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## Survey and behavioral measurements of interpersonal trust

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## ABSTRACT

Although many studies treat trust as a situational construct, individual differences can be used to study and predict trusting behavior. We report two studies, the first showing the psychometric properties of a new trust inventory (the Propensity to Trust Survey or PTS), the second study validating this inventory using the standard economic task, the Investment Game. The first study utilized online survey data ( $N > 8000$ ) to show that the PTS scales were reliable and measured broad constructs related to Big Five personality domains. Trust was related to extraversion and negative neuroticism, and trustworthiness was related to agreeableness and conscientiousness. The second study ( $N = 90$ ) validated the PTS trust scale as a predictor of behavior in the Investment Game. These findings are evidence that trust and trustworthiness are compound personality traits, and that PTS scales are preferable to general Big Five measures for predicting trusting behavior.

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## 1. Introduction

The empirical study of trust is a cornerstone of current work in the field of behavioral economics (Camerer, 2003). This research has taken a situational approach to the measurement of trust, neglecting the role of individual differences. Economic studies have reported that individual differences play a weak or minor role in predicting trusting behavior (Glaeser, Laibson, Scheinkman, & Soutter, 2000; Snijders & Keren, 2001). However, these studies measured dispositional trust using insufficient, single-item measures (e.g., generally speaking, would you say that most people can be trusted?). We challenge the finding that trust is purely situational, presenting evidence of an underlying disposition called the propensity to trust. We report an original survey to measure trust, evaluate its reliability using psychometric techniques, and assess its validity using the standard dilemma of trust, the Investment Game (Berg, Dickhaut, & McCabe, 1995).

Trust is “a psychological state comprising the intention to accept vulnerability based upon the positive expectations of the intentions or behavior of another” (Rousseau, Sitkin, Burt, & Camerer, 1998, p. 395). This definition has been widely adapted in economic and psychological trust literature because it can be applied to many situations. However, we depart from it in one key aspect—we treat trust as an enduring trait rather than a transient state. We measure the personality trait underlying behavior measured in specific situations. This construct is referred to as the propensity to trust (Mayer, Davis, & Schoorman, 1995; Rotter, 1967). We report a new survey to measure this construct, and assess it as a predictor of behavior in economic contexts.

The Investment Game (also called the Trust Game) is the most common situation used to study trust. The general form is as follows: There are two players, the sender and the receiver. At the beginning of the game the sender has \$10. The sender decides how much of the money he would like to invest (the sender will keep the money that he does not invest). The receiver is given triple the amount that the sender invests. Finally, the receiver decides how much money to return to the sender (and how much to keep for herself).

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The rational prediction of game theory is that the sender will invest no money (Berg et al., 1995). However, the empirical results on the Investment Game have found that people show varying degrees of trust. Psychologists and economists have explored a range of explanations for this variance. Sending money in the Investment Game is positively correlated with positive affect (Dunn & Schweitzer, 2005; Kirchsteiger, Rigotti, & Rustichini, 2006; Scharlemann, Eckel, Kacelnik, & Wilson, 2001), decreased social distance from the trustee (Glaeser et al., 2000), and positive social history in trust situations (Berg et al., 1995). These studies have shown that multifaceted, psychological variables influence trusting behavior in anonymous games. In the present studies, we assess whether individual differences in behavior are related to an underlying disposition.

There are two previously established scales to measure dispositional trust. The first such instrument was the Interpersonal Trust Scale (Rotter, 1967). Rotter defined trust as the generalized expectation that the verbal statements of others can be relied upon. There are two types of item included in the scale: The first asks participants to rate how much they trust social objects, such as friends, teachers, and the United Nations. The second measures “general optimism” towards society. High scores on the scale were associated with religious faith (religious participants were more trusting than agnostics and atheists) and higher socioeconomic status. Studies conducted using this scale reported that trust was uncorrelated with behavior in economic situations, such as the prisoner’s dilemma (Rotter, 1971). Despite this result, Rotter’s program of research was prescient of the potential for collaboration between psychologists and economists.

