

## Empathy, Guilt-Aversion, and Patterns of Reciprocity

Vittorio Pelligra

University of Cagliari, CRENoS, Cagliari, Italy, and UniCa-BERG, Cagliari, Italy

This paper reports the results of an experiment aimed at investigating the link between empathy, anticipated guilt, and pro-social behavior. In particular, we test the hypothesis that empathy modulates the anticipatory effect of guilt in bargaining situations and, more specifically, that it correlates with subjects' willingness to give and to repay trust in an investment game. We also control for the effect of individual risk attitude. Our main results show that empathy significantly influences players' pattern of restitution in the investment game and that risk-propensity weakly affects the decision to trust; we also find a significant gender difference in the distribution of empathy. These results seem to indicate that empathy affects pro-social behavior in a more complex way than previously hypothesized by existing models of social preferences.

*Keywords:* trust, reciprocity, guilt-aversion, empathy

Recent economic research has indicated that individual behavior in economic interactions can be explained, in many cases, by other-regarding preferences. This evidence has led to the development of models of agents with “extended” utility functions that incorporate both material and psychological elements (see, e.g., Fehr & Gächter, 2000; Sobel, 2005, and Fehr & Schmidt, 2006, for recent surveys). Alternative theoretical approaches differ with respect to how those functions are defined. In particular, two main classes of models can be distinguished: models that focus on distributional concerns (Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000), and models that focus on

intention-based motives (Rabin, 1993; Dufwenberg & Kirchsteiger, 2004; Battigalli & Dufwenberg, 2007; Pelligra, 2010).

Both classes of models include a psychological element in the extended utility function that can be interpreted as a *guilt factor* (Krajbich, Adolphs, Tranel, Denburg, & Camerer, 2009; Dufwenberg, 2002). When triggered by inequality or by opportunism, the guilt factor produces a cost whose negative effects agents tend to anticipate and avoid by behaving prosocially. In this interpretation, thus, individual sensitivity to guilt should affect, *ceteris paribus*, the likelihood of prosocial behavior.

Psychologists from different perspectives suggest that the cognitive and affective basis for feeling guilt is the capacity to feel or anticipate the suffering and distress of others, in other words, to empathize with others (Hoffman, 1982, 2000; Baumeister, Stillwell, & Heatherton, 1994; Singer & Fehr, 2005; Tomasello, Carpenter, Call, Behne, & Moll, 2005).

In this paper we report on an experiment designed to investigate the connection between individuals' ability to empathize and their prosocial behavior, supposedly driven by guilt-aversion, in a simple economic game. More precisely, we test the hypothesis that the Empathy Quotient (EQ henceforth), a widely used and well-validated psychometric measure (Baron-Cohen & Wheelwright, 2004; Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004), is correlated with the subjective sensitivity parameter that appears in

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Vittorio Pelligra, Department of Economics, University of Cagliari, CRENoS (Centro Ricerche Economiche Nord Sud), Cagliari, Italy, and UniCa-BERG, Cagliari, Italy.

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Correspondence concerning this article should be addressed to Vittorio Pelligra, Department of Economics, University of Cagliari, V.le S. Ignazio 17, 09123 Cagliari, Italy. E-mail: pelligra@unica.it

models of social preferences, and consequently, with players' tendency to give and to repay trust in an investment-game (IG).

On the trustor's side we find that players' EQ does not affect trust (the amount sent in the IG), which is instead weakly correlated with individual risk-propensity. On the trustee's side, the EQ appears to be strongly associated with different *patterns* of restitution (conditional vs. balanced reciprocity). We also find, in line with the literature on the subject, a significant difference in the empathy distribution across gender.

The paper is organized as follows: the next section briefly discusses the psychological and neuroscientific literature on empathy and anticipated guilt and its associations to the economic models of social preferences. The following section describes the experimental design, the hypotheses and the procedures. Subsequent sections present and discuss the results, and conclude the paper.

## Relevant Literature

### Empathy

Game theory is fundamentally based on the assumption that people are capable of predicting the actions of others. This ability, usually referred to as Theory of Mind, has two distinct components: cognitive (mentalizing) and affective (empathy) (see Singer & Fehr, 2005; Singer, 2009). In our study, we focus mainly on the affective component. If we assume that people's actions are, at least partially, emotionally driven, the ability to anticipate and share emotions and feelings with others—that is, to empathize—represents a crucial factor of this more general process.

Empathy, or emotional perspective-taking, is generally defined as our ability to understand other people's feelings (Preston & de Waal, 2002; Gallese, 2003). A more specific definition is proposed by de Vignemont and Singer (2006). In their view, empathy can be defined by a set of four conditions: we empathize with others when we have (a) an affective state, (b) which is isomorphic to another person's affective state, (c) which was induced by observation or imagination of another person's affective state, and (d) when we know that the other

person's affective state is the source of our own affective state. Condition (a) is particularly important as it helps to differentiate empathy from mentalizing, which denotes, instead, our ability to represent others' mental states without emotional involvement.

