



Mutual choice of partner and communication in a repeated prisoner's dilemma

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ABSTRACT

Many markets resemble repeated prisoner's dilemma situations with the possibilities for mutual partner choice. In this paper, we show experimentally that partner choice by mutual consent has a strong positive effect on cooperation. Mutual partner choice makes it possible to form long-lasting reciprocal partnerships. To understand partnership formation we also add a treatment where the participants could communicate with each other in a common chat room. Chat transcript reveals that promises are important in forming and sustaining a partnership.

“Where people seldom deal with one another, we find that they are somewhat disposed to cheat, because they can gain more by a smart trick than they can lose by the injury it does to their character. [...] Wherever dealings are frequent, a man does not expect to gain so much by any one contract as by probity and punctuality in the whole, and a prudent dealer [...] would rather choose to lose what he has a right to than give any ground for suspicion.”

Adam Smith, Lectures on Jurisprudence (1766/1978: 538–539)

1. Introduction

An important feature of markets is that individuals can choose their exchange partners. Exchange relationships form voluntarily based on expectations of mutual benefits and may dissolve if expectations are broken. The exchange situation opens for opportunistic behavior, as most exchanges cannot be simultaneous—it takes some time from the point of agreement until the actual exchange is completed—and no contract can completely govern transactions. However, the expectation of repeated interactions may restrict opportunistic behavior. Exchange partners may behave well to increase the chances of keeping their current partners and to uphold their own reputation as reliable exchange partners. The repeated nature of many exchange situations and the mutuality of partner choice constrain opportunistic behavior. A prudent dealer, as Adam Smith observed, may even “choose to lose what he has a right to than give any ground for suspicion.”

Language is another mechanism that constrains opportunistic behavior in markets. According to standard game theory, talk is cheap and should not affect behavior in an upcoming social dilemma situation. However, according to David Hume, people can make promises to cooperate; promises are conventions “which create a new motive, when experience has taught us, that human affairs would be conducted for much more mutual advantages” (Hume, 1739/1985: 572). To make a promise is to express a purpose of behaving in a certain way, and a failure to do so leads to a loss of trustworthiness. Through language, people can persuade one another to work together as exchange partners. Forming a partnership, in itself, is a form of mutual promise to follow rules of conduct in the situation. Talking can help partners further persuade one another to abide by these rules of conduct.

In this paper, we examine the effect of mutual choice of partners and the effect of language through chat room communication in a repeated prisoner's dilemma game experiment. In the Choice condition, a participant is randomly assigned to a fixed group of eight subjects. Within each group of eight, subjects can propose a partner. If two participants choose each other, they play one round of the prisoner's dilemma game. In the next round, each participant can choose to continue the partnership simply by choosing the same partner. The partnership dissolves if one of them does not choose the previous partner. We compare the outcomes in the partner choice treatment to a baseline where pairs form randomly within a fixed group of eight participants. The information in both conditions is private; in each round we inform the subjects about

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their current partner's identity number and their own payoff. Hence, the choice of partner in our experiment is based on private experience only, not reputation through third parties. To capture the effect of language on partnership formation, we also ran a chat treatment in both the Choice and Random conditions. In the fixed group of eight, participants could chat in a common chat room. In the Choice condition, chat could be used to form and sustain pair of partnership within the fixed group of eight subjects. In the Random condition, the chat was targeted towards the fixed group of eight.

Many scholars point out that markets resemble repeated prisoner's dilemma situations, with the possibilities for mutual partner choice, and that the partner choice has a disciplining effect on opportunistic behavior.¹ In the literature, many different mechanisms have been studied for choosing partners. In some studies, subjects choose between groups (Ahn et al., 2009; Ehrhart and Keser, 1999; Brekke et al., 2011), and in others, subjects' stated preferences for partners determine groups (Page et al., 2005), or groups are based on subjects' votes (Charness and Yang, 2014; Cinyabuguma et al., 2005). Also, some have studied auctioning of partners (Bayer, 2016; Coricelli et al., 2004), opting out of a social dilemma situation (Hauk and Nagel, 2001), and the one-sided choice of partner (Huck et al., 2012; Barclay and Willer, 2007). Even when subjects are unaware of being sorted according to cooperativeness, endogenous matching tends to increase cooperation (Gunnthorsdottir et al., 2007; Rigdon et al., 2007). The ability for self-selection into and out of groups has also been shown to be important for realizing gains from trade in similar market-like settings. In an extension of Kimbrough et al. (2010), Jaworski and Wilson (2013) study how subjects discover exchange and specialization in an open-ended environment and allow subjects to incur a cost to endogenously form groups. They find that specializing traders sort via migration and avoid plunderers.

