Survey and behavioral measurements of interpersonal trust

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The study of interpersonal trust is important to both psychologists and economists. However, one of the fundamental obstacles in trust research is how to measure and define it. Contemporary researchers study trust as both an internal propensity to trust and an economic decision. The present studies proposed and validated the Propensity to Trust Survey - a survey containing two scales that measure psychological differences in trust and trustworthiness. Study 1 used online survey data (N = 10,767) to assess the reliability of the PTS, and viewed the relationships between trust, trustworthiness, and Big Five personality domains. Study 2 assessed the PTS as a predictor of trusting behavior in an economic experiment known as the Investment Game. Participants (N = 90) in the game encountered two dilemmas of trust: 1. Should they invest money in an anonymous partner? 2. How should they share a sum of invested money between themselves and their partners? These studies integrated survey methodologies with experimental practices from behavioral economics. The results of Study 1 showed that trust is related to agreeableness and negative neuroticism, and that trustworthiness is related to agreeableness and conscientiousness. Study 2 found that the PTS can be used to predict decision making in the Investment Game. The studies also found evidence supporting a reciprocal relationship between trust and trustworthiness.
Interpersonal trust is an important part of human relationships, and its significance can be observed in both professional and personal spheres: We trust our close friends to keep secrets. We trust the local mailman to deliver our letters safely. Every day, we trust complete strangers not to harm us. There is evidence of trust (or distrust) in any social relationship. It comes as no surprise that the study of trust has attracted the attention of economists and social psychologists. In recent years, the study of interpersonal trust has been a common ground for the two fields. The empirical study of trust and trustworthiness is a cornerstone in the field of behavioral economics. This research addresses the behavioral topics of fairness, reciprocity, and social perception.

Although there has been growing interest in the study of trust, this research has taken a behavioral and situational approach to its measurement. The most commonly accepted measurement of trust is a scenario known as the Investment Game. The game measures trust as economic cooperation and reciprocity between two strangers. While useful, the game provides a limited view of interpersonal trust. The Investment Game fails to consider the stable differences underlying behavior. The latent construct of trust has remained an unexplored mystery. In these studies, we attempted to measure the systematic differences that explain trust and trustworthiness. To accomplish this task, we developed an original survey to measure trust, evaluated its reliability using psychometric techniques, and assessed the construct validity of the survey using the Investment Game as a measure of behavior.

Defining Trust

In order to measure trust we must first define it. However, this is easier said than done. There is a challenge in generalizing the meaning of trust without obscuring its
practicality. Rousseau, Sitkin, Burt, & Camerer, (1998) offers an interdisciplinary definition that is satisfying to social scientists: “Trust is a psychological state comprising the intention to accept vulnerability based upon the positive expectations of the intentions or behavior of another” (p 395). In this paper, we addressed and integrated the components of this definition using observational and experimental tools:

*Trust is a psychological state.* A psychological state is a temporary feeling or behavior that takes place in a particular situation. In these studies, we measured trust as an enduring trait rather than a transient state. We measured the personality trait underlying the decision to show trust. This construct is referred to as the propensity to trust (Rotter 1967; Mayer, 1995). The propensity to trust is a trait that varies across individuals - not all individuals are equally trusting. The present studies measured differences in propensity to trust using an original personality survey.

*Trust is based upon the expectations of the intentions or behavior of another:* The decision to show trust is related to broad social attitudes and expectations of others. Previous research has found that trust is influenced by several psychological factors, including positive affect (Dunn & Schweitzer, 2005; Scharlemann, Eckel, Kacelnik & Wilson, 2001; Kirchsteiger, Rigotti, & Rustichini, 2006), social distance from the trustee (Glaeser, 2001), and social history in trust situations (Berg, Dickhaut & McCabe, 1995). The present studies evaluated trust in its relation to an established measurement of personality - the Big Five.

*Trust is the intention to accept vulnerability.* The decision to show trust involves a situation of risk and interdependence. These situations involve circumstances where the trustor faces uncertain outcomes in a social setting. In situations of trust, the trustee has a
power to hurt or help the trustor. Trust occurs when the trustor willingly accepts this vulnerability. Our studies use the Investment Game as an example of these situations.

Psychometric Measurement of Trust

For over 100 years, psychologists have used psychometric tools to observe individual differences in personality. Today, many personality psychologists agree that the “Big Five” is a useful taxonomy of personality (John & Srivistava, 1999). The Big Five model consists of five broad personality domains: Extraversion, agreeableness, neuroticism, conscientiousness, and openness to experience (John, Donahue & Kentle, 1991). Extraversion reflects positive affect and confidence. Neuroticism is a measurement of emotional stability versus worrying. Agreeableness is a measure of cooperation and social good-nature. Conscientiousness measures dependability and responsibility. Openness to experience is a measure of cultural and intellectual open-mindedness. Psychologists frequently use self-report surveys to measure differences in these traits.

