Towards an understanding of the endogenous nature of identity in games

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15 November 2009

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November 15, 2009

Abstract

We test the assumption that social preferences are unchanged throughout a one-shot strategic game. To do so, we study the relationship between the strategic nature of a game and identification in social groups. In our experiment, the subjects play one of two versions of the prisoner's dilemma game where the attractiveness of the uncooperative action is manipulated. We refer to the version with a relatively attractive uncooperative action as the *Mean Game* and the other as the *Nice Game*. Note that choice is relatively more difficult in the Nice Game as a result of the smaller difference between the payoffs associated the actions. We find that the strategic nature of the game affects the strength of identity. Specifically, we find that in the Mean Game there is little difference in the change in identification of those playing cooperatively and those playing uncooperatively. However, in the Nice Game those playing cooperatively exhibit a significantly stronger change in identification than those playing uncooperatively. We also present evidence regarding the timing of the change in identity and what causes this change. In particular, the decision difficulty literature is helpful in interpreting the results.

Keywords: Identity, Prisoner's Dilemma, Endogenous Preferences, Social Preferences

1 Introduction

Social preferences of players in a strategic game are of fundamental importance to the analysis of that game. Even if players consider the welfare of other players, it is assumed that preferences are unchanged throughout the play of a one-shot game. In this paper, we test the assumption that these preferences are indeed unchanged. Specially, we ask whether social preferences can be affected by the strategic nature of the game, even without feedback concerning the action of the opponent. We measure these preferences by employing a standard measure of identity. Consistent with the literature, we interpret the measure of identity as suggesting the extent to which a subject values the outcomes of others.

In our experiment, each subject plays one of two versions of a prisoner's dilemma game and we measure their identity. In both versions of the game, each subject decides to take a cooperative action or an uncooperative action. In one version of the game, the uncooperative action is relatively more attractive than in the other version. We refer to the game with the relatively attractive uncooperative action as the *Mean Game* and the other as the *Nice Game*. The choice in the Nice Game is relatively more difficult than that in the Mean Game because of the smaller difference between the payoffs associated the actions.

We allocate subjects into groups based on a trivial criterion. Before the subjects are aware of the strategic setting, we take a baseline measure of identity. Subjects are then presented with either the Mean or Nice Game. Before the subjects decide on their action, their group identity is again measured. The subjects then make a choice of action in the game and we take final identity measure.

The first contribution of this paper entails evidence of the relationship between the game type and action choice as affecting identity. Specifically, we find that when playing another ingroup member, the change in identity for those playing cooperatively and uncooperatively in the Nice Game is significantly different, whereas there is no such relationship in the Mean Game (Result 1). The second contribution is the specification of the timing of the change. We present evidence that the change in identity which does occur, does not happen upon initial inspection of the game but rather largely after the action choice has been made (Result

2). The third contribution involves evidence regarding the cause of this change. We find that identity is enhanced by actions which are considered to be less competitive and more cooperative (Result 3).

These results are best understood with the insights from the decision difficulty literature. Research has found that when a subject makes a choice from a set of alternatives, the decision difficulty is related to post-decision evaluation of the options (Ariely & Norton, 2007; Bodner & Prelec, 2003; Liberman & Forster, 2006; Sharot et. al., 2009; Shultz et. al., 1996; Shultz & Lepper, 1999; Steffel, 2009). In particular, the research indicates that more difficult decisions will be associated with a larger post-decision spread in the evaluation of the selected and not selected options.

Our results are similar as the identity change which does occur, happens after the decision is made (Result 2) and is particularly large after a difficult decision (Result 1). In the Mean Game, most participants select the uncooperative action, whereas in the Nice Game there is a more even distribution of choices. This supports our contention that the decision in the Nice Game is more difficult than that in the Mean Game. Consistent with the decision difficulty literature, we find that there is a significant difference in the change in identity for those playing uncooperatively in the Nice Game and those playing cooperatively, however no such relationship exists in the Mean Game.

The results of this paper have significant implications for the study of games. Our results suggest that the analysis of a one-shot game without feedback must consider that identity might not be constant throughout the interaction. Additionally, our results suggest that techniques which measure social preferences through observing allocation choices (such as Social Value Orientation) could possibly affect the very preferences which these techniques are designed to measure.