The second trust scale was introduced to study cross-cultural differences in cooperation (Yamagishi, 1988).<sup>1</sup> The inventory contains 60 items selected from several inventories, including several items from Rotter’s survey. Yamagishi and Yamagishi (1994) reduced this inventory to a six-item General Trust Scale. In this research, the trust scale was used to separate participants into homogeneous groups of high and low trustors. Using this method, the Yamagishi inventory predicted behavioral differences between groups (Yamagishi, Kanazawa, Mashima, & Terai, 2005). Groups of high trustors were more likely to cooperate and reciprocate across variations of the prisoner’s dilemma and public goods problems. This program of research is evidence that prosocial behavior is related to individual differences.

Items from the Rotter and Yamagishi scales define trust as the general expectation of others. To measure expectation, the Rotter scale aggregates attitudes across situations. Similarly, the Yamagishi measures attitudes about the general population (i.e. “most people”). These scales define a high trustor as someone who believes that others are generally benevolent. Although this view is consistent with the recent interdisciplinary definition of trust, it is not a comprehensive representation of trust. In the present studies, we propose a broader approach to dispositional trust defined by both generalized expectation and the willingness to accept vulnerability.

The willingness to accept vulnerability is an important factor in dilemmas of trust. Consider the simple situation where there are two possible outcomes of trust, reciprocity and betrayal. In this situation, vulnerability can be defined by the ratio of costs and benefits for trusting. Benefits are the profits when the trustee reciprocates; costs are the losses incurred from betrayal. Empirical evidence shows that players in the Investment Game are sensitive to this ratio (Malhotra, 2004; Snijders & Keren, 2001). If the trustor’s vulnerability is high (low profit from reciprocity and high cost for betrayal), then individuals are less likely to choose trust over the safe option. The uncertainty of gains and losses motivates (or discourages) trusting behavior. Although previous scales do not acknowledge this aspect of trust, we propose that individual differences in the perception of vulnerability are associated with dispositional trust.

The present studies also investigate the relationship between trust and trustworthiness. The concept of trustworthiness is often considered to be the natural complement of trust. Models of reciprocity theorize that there is a cyclical relationship between trust and trustworthiness (Burnham, McCabe, & Smith, 2000; Pillutla, Malhotra, & Murnighan, 2003). Trustees are more likely to reciprocate when they feel trusted, and trustors are more likely to trust when they have evidence that a partner is trustworthy.

Reviewing literature from psychology, economics, and sociology, Mayer et al. (1995) identified three factors associated with trustworthiness: ability, benevolence, and integrity. Mayer and colleagues defined ability as the group of skills, competencies, and characteristics that enable a party to have influence in a given domain. A person of high ability is someone who is competent and able to follow through with a plan of action. Benevolence is the general desire to do good. The benevolent are willing to help others, even when that help comes at her own expense. The third aspect of trustworthiness, integrity, is associated with the desire to uphold rules and social norms. The difference between integrity and benevolence is that while a benevolent person reciprocates out of concern for others, a person of integrity reciprocates because she believes it is the right thing to do.

In the present studies, trust and trustworthiness are studied as broad constructs that complement an established model of traits referred to as the Big Five (Digman, 1990; Goldberg, 1990). This model consists of extraversion, agreeableness, neuroticism, conscientiousness, and openness to experience. A number of studies in personality psychology have studied the predictive power of the Big Five. Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007) have shown the importance of Big Five variables in predicting real life outcomes such as mortality, divorce, and occupational attainment. Additional meta-analyses have found that measures of the Big Five could be used to predict domain-specific outcomes, including job satisfaction, commitment, and productivity (Hogan & Holland, 2003). The trait of trust is often treated as a subscale of agreeableness (Digman,

<sup>1</sup> The difference between trust and cooperation is symmetry of risk. Cooperation occurs when individuals depend upon each other equally. In these situations, mutual success requires a coordination of efforts. In a dilemma of pure trust, risk is one-sided. In many situations, such as the Prisoner’s Dilemma, the concepts of trust and cooperation are confounded.

1990; Goldberg, 1990). However, this view is too narrow to describe the complex motives associated with trusting behavior. We will investigate an alternative definition as a compound trait related to multiple Big Five domains.