The survey measurements of personality traits can be studied as correlates of social behavior. An area of applied research in personality psychology has focused on the predictive power of traits. Researchers have consistently found that personality measurements have real-life correlates, especially in the work place. Meta analysis of personality research found that measurements of neuroticism could be used to predict occupational outcomes, including job satisfaction, commitment, and productivity (Hogan & Holland, 2003). The Big Five model has also been used to predict differences in leadership style and effectiveness (Hogan & Kaiser, 2005). However, the Big Five is not ideal for predicting specific outcomes. Ones, Viswesvaran, & Dilchert, 2005 found that
compound personality traits, such as integrity, stress tolerance, and aggression, have the strongest predictive power. Compound traits are specific measures that correlate with multiple Big Five dimensions. Because of their specificity, they can be used to predict outcomes, such as job performance and satisfaction. Our studies will show that trust and trustworthiness are compound traits. Considering the usefulness of compound traits, it is easy to imagine the potential applications of a reliable trust scale.

However, personality psychologists at large have avoided the measurement of interpersonal trust. The single published measurement of individual differences in trust is the Interpersonal Trust Scale (Rotter, 1967). The ITS measures an individual’s general tendency to trust different groups of people, such as teachers, parents, politicians, physicians, classmates, and friends. The survey measures the individual’s “general optimism regarding the society” (Rotter, 1967, p. 653). However, the ITS has become dated and has been ignored in recent trust research. Organizational scientists have developed surveys to measure trust in specific situations (Couch, Adams & Jones, 1996; Cummings & Bromiley, 1996; Johnson-Georges & Swap, 1992), but none have attempted to measure systematic differences in trust. These specific surveys are useful for studying trust as a state, but they offer little insight into the study of individual differences.

Behavioral Measurement of Trust

The most common scenario used to measure trust is the Investment Game. The Investment Game was first proposed in Berg, Dickhaut, & McCabe (1995) and it has since been replicated with variations. The rules of the game can be manipulated to test specific hypotheses, but the general form is as follows: At the beginning of the game the
sender receives $10. The sender decides how much of the money, x, 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: 3x. Finally, the receiver decides how to split the money, 3x, between himself and the sender.

Rational analysis of the Investment Game predicts that the sender will invest no money and that the receiver will return no money. This outcome is easily determined by induction: If the receiver acts to maximize his profit, then he will return no money to the sender. Thinking ahead, the sender should understand that any money he gives to the receiver is lost. Therefore, the sender would be better off keeping all of his initial investment. However, the empirical findings on the Investment Game have found that people show varying degrees of trusting and trustworthy behavior. These findings are true to life – in a given situation, some people are more trusting than others. It is difficult to imagine a purely rational society where there is neither trust nor trustworthiness.

Berg, Dickhaut & McCabe (1995) reported that subjects show varying degrees of trust and trustworthiness. The senders invested an average of $5.16 out of a possible $10. Only 2 of the 32 senders (6%) invested no money at all, and 5 senders (15%) invested all $10. The receivers showed varying degrees of reciprocity: 12 of the 28 receivers who received money chose to give $0 or $1 back to the sender. However, 11 of the 28 trustees chose to give the sender more than his initial investment. On average, senders earned a 95% return on their initial investments. These results defy classical game theory’s prediction that individuals will not show trust or reciprocity.

The empirical evidence of trust and trustworthiness has been explained by models of social preference theory (Bolton & Ockenfels, 2000; McCabe, Rigdon & Smith, 2003).
These models predict that participants in the Investment Game cooperate due to an aversion to inequality, and that they will follow social norms, such as fairness, to a certain point. Trust and trustworthiness in the Investment Game are related to the players’ perceptions of fairness and morality. Individuals in the Investment Game value their self interests first, but remain considerate of the social expectations of moral behavior (Kruger, Massey & DiDonato (in press). Under the social preference model, individuals strike a balance between their selfish interests and the interests of others. This balance is a manifestation of the individual differences we intend to measure.