1.1 Measurement of Identity

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, 1970;

Tajfel et. al., 1971; Tajfel, 1978, Tajfel & Turner, 1979; Tajfel & Turner, 1986; Turner & Bourhis, 1996). 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 identity was more effectively manipulated. However, in order to verify the effectiveness of the manipulation, experimenters would seek to measure the identity of the subject (Abrams & Hogg, 1999; Brown et. al., 1986; Gaertner et. al., 1989; Grieve & Hogg, 1999; Hogg et. al., 1993; Hogg & Grieve, 1999; Hogg & Hardie, 1991,1992; Reid & Hogg, 2005; Swann et. al., 2003).

Subsequent identity 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 social group. Research has indicated that group distinctiveness (Brewer, 1991), group prestige (Ellemers et. al., 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. Also, to our knowledge, we are the only paper to measure identity multiple times throughout the experiment. In the event that there is a change in identity, this allows us to determine when the change occurs.

Similar to identity, Social Value Orientation (SVO) (Griesinger & Livingston, 1973) seeks to learn the social preferences of subjects by observing a series of allocation decisions. It seems that SVO is better suited as a measure of the general disposition of a subject rather than as a measure of the disposition towards a particular person (De Cremer & Van Vugt, 1999; De Cremer & Van Dijk, 2002; De Cremer et. al., 2008). An advantage of measuring social preferences through techniques such as SVO is that the responses are incentive compatible: a subject receives payment on the basis of their decisions and therefore has a material incentive to respond truthfully. However, the results presented here suggest that it is possible that eliciting preferences through techniques such as SVO might affect the very preferences which they are designed to measure.

1.2 Interpretation of Identity Measure

Research has suggested that, in settings similar to that in our experiment, there is a link between group identification and bias.[1] 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 (also see Ando, 1999; Branscombe & Wann, 1994; Voci, 2006). Therefore, we interpret the identity measure of a subject as indicating the extent to which the subject positively values the material payoffs of an ingroup member.

1.3 Identity and Games

There is a growing interest in identity research in games .[2] Within this literature, it is not uncommon for the experimenter to manipulate some feature of the environment, which the authors ascribe as having affected the identity of the subject (Kramer & Brewer, 1984; Brewer & Kramer, 1986; Dawes et. al., 1988; Wit & Wilke, 1992; Aguiar et. al., 2007). The authors typically observe the influence of this manipulation on the behavior in games. For instance, Charness, Rigotti and Rustichini (2007) manipulate the saliency of groups by allowing ingroup members to view behavior or by connecting the payoffs of ingroup members. Eckel and Grossman (2005) observes that subjects in treatments with strong identity manipulations contribute more in repeated public goods games than in treatments with weak manipulations. Ahmed (2007), Chen and Li (2009) and McLeish and Oxoby (2007) observe the difference in outcomes of games played between ingroup and outgroup members. We primarily distinguish our paper from these papers in two respects. First, we do not directly manipulate identity. Second, we examine the relationship between social identification and the strategic nature of a game.

To our knowledge, Guth, Levati and Ploner (2008) is the only other paper which employs an established measure of identity in games. The authors investigate the relationship between

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[1]Although the relationship between identity and 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.

[2]For work involving real social groups, see Benjamin et. al. (2007), Ben-Ner et.al. (2006), Ferraro and Cummings (2007), Goette et. al. (2006) and Hoff and Pandey (2006).

identity and behavior in an investment game. Specifically, the authors place subjects into groups (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 subsequently measure.[3] The authors find that subjects who contribute more in the public goods game are significantly more trusting in the subsequent investment game. We present a result with a similar flavor: those who play cooperatively against an ingroup member in the Nice Game have a significantly larger change in identity than those playing uncooperatively in the Nice Game.

