Y., & Wan, C. (2006). Birds of a feather and birds flocking together: Physical versus behavioral cues may lead to trait- versus goal-based group perception. *Journal of Personality and Social Psychology*, 90, 368-381.

Izuma, K., Matsumoto, M., Murayama, K., Samejima, K., Sadato, N., & Matsumoto, K. (2010). Neural correlates of cognitive dissonance and choice-induced preference change. *Proceedings of the National Academy of Sciences*, 107(51), 22014-22019.

Kramer, R., & Brewer, M. (1984). Effects of group identity on resource use in a simulated commons dilemma. *Journal of Personality and Social Psychology*, 46(5), 1044-1057.

Liberman, V., Sammuels, S., & Ross, L. (2004). The name of the game: Predictive power of reputations versus situational labels in determining prisoner's dilemma game moves. *Personality and Social Psychology Bulletin*, 30(9), 1175-1185.

Liberman, N., & Forster, J. (2006). Inferences from decision difficulty. *Journal of Experimental Social Psycholgy*, 42, 290-301.

McLeish, K., & Oxoby, R. (2007). Identity, cooperation and punishment. Working paper, University of Calgary and IZA.

McLeish, K., & Oxoby, R. (2011). Social Interactions and the Salience of Social Identity. *Journal of Economic Psychology*, 32(1), 172-178.

Oakes, P., & Turner J.C. (1980). Social categorization and intergroup behaviour: Does minimal intergroup discrimination make social identity more positive. *European Journal of Social Psychology*, 10, 295-301.

Perreault, S., & Bourhis, R. (1999). Ethnocentrism, social identification, and discrimination. *Personality and Social Psychology Bulletin*, 25(1), 92-103.

Pettigrew, T. (1998). Intergroup contact theory. *Annual Review of Psychology*, 49, 65-85.

Rapoport, A., (1967). A Note on the "Index of Cooperation" for Prisoner's Dilemma. *Journal of Conflict Resolution*, 11(1), 100-103.

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

Reid, S., & Hogg, M. (2005). Uncertainty reduction, self-enhancement and ingroup identification. *Personality and Social Psychology Bulletin*, 31, 804-817.

Schotter, A., Weiss, A., & Zapater, I. (1996). Fairness and survival in ultimatum and dictatorship Games. *Journal of Economic Behavior and Organization*, 31, 37-56.

Schwarz, N., Bless, H., Strack, F., Klumpp, G., Rittenauer-Schatka, H., & Simons, A. (1991). Ease of retrieval as information: Another look at the availability heuristic. *Journal of Personality and Social Psychology*, 61, 195-202.

Sharot, T., De Martino, B., & Dolan, R. (2009). How choice reveals, and shapes, expected hedonic outcome. *Journal of Neuroscience*, 29(12), 3760-3765.

Sharot, T., Velasquez, C., & Dolan, R. (2010). Do Decisions Shape Preference? Evidence From Blind Choice. *Psychological Science*, 21(9), 1231-1235.

Shultz, T., & Lepper, M. (1996). Cognitive dissonance reduction as constraint satisfaction. *Psychological Review*, 103(2), 219-240.

Shultz, T., Leveille, E., & Lepper, M. (1999). Free choice and cognitive dissonance revisited: Choosing 'lesser evils' versus 'greater goods'. *Personality and Social Psychology Bulletin*, 25(1), 40-48.

Steffel, M. (2009). The impact of choice difficulty on self and social preferences. Unpublished dissertation, Princeton University.

Swann, W., Kwan, V., Polzer, J., & Milton, L. (2003). Fostering group identification and creativity in diverse groups: The role of individuation and self-verification. *Personality and Social Psychology Bulletin*, 29(11), 1396-1406.

Tajfel, H., Flament, C., Billig, M., & Bundy, R. (1971). Social categorization and intergroup behavior. *European Journal of Social Psychology*, 1, 149-178.

Tajfel, H., & Turner, J. (1986). The social identity theory of intergroup behavior. In S. Worchel and W. Austin (Eds.), *Psychology of intergroup relations*. Chicago, Nelson-Hall, 7-25.

Turner, J. (1999). Some current issues in research on social identity. In N. Ellemers, R. Spears & B. Doosje (Eds.), *Social identity: Context, commitment, content*. Malden, MA, Blackwell, 6-34.

Vanbeselaere, N. (1991). The impact of in-group and out-group homogeneity/heterogeneity upon intergroup relations. *Basic and Applied Social Psychology*, 12(3), 291-301.

Vlaev, I., & Chater, N. (2006). Game relativity: How context influences strategic decision making. *Journal of Experimental Psychology Learning, Memory, and Cognition*, 32(1), 131-149.

Voci, A. (2006). The link between identification and in-group favourtism: Effects of threat to social identity and trust-related emotions. *British Journal of Social Psychology*, 45, 265-284.

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

Table 1: Mean group identity by time
(standard deviation in parenthesis).

	Time 1	Time 2	Time 3
Identity	4.216	4.170	4.096
	(0.929)	(0.938)	(1.092)

Table 2: Summary of the regression analysis: group identity at Time 3

	Pooled	Difficult Game	Easy Game
Time 1 identity	0.831***	0.790***	0.864***
	(0.0722)	(0.0984)	(0.107)
Action	0.233*	0.424**	0.0351
	(0.135)	(0.186)	(0.208)
R^2	0.52	0.54	0.52
Observations	130	68	62

Notes: The coefficients are reported for OLS. Standard errors are given in the parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 3: Regressions involving changes in measures of group identity for Difficult Game subjects

	T3 identity		T2 identity		T3 identity
T1 identity	0.790***	T1 identity	0.702***	T2 identity	0.958***
	(0.0984)		(0.0836)		(0.0789)
Action	0.424**	Action	0.206	Action	0.260*
	(0.186)		(0.158)		(0.147)
p-value	0.0260	p-value	0.198	p-value	0.0822
R^2	0.54	R^2	0.54	R^2	0.72

Notes: The coefficients are reported for OLS. Standard errors are given in the parentheses. Each regression has 68 observations. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Figure 1: Specification of the Easy and Difficult Games.