In the present studies, two scales are reported in an inventory (the Propensity to Trust Survey or PTS) to measure individual differences in trust and trustworthiness. We assessed the properties of the PTS in two studies: In the first study, PTS data were collected online and analyzed in relation to a Big Five model. In the second study, we tested the PTS as a predictor of trusting behavior using the Investment Game. These studies consider the relevance and definition of the propensity to trust in economic decision making.

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants

8183 participants completed the personality inventory. 73% of participants were women and the mean age was 28,  $SD = 11.8$ . Table 1 reports education levels and countries of origin.

#### 2.1.2. Materials

Data were collected via the personality project (<http://personality-project.org>), a website run through the psychology department at Northwestern University. This website serves as both an informational resource about personality research and a vehicle for data collection. Although not advertised on commercial websites, participants can access this website by searching for information about “personality”. Participants responded to survey items taken from the International Personality Item Pool. The IPIP is an online collaboratory of over 2,400 personality items from over 200 scales (Goldberg et al., 2006).

*Propensity to trust survey.* An initial pool of 40 items to measure trust and trustworthiness was selected from the IPIP. Items were selected based upon face validity to the aforementioned definitions of trust and trustworthiness. Items selected for the trust scale had content related to the willingness to accept vulnerability and expectations of others. Trustworthiness items were related to ability, benevolence, and integrity.

Three raters familiar with the trust literature (two from social psychology and one from economics) rated the content validity of the 40 items and 20 randomly selected Big Five items. The judges were asked to rate the extent to which each item was representative of trust and trustworthiness on a scale of 1 (not representative of the construct) to 6 (very representative of the construct). The average inter-rater correlation was 0.62 for trust items and 0.65 for trustworthiness items. Items were removed from the PTS if they met either of the following criteria: (1) An item received an average rating less than or equal to 2.5. (2) An item was rated as very representative (average rating 5 or greater) for both trust and trustworthiness. Using these criteria, the initial 40 items were reduced to 26.

#### 2.1.3. Procedure

The procedure for data collection was based on the Synthetic Aperture Personality Assessment (SAPA) method (Revelle & Laun, 2004; Revelle, Wilt, & Rosenthal, in press). The SAPA technique analyzes item statistics and inter-item covariances by presenting overlapping subsets of items to a large number of subjects. The technique is named for its similarity to measurement methods in radio astronomy that integrate incomplete input from multiple sources. The advantage of this technique is that it allows for collection and analysis of a large number of items while maintaining a reasonable inventory length for any one subject.

On the website, participants provided basic demographic information, including gender, age, location and education. Then they completed an inventory of systematically sampled IPIP items. Each participant responded to 50 (selected from 100 total) Big Five items and 10 (selected from 26 total) PTS items. Thus, each participant responded to 60 items and a total

**Table 1**  
Participant characteristics

<i>Education</i>	
Less than 12 years	12%
High school graduate	7%
Some college, but did not graduate	10%
Currently attending college	32%
Graduated college	21%
Graduate or professional school	18%
<i>Country of origin</i>	
USA	80%
Canada	6%
UK	2%
Australia	2%
India	1%
Other countries	9%

of 126 items were analyzed. The Big Five items were selected from a general inventory taken from the IPIP. There was no overlap in Big Five and PTS items, though many of the PTS items were associated with Big Five content. Participants were asked to rate the extent that each item describes them. Items were presented to participants in a Likert like format with responses ranging from (1) strongly inaccurate to (6) strongly accurate. After completing the inventory, participants received feedback on their Big Five trait scores relative to the general population.

**Factor analysis.** Principal axes factor analyses were conducted to psychometrically assess and refine the content of the trust and trustworthiness scales. The Very Simple Structure (VSS) criterion (Revelle & Rocklin, 1979) identified two factors as the optimal number to extract. The VSS criterion is an exploratory procedure to test how well a “simple” factor pattern matrix fits the actual correlation matrix for solutions of differing item complexity (the number of non-zero loadings to retain per item) and a differing number of factors. A factor solution is then selected to maximize the VSS goodness of fit.