Trust and Trustworthiness

It is impossible to understand trust without considering its relationship to trustworthiness. In a social situation, trustworthiness is the validation or betrayal of trust. Social scientists have found that there is a reciprocal relationship between the concepts of trust and trustworthiness (Malohtra, 2004). Trustors naturally want to show more trust to people who are known to be trustworthy, because there is a greater likelihood that their trust will be reciprocated. Similarly, the trustee’s decision to be trustworthy is influenced by the level of trust shown by the trustor. Social perception plays a role in the decision to reciprocate trust. Trustee reciprocity in the Investment Game increases when more money is sent (Pillutla, Malohtra, and Murninghan (2003). Trustees show reciprocal behavior because they feel a social obligation to the trustor. In some cases, the decision to only show some trust may backfire for the trustor. The trustee is more likely to act in a trustworthy manner when he feels that he has been trusted. Research has shown that trustworthiness is influenced by perception and situation. In the present studies, we
studied the underlying trait of trustworthiness and how it relates to trust. To measure these differences the PTS includes a scale to measure the trait of trustworthiness.

Hypotheses

In these studies, we developed two scales that are presented in the Propensity to Trust Survey. [Appendix A] The PTS is a survey designed to independently measure differences in both trust and trustworthiness. The items of the PTS were taken from the International Personality Item Pool (Goldberg, 2006). The PTS items were selected to elicit attitudes about cooperation, society, and morality. The items also ask subjects to describe how they typically act in a number of trust related situations.

**Study 1:** We collected subject data on the PTS items and analyzed them in the context of the Big Five model. We used [http://test.personality-project.org/](http://test.personality-project.org/) to collect PTS and Big Five data from over 10,000 participants. Our analysis showed that trust and trustworthiness are related to established measurements of personality, and that they can be predicted using Big Five measurements. In our analysis, we showed that trust and trustworthiness are compound personality traits.

**Study 2:** We showed that trusting and trustworthy behavior can be explained by differences in personality traits. We used three conditions of the Investment Game to test the construct validity of the PTS. Participants were assigned to play the role of senders, receivers, or both simultaneously. The Investment Game showed that the PTS is a meaningful measure of the underlying traits of trust and trustworthiness.

In these studies, we tested several predictions about the relationship between trust and trustworthiness: I. We predicted that there would be a strong positive correlation between PTS measures of trust and trustworthiness. II. We predicted that having high
PTS measures in both trust and trustworthiness would predict trusting and trustworthy behavior in the Investment Game. III. We predicted that participants would show more trust when they are faced with a reciprocal situation. We represented this reciprocal situation by having a condition of participants in the second study simultaneously play both roles (sender and receiver) in the Investment Game.

Study 1

Participants

10,767 participants completed the personality inventory at http://test.personality-project.org/.

Materials

Participants responded to survey items from the International Personality Item Pool. IPIP is an online collaboratory of over 2000 personality items taken from 17 surveys (Goldberg, 2006).

Procedure

Our procedure for data collection was based on the Synthetic Aperture Personality Assessment method (Revelle & Laun, 2004). The SAPA technique allowed us to collect item statistics and interitem covariances by presenting subsets of items to a large number of subjects. On the website, participants provided us with basic demographic information, including gender, age, location and education. Then, they completed a quasi randomized 60 item personality inventory comprised of IPIP items. Each subject completed 50 (out of 120) Big Five items and as many as (out of 28) PTS items. In our analysis we combined data across all subjects, allowing for synthetic correlations of our items. This algorithm
allowed us to study the correlations and covariances between the PTS items and a large number of Big Five items.

Results

PTS Reliability: We found $\alpha = 0.75$ for the trust scale and $\alpha = 0.71$ for the trustworthiness scale. The trust scale contained 15 items with an average correlation of $r = 0.17$. The trustworthiness scale contained 13 items with an average correlation of $r = 0.16$. The Big Five scales reported reliabilities ranging from $\alpha = 0.85$ to $\alpha = 0.94$.

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<thead>
<tr>
<th>Scale</th>
<th>$\alpha$</th>
<th>Items</th>
<th>Average correlation</th>
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<tbody>
<tr>
<td>Trustworthiness</td>
<td>0.71</td>
<td>13</td>
<td>0.16</td>
</tr>
<tr>
<td>Trust</td>
<td>0.75</td>
<td>15</td>
<td>0.17</td>
</tr>
<tr>
<td>Agreeableness</td>
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<td>0.21</td>
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<td>Openess</td>
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<td>Conscientious</td>
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<td>24</td>
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<tr>
<td>Neuroticism</td>
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<td>26</td>
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<tr>
<td>Extraversion</td>
<td>0.94</td>
<td>24</td>
<td>0.39</td>
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PTS and the Big Five: Our analysis found that our measures of trust and trustworthiness were highly correlated with measures of the Big Five traits. Trust was positively correlated with agreeableness ($r = 0.59$) and extraversion ($r = 0.34$), and was negatively correlated with neuroticism ($r = -0.44$). Trustworthiness was positively correlated with conscientiousness ($r = 0.48$) and agreeableness ($r = 0.63$). We also found that trust and trustworthiness scores were significantly correlated ($r = 0.47$).