Following the perception–action model of motor behavior and imitation, Preston and de Waal (2002) develop a theory of empathy that explains how we can understand what someone else feels when he or she experiences simple emotions such as anger, fear, sadness, joy, or pain, or even more complex ones such as disappointment, shame, or guilt. They suggest that the mere observation or imagination of another person's emotional state automatically triggers a representation of that state in the observer. This theory is supported by recent neuroscientific evidence that shows how the observation or imagination of another person in a given emotional state activates a representation of a similar state in the observer through an unconscious and effortful process (Singer, Kiebel, Winston, Dolan, & Frith, 2004). In a fMRI study, Singer and colleagues find that, as hypothesized, the empathic response is automatic and does not require any form of engagement of judgment about others' feelings. This study also finds a considerable level of heterogeneity across individuals in their ability to empathize.<sup>1</sup>

These individual differences measured by questionnaires have been found to be highly correlated with differences in the activation of the bilateral anterior insula and the rostral anterior cingulate cortex, neural circuitry that is normally activated in the processing of the affective component of pain. The same affective pain circuits that are activated when we feel pain are also active when we observe someone else experiencing pain. That suggests that if another person suffers pain, “our brains also make us suffer from this pain” (Singer & Fehr, 2005, p.342). It is also important to note that

<sup>1</sup> It was already known that higher scores in empathy questionnaires are strongly correlated with differences in prosocial behavior such as volunteering and charitable giving (Davis et al., 1999). In economic experiments, Ben-Ner, Kong, and Putterman (2004) and Ben-Ner and Halldorsson (2010) also find that a measure of “agreeableness” affects giving choices in the dictator game and trustworthiness in the trust game. Gunnthorsdottir, McCabe, and Smith (2002) find that a Machiavellian scale (which is related with individuals' ability in perspective-taking) predicts reciprocity.

empathy is not limited to known or significant others but extends also to unknown or imagined persons (Morrison, Lloyd, di Pellegrino, & Roberts, 2004; Jackson, Meltzoff, & Decety, 2005).

Several studies on the functioning of the mirror-neuron system and its relation to the simulation theory-of-mind have identified in this neural circuitry the physiological correlates of this “mental mimicry” ability (Rizzolati, Fogassi, & Gallese, 2001; Gallese & Goldman, 1998).

In strategic interactions, empathy allows us to anticipate others’ emotional reactions to our perspective choices.

People can anticipate others’ emotional reactions as they consider behavioral alternatives and direct their choices in order to avoid negative feelings or to produce positive ones. Thus, emotions can exert a strong influence on choice, “by providing critical feedback regarding both anticipated behavior (feedback in the form of anticipatory shame, guilt, or pride) and actual behavior (feedback in the form of consequential shame, guilt, or pride)” (Tangney, Stuewig, & Mashek, 2007, p. 347). These considerations are the building blocks of the so-called “negative-state relief model” (Baumann, Cialdini, & Kendrick, 1981) that posits that people tend to perform actions that are believed to increase positive affect, while reducing any unpleasant emotional state and distress such as feelings of guilt. In this perspective, guilt, and especially “anticipated guilt”, is thought to mediate the prosocial effects of empathy (Leith & Baumeister, 1998; Hoffman, 2000).

### Anticipated Guilt

As an emotional state arising from the consequences of a certain action, guilt has been extensively studied; however, anticipated guilt remains a relatively obscure concept. Some evidence is available in the context of health behavior that shows how people’s choice to avoid a risky conduct is related to their assessment of how guilty they would feel if they performed that action (Birkimer, Johnston, & Berry, 1993). In a different context, O’Keefe (2002) finds evidence along the same line, showing that people tend to avoid actions they anticipate will make them feel guilty. Lindsey (2005) collects further evidence that shows that, when induced

to anticipate feelings of guilt, people are more likely to comply with a certain prescription, precisely to avoid the guilt that would result from noncompliance.

This evidence lends support to the *negative-state relief model*, and helps clarify its structure, which appears to be ultimately based on two basic elements: first, anticipated guilt, which is induced by a counterfactual reasoning about the negative consequences that our potential action or inaction may produce to others, and it is mediated by empathy. Second, a common tendency to avoid such guilt feelings. Thus empathy leads to anticipatory guilt, and guilt-aversion, in turn, leads to prosocial behavior. In this framework, the ultimate basis for experiencing anticipatory guilt is constituted by the ability to empathize with others; that is, the ability to feel, share, and anticipate the potentially negative emotions that our actions may produce in others.