Carpenter (2005) is one of the few papers to explicitly investigate the extent to which a competitive strategic environment can affect social preferences.[4] However, there are fundamental methodological differences between the papers. For instance, the subjects in Carpenter receive feedback regarding the action of their opponents. In our paper, there is no feedback therefore the change in identity which we find can only be attributed to the nature of the game and the action selected by the subject. Like Carpenter, we measure preferences both before and after the actions have been selected, however we use the identical measure. By contrast, Carpenter uses Value Orientation (VO)[5] to obtain an ex-ante measurement and the technique of Andreoni and Miller (2002) to obtain an ex-post measurement.

2 Experiment

2.1 Procedure

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 classes of 19, 34, 37, 10, 11 and 19 students. In each trial, the same male experimenter provided the instructions to the subjects.[6] In accordance with the

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[3]Although Guth et. al. (2008) use items adapted from Gaertner et. al. (1989) rather than, as we do, Grieve and Hogg (1999).

[4]See Canegallo et. al. (2008) for a related paper. Also, Schotter et. al. (1996) examines the effect of framing on judgements of fairness and is motivated by questions related to endogenous identity. Finally, see Bowles (1998) for more on endogenous preferences.

[5]Another measure of social preferences, similar to SVO.

[6]The instructions were presented via Power Point slides. These slides are available from the corresponding author upon request.

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 played the game, we familiarized the subjects with 2×2 games. Our experimental manipulation was the nature of the prisoner's dilemma game. Roughly half of each class was given the Mean Game and half the Nice Game.[7]

Mean Game

Someone Else

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

Nice Game

Someone Else

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

Subjects were told that they were to play the game with every student in their class, in the same group who received the same game. The subjects were instructed that they were only able to make a single choice to be used against each ingroup opponent. The subjects were notified that the points attained in these matches would be converted into an average which would go towards a lottery for a prize of $50 which would be conducted in a future class meeting. Note that incentives work in the same direction as if we used the result of only a single match. However, payoffs depend on the distribution of choices made by the subjects rather than on the outcome of a single interaction and this would seem to be more transparent to the subject.

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[7]The subjects were not aware of our name of the games (ie. Nice Game and Mean Game) as this label could affect behavior. For instance, Liberman et. al. (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."

2.2   Identification Measure

Our measure of identity was adapted from Grieve and Hogg (1999). We asked the subjects, how much do you like being a member of a 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.

2.3   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 choice of action in the game. The items of our competitiveness measure were adapted from Beersma and DeDreu (1999). Subjects were provided 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."

Likewise, the items of our cooperation measure were adapted from Beersma and DeDreu (1999). Subjects were provided 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, 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."

2.4 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 (Nice or Mean) to be played. In Time 1 we ask standard background questions, in addition to seeking a baseline measurement of group identity, 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 identity. 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 of the subject by using an appropriate adaptation of the items. Additionally, in Time 3 we measure group identity a final time.

Every 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 the we could verify that the subject adhered to the procedure.

3 Results

3.1 Manipulation Check

First, we may ask whether the manipulation induced different action choices. Participants in the Mean Game condition were more likely to chose the uncooperative choice (42 of 62, 67.7%) and participants in the Nice Game condition were more likely to chose the cooperative choice (37 of 68, 54.4%), $\chi^2 (1, 129) = 6.465$, $p = .0110$.

3.2 Identity

The average of the 6 identity questions forms our measure of identity. Our Cronbach alphas for identity in Time 1, Time 2 and Time 3 are 0.810, 0.858 and 0.885, respectively. Our Cronbach alphas for cooperativeness in Time 1 and Time 3 are 0.74 and 0.74, respectively. Our Cronbach alphas for competitiveness in Time 1 and Time 3 are 0.55 and 0.76, respectively.

Table 1 presents a summary of the data by listing the mean identity (and variance in the

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parenthesis) according to the action selected at Time 3 and the game type in Time 1, Time 2 and Time 3.