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<td>Trust</td>
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<td>Trustworthy</td>
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<td>Conscientious</td>
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<td>Agreeable</td>
<td>0.59</td>
<td>0.63</td>
<td>0.27</td>
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<tr>
<td>Extraversion</td>
<td>0.34</td>
<td>0.17</td>
<td>0.17</td>
<td>0.41</td>
<td>0.94</td>
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<tr>
<td>Neuroticism</td>
<td>-0.44</td>
<td>-0.20</td>
<td>-0.20</td>
<td>-0.23</td>
<td>-0.34</td>
<td>0.94</td>
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In Study 1, we collected survey data from a large number of participants (N > 10,000). Because of the size of our sample, all of our findings are statistically significant and we have omitted p values in the interest of brevity. The correlations reported in Study 1 have been corrected for attenuation.

We then used multiple regressions to predict trust and trustworthiness. These models support our correlational findings. Agreeableness played the strongest role in predicting both trust and trustworthiness. Negative neuroticism predicted trust and conscientiousness predicted trustworthiness. We found that extraversion did not significantly predict trust. Our model suggests that its relation to trust is redundant in a model that included agreeableness: Table 2 shows that agreeableness and extraversion are positively correlated (r = 0.41). The common component of extraversion and agreeableness may explain trust’s correlation with extraversion.

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<tr>
<td>Trust</td>
<td>0.58</td>
<td>-0.29</td>
<td>-0.07</td>
<td>0.03</td>
<td>0.03</td>
<td>0.52</td>
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<tr>
<td>Trustworthiness</td>
<td>0.56</td>
<td>0.01</td>
<td>0.35</td>
<td>-0.16</td>
<td>0.16</td>
<td>0.53</td>
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Table 3 shows the beta coefficients of the Big Five traits used as linear predictors of trust and trustworthiness. The R2 coefficient show the goodness-of-fit of our models.

Finally, we used correlational findings on our Big Five items to expand our PTS scales in order to enhance their reliability measures. To accomplish this, we measured individual item correlations with our trust and trustworthiness scales. We selected the 15 items which had the highest magnitude correlations with each scale. After removing the overlapping and redundant items, we added 8 trust items and 8 trustworthiness items to our PTS measures. [Appendix B] Our findings show that our expanded scales are significantly more reliable, reporting α coefficients comparable to our Big Five scales.

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<td>Scale</td>
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<td>Items</td>
<td>Average correlation</td>
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<td>13</td>
<td>0.16</td>
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<tr>
<td>Trust</td>
<td>0.75</td>
<td>15</td>
<td>0.17</td>
<td></td>
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<tr>
<td>Expanded Trust</td>
<td>0.85</td>
<td>23</td>
<td>0.20</td>
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<tr>
<td>Expanded Trustworthiness</td>
<td>0.85</td>
<td>21</td>
<td>0.21</td>
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**Discussion**

The results of Study 1 gave us insight into the psychometric qualities of the PTS: We found that our trust and trustworthiness scales were reliable. Then, we used multiple regressions to predict trust and trustworthiness with Big Five traits. We found that trust could be predicted as a function of agreeableness and negative neuroticism. We also discovered that trustworthiness can be predicted as a function of agreeableness and conscientiousness. Agreeableness was the most prevalent factor in predicting both trust and trustworthiness. We found that our trust and trustworthiness measures were positively correlated. Finally, we expanded our PTS measures by adding highly correlated Big Five items to each scale, significantly improving the reliability of our PTS measures.

**Study 2**

**Participants**

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.

**Materials**

Propensity to Trust Survey: When registering online for the study, participants completed the 28 item PTS.
The Investment Game: Participants were randomly assigned to one of three conditions of an economic task known as the Investment Game. In each condition, participants were led to believe that they were participating in the Investment Game with a human partner in another room. However, there was no actual partner and the decisions of the “partner” were controlled by the experimenter. [For complete instructions see Appendix C]

In the trustor condition participants played the role of the sender: they decided how much of their initial $10 endowment to send to an unseen partner.

In the trustee condition participants played the role of the receiver: they received an investment of $15 (a tripled $5 investment from the sender) and decided how much of that $15 to return back to the sender.