Because trust and trustworthiness are believed to be correlated, a promax rotation was used to interpret the factor loadings. Two items were discarded because they did not have meaningful loadings (greater than 0.30) on either factor. Three items were discarded because of high cross loadings. Table 2 reports the loadings of the remaining 21 items. Items 4, 8, 9, and 13 were rated as being representative of trust, but their highest loadings were on the first factor, which was associated with all of the trustworthiness items. Using these factor loadings as criteria, items 1 through 14 were defined as the trustworthiness scale and items 15 through 21 were defined as the trust scale. Items were unit weighted in subsequent analyses.

## 2.2. Results

The PTS measures were statistically reliable,  $\alpha = 0.73$  for the trust scale (7 items) and  $\alpha = 0.80$  for the trustworthiness scale (14 items). The average inter-item correlations were  $r = 0.28$  for trust items and  $r = 0.22$  for trustworthiness.

Trust and trustworthiness scores were weakly associated with gender and age. Men were slightly more trusting ( $r = 0.05$ ) and trustworthy ( $r = 0.19$ ) than women. Age was also positively correlated with trust ( $r = 0.10$ ) and trustworthiness ( $r = 0.13$ ).

Trust and trustworthiness were highly correlated with measures of the Big Five traits. Trust was positively associated with agreeableness ( $r = 0.27$ ) and extraversion ( $r = 0.66$ ), and was negatively correlated with neuroticism ( $r = -0.57$ ). Trustworthiness was associated with agreeableness ( $r = 0.70$ ), conscientiousness ( $r = 0.52$ ), and openness to experience ( $r = 0.30$ ). Trust and trustworthiness were weakly correlated ( $r = 0.16$ ). Table 3 reports the full correlation matrix.

Multiple regressions modeled trust and trustworthiness as composites of the Big Five. Trust was predicted by extraversion ( $\beta = 0.34$ ) and negative neuroticism ( $\beta = -0.47$ ) adjusted  $R^2 = 0.46$ . Trustworthiness was predicted by agreeableness ( $\beta = 0.63$ ) and conscientiousness ( $\beta = 0.35$ ), adjusted  $R^2 = 0.63$ .

## 2.3. Discussion

The PTS trust and trustworthiness scales were reliable. Correlational analysis and multiple regressions showed associations between PTS and Big Five scales. Trust was positively correlated with agreeableness, extraversion, and negative neu-

**Table 2**  
Factor loadings of PTS items

Content	Scale	Factor loadings	
		Trustworthy	Trust
1. Listen to my conscience	Trustworthy	<b>0.59</b>	–
2. Anticipate the needs of others	Trustworthy	<b>0.58</b>	–
3. Respect others	Trustworthy	<b>0.57</b>	–
4. Can get along with most people	Trust	<b>0.53</b>	–0.21
5. Have always been completely fair to others	Trustworthy	<b>0.52</b>	–
6. Stick to the rules	Trustworthy	<b>0.52</b>	0.22
7. Believe that laws should be strictly enforced	Trustworthy	<b>0.50</b>	0.18
8. Have a good word for everyone	Trust	<b>0.49</b>	–0.15
9. Value cooperation over competition	Trust	<b>0.49</b>	–
10. Return extra change when a cashier makes a mistake	Trustworthy	<b>0.44</b>	–
11. Would never cheat on my taxes	Trustworthy	<b>0.39</b>	–
12. Follow through with my plans	Trustworthy	<b>0.35</b>	–0.15
13. Believe that people are basically moral	Trust	<b>0.34</b>	–0.18
14. Finish what I start	Trustworthy	<b>0.34</b>	–
15. Retreat from others (–)	Trust	–	<b>0.64</b>
16. Am filled with doubts about things (–)	Trust	–	<b>0.59</b>
17. Feel short-changed in life (–)	Trust	–	<b>0.58</b>
18. Avoid contacts with others (–)	Trust	–	<b>0.56</b>
19. Believe that most people would lie to get ahead (–)	Trust	–	<b>0.50</b>
20. Find it hard to forgive others (–)	Trust	–	<b>0.45</b>
21. Believe that people seldom tell you the whole story (–)	Trust	–	<b>0.40</b>

Loadings that were less than 0.10 in magnitudes were not reported; loadings greater than 0.30 are in bold. The eigenvalues of the factors were 3.52 and 2.01, respectively. The factors explained 26.5% of the common variance. (–) identifies items that were negatively scored.