In the context of an economic interaction, this ability is useful both from a self-interested point of view and in motivating other-regarding behavior. Empathy enables us to predict and to take into account others’ emotional responses to our perspective actions. This way, a self-interested agent can be able to best reply to the expected reaction of the other agents in order to maximize her material payoff. On the other hand, the ability to empathize may also promote other-regarding behavior by inhibiting courses of action that may induce negative emotional states in others and consequent feelings of guilt in the agent.

### Guilt in Social Preferences Models

According to many psychologists, the ability to empathize enables people to predict others’ emotional responses and, to some extent, their emotionally driven choices. This fact is particularly relevant for the game-theoretical modeling of social preferences. In the distributional approach, agents are supposed to have a taste for fairness in the distribution of material payoffs. They are motivated not only by their own material gains, but also by how their payoff compares with that of the other agents. Inequality-aversion models posit that subjects experience a psychological cost if their joint actions determine an outcome associated with unequal payoff distributions. If player *i* gets more than

player  $j$ , the difference between the two payoffs, weighted by a subjective sensitivity parameter, represents a psychological cost for  $i$ , that reduces her overall utility.

More specifically, Fehr and Schmidt (1999) assume that the utility of a subject depends on the difference between her own payoff and those of the other subjects, so that agents have egalitarian preferences. Bolton and Ockenfels (2000) assume, instead, that the utility function of a subject depends on her own payoff relative to the average overall payoff, so that agents care about their own relative status. In these models, fairness-related preferences depend only on the final distribution of payoffs.

The intention-based approach, on the other hand, models other-regarding preferences by incorporating the role of players' perceived intentions in the form of *reciprocity* (Rabin, 1993; Dufwenberg & Kirchsteiger, 2004) or *fulfilling expectations* (Battigalli & Dufwenberg, 2007; Pelligra, 2010). Reciprocity theories are built upon the idea of reciprocating kindness; namely, the willingness to repay a kind action and punish an unkind one, even at some cost. Theories of fulfilling expectations describe the tendency to fulfill others' manifest expectations in order to avoid the feeling of guilt arising from consciously letting others down.

In the guilt-aversion model, if  $i$  betrays  $j$ 's expectations, she experiences a psychological cost that is proportional, given a subjective sensitivity parameter, to  $i$ 's conjecture about  $j$ 's disappointment ( $i$ 's second-order expectations). Thus, a utility maximizing strategy involves, in both models, an attempt to avoid guilt.

Both models incorporate in their utility functions a subjective parameter aimed at describing individual differences in the sensitivity to guilt feelings. The above discussion about the negative-state relief model and the role played by guilt-aversion and empathy in the theoretical models, leads us to Singer and Fehr's (2005) claim, according to which: "The hypothesis that empathy enhances other-regarding behavior in combination with the existence of individual differences in empathy suggests that people who exhibit more affective concern are more likely to display altruistic behaviors" (p. 343).

The empirical value of this claim is what we intend to test with our experiment. More precisely, we investigate whether empathy is cor-

related with trust and reciprocity and in which sense we can say that "empathy enhances other-regarding behavior."

## The Experiment

### Experimental Design and Hypotheses

To assess the effect of empathy on other-regarding behavior, we first measure subjects' disposition to empathize using the EQ (Baron-Cohen & Wheelwright, 2004), a widely used and well-validated psychometric test.<sup>2</sup>

The EQ questionnaire was designed to be short, easy to use, and easy to score. It comprises (in its short form) 40 questions and three subscales focused on the emotional, cognitive, and social dimensions. Responses are given on a 4-point scale ranging from *strongly agree* to *strongly disagree*. The total sum of points represents the individual's EQ.

We also measure subjects' attitude toward risk with the Holt-Laury algorithm (Holt & Laury, 2002). In this procedure, a subject is presented with a series of 15 choices between a lottery that pays either 200 euros or zero with equal probability and an increasing amount (ranging from 50 to 120 euros in the fifteenth choice) paid for sure. The lottery at which the subject switches her choice from the risky alternative to the guaranteed amount is considered an individual index of subject's risk-

<sup>2</sup> There are several psychometric instruments used to measure empathy. One of the most widely used in the psychological literature is the Interpersonal Reactivity Index (IRI) (Davis, 1983). The IRI questionnaire is formed by four 7-item subscales focused on "empathic concern," "perspective-taking," "fantasy," and "personal distress." Critics, however, argue that the IRI may measure processes broader than empathy. In particular the fantasy and the personal distress subscales may assess imagination or emotional self-control, and: "although these factors may be correlated with empathy, it is clear that they are not empathy itself" (Baron-Cohen and Wheelwright, 2004, p. 166). We preferred to use the EQ precisely to overcome those drawbacks. Validation studies (Lawrence et al., 2004) found a good association between the EQ and IRI's "empathic concern" and "perspective-taking" subscales, suggesting concurrent validity. The EQ was also shown to have high test-retest reliability over a period of 12 months. Furthermore, comparing self-reported and brain imaging data, Lamm et al. (2007) found a correlation between the EQ and the activation of brain areas (right putamen, the left posterior/middle insula, the anterior medial cingulate cortex, and the left cerebellum) traditionally regarded to be central for empathy.