In the simultaneous condition participants simultaneously played as the sender and the receiver: They decided how much of the $10 to invest, and then how to share $15 (a tripled $5 investment). In this condition participants were led to believe that another player was simultaneously playing the corresponding roles of sender and receiver.

Big Five Inventory: After finishing the Investment Game, participants completed a 120 item Big Five Inventory constructed with the same IPIP items used in Study 1.

Procedure:

Participants registered for the experiment online. Upon registering, they completed the Propensity to Trust Survey. Then, they selected a session for the experiment, and were assigned into one of three conditions: the trustor condition, the trustee condition, or the simultaneous condition. Participants were assigned to conditions 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). They were told that they would not meet these other individuals. All of their actions would remain anonymous.

Then, participants were told the rules of the task. They were told that they would play the role of the sender, the receiver, or both simultaneously. The senders would decide how much money to send, the receivers would decide how much money to return, and players in the simultaneous condition would make both decisions sequentially. During the experiment, subjects would not be able to see or interact with each other. Instead, their decisions would be delivered by the experimenter.

After participants finished the game, they completed a Big Five personality inventory.

The experiment took thirty minutes. 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 completion of the study.

Results

Amount Sent: Participants in the trustor condition showed varying degrees of trust, $M = 3.36$, $SD = 3.79$, $N = 30$. 5 participants invested all of the initial $10, 14 invested between $2 and $8, and 11 sent no money at all. This is consistent with previous findings on the Investment Game. Individuals in the simultaneous condition showed even more trust, $M = 6.98$, $SD = 3.12$, $N = 30$. 14 of the 30 participants invested all $10. The participants in the simultaneous condition invested significantly more money than those
in the trustor condition, $t(58) = 4.039, p < .001$. [Figure 1] The participants in the simultaneous condition faced a reciprocal situation, and because they were on an equal footing with their partners, felt more comfortable investing their endowments.

Using these data, we predicted the amount sent using our PTS and Big Five measurements. The Big Five measures were not significantly related to behavior. Our best approximation of the amount sent found that our trust scale and the participant’s condition were linear predictors of the amount sent. Participants who were more trusting sent more money, and those who were assigned to the simultaneous condition sent more as well. There was no interaction between trust and condition.

<table>
<thead>
<tr>
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<th>SE</th>
<th>t</th>
<th>p</th>
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</thead>
<tbody>
<tr>
<td>intercept</td>
<td>1.70</td>
<td>0.98</td>
<td>1.74</td>
<td>0.088</td>
</tr>
<tr>
<td>trust</td>
<td>0.15</td>
<td>0.05</td>
<td>2.91</td>
<td>0.005</td>
</tr>
<tr>
<td>condition</td>
<td>1.42</td>
<td>0.45</td>
<td>3.11</td>
<td>0.003</td>
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$F(2, 55) = 13.43$, $p < .001$  
Adjusted $R^2 = 0.30$

Amount returned: Participants in the trustee condition returned varying amounts of the $15 investment, ($M = 5.17, SD = 3.77$). 14 of the 30 participants returned $5, leaving both players with an equal outcome of $10 each, and only 5 participants chose to return no money to the investor. 8 participants returned more than $5 to the sender, rewarding the other player’s decision to invest money at their own expense.

The data from participants in the simultaneous condition tells us a different story. There are two rounds of decision making in this condition: In the first round, participants decide how much of their $10 they would like to invest in a partner. In the second round, participants receive $15 ($5 tripled) from their partner, and decide how much to send back. By the second phase of the game, each participant has already invested a certain
amount of money. In this condition, the decision to return money was influenced by whether or not the participants felt that their partner had reciprocated their trust. Participants felt betrayed if they received less money than they had sent. We found a negative relationship between amount sent in the first round and amount returned in the second round, \( r(30) = -0.44, p < .015 \).

Next, we attempted to predict the amount returned using the PTS measure of trustworthiness. Analyzing the trustee and simultaneous conditions together, we found that our trustworthiness measure did not predict amount returned, nor were the two variables correlated. Big Five measures were also unable to predict the amount returned. However, there is a problem with analyzing these two conditions together. Consider our previous findings of participants in the simultaneous condition: We discovered that individuals who are more trusting were likely to send more money, and that those who send more money would return less. In conjunction, these effects could be canceling out the predictive power of our PTS measures for participants in this condition. To correct this problem we isolated subjects in the trustee condition. Trustworthiness and the Big Five measures were still unable to predict amount returned. However, we found a significant correlation with trust, \( r(30) = 0.62, p < .001 \).