**Table 3**

Correlation coefficients between PTS and Big Five scales

	Trust	Worthy	Con	Agree	Neuro	Open	Extra
Trust	0.73	0.21	0.19	0.34	−0.70	0.00	0.56
Trustworthy	0.16	0.80	0.61	0.83	−0.14	0.36	0.22
Conscientious	0.16	0.52	0.90	0.30	−0.15	0.14	0.15
Agreeable	0.27	0.70	0.27	0.88	−0.17	0.30	0.44
Neuroticism	−0.57	−0.12	−0.14	−0.15	0.92	−0.10	−0.29
Openness	0.00	0.30	0.13	0.26	−0.09	0.86	0.33
Extraversion	0.46	0.19	0.14	0.39	−0.27	0.29	0.92

The correlations between scales are based upon composite correlations formed from the pairwise correlations. Correlations above the diagonal are corrected for attenuation. Values along the diagonal indicate Cronbach's alpha. The minimum number of observations per pair of items was 607 and the average number of responses to a pair of items was 656. Given the sample size of the composite scales (8183), all correlations have a confidence interval < .012.

roticism. The association of trust and agreeableness was no longer significant in multiple regressions that included other traits as predictors. Trustworthiness was positively correlated with agreeableness and conscientiousness. Trust and trustworthiness were positively correlated.

### 3. Study 2

#### 3.1. Method

##### 3.1.1. Participants

A total of 90 Northwestern undergraduates (43 women) were recruited to participate in this study. The participants were recruited using flyers posted around campus and on email listservs.

##### 3.1.2. Materials

When registering online for the study, participants completed half of the items from the PTS. They completed the remaining items on the day of the experiment; these items were mixed into a larger personality inventory containing the Big Five scales used in Study 1.

##### 3.1.3. Procedure

Participants were told the rules of the task. They were assigned to Participants registered for the experiment online and completed the Propensity to Trust Survey. Participants were assigned to a condition (send-only, return-only, or simultaneous) using a block random protocol. Upon arrival, participants were led to a sequestered room and were told that they were going to participate in a decision making study in which they would interact with another participant through the experimenter (i.e. participants would not see or interact with each other directly). Before beginning the task, participants completed a personality inventory.

Participants were told the rules of the task. They were assigned to the role of the sender, the receiver, or both roles simultaneously. The senders decided how much money to invest, the receivers decided how much money to return, and players in the simultaneous condition made both decisions sequentially. During the experiment, subjects were not able to see or interact with each other. In each condition, the actions of the "partner" were controlled by the experimenter. Before participants began the game, they completed a Big Five personality inventory.

In the send-only condition participants were given \$10 to invest.

In the return-only condition participants received an investment of \$15 (a tripled \$5 investment from the (fictious) sender) and decided how much to return.

In the simultaneous condition participants sequentially played the roles of the sender and receiver. The game took place in two rounds. In the first round participants were given \$10 to invest. In the second round investments were "exchanged" by the experimenter. The participants received \$15 (a tripled \$5 investment) and decided how much of that investment to return. Participants were aware that there was a second round before they made their initial investments.

The experiment took 30 min. At the end of the each session, participants were debriefed. They were told that they were not interacting with another person. Participants were paid a flat rate of \$10 for completing of the study. Performance in the Investment Game had no effect on compensation, though during the game participants believed that their decisions could affect compensation.

#### 3.2. Results

Table 4 reports the means and standard deviations for PTS and Big Five scores. The weak gender differences in trust and trustworthiness found in Study 1 were not replicated.