Easy Game

Someone Else

		C	D
You	C	100,100	0,150
	D	150,0	50,50

Difficult Game

Someone Else

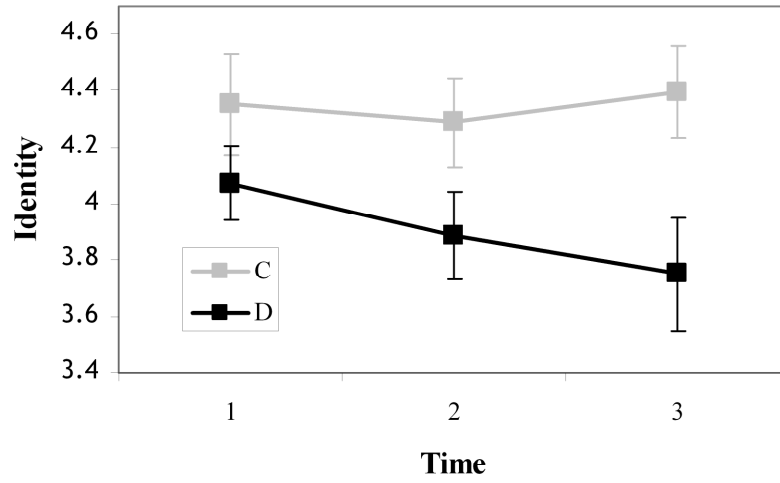|		C	D
You	C	100,100	45,105
	D	105,45	50,50

Figure 2: Mean group identity within the Difficult Game across time by game type and action
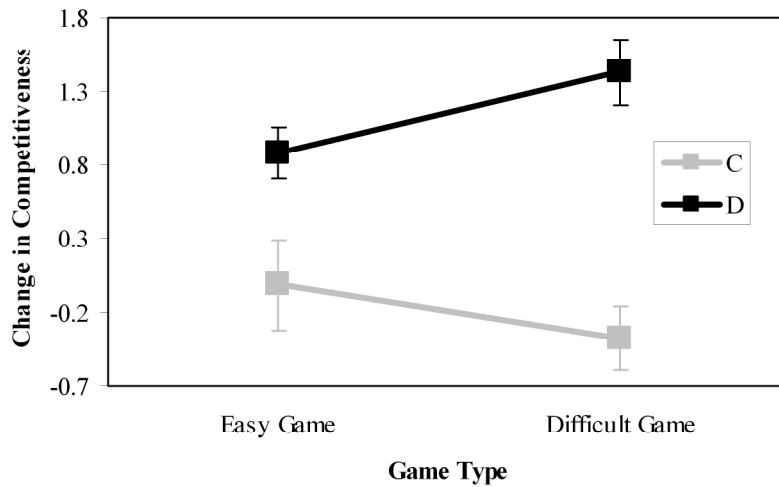
selected.

Figure 3: Mean difference in Time 3 and Time 1 competitiveness by game type and action
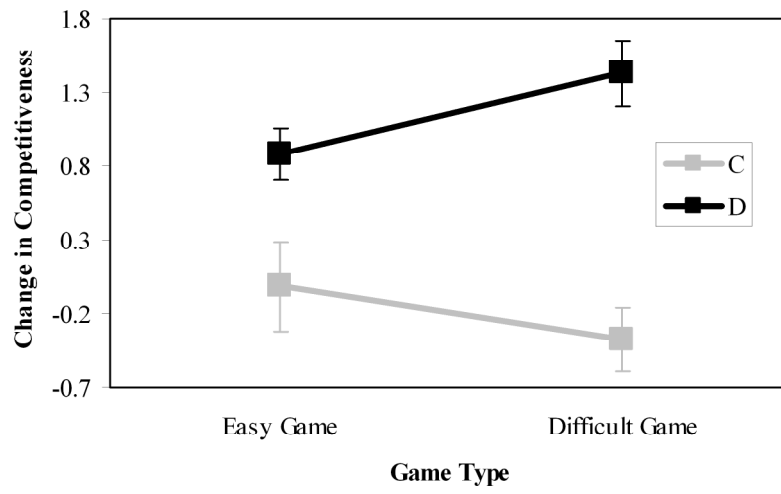
selected.

Figure 4: Mean difference in Time 3 and Time 1 competitiveness by game type and action selected.

Appendix

These are the paper instructions given to the subjects.

In this experiment, you are to play a strategic game.

In this game you are to make a choice between C and D simultaneously with your opponent.

The combination of your decision and the decision of your opponent will determine your payoff.

Such a game is represented in the following form.

Opponent

		C	D
	C	A_{cc},B_{cc}	A_{cd},B_{cd}
You	D	A_{dc},B_{dc}	A_{dd},B_{dd}

The payoffs are listed as "your payoffs, opponent's payoffs."

If you select C and your opponent selects C then your payoff is A_{cc} and your opponent's payoff is B_{cc}.

If you select C and your opponent selects D then your payoff is A_{cd} and your opponent's payoff is B_{cd}.

If you select D and your opponent selects C then your payoff is A_{dc} and your opponent's payoff is B_{dc}.

If you select D and your opponent selects D then your payoff is A_{dd} and your opponent's payoff is B_{dd}.