



# Evaluating the role of personality trait information in social dilemmas



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## ABSTRACT

We investigate whether cooperative behavior in social dilemmas is conditional on information about a partner's personality traits. Using a repeated one-shot continuous strategy Prisoner's Dilemma (two person Public Goods game), we test how information on personality traits of partners influences cooperative actions. Before each game we provide subjects with the rank-order of their partner (relative to all subjects in the session) on one of the personality traits of the Big Five Inventory. Using a within-subjects design we find that subjects are more cooperative when informed that their partner is more 'Agreeable' or 'Open to Experience'. The primary reason for more cooperative behavior is the expectation that partners will give more to the public good.

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## 1. Introduction

Cooperation is a key component of many economic situations, for example the co-management of common pool resources, treaty negotiations, or building teams. Cooperation creates opportunities to improve economic outcomes and/or increase efficiency through collective action, like in the prisoner's dilemma. The institutions that influence individual cooperative actions are important, such as rules or social norms, and so are the motivations, preferences, and cognitive processes that govern cooperative decisions. We know that cooperation can be conditional on previous play in repeated games via reciprocity and trust (e.g. Fehr and Gächter 2000, Cox 2004, Berg et al., 1995, Nowak and Sigmund 2005) or even through social comparisons (Frey and Meier 2004). In addition to induced cooperation it is known that some individuals have pro-social preferences in social dilemmas, known sometimes as Social Value Orientation (Balliet et al., 2009). Most of the economic research done on non-cooperative games focuses on how past play interacts with institutions to govern behavior. While these aspects of cooperation are well established there is less research on how the perceptions of partners and their traits shape cooperative strategies

and pro-social behavior. Information about partner's behavior and traits may both play a role in how cooperation evolves in social dilemmas.

In many real life situations detailed and accurate information on past actions may be difficult to come by without a formal mechanism to enforce accurate reporting. Consider many common pool resources, such as fisheries or aquifers, that depend on management structures that report and audit behavior. Some other forms of information may be more readily available through social interactions, which we call social information. Social information about others (e.g., gender, intelligence, or personality) is likely to be available or impressions of these information sets can be formed from social interactions. Perceptions of social information may be used to condition behavior or form expectations about other's behavior. For instance, when new teams form to accomplish a common task, each individual has an incentive to free ride on other team members in completing the task if individual contributions are hidden. This is a common problem that most college students face when assigned group work for a class where there are incentives to free ride on other group members.<sup>1</sup> Each team member must decide how much effort to put toward the

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<sup>1</sup> Though there are mechanisms to overcome this situation, such as evaluations of each student by their peers.

team objective and may have limited experience or knowledge of other team members. Therefore, individuals are left with little past play information to base inferences on and may use social information of their new team members to form expectations of behavior. Even in repeated play situations, if information is incomplete, then information of player types could be influential to the expectations about other's play. This could be particularly important when groups adopt new rules or regulations as play under the new rules has not been observed even when past behavior is observable. Take for example the initial forming of a coalition of fisherman to undergo joint restrictions on fish harvesting- before all fisherman reduce harvesting effort there is no information on past play under the new restrictions. There are also a host of other situations in which expectations of individual's pro-social preferences are likely to be important such as conflict resolution, negotiations (Hosmanek et al., 2014), international agreements, complex governance agreements (Conca et al., 2006), and research and design work (Mora-Valentin et al., 2004).

The characteristics of other people can play multiple roles in group decisions. Social identification, i.e., the level of kinship with others, can influence trust in partner's behavior since individuals may identify with others based on certain characteristics (Ahmed 2007; De Cremer and Van Vugt 1999). The feeling of kinship with others is also referred to as social distance. Charness and Gneezy (2008) find that providing the names of partners decreases social distance and increases allocations to partners in dictator games. Buchan et al., (2006) find that subjects give more in an investment game to partners of the same country of origin. These examples suggest that social distance may affect other-regarding preferences. Social information like personality traits may also reduce social distance in social dilemmas and influence judgements about whether to cooperate with partners whom subjects identify with based on similar traits.

Forming expectations about player personality may also be an important aspect of the social cognition that underlies the interaction (Frith and Singer 2008; Bodenhausen 2010) – including the formation of beliefs about the player's intentions and the appropriate way to respond in a social situation. Psychological studies have demonstrated how perceptions of others, through facial features or eye gaze, are used to make judgements about personality types (Bayliss and Tipper 2006; Bayliss et al. 2006; Wolffhechel et al. 2014). Research has also connected personality types to the categorization of others to make decisions in social contexts (Macrae and Bodenhausen 2001) though this line of inquiry has not been linked specifically to economic decisions and incentives.