propensity that can be easily mapped into the traditional Arrow-Pratt measure of relative risk-aversion.<sup>3</sup>

We then observe subjects' choices in a one-shot version of the Investment Game (IG) (Berg, Dickhaut, & McCabe, 1995). In the IG, a proposer has to decide how much, if any, of his initial endowment he should send to the receiver. Any positive amount is tripled by the experimenter and passed to the receiver, who in turn has to decide how much of the tripled amount to send back to the proposer. The amount sent by the proposer and the restitution by the receivers are usually interpreted as measures of trust and trustworthiness, respectively.

In the subgame perfect Nash equilibrium of the game, both the proposer and the receiver send nothing to the other.

However, deviations from equilibrium behavior are commonly observed in experimental studies (see Camerer, 2003 for a general review). These "anomalies" can be explained in terms of both distributional concerns and/or guilt-aversion. As we said, both explanations incorporate the effect of guilt: feelings of guilt for determining an unfair distribution in the inequality aversion-type of explanation and guilt from betraying others' expectations in the guilt-aversion models.

Our general hypotheses refer to the correlation between the amount sent and the payback and individuals' EQs. More specifically we want to test whether:

Hypothesis 1: the amount sent is positively related to the EQ;

Hypothesis 2: the reciprocal behavior (measured as the correlation between the amount received and the amount returned) is positively affected by the EQ.

## Procedures

Data refers to a total of 106 subjects (53 males and 53 females) recruited via posters and e-mails, among Economics, Law and Politics students at University of Cagliari, where the experiment was conducted during six sessions from 24 to 28 May, 2010. Subjects were randomly assigned upon arrival to one of two large rooms, one for the A players and one for the B players. Then each subject received an ID card with a random number and a booklet containing

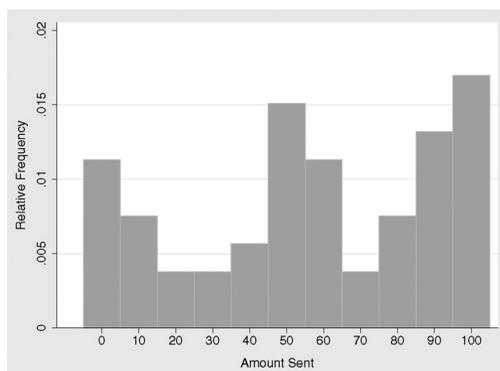


Figure 1. Amount sent in the IG (Players A).

the instructions, the Holt-Laury task, the IG, and the EQ questionnaire. They were invited to write the ID number in the booklet and to keep the card. Instructions were read aloud and questions about the procedure and the payment rules were answered privately. After a series of illustrative examples, the choice task began. After completing the Holt-Laury procedure, each subject selected his or her preferred strategy in the game, receiving no feedback about other players' choice until the end of the session. We adopted the strategy method (Selten, 1967) to elicit B players' strategy profile for the game. In the end, each subject completed the EQ questionnaire.

We rewarded participants using the two-stage random-lottery incentive system, which is increasingly used when the experimental design presents particular features (Fong & Luttmer, 2009; Loewen, 2010; Pelligra & Stanca, 2010). We adopted this system to be able to present large payoffs and especially to implement the Holt-Laury procedure that involves the choice among lotteries whose prices vary from 0 to 200 euros, in a realistic way. At the end of the last session, all players' ID were randomly paired, one pair was randomly selected and one task, among the game and the Holt-Laury procedure, was randomly picked and paid according to the choices made by the selected players. Money

<sup>3</sup> If a subject prefers the lottery (200, 0.5; 0, 0.5) to the sure amount ( $x$ , 1) up to lottery 7 and then she switches to the sure amount, that subject's risk-propensity will be equal to 7.

Table 1  
Summary Statistics (Players A)

Empathy	Mean (All)	(M)	(F)
Sent	56.792 (34.124)	62.692 (29.096)	51.111 (38.062)
Empathy	44.735 (9.499)	40.807 (7.271)	48.518 (9.966)
Risk	7.340 (3.700)	7.438 (3.794)	7.246 (3.676)
N	53	26	27

Note. Standard errors reported in brackets.

was placed in two envelopes with the ID numbers of the corresponding players and the sealed envelopes were distributed to the subjects by members of the administrative staff to preserve the double-blind design. Player A won 110 euros and player B 490 euros. The sessions lasted approximately 90 minutes. No additional show-up fee was paid.

## Results

The data collected consist of the amount that players A sent to players B in the IG; the amount that players B sent back for each sum hypothetically received; risk-propensity and EQs for both players A and B.