We contribute to the literature on partner choice and voluntary group formation in social dilemmas. Our matching procedure is straightforward and involves no use of a computerized “middleman;” subjects can mutually choose each other, and only these choices determine who forms a partnership. Our procedure resembles Tullock's (1999) experiment, where subjects could freely choose their partner in a prisoner's dilemma game. His experiment, however, did not use a control group and so could not isolate the effect of mutual partner choice.

Language is a key ingredient in the human ability to work out social dilemma problems (Bickerton, 2014). An extensive experimental literature correspondingly demonstrates that communication increases cooperation in social dilemma situations.² Our paper focuses on how participants use language to persuade one another to cooperate and maintain cooperation. In addition to our more standard chat treatment with random matching, we also study a setting where subjects may chat and choose their partners. This enables us to study whether communication is used for a different purpose when partner choice is allowed; in such a setting, subjects can use communication to form trade relationships. We hypothesize that communication can increase the effect of partner choice by making it easier for cooperative subjects to find each other in the partner choice stage.

We find that both mutual partner choice and the ability to chat increase cooperation, compared to random matching. There is also a striking difference in the time pattern between partner choice and chat. The partner choice treatment starts out with a relatively high level of

cooperation, but it levels off at the end. In the chat treatment, cooperation is relatively low in the beginning but increases substantially over time. We do not find a positive interaction effect between chat and partner choice. In fact, analyses of the chat transcripts suggest that subjects tend to use the chat for a similar purpose in both treatments with chat—establishing a common end in the fixed group of eight subjects—a strategy that serves them remarkably well.

2. Experimental design and procedures

2.1. Experimental design

The main aim of the experimental design was to test the effect of mutual choice of partners in a repeated prisoner's dilemma game of 30 rounds. We used a 2×2 between-subjects design, varying whether matching was random or based on mutual choice and whether chat room communication was allowed or not. In each experimental session, subjects were randomly assigned to one of two groups of eight subjects. This group remained fixed during the entire experiment. The subjects also randomly received a fixed identity number between 1 and 8.

The reason why we needed ID recognition in all treatments, including the baseline treatment with random matching, was to avoid confounding effects. If we had removed the ID recognition feature from the baseline, our baseline would have been more similar to standard ones used in the literature (see e.g., Andreoni, 1988; Andreoni and Miller, 1993). However, comparing this to partner choice would pick up the effect of ID recognition itself, which both theoretically (Kandori, 1992) and empirically (e.g., Huck et al., 2012) has been shown to affect cooperative behavior. To allow for a clean comparison, we therefore also allowed for ID recognition in the baseline condition.

We informed the subjects about the structure of the game, and before entering the game, they answered several control questions in order to ensure that they understood the payoff structure. The experiment did not proceed until all individuals had successfully answered the control questions.³ The experiment was computerized using z-Tree (Fischbacher, 2007).⁴ Table 1 displays the different treatments employed, along with the number of subjects in each condition.

In the Choice condition, each participant could choose her preferred partner. This was done by entering a number between 1 and 8 in a field on the screen. The default choice was the subject's own identity number. Each participant had only one choice every round, and choices were made simultaneously. In order to match with the preferred partner for certain, both subjects needed to choose each other as partners. Subjects not matched by mutual consent were randomly matched with either other “unsuccessful” subjects or with subjects choosing their own identity number. Prior to entering the contribution stage, subjects were informed whether their preferred partner had chosen them or not and were informed about the identity number of their assigned partner. In the instructions, we chose the neutral term “person” instead of “partner” to avoid framing effects. The partner choice stage lasted for 10 s.

After being assigned a partner, the subjects entered the contribution stage. The stage game is a continuous-strategy prisoner's dilemma (i.e., two-player public good game). In each round, each subject received an endowment of 20 private goods and chose how much of the endowment to use in production of a public good shared with her assigned partner. The default choice was set to zero contribution, so that the subjects needed to actively engage in production of the public good. In the instructions, we used the neutral terms “blue item” for the private good and “red item” for the public good. The instructions were explained the stage game payoff structure as follows:

¹ See Sen (1985), Tullock (1985, 1999), Vanberg and Congleton (1992), Orbell and Dawes (1993), Buchanan (1994), Ghosh and Ray (1996), McNamara et al. (2008), Izquierdo et al. (2014).

² Communication may affect cooperation through shaping group identity and committing participants to cooperate (Balliet, 2009; Bochet et al. 2006; Isaac and Walker, 1988; Orbell et al. 1988; Kerr and Kaufman-Gilliland, 1994; Sally, 1995, McCloskey and Klammer, 1995). A game theoretic perspective is that communication influences cooperation, as it may affect players' beliefs about other players' actions (Rabin, 1993, 1998).

³ Experimental instructions and control questions are provided in Appendices B and C.

⁴ The program is available upon request.

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