Why might social information be used in conditioning expectations about another person's behavior? Primarily because social information has power in predicting economic behavior and preferences. Studies have established that behavior can vary across important attributes of the population such as personality type (Borghans et al. 2008). The attributes of individuals can affect pro-social preferences: intelligent groups cooperate more than less intelligent groups (Jones 2008), females cooperate more often than males (Molina et al. 2013), and social identity increases cooperation (Chen et al. 2014). Along these lines, Cobb-Clark and Schurer (2012) show that personality traits are stable inputs into economic decisions. Therefore, individuals can demonstrate stable preferences for cooperation. Stable personality traits and cooperative preferences would allow for perceptions of types to become more salient in the real world. Ben-Ner et al. (2004) report that personality measures have predictive power in the dictator game – sharing behavior relates to Agreeableness in both males and females. Team composition and Openness to Experience explain performance in group tasks: greater Openness to Experience of team members improved team performance (LePine 2003). LePine and Van Dyne (2001) also find that Agreeableness explains coopera-

tive behavior in team tasks. Muller and Schwieren (2012) report that personality traits are important in predicting behavior in trust related games, especially in situations where economic incentives are weak. Openness to Experience is also related to increased responses in the reward-sensitive region of the brain when choosing cooperative actions in a social context (Morawetz et al. 2014). Schroeder et al. (2015) find that Extraversion is associated with less free-riding when individuals are subject to the institution of punishment. The authors also report that agreeableness is associated with more giving to the public good, while neuroticism is associated with less giving to the public good. The personality traits of subjects can predict behavior in the prisoner's dilemma game. Boone et al. (1999) finds that internal locus of control, high self-monitoring, and high sensation seeking traits are associated with more cooperative play in the prisoner dilemma games. Al-Ubaydli et al. (2015) find that group's average Openness to Experience predicts first round cooperative behavior in a repeated Prisoner's Dilemma experiment.

A small number of studies explore whether players use social information to condition their strategies in non-cooperative economic games: Schwieren and Sutter (2008) find that men trust female more than male partners in their mathematical ability; and Van Lange and Kuhlman (1994) report that subjects expected high contributions to the public good in partners perceived as honest or less intelligent. Other studies have established that perceptions are important to game play in other ways. Labels such as 'trust', 'cooperate', or 'defect' used in a prisoner's dilemma game to describe strategies induce more cooperation by subjects and increased the perceptions that others would play cooperatively (Zhong et al., 2007). Tinsley et al., (2002) demonstrate that perception of partner's experience in negotiations affected the reputation and ultimately the behavior of subjects. Experience is viewed negatively by novices which reduces the ability of experienced negotiators to capitalize on their real negotiation expertise. These studies establish that the expected value of strategies are not only conditional on past play but on perceptions as well.

The critical question we address is: how does information about personalities of partners change cooperative play and expectations of partners in a non-cooperative economic game? We employ a laboratory experiment and provide subjects with personality information about their partners to investigate this question. Exploring expectations of personality types in a non-cooperative economic game furthers the research on other-regarding preferences and cooperation. Other-regarding preferences are required for cooperation in this game because the Nash Equilibrium of the one-shot prisoner's dilemma is to defect regardless of the partner's strategy. Other-regarding preferences are well established – we test whether other-regarding preferences depend on personality trait information.

In our study, participants answer a 44 question Big Five Personality Inventory that scores subjects in each of the Big Five personality traits. Subjects then play a repeated one-shot public goods game with anonymous partners and are provided with one piece of personality information about their partner. In five separate treatments subjects are provided with the rank-order of their partner on one of the Big Five Personality Traits (Agreeableness, Extraversion, Neuroticism, Conscientiousness, or Openness to Experience). Having completed the inventory at the beginning of the session, subjects are likely to take the ranking information at face value. Subjects receive a short, clear description of the personality trait and how to interpret high versus low rankings (shown in Table 1). Partner identity is kept completely anonymous. Subjects are not given their own ranking or raw scores. The information treatment is the relative position of their partner within the group on a given trait – which prompts a particular perception of the partner. We argue traits are perceived because we provide the rank-order of the

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