Finally, we analyzed our Investment Game data using the expanded PTS measures that we developed in Study 1. Our findings showed no improvements over the original PTS measures.

Discussion

The results of Study 2 showed that the PTS trust scale is a valid predictor of both trusting and trustworthy behavior in the Investment Game. We found that trust could be
used to predict how much money participants would send, and in the case of the trustee condition, how much they would return. In the simultaneous condition, we found that the reciprocal nature of the game encouraged participants to be more trusting. Furthermore, the decision to return money in this condition was related to the perceived reciprocity of the other player. Participants returned money when they felt that their trust in the other player had been validated. We also showed that the original and expanded PTS scales can be used interchangeably to predict behavior.

General Conclusions

The findings of Study 1 show that trust and trustworthiness are compound personality traits; each is significantly related to multiple Big Five domains. The dimension of trust, as we have measured it, has strong components of agreeableness and negative neuroticism. Agreeableness plays the most significant role in predicting trust. This is consistent with our understanding of interpersonal trust. We cannot study trust without considering its existence in social behavior. Individuals who are high in agreeableness, those with strong cooperative tendencies, are more likely to show trust. We have also found that people who are high in neuroticism are less likely to be trusting of others. One possible explanation is that these individuals worry more about possible negative outcomes. They are more likely to form negative perceptions about situations and others. In the Investment Game, high neuroticism (as a component of trust) influences individuals towards self-interested, rational behavior.

Similarly, we have found that trustworthiness is related to the domains of agreeableness and conscientiousness. As in the case of trust, agreeableness is the strongest predictor of trustworthiness. The relationship between agreeableness and
trustworthiness follows naturally. In social situations, trustworthiness depends upon the individual’s ability to put the interests of others first. It is naturally related to unselfishness, cooperative tendencies, and empathy. The conscientiousness component of trustworthiness is also fairly straightforward: The concept of trustworthiness follows naturally from integrity and a sense of personal responsibility, two elements of conscientiousness.

The findings of Study 2 show that our measure of trust is both valid and behaviorally relevant. Our analysis found that the Big Five could not be used to predict behavior in the Investment Game. However, the PTS trust scale could predict amounts sent and returned. The significance of our findings is not that the Big Five is unrelated to behavior. Rather, these findings show that the influence of the Big Five is mediated through compound traits such as trust and trustworthiness. [Figure 2] Distal traits, such as the Big Five, relate to the broadest dimensions of personality. They are the building blocks that we must utilize in order to construct meaningful measures of compound traits, such as trust and trustworthiness. In turn, these compound traits will give us insight into individual differences of behavior.

We also found evidence to support the reciprocal relationship between trust and trustworthiness: Study 1 showed that our trust and trustworthiness scales were positively correlated, and that they shared a strong common component of agreeableness. Study 2 found that our trust scale was strongly correlated to behavioral measurements of both trust and trustworthiness. Furthermore, participants in the simultaneous condition (which represents a reciprocal relationship) were willing to invest more money.
relationship between the traits of trust and trustworthiness, and it is worth consideration in future research.

In our analysis, we attempted to improve our scales by adding highly correlated Big Five items to them. In Study 1 this improved the reliability of our scales, increasing both the $\alpha$ values and the average correlations between items. However, in Study 2 we found that these expanded scales were no better than the originals at predicting behavior in the Investment Game. With this in mind, we will refrain from permanently amending the PTS to include these items. While these reliability improvements are noteworthy, it is important to retain the integrity of our survey. Trust and trustworthiness are related to Big Five domains, but it is important to explore their independent qualities as well. The concept of trust is more than just a linear combination of agreeableness and neuroticism. It would be limiting to rely upon a survey which borrows too heavily from Big Five surveys.

The results of our studies offer an integrative approach to the measurement of interpersonal trust. We have shown that the traits of trust and trustworthiness exist in the domains of the Big Five, and that these compound traits can be used to predict economic behavior. We have shown that the PTS can be used as a common ground between the methodologies of personality psychology and behavioral economics. In this paper we presented the Propensity to Trust Survey, assessed its reliability as a psychometric measure, and used it as a predictor of strategic behavior.

