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Cooperation through communication: Teams and individuals in finitely repeated Prisoners' dilemma games

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ABSTRACT

For both two person teams and individuals unrestricted communication between opponents in a finitely repeated prisoner dilemma game results in stage-one cooperation rates of between 95–100%. Content analysis of between opponent communication focuses on the increased earnings cooperation can achieve, with minimal discussion of punishment for failing to cooperate. Restoring cooperation after an early stage-game defection typically requires compensating the aggrieved agent.

1. Introduction

Results are reported for an experiment investigating behavior in a finitely repeated prisoners' dilemma game (FRPD) where opponents can talk to each other between stage-games, but cannot make binding agreements (cheap talk).[1] Communication of this sort is a central element underlying cooperation in a variety of repeated games outside the laboratory: It is a common element to collusive arrangements within cartels (e.g., Genosove and Mullin, 2001), collaboration with colleagues, and coordination games, to name but a few. Laboratory studies of the role of communication between agents in conflict situations has been drawing increased attention lately (Fonseca and Norman, 2012; Cooper and Kühn, 2014; Arechar et al., 2017).

We study the effect of cheap talk for both teams and individuals as many economic decisions are made in teams. As such it is important to extend laboratory studies of economic behavior to teams, in order to identify what if any differences there are compared to individuals. In addition, analysis of within team discussions provides an opportunity to understand what motivates team behavior. Further, to the extent that between opponent communications are similar between teams and individuals, provides some assurance that the motivation underlying team behavior extends to individuals.

Focusing on cooperation rates in the first stage-game of a sequence of FRPD games, there are large and consistent increases in cooperation rates compared to the absence of communication for both individuals and teams: Average cooperation rates across super-games of 92.9% with communication compared to 62.2% without for teams, and 97.9% with communication

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[1] Cheap talk refers to the fact that there are no formal mechanisms in place to enforce agreements between opponents.

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	A	B
A	105 105	5 175
B	175 5	75 75

Fig. 1. Stage Game Payoffs (in ECUs).

compared to 57.4% for individuals. This change in cooperation rates with and without communication is at the upper end of those reported for social dilemma games (Balliet, 2010).[2] For both teams and individuals, between agent discussions prior to each stage-game focus on the increased earnings from cooperation, with fairness coming in second, and punishment for failure to cooperate coming in a distant third. Restoration of cooperation following breakdowns in early stage-game cooperation are almost always associated with explicit compensation for the agent earning the sucker payoff. For both teams and individuals, unilateral defections over the last several stage-games are most often met with no comment, or mild upset, consistent with the notion that end game defections were, in most cases, anticipated.

The remainder of the paper is organized as follows: Section 2 reports results from prior research on the impact of cooperation in social dilemma games. Section 3 describes the experimental design and procedures. Section 4 briefly discusses what might be anticipated as a result of communication for both individuals and teams. The experimental results. are reported in Section 5 Section 6 briefly contrasts the results reported here with prisoner dilemma games with cheap talk reported in the psychology literature, as this is one of the few (and perhaps the only) place where the effects of communication on cooperation rats in social dilemmas has been investigated in any detail. Section 7 summarizes the main results along with some of their implications.

2. Prior experimental research on the effects of communication on cooperation rates

Balliet (2010) conducted a meta-analysis of some 45 social dilemma games looking at the effects of communication on cooperation rates. The studies under consideration consisted of step level public good games, resources dilemmas (including voluntary contribution public good games) and prisoner dilemma (PD) games. He includes one-shot and iterated dilemma games. It seems clear that he did not include any experiments were the decision makers consisted of teams .[3]

The focus is on the mediating effect of type of communication (face-to-face versus computer or written communication), pre-game versus continuous communication, and the number of individuals involved. Broadly his results can be summarized as follows: There is a large positive effect of communication on cooperation (Cohen's d = 1.01), with the effect of face-to-face communication significantly greater than computer or written messages (d = 1.21 versus d = 0.46). There are no significant effects of discussion before versus during the dilemma for iterated games.[4] Group size had a marginally significant, positive effect (p = .06).[5]

3. Experimental design and procedures

Procedures are first described for the cheap talk sessions. They were essentially the same for games without cheap talk, with the differences described briefly at the end of this section.

The team treatment consisted of two-person teams, with subjects randomly matched with a partner at the beginning of an experimental session, and partners remaining the same throughout the session. Teams played against teams, and individuals played against individuals. In what follows we will use the term agent to refer to either a two person team or an individual. Following each FRPD game, agents were randomly re-matched under the restriction that no two agents would be re-matched in consecutive super-games. All teams played in seven FRPD super-games which were about all we could squeeze in a two hour session. All individuals played in ten FRPD games. Agents in both treatments were told they would play between 5 and 10 super-games.

Agents played a ten stage, simultaneous move, FRPD with stage-game payoffs reported in Fig. 1. Payoffs were denominated in experimental currency units (ECUs) which were converted into dollars at the rate of $1 = 250 ECUs. Payoffs were computed over all plays of all super-games and paid in cash at the end of an experimental session along with a $6.00 participation fee. Each member of a team received his team's total earnings.

For teams, each stage-game began with a brief period of within team discussions, followed by a period for between team discussions, with both team members able to communicate with their common opponent. This was followed by a brief

[2] Balliet is the latest survey I could find.

[3] The PD games comparing groups with individuals reported in the psychology literature, discussed in Section 5 were all conducted prior to 2010 and are not included.

[4] p =. 17 including all studies, p =. 63 when excluding two outliers with d values of 8.37 and 12.09.

[5] p = 0.05 when including the two outliers.