It is important to note that the design we used in this paper does not allow us to test causal links between variables. The results, therefore, do not yield causal, but rather correlational evidence. Summarizing this evidence, we can say that risk-propensity appears to be (weakly) positively correlated with proposers' choices in the IG; empathy does not correlate with the amount sent back but, instead, it strongly affects the pattern of reciprocal responses. There is also a strong gender effect in the EQ distribution.

We first present the results for players A, then for players B.

Figure 1 shows the distribution of the sums sent to Bs in the IG. Only six subjects sent zero, while nine sent the entire endowment of 100 euros. The average amount sent was 56.79 euros. A Wilcoxon's Mann-Whitney rank sum test confirms no significant difference across gender in the amount sent ( $Z = 0.932$ ,  $p = .351$ , two-tailed test).

The average EQ of players A is equal to 44.73, with a significant gender difference (40.80 for males and 48.51 for females;  $Z = -2.885$ ,  $p = .003$ , Wilcoxon's Mann-Whitney

rank sum test, two-tailed test). Their average level of risk-propensity is 7.34 (see Table 1 for As' summary statistics).

Figure 2 plots the correlation between the amount sent in the IG and the EQ. We estimated a simple OLS model (see Table 2) that shows that individual risk-propensity as measured by the Holt-Laury procedure is the only variable to affect positively and in a significant way the amount sent in the IG; however, it is likely that this result is driven by two outliers that show extreme levels of risk-propensity.

We now analyze data for B players. The average EQ is equal to 44.18 with, again, a significant gender difference (41.84 for males and 46.28 for females;  $Z = -2.034$ ,  $p = .004$ , Wilcoxon's Mann-Whitney rank sum test, two-tailed test). The average level of risk-propensity is 6.32 (Table 3 for Bs' summary statistics).

Bs' behavior in the IG is depicted in Figures 3. As a measure of reciprocity, we are able to compute for each subject the Spearman correlation coefficient between each hypothetical offer and the conditional amount sent back (see Figures 4). Only 5 out of 53 subjects sent back

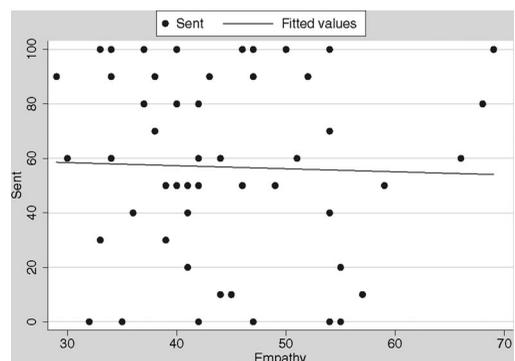


Figure 2. Empathy and amount sent (Players A).

Table 2  
*Determinants of Trust (Players A)*

Constant	(1)	(2)	(3)	(4)
Empathy	-0.111 (0.502)	-0.068 (0.482)	-0.137 (0.505)	0.151 (0.558)
Risk		2.874** (1.239)	2.893** (1.246)	2.8690** (1.244)
Age			-0.634 (1.260)	-0.399 (1.270)
Gender				-12.133 (10.108)
Constant	61.796 (22.944)	38.740 (24.194)	1302.623 (2509.194)	827.035 (2529.220)
R <sup>2</sup> adj.	-0.018	0.061	0.047	0.056
N	53	53	53	53

*Note.* OLS estimates, dependent variable: Amount sent (IG). Standard errors reported in brackets. “Risk” indicates the switch from the risky lottery to the certain option (0 = *strongly risk-averse*, 15 = *strongly risk-loving*).

\*  $p < .1$ . \*\*  $p < .05$ . \*\*\*  $p < .01$ .

nothing, independently of the amount received. The others show a positive relationship between the amount sent and the amount returned, the average Spearman correlation coefficient is equal to 0.794.

We estimate the effect of empathy and other individual variables on the amount returned in the IG using a series of OLS regressions (Tables 4). The results show no significant effects.

However, if we consider the ratio between the amount returned and that received (see Figure 4), we can easily distinguish two different patterns of restitution: one described by a norm of *conditional reciprocity*, and a second one that follows a norm of *balanced reciprocity*. Following a classification system introduced first by Fischbacher, Gächter, and Fehr (2001), we formally denote a trustee as *conditional reciprocator* if the Spearman correlation coefficient between the returned proportion and the amount received is significantly greater than zero ( $\rho > 0$ , with  $p < .001$ ). On the other hand, a *balanced reciprocator* complies to a norm according to which the relative payback does not vary systematically with trust (see Camerer & Fehr, 2004; Greig & Bohnet, 2008). Following these definitions we isolate 18 conditional<sup>4</sup> and 35 balanced reciprocators.<sup>5</sup>

A Wilcoxon’s Mann-Whitney rank sum test shows that the distribution of empathy among the conditional reciprocators (avg. 49.88, median 49) is significantly different ( $Z = -3.065$ ,  $p = .002$ ) from that associated with balanced reciprocators (avg. 42.97, median 42)<sup>6</sup>. Furthermore, we use a series of logit estimations to test for the effect of empathy on the likelihood to comply with a norm or another and find a significant effect (see Table

5). These results seem to suggest that subjects with higher EQs tend to behave as conditional reciprocators, while subjects with lower EQs have a propensity toward balanced reciprocity (see Figure 5).