**Table 4**

Summary scores and standard deviations by gender (scores reflect the average score on the 1–6 alternative items)

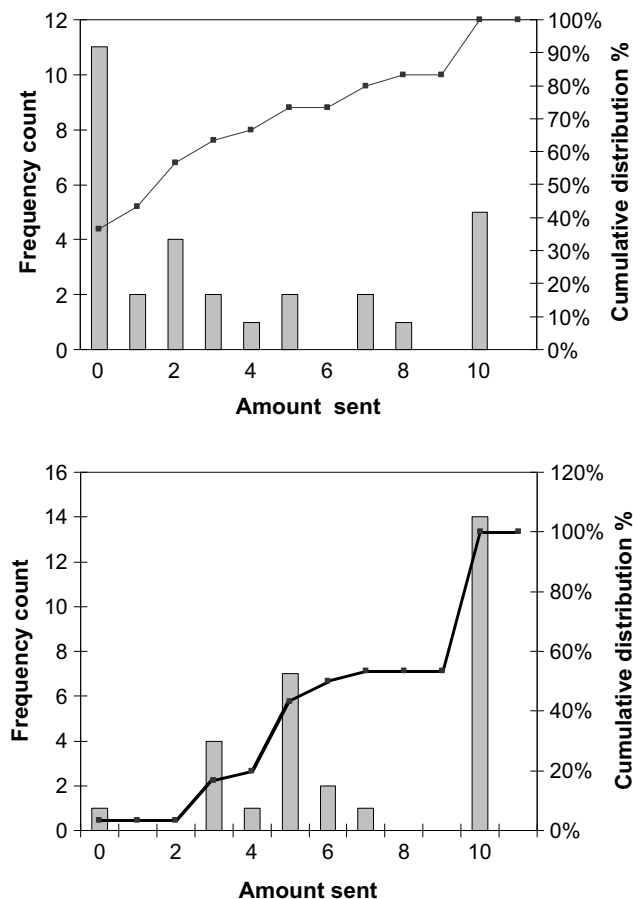
	Women (N = 43)		Men (N = 47)		Total (N = 90)	
	M	SD	M	SD	M	SD
Trust	3.71	1.51	3.86	1.89	3.71	1.89
Trustworthy	4.43	1.87	4.29	2.14	4.36	1.87
Extraversion	3.80	3.58	3.65	3.58	3.70	3.58
Neuroticism	3.25	4.47	3.05	4.25	3.15	4.47
Agreeableness	4.35	2.01	3.95	2.68	4.10	2.46
Conscientiousness	4.25	3.35	3.95	2.91	4.05	3.13
Openness	4.55	2.68	4.55	2.46	4.55	2.68

### 3.2.1. Amount sent

Amount sent was examined in a series of linear models as a function of condition, the PTS, and Big Five scales. Fig. 1 indicates the frequencies and cumulative distributions of amount sent in the send-only and simultaneous conditions. Since participants in the simultaneous condition invested significantly more money, condition was analyzed as a predictor.

Model 1 examined the effect of trust. Amount sent increased with trust ( $\beta = 0.30$ ,  $t(57) = 2.67$ ,  $p < 0.01$ ) and was higher in the simultaneous condition rather than the send-only condition ( $\beta = 0.41$ ,  $t(57) = 3.62$ ,  $p < 0.001$ ), adjusted  $R^2 = 0.28$ . There was no interaction between trust and condition.

Out of the Big Five scales, agreeableness was the only measure significantly associated with amount sent. Model 2 examined the effect of agreeableness and condition: Amount sent increased with agreeableness ( $\beta = 0.49$ ,  $t(56) = 3.37$ ,  $p < 0.01$ ), and as before, was higher in the simultaneous condition ( $\beta = 2.49$ ,  $t(56) = 3.1$ ,  $p < 0.001$ ). Agreeableness and condition interacted ( $\beta = -2.21$ ,  $t(56) = -2.65$ ,  $p < 0.02$ ). As shown in Fig. 2, having a high agreeableness score predicted sending more



**Fig. 1.** Amount sent in the send-only (top) and simultaneous (bottom) conditions. Bars denote frequency count and lines refer to cumulative distributions of amount sent. Participants in the simultaneous condition invested more money  $t(58) = 4.0$ ,  $p < 0.001$ .