Limitations of the present study

In our studies, the Investment Game was a useful tool to draw out individual differences in trust. Participants in the trustor and simultaneous conditions chose to invest
different levels of money. These differences were related to scores in the PTS trust measure. However, the results of the trustee condition leave something to be desired. Participants in this condition were given $15 (a tripled $5 investment), and asked how much they would like to return to the sender. The majority of participants chose to return either $0 or $5. The popularity of returning $5 can be explained by an aversion to inequality – in this outcome both players finish the game with equal amounts of money, $10 each. This tendency is consistent with social preference theory, but it has overwhelmed the personality differences that we hoped to draw out with the PTS. The trustee condition was a less than ideal tool to assess the construct validity of our trustworthiness measure. It would be better to use multiple behavioral measurements of trustworthiness in the Investment Game. In a future study, it would be beneficial measure how participants would respond to different levels of investment ($1, $3, $5 etc). In doing so, we could better measure differences in behavior.

Areas for future research

In future research, it would be beneficial to consider the far reaching domains and outcomes of interpersonal trust. Trust is one of the fundamental building blocks of human interaction, and the Investment Game is only one possible measure at our disposal. In these studies we attempted to define the broadest dimensions of trust and trustworthiness. As we continue to study trust, we must consider whether the propensity trust is a universal construct. Will our measure of trust remain valid in different contexts? For example, can romantic trust and economic trust be measured using the same scale? What are the social and personal outcomes of being a trusting person? In the future, it would be worthwhile to explore whether the PTS could be used to study trust differences in other
situations. As personality psychologists, we must resist the urge to accept a narrow view of interpersonal trust.

In a larger sense, our studies present a unique approach to the study of economic decision making. We have found that differences in interpersonal trust can be explained with both survey and behavioral measures. More importantly, we have shown that personality measurements are valid predictors of strategic behavior. The methodology of “personality economics” can be applied to study the matrix of differences in social behavior. Consider well-studied dimensions such as selfishness, risk aversion, and conformity. The integration of survey and behavioral measures could provide us with new insights into these phenomena. With the growing interest in behavioral economics and integrative research in the social sciences, now is an ideal time to expand the study of personality to these areas. In the future, measures such as the PTS provide us with the tools to understand and explore the diversity of human behavior.
Participants in the Investment Game were given the chance to send up to $10 to a player in another room. Whatever money they sent would be tripled. Participants showed varying levels of trust. Those assigned to the simultaneous condition invested significantly more money.
Figure 2 shows the integration of our findings on the measurement of trust. Study 1 explored relationships between the Big Five and PTS scales. Study 2 found relationships between the PTS and decision making in the Investment Game. In our research, we were unable to directly link Big Five traits to economic behavior. As our model indicates, their influence was mediated through our measurements of trust and trustworthiness. These results demonstrate the convergent validity of the PTS as a psychometric measure.
Appendix A

Propensity to Trust Survey

Directions: On the following pages, there are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes you. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex, and roughly your same age.

Please use the following scale as you are answering the questions
1) Very Inaccurate
2) Moderately Inaccurate
3) Slightly Inaccurate
4) Slightly Accurate
5) Moderately Accurate
6) Very Accurate

1) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Am not interested in other people's problems.
2) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that people should fend for themselves.
3) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Hold a grudge.
4) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that criminals should receive help rather than punishment.
5) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Stick to the rules.
6) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that the end justifies the means.
7) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Can get along with most people.
8) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Find it hard to forgive others.
9) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that people are basically moral.
10) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Can be relied upon by others.
11) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Have a good word for everyone.
12) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Break my promises.
13) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that people seldom tell you the whole story.
14) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Trust what people say.
15) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Anticipate the needs of others.
16) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Use flattery to get ahead.
17) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Feel short-changed in life.
18) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Enjoy being part of a group.
19) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe in an eye for an eye.
20) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Have always been completely fair to others.
21) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Value cooperation over competition.
22) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that most people would lie to get ahead.
23) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Would never cheat on my taxes.
24) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Believe that laws should be strictly enforced.
25) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Return extra change when the cashier makes a mistake.
26) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Love a good fight.
27) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Listen to my conscience.
28) ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) 6 Love to help others.
Appendix B

Extended Propensity to Trust Survey Items

Trust items

- Am not really interested in others. (Agreeableness)
- Am on good terms with nearly everyone. (Agreeableness)
- Am out for my own personal gain. (Neuroticism)
- Feel at ease with people. (Agreeableness)
- Get angry easily. (Neuroticism)
- Get irritated easily. (Neuroticism)
- Insult people. (Agreeableness)
- Sympathize with others’ feelings. (Agreeableness)

Trustworthiness items

- Feel little concern for others. (Agreeableness)
- Feel others' emotions. (Agreeableness)
- Inquire about others' well-being. (Agreeableness)
- Neglect my duties. (Conscientiousness)
- Respect others. (Agreeableness)
- Show my gratitude. (Agreeableness)
- Take time out for others. (Agreeableness)
- Think of others first. (Agreeableness)
Appendix C

Truster Condition Instructions

The Interaction Exercise

You start this exercise with $10. You can keep this money and do with it whatever you wish or you can send some or all of it to another person in another room (whom you will never see or meet). Any money that you send will be \textit{tripled} on its way to them. Thus, if you send them $1, they will receive $3; if you send them $3, they will receive $9; if you send them $10 they will receive $30. You can send them any amount that you wish. You can send them nothing if you wish. This decision is completely up to you.