To summarize, our main results are two: trust in the IG appears to be weakly correlated with risk propensity. This first point seems to contradict the findings reported by Houser, Schunk, and Winter (2010), who observe that risk attitudes do not predict individual decisions in the investment game. However, our result is probably driven by two outliers with extreme risk-propensity values; our second and more important result refers to the fact that empathy affects trustworthiness in a more complicated way than we (and the formal models) initially hypothesized. Indeed, the EQ seems to be uncorrelated with the level of reciprocal behavior as measured by the Spearman coefficients, but it strongly affects the *patterns* of restitution (conditional vs. balanced reciprocity) as measured by the ratio of amount received/payback. Our data seem to suggest that subjects with high EQ are more likely to be conditional reciprocators, whereas those with lower EQ tend to behave more frequently as balanced reciprocators.

<sup>4</sup> Subjects no. 1, 9, 11,12, 26, 30, 31, 37, 38, 39, 41, 45, 47, 48, 49, 50, 52, 53.

<sup>5</sup> Subjects no. 2, 3, 4, 5, 6, 7, 8, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 28, 29, 32, 33, 34, 35, 36, 40, 42, 43, 44, 46, 51.

<sup>6</sup> The  $t$  test between the two groups provides virtually the same result ( $t = -3.415$ , 51 d.f.,  $p = .001$ ).

Table 3  
Summary Statistics (Players B)

Variable	Mean (All)	(M)	(F)
Empathy	44.188 (7.475)	41.840 (7.498)	46.285 (6.927)
Risk	6.327 (3.417)	6.127 (3.446)	6.504 (3.445)
N	53	27	26

Note. Standard errors reported in brackets.

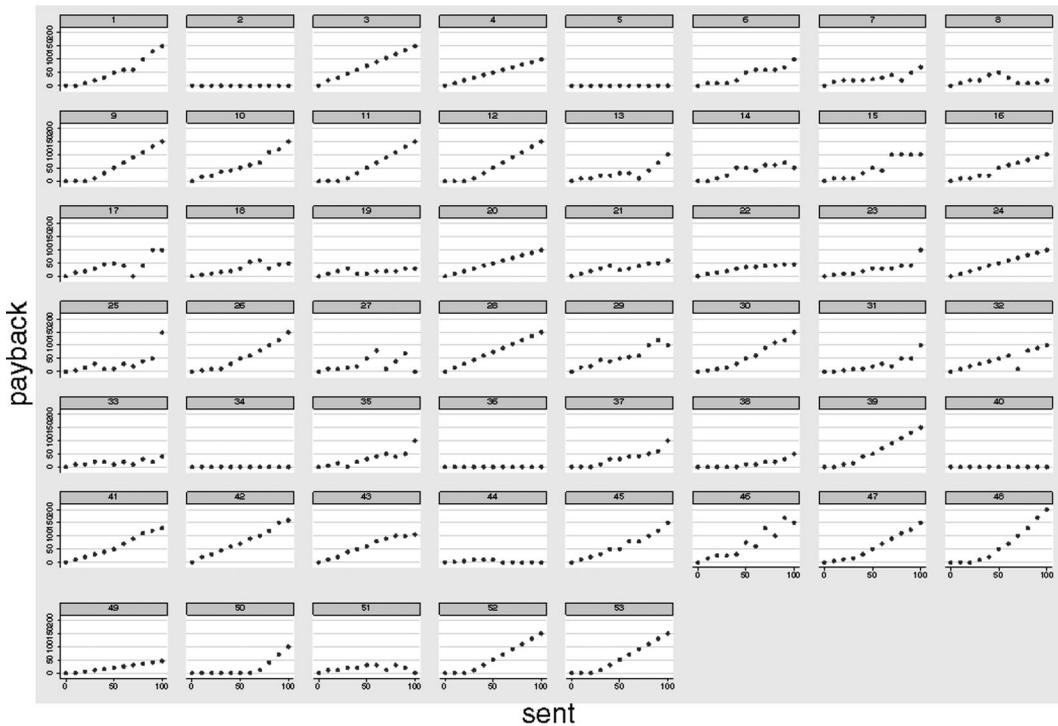
In the following section we discuss the meanings of these two models of reciprocity and the potential implications of our results.