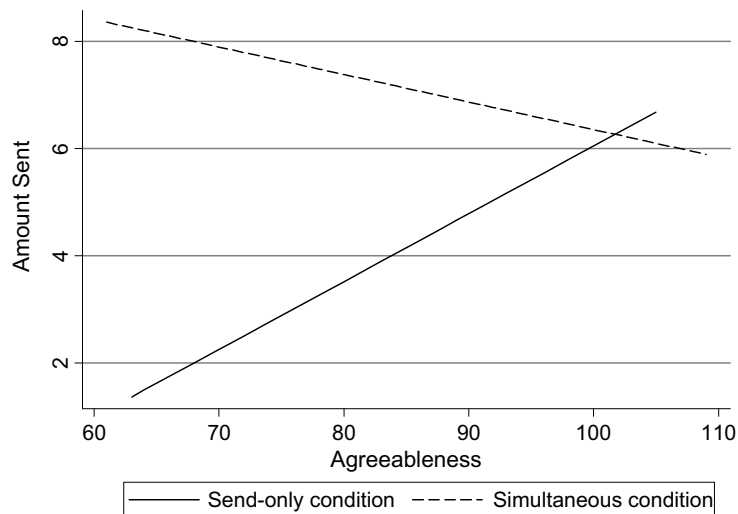


Fig. 2. High agreeableness predicted sending more money in the send-only condition and less in the simultaneous condition.

money in the send-only condition and less in the simultaneous condition. The overall adjusted  $R^2 = 0.29$ . Simple regression on observations from the simultaneous condition found that the slope of agreeableness was not significantly different from zero in this condition ( $p = 0.37$ ).

In order to directly compare the effects of trust and agreeableness, both variables were included in a hierarchical regression. Condition, agreeableness, and trust were added sequentially to the model. This procedure replicated the results of Model 1 with trust and condition as significant predictors. Agreeableness was no longer significant in a model that also included trust ( $p = 0.68$ ). Adding trust as a predictor increased the adjusted  $R^2$  by 0.51.

### 3.2.2. Amount returned

*Return-only condition.* The average amount returned in this condition was \$5.17,  $SD = \$3.77$ . Trust and amount returned were positively correlated,  $r(30) = 0.41$ ,  $p < 0.05$ . Trustworthiness and Big Five scales were not significantly related to the amount returned.

*Simultaneous condition.* There were two rounds of play in the simultaneous condition – participants invested money during the first round and returned money in the second round. Amount sent in the first round was negatively correlated with amount returned in the second round,  $r(30) = -0.44$ ,  $p < .015$ . PTS and Big Five scales were unrelated to amount returned in this condition.

### 3.3. Discussion

The trust scale predicts both trusting and trustworthy behavior. Amount sent was related to the participant's condition, trust, and agreeableness. Participants in the simultaneous condition sent more money than participants in the trustor condition. Models 1 and 2 show that both trust and agreeableness predict amount sent. The effect of high agreeableness was positive in the sender condition and negative in the simultaneous condition. Hierarchical regressions reported that trust scale supersedes the influence of agreeableness. Trust is also related to amount returned in the receiver condition. In the simultaneous condition, the decision to return money is presumably related to the perceived contribution of the partner. The data suggest that participants returned money when they felt that their initial trust had been reciprocated.

## 4. General discussion

The present studies report new evidence that trusting behavior is related to underlying individual differences. We have proposed a new instrument to measure trust and validated it as a predictor of behavior in the standard economic task, the Investment Game. Our instrument differs from previous measures of trust in treating the construct as both the generalized expectation of others and the willingness to accept vulnerability.

In Study 1, we assessed the psychometric properties of the PTS and analyzed its subscales in terms of the Big Five. The trust and trustworthiness scales were assembled from a pool of IPIP items and were refined by a panel of raters. We then assessed the reliability and construct validity of the PTS scales, showing that trust and trustworthiness are separate constructs with a common association.

Five Factor Models have previously treated trust as a facet or subscale of agreeableness (Digman, 1990; Goldberg, 1990). In Study 1, the PTS trust scale was associated with agreeableness, extraversion, and negative neuroticism. We suggest that

neuroticism and extraversion components of trust are related to the willingness to accept vulnerability. These aspects of trust reflect differences in sensitivity to the potential costs and benefits of trusting. As a broad construct, trust is related to individual differences in attraction to rewards and sensitivity to punishments. We believe that the view of trust as a compound trait is relevant to the broad motives underlying behavior.