If they receive any money from you, they will then have a choice to send some, none, or all of it back to you. (Remember, they will have 3 times what you sent them.) They can send back any amount that they wish.

(Note: whatever they send back will not be tripled.)

They will never see or meet you. They will know all of the rules and all of the information that you know.

Do you want to send any money to this other person? If so, how much? You can send anything from nothing to all of the $10.

Indicate how much you want to send here: $\text{______________}$

Briefly tell us why you did what you did?
Trustee Condition Instructions

The Interaction Exercise

A participant in another room was given $10. They were told that they could keep the money and do with it whatever they wished, or they could send some or all of the money to you. Any money that they sent to you would be **tripled** on its way. Thus, if they sent you $1, you would receive $3; if they sent you $3, you would receive $9; if they sent you $10, you will receive $30.

The other person was given $10

They sent you _____ (tripled, this gives you _____ They have retained _____)

You can send back any amount that you wish. You can send them some, all or none of the money if you wish. They will never see or meet you. They know all of the rules and all of the information that you know.

This decision is completely up to you.

How much do you keep for yourself? _____

How much do you give the other person? _____

(Remember – the money you send back will NOT be tripled.)

(Obviously, the total of these two numbers needs to be _____)

Briefly tell us why you did what you did?
Simultaneous Condition Instructions

The Interaction Exercise

Part 1

You start this exercise with $10. You can keep this money and do with it whatever you wish or you can send some or all of it to another person in another room (whom you will never see or meet). Any money that you send will be **tripled** on its way to them. Thus, if you send them $1, they will receive $3; if you send them $3, they will receive $9; if you send them $10 they will receive $30. You can send them any amount that you wish. You can send them nothing if you wish. This decision is completely up to you.

If they receive any money from you, they will then have a choice to send some, none, or all of it back to you. (Remember, they will have 3 times what you sent them.) They can send back any amount that they wish.

(Note: whatever they send back will not be tripled.)

The other person has also been given $10 and the same instructions. They may choose to send none, some, or all of that money to you. You will then have a choice of how to share that money with the other person. Both of you will receive the sent money only after you have both made your decisions.

They will never see or meet you. They will know all of the rules and all of the information that you know. Your decisions will take place simultaneously.

Do you want to send any money to this other person? If so, how much? You can send anything from nothing to all of the $10.

Indicate how much you want to send here: $_____________

Briefly tell us why you did what you did?
Simultaneous Condition Instructions

The Interaction Exercise
Part 2

The other person sent you _____ (tripled, this gives you _____ They have retained _____.)

Reminder: You just sent _____ to the other person (tripled, this gives them _____). The other person will now decide how much of the _____ to send back to you.

How much do you keep for yourself? _______

You will keep this money, in addition to the _____ you retained from the first part.

How much do you give the other person? _______

(Remember – the money you send back will NOT be tripled.)

(The total of these two numbers needs to be _____)

Briefly tell us why you did what you did?
Bibliography


Author’s Note

I began researching interpersonal trust over a year ago. Today, I am both amazed and relieved to find that my project is coming to a close. It has been an incredible experience for me, and I cannot count the ways in which I have grown as a student and a social scientist. I am deeply indebted to the many people who have encouraged me in this journey.

First, I would like to thank Northwestern University for supporting my research. This project would not have been possible without funding from the summer and academic year Undergraduate Research Grants. My research benefited greatly from the encouragement and input of Christopher Hayden and Kathryn de Luna at the Office of Fellowships.

My work has also been supported by my professors in MMSS and psychology. I would like to thank Sean Gailmard (Political Science) for advising the summer research that led to the development of the project, Rick Zinbarg (Psychology) for allowing me to use his laboratory space to run subjects, Keith Murnighan (Social Psychology, Kellogg) for assisting me with study design, and my faculty advisor, William Revelle (Psychology), for his support and insights over the past nine months.

I would like to thank everyone who participated in my study and assisted me in recruiting subjects.

And finally, I would like to give special thanks to Sarah Muir for her tireless administrative support. I would never have completed this project without the resources and support of Sarah and the MMSS program.