### Discussion

This paper presents both negative and positive results. The negative results are those indicating the lack of direct effect of empathy on trust and trustworthiness. They can be interpreted in at least three ways. First, the EQ Questionnaire that we used is not a good measure for individual empathy. However, we tend to dismiss this interpretation, as the

distributions we observe are very similar to many others found in the literature, especially with respect to gender differences. Second, the EQ is not a good proxy of individuals' sensitivity to guilt; in other words, we succeeded in measuring empathy, which, however, is unrelated with guilt-aversion that ultimately triggers subjects' choices. Third, guilt-sensitivity, although related with empathy, does not directly affect trust and trustworthiness in the IG.

This latter view, which is in line with other psychological evidence (see Lindsey, Ah Yun, & Hill, 2007), would have strong implications



Graphs by id

Figure 3. Amount sent and payback (Players B).

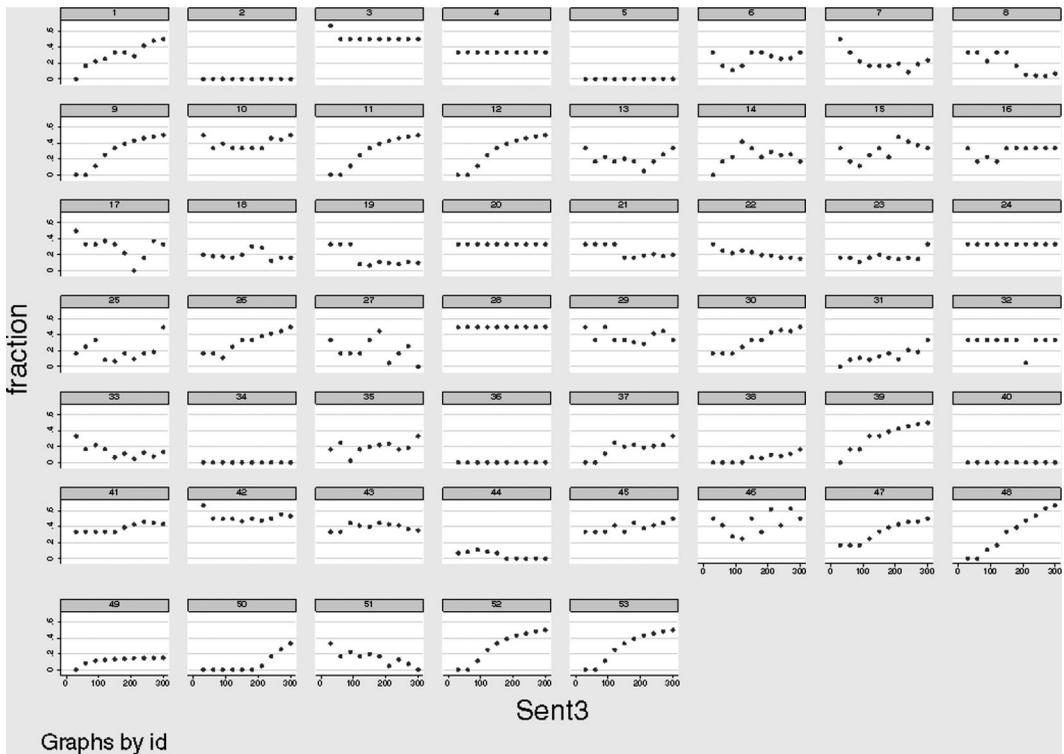


Figure 4. Amount sent and fraction returned (Players B).

for economic modeling, being at odds with the psychological foundations and the usual interpretation (the negative-state relief model) of both Fehr-Schmidt and Battigalli-Dufwenberg theories.

On the positive side, our results suggest that the decision to trust is weakly affected by a subjective assessment of the risk implied by

that choice. Risk-loving subjects are, in fact, slightly more likely to trust than risk-averse ones. Furthermore, the absence of direct correlation between empathy and prosocial behavior in the IG, if corroborated by further research, could suggest that the decisions to repay trust are driven more by compliance to an unconditional categorical norm than by a

Table 4  
Determinants of Trustworthiness (Players B)

Variable	(1)	(2)	(3)	(4)
Empathy	0.009 (0.008)	0.008 (0.008)	0.013 (0.009)	0.016 (0.009)
Risk		0.028 (0.017)	0.028 (0.017)	0.029 (0.017)
Age			0.028 (0.019)	0.032 (0.020)
Gender				-0.107 (0.129)
Constant	0.110 (0.373)	-0.004 (0.374)	-56.609 (39.468)	-64.016 (39.540)
R <sup>2</sup> adj.	0.006	0.034	0.054	0.135
N	53	53	53	53

Note. OLS estimates, dependent variable: Spearman Correlation Coefficient (IG). Standard errors reported in brackets. “Risk” indicates the switch from the risky lottery to the certain option (0 = strongly risk-averse, 15 = strongly risk-loving).

\*  $p < .1$ . \*\*  $p < .05$ . \*\*\*  $p < .01$ .