	$MT1$	$MT2$	$MT3$	$NT1$	$NT2$	$NT3$
C	4.232	4.246	4.133	4.351	4.288	4.396
	(1.117)	(1.054)	(1.297)	(1.208)	(0.922)	(1.010)
D	4.194	4.238	4.067	4.074	3.887	3.752
	(0.725)	(0.838)	(1.171)	(0.522)	(0.762)	(1.259)
Total	4.206	4.2401	4.088	4.225	4.105	4.103
	(0.835)	(0.891)	(1.192)	(0.902)	(0.877)	(1.211)

Table 1: Mean identity by game type and action

We note that the action choice affects the identity of subjects. Time 3 identity is significantly different for those who played C and those who played D ($t = 1.938$, $p = 0.053$). However, there is no significant difference of identity at Time 1 or Time 2 for those playing C or D.

No significant relationship with identity exists between those received the Nice Game and those who received the Mean Game. However, significant relationships emerge when we restrict attention within a game treatment. For those who received the Nice Game, there is a significant difference ($t = 2.470$, $p = 0.0163$) between the Time 3 identity of those playing C and those playing D. Similarly, among those who received the Nice Game, there is a significant difference ($t = 1.803$, $p = 0.0759$) between the Time 2 identity of those playing C and those playing D. An ANOVA of identity at Time 3, with independent variables game type, choice and an interaction term ($F = 2.019$, $p = 0.115$) indicates that the choice term is significant ($F = 3.255$, $p = 0.074$). However, no such significant relationship exists for those who received the Mean Game.

Although we have found a significant relationship between absolute levels of identity, perhaps it is worthwhile to consider the differences in identity. Indeed, among those receiving the Nice Game, there is a significant difference in the change in identity between Time 1 and Time 3 for those who played C and those who played D ($t = 1.862$, $p = 0.0686$). Again, no such significant relationship exists for those who received the Mean Game. We summarize this evidence by the following result.

Result 1: For those who received the Nice Game, the subjects who played C identified significantly more with the group over time than those who played D. For those who received the Mean Game, there was no difference in identification for those who played C or D.

3.3 Timing of Changes

A natural question is then, when do these changes in identity 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 2 then it would seem that the subjects correctly anticipated their subsequent choice and that the act of executing the choice did not significantly affect their identity. However, if the change occurs between Time 2 and 3 then the act of executing the choice significantly affected their identity. A t-test between the difference in Time 2 and Time 3 identity of those who received the Nice Game and played C and those who received the Nice Game who played D is significant at the 10% level of a one-sided test ($t = 1.63$, $p = 0.109$)[8]. Similarly, a t-test between difference in Time 1 and Time 2 identity of those who received the Nice Game and played C and those who received the Nice Game who played D is not significant ($t = 0.757$, $p = 0.452$). On the basis of the above we infer that most of the changes occur between Time 2 and Time 3. Therefore, the evidence supports the contention that the act of making the selection affects identity and that the subjects do not correctly anticipate their choice. We summarize this by the following result.

Result 2: The change in identification which did occur, happened primarily between Time 2 and Time 3 rather than between Time 1 and Time 2.

3.4 Competitiveness and Cooperativeness

Recall that at Time 1, a baseline measurement of competitiveness and cooperativeness is taken. Then at Time 3, we make a measurement of the perception of the competitiveness and cooperativeness of the action taken. We take the difference between these Time 1 and Time 3 measurements to better understand how the subject considers the action undertaken.

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[8]These numerical values are for a two-sided test.

Table 2 lists the mean values (with variance in parenthesis) below.

Mean Difference in Competitiveness

$Comp\ 3-1$	M	N	Total
C	-0.0167	-0.374	-0.249
	(1.783)	(1.724)	(1.743)
D	0.881	1.430	1.114
	(1.284)	(1.557)	(1.454)
Total	0.5914	0.4485	0.5617
	(1.597)	(2.443)	(2.029)

Mean Difference in Cooperativeness

$Coop\ 3-1$	M	N	Total
C	-1.325	-0.831	-1.004
	(2.231)	(2.469)	(2.401)
D	-1.845	-2.218	-2.003
	(1.890)	(2.378)	(2.102)
Total	-1.677	-1.463	-1.565
	(2.025)	(2.875)	(2.463)

Table 2: Mean Difference in Time 1 and Time 3 Competitiveness and Cooperativeness by action and game type

First, we ask how the subject considers the actions taken. Across both games, playing C is considered to be more cooperative than playing D ($t = 3.75$, $p < 0.001$). Also across both games, playing C is considered to be less competitive than playing D ($t = -6.064$, $p < 0.001$). Therefore, we regard the choice of C as more cooperative and less competitive than the choice of D.

