Identifying Personality Traits to Enhance Trust between Organisations – An Experimental Approach[*]

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Abstract

We investigate an experimental *representatives' trust game* which resembles trust relation-ships between representatives of organisations. Personality traits of subjects are elicited by a personality questionnaire (Cattell's 16 PF-R) which is well established in personnel psychology. For the first time personality traits are linked to actually observed behaviour in a trust game. Detailed personality profiles are derived and it is shown that they differ significantly between behavioural types. Individuals with low scores in *anxiety* turn out to be particularly qualified for enhancing trust between organisations. The proposed method of validating personality questionnaires and the obtained personality profiles promise to be valuable when screening candidates.

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1. Introduction

Trade between firms, e.g., in supply chains, becomes largely facilitated if organisations *trust* each other. Not only has *trust between organisations* been identified to lower transaction costs (Barney and Hansen, 1994, Uzzi, 1997, Dyer and Chu, 2003, Hite, 2003) but it is also seen as essential to enable exchange given that contracts are bound to be incomplete (Macaulay 1963, Fehr et al., 1997, Egglestone et al., 2000, Bohnet et al., 2001, Irlenbusch, 2004). Although the notion of *trust between organisations* is commonly used (Zaheer et al., 1998, Edwards and Kidd, 2003) it appears to be obvious that organisations do not exhibit trust. Trust is an attitude which can only be shown by people rather than by organisations. Note that while organisations cannot trust as a whole entity it is in principle possible, however, that they are the recipients of trust which they might honour or betray on return. In a very simple case organisations interact via single *representatives* who can be seen as *individual boundary-spanning agents* (Friedman and Podolny, 1992, McEvily et al., 2003). It is intuitive to assume that these representatives would benefit from having certain personality traits in order to be qualified for enlarging trust between organisations. The current paper aims at contributing to the largely unresolved question of what these personality characteristics actually are.

As an example consider a representative *A* acting on behalf of her organisation who can show trust while interacting with another person *B* representing a different organisation. In such a situation on the one hand the decision of person *A* to trust is likely to depend on issues which similarly play a role in trust relationships between individuals, e.g., whether *A* in general is inclined to trust other people or whether *A* thinks *B* is trustworthy or not, etc. On the other hand *A*'s decision depends on additional factors, which come into play because each of the two agents represents an organisation, e.g., whether *A* is willing to bear the risk of potential negative consequences even if these are not only experienced by her but also by other members of her organisation or what *A* thinks in how far *B* will be influenced by the fact that other members of his organisation also have to bear the consequences of his decision. Further influencing factors in this vein might be how *A* perceives *how things are done* in *B*'s organisation, i.e., what *A* thinks about the culture in *B*'s organisation or how *A* judges the decision processes and the hierarchical influence employed in *B*'s organisation. Thus, trust between representatives of organisations seems to be considerably more complex than trust between individuals.

In this study we investigate an experimental trust game which resembles such a trust relationship between representatives of two organisations. Since these relationships are highly complex in our game we abstract from several inter-organisational issues by concentrating on

the simple fact that representatives have to take decisions whose consequences do not only affect their own well-being but are also somehow borne by *other* members of the own organisation. We are especially interested in the question of what kind of personality traits people should have to successfully act as trust enhancing representatives in the way described above. To approach this question we compare personality traits of subjects with behaviour shown in an adapted version of the *trust game* introduced by Berg, Dickhaut and McCabe (1995). In their game a first mover (the *sender*) decides whether to share an integer fraction x of a total endowment of € 10 with a second person (the *responder*). The sent amount will be tripled to $3x$ and this will be given to the responder. Subsequently, the responder decides whether to return an integer share y of the (tripled) amount $3x$ to the sender, i.e., $0 \leq y \leq 3x$. Different to this original trust game in our adapted *representatives' trust game* participants decide as representatives, i.e., their decisions have payoff consequences not only for themselves but in the same way also for a group of other players whom they represent.

The amounts that are sent and returned allow us to categorise sending and responding representatives. As for the personality measurement we use the German version (Schneewind and Graf, 1998) of the Cattell's 16-PF-R questionnaire from the Institute for Personality and Ability Testing, Inc., Champaign, Illinois. This is one of the most explored and most detailed methods of personality assessment which is widely employed in personnel psychology. We start our analysis by classifying subjects according to their trust and trustworthiness behaviour revealed in the experimental trust game. Senders are categorized as *selfish*, *altruistic*, and *trusting*. The classification of responders comprises *strong reciprocators*, *weak reciprocators* and *egoists*. In a next step the personality assessments allow us to derive distinctive personality profiles for each type of representatives. Since we correlate the behavioural measures of trust and trustworthiness with the individual personality factors obtained from the personality assessment, the obtained personality profiles promise to be valuable for HR units that want to screen candidates with respect to their ability to enlarge trust between organisations.