#### 4.1. Personality and investment decisions

Study 2 found that the trust scale predicts sending money in the Investment Game. PTS trust scores were associated with investing more money across both conditions. Analyses showed that the trust scale predicted economic behavior better than the general Big Five scales. Out of the Big Five, only agreeableness was associated with investing. However, the effect of agreeableness was superseded in models that also included trust.

While the effect of trust was consistently positive, agreeableness interacted with condition. High agreeableness predicted sending more money in the send-only condition and less in the simultaneous. Because of the relatively small sample size and the magnitude of the interaction, we are hesitant to overemphasize the importance of this finding. However, it could be interpreted from a person X situation perspective (Graziano, Habashi, Sheese, & Tobin, 2007). In certain situations, high agreeableness is associated with decreased motivation for prosocial behavior. For example, high agreeableness predicts decreased helping behavior when the recipient is a member of an in-group (as opposed to an out-group). Agreeableness may have affected participants' prosocial motivation differently in the situations of the send-only and simultaneous conditions. We suggest that agreeableness motivates trust in situations of greater uncertainty and risk, in this case the send-only condition.

#### 4.2. Trust and reciprocity

The disposition of trust, rather than trustworthiness, predicted returning money. In the return-only condition, high trustors returned more money to the sender. This is a surprising, though not anomalous, finding. Glaeser et al. (2000) obtained a similar result, reporting that trust survey items predict trustworthy behavior in a similar game. A possible explanation of this correlation is that high trustors are more likely to interpret the Investment Game as a reciprocal exchange. Burnham et al. (2000) found that trust and reciprocity were affected by social framing. The reciprocity rate changed when the instructions to the receiver referred to the other player as a partner rather than an opponent. When the game was framed as a cooperative interaction, trust and reciprocity were both more likely. Perhaps the high trustors in Study 2 returned more money because they were more likely to identify the investor as a partner. Formally testing this explanation is a task for future research.

#### 4.3. Fairness and equality

Data from the simultaneous condition showed that equality was an important criterion for successful interactions. Participants in the simultaneous condition invested significantly more money than those in the send-only condition. We theorize that participants were more trusting because they knew that the other player was in an identical situation. In the send-only condition, investors were at the unilateral mercy of receivers. This inequality heightened the situational vulnerability of sending money. Participants were more likely to invest when they were in a symmetric situation; this equality acted as insurance for their trust. The equality hypothesis is consistent with evidence that economic agents are averse to inequality (Bolton & Ockenfels, 2000).

The effect of playing dual roles in the Investment Game was tested by a previous study. In a similar investing experiment, Burks, Carpenter, and Verhoogen (2003) obtained the opposite result: Playing both roles simultaneously discouraged participants from investing money. This finding was explained by a reduced responsibility hypothesis. Because participants completed two separate interactions, they felt less responsibility for the well-being of their partners in any single interaction. However, there is one key difference in design that distinguishes the two studies. Burks and colleagues assigned participants to play the roles of sender and receiver against two different players. Participants in the experiment still faced one-sided investment decisions; their finding does not discredit an aversion-to-inequality explanation.

Perceptions of fairness were also related to reciprocity decisions. The amount sent in the first round was negatively correlated with the amount returned in the second round. Recall that participants received a tripled \$5 investment at the start of the second round. Individuals who previously invested more than \$5 themselves were unlikely to return any money in the second round. Those who invested \$5 or less were more likely to return money, perhaps out of guilt or obligation. The amount of money sent in the first round acted as an anchor in evaluating the other player's \$5 investment. Participants reciprocated when they observed that the partner had invested as much (or more) than they had. They were unlikely to return money to a partner who had shown less trust than they had. This example suggests that trustworthy behavior is determined by perceptions of fairness, rather than an underlying disposition.

#### 4.4. Conclusion

Economic models often invoke the concept of individual differences by defining agents according to discrete types with fixed strategies. For example, players in public goods games are often categorized as cooperators and free-riders. However,



economists are often reluctant to acknowledge the importance of personality. We propose that the empirical study of individual differences can contribute to the understanding of economic behavior. Similarly, the use of economic decisions as behavioral criteria can enhance the psychological knowledge of underlying motives and dispositions. The integration of survey and behavioral measurements offers an underutilized approach to research topics in psychology and economics.

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