Table 5  
*Empathy and Patterns of Reciprocity (Players B)*

Variable	(1)	(2)
Empathy	0.148*** (0.051)	0.147*** (0.051)
Risk		-0.082 (0.093)
Constant	-7.565*** (2.458)	-7.049*** (2.522)
Pseudo- $R^2$	0.161	0.173
$N$	53	53

*Note.* Logit estimations. Dependent variable: Pattern of reciprocity (Balanced vs Conditional). Standard errors reported in brackets. "Risk" indicates the switch from the risky lottery to the certain option (0 = *strongly risk-averse*, 15 = *strongly risk-loving*).

\*  $p < .1$ . \*\*  $p < .05$ . \*\*\*  $p < .01$ .

reasoning aimed at maximizing the net effect of material and psychological costs and benefits. In other words, in similar situations subjects obey, in different degrees, to a categorical imperative of the form, "if someone trusts me, I should not let her down." In particular, our data seem to show that higher levels of empathy supplement this norm-compliant behavior, by leading subjects to switch from a balanced form of reciprocity to a conditional one.

Conditional reciprocity, according to which greater trust is rewarded with proportionally larger returns, is what is usually found in experiments with students in developed countries (see Greig & Bonhet, 2008). Balanced reciprocity, on the other hand, is a form of "no-loss" norm that induces the trustee to maximize her material gain while refraining from making the trustor worse off with respect to the status quo. This norm has been extensively observed in

reciprocal-exchange economies from less developed countries (e.g., Platteau, 1997; Thomas & Worrall, 2002) where contracts are informally enforced by norms that obligate future quid pro quo (balanced) repayment of loans and gifts.

The IG that we considered in our experiment has an intrinsic element of superadditivity that leads a positive investment to generate social surplus. This game represents a typical exchange situation where trust and trustworthiness produce gains from trade. A conditional reciprocator shares with the trustee part of the surplus generated in the interaction, providing in this way a good reason to invest a positive amount of her endowment. Conditional reciprocity tends for this reason to promote a trusting attitude toward exchanges.

In the balanced reciprocity norm, instead, the entire surplus, or even more, is retained by the trustee. The problem with this pattern of behavior is that a mere "no-loss rule" may not be sufficient to induce the trustor to invest a positive amount of her endowment, and because of this, the potential gains of a successful trusting interaction may be lost.

One may speculate that, if corroborated by further researches, our results could link empathy, the ability to anticipate and share others' emotional states, to the social capital literature. The prevalence of one norm or the other, in fact, may affect a community's ability to extract gains from trade. Only highly empathic subjects that are willing to reciprocate in a conditional way are able to induce trust and contribute to lay the ground for the social benefits associated to high-trust communities; notably, the presence of large orga-

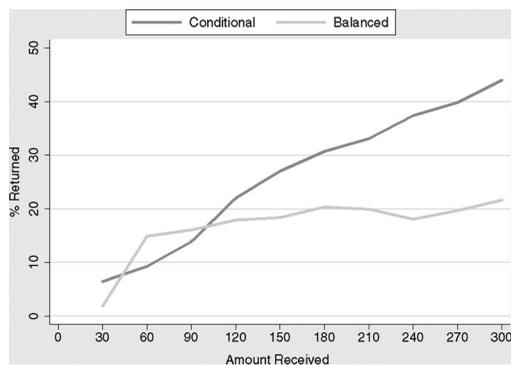


Figure 5. Average fraction returned by conditional and balanced reciprocators (Players B).

nizations (La Porta, Lopes de Silanes, Shleifer, & Vishny, 1997), a sustained rate of growth (Knack & Keefer, 1997), a higher degree of financial development (Guiso, Sapienza, & Zingales, 2004), and better quality law enforcement (Zak & Knack, 2001).

We think that all these possibilities are worthy of further research and deeper exploration.

### Conclusions

In this paper, we report on an experiment designed to test the effect of individuals' empathy on prosocial behavior. Anticipatory guilt is an emotional state that leads subjects to avoid the psychological cost associated to any feelings of guilt that they may experience when their choice causes harm to other subjects. According to many psychologists and some behavioral economists, this emotion is mediated by empathy, the ability to share others' emotional states. It follows that subjects with higher EQ should be more sensitive to guilt and therefore, more willing to behave prosocially.

We observe players' behavior in an investment game (IG) and measure their EQ. We find that players' EQ does not affect subjects' level of trust, but is correlated with different patterns of restitution (conditional vs. balanced reciprocity). We also find, in line with the literature on the subject, a significant difference in the empathy distribution across gender, and, contrary to other studies (Eckel & Wilson, 2004; Houser, Schunk, & Winter, 2010), a weak correlation between risk propensity and the amount sent in the IG.

These results seem to indicate that empathy affects prosocial behavior in a more complex way than previously hypothesized by existing models of social preferences.

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