Within the Mean Game, playing C is considered to be more cooperative than playing D ($t = 1.315$, $p = 0.197$) although this result is insignificant. Also in the Mean Game, playing C is considered to be less competitive than playing D ($t = -2.594$, $p = 0.0142$). However, these effects are stronger in the Nice Game. In the Nice Game, playing C is considered to be more cooperative than playing D ($t = 3.661$, $p < 0.001$). In the Nice Game, playing C is considered to be less competitive than playing D ($t = -5.797$, $p < 0.001$). Within each game, playing C is considered to be more cooperative and less competitive than playing D, however in the Nice game these differences are more pronounced. We summarize this by the following result.

Result 3: The difference in the perception of the competitiveness and cooperativeness of playing C and playing D was larger in the Nice Game.

3.5   Discussion

Although we see less cooperation in the Mean Game than in the Nice Game, we see no significant difference in the change in identity between the two treatments.   However, we observe in Result 1 that the difference in the change in identity for those playing C and D is larger in the Nice Game treatment than in the Mean Game treatment.   We view this result as arising from the condition that subjects have an imperfect understanding of their own social preferences and they make an inference of these preferences based on the action selected.   The differential effect is consistent with the literature as the choice in the Nice Game is more difficult than that in the Mean Game.

Result 2 demonstrates that the change in identity, primarily occurs only after the action is selected.   This result offers further support for our contention that the subject has an imperfect understanding of their own social preferences and their future action.   For this reason, we view Result 2 as supporting our interpretation of Result 1.

The evidence above 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 identity.   As playing C is considered to be more cooperative and less competitive than playing D, we see the former exhibiting a stronger identity than the latter.   Further, Result 3 demonstrates that the difference in the perception of cooperativeness and competitiveness for playing C and D is larger in the Nice Game than in the Mean Game.

4   Conclusion

We have provided evidence related to the endogenous nature of identity in games.   We have found that the identity of a subject is affected by the action taken and the strategic setting in which the action was taken.   Those subjects who received the Nice Game and played C had a significantly stronger change in identity than those who received the Nice Game and

played D. Additionally, we have found that the identity change which does occur, happens primarily after the subject selects an action. Finally, we presented evidence that the change in identity 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 social preferences are constant throughout a one-shot strategic game without feedback.

Our results have significant implications for the study of games. As we have demonstrated that preferences are not constant throughout the play of a one-shot game without feedback, the assumption otherwise needs to used with caution. Further, our results suggest that measuring other-regarding preferences with techniques such as SVO might affect the very preferences which they are designed to measure. In our experiment other-regarding preferences, as measured by identity, changed in a manner which depended on the specification of the prisoner's dilemma game and the action selected. It is possible that these effects also occur when the subjects make a series of allocation decisions as is the case for measurement of other-regarding preferences via techniques such as SVO. If this is the case then measuring preferences by SVO might affect those preferences which they are designed to measure. We hope future work will address this question.

It is worth reflecting on the limitations of the present study and the possibilities for future work. Here, there was no feedback regarding the action of the opponents. It is unclear how feedback, or the anticipation of the feedback, would affect the change in identification. Also, the experiment only contained a single play of the game. It is unclear how the endogenous identity described in this experiment would affect future behavior in a repeated decision setting. It is possible that the new identity would revert back to its original form thus not affecting behavior or perhaps the endogenous identity would have a lasting influence on behavior.[9] 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 identity than members of less trivial groups. Hopefully, future work can clarify these issues.

Finally, note that playing D rather than C in the Mean Game yields the subject a gain

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[9]Although the reults of Sharot et. al. (2007) suggest that these effects are lasting.

50 points while costing the opponent 100 points. Playing D rather than C in the Nice Game yields the subject a gain 5 points while costing the opponent 50 points. It is unclear exactly how each of these gains and costs individually affects the change in identification of the subject. We hope that future work can tease out this relationship.

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