A range of studies in the organisational literature already investigates intra-organisational trust between individuals (Rousseau et al., 1998, Dirks and Ferrin, 2001). In the context of trust between organisations the standard definition of trust (Rousseau et al., 1998, p. 394 or Mayer et al., 1995, p. 712) has to be extended to account for other members of the organisation affected by the decisions. Thus, in the following we think of trust between organisations as "the willingness of a representative *A* to make herself and other members of her organisation vulnerable to the actions of another representative *B* based on the expectation

that the representative *B* will perform a particular action important to the members of *A*'s organisation – irrespective of the ability to monitor or control the representative *B* and irrespective of the fact that *B*'s action might negatively affect the representative *B* as well as other members of *B*'s organisation." In accordance with Gunnthorsdottir et al. (2002) we describe an organisation as being trustworthy or showing a reciprocal behaviour if its representative *B* voluntarily repays a previous trusting move from a representative *A* which is beneficial for the members of *A*'s organisation, although defaulting on such repayment is in the short-term self-interest of the members of *B*'s organisation. In the following we assume that if trust is reciprocated, members of both organisations gain from the exchange.

As the existence of trust and trustworthiness enables beneficial exchange from a macro perspective, it is found valuable to be for societies as a whole (Knack and Keefer, 1997, Zak and Knack, 2001). The detailed conditions for the occurrence of trust and reciprocity between individuals on a micro level are extensively investigated in experimental studies (Fehr et al., 1993, Güth et al., 1997, Bolle, 1998, Abbink et al., 2000, Dufwenberg and Gneezy, 2000, Fahr and Irlenbusch, 2000, Clark and Sefton, 2001, Camerer, 2003, Fehr and Fischbacher, 2003, Ashraf et al., 2004, Cardenas and Carpenter, 2005, Ho and Weigelt, 2005).[1] While literally hundreds of experiments exist which confirm that human individuals often reciprocate trusting actions and to a large extent are willing to show trust, the experimental literature on trust behaviour is quite sparse when individuals are embedded in groups or organisations. The setting most akin to our experimental setup is independently and concurrently proposed by Song (2005). Similar to our setting in her *autonomous agent mechanism* senders and responders are each constituted by a group of three players. In each group the privately taken decision of one of the players – the autonomous agent – is decisive for how the trust game is played. In contrast to our experiment, however, each group takes part in a face to face quiz activity before decisions are made. The only purpose of the quiz is to establish a group-identity without having any further consequences on endowments and actions. In a sense our group formation is more elementary as a group is exclusively constituted by the fact that all group members share exactly the same consequences of the decisions taken by the representative players. Thereby we exclude hardly controllable effects

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[1] Since recently researchers are increasingly interested in identifying human predispositions of individuals towards trust and trustworthiness. So called neuroeconomic approaches aim at bringing light into the black box of the human brain by discovering brain regions that play a role when decisions of trust and trustworthiness are made (Camerer et al., 2005, Fehr et al. forthcoming). Neurobiological foundations are investigated by Kosfeld et al. (2005) who find indications that the neuropeptide Oxytocin might provide a biological basis for trusting behaviour in humans. In the foreseeable future, however, ethical as well as legal considerations seem to prevent HR departments from making use of this kind of knowledge when screening employees.

like sympathy or antipathy between group members. In Song (2005) subjects additionally take part in a trust game between two individuals. Interestingly, some evidence is found that subjects are less trusting and less reciprocating if they decide as a representative of a group. Note, however, that reciprocity is measured differently compared to our study. In Song's experiment responders only have to decide on how much to return to the amount *actually* sent by the sender. In a second study Song (2005) analyses group behaviour in the trust game if the members of a group have to reach a consensus about their decision in a discussion. The findings suggest that in such a setting the level of trust is not different between groups and individuals, but groups reciprocate significantly less than individuals. While this result is weakly supported by Cox (2002) it is challenged by the findings of Bornstein et al. (2004) who also compare individual behaviour with consensus group decisions in the trust game. Their findings tend to indicate that groups are less trusting than individuals, but that they are just as trustworthy. McEvily et al. (2006) find that subjects transfer a perception of trustworthiness, which they gained from an interaction with a group, to each of its individual members (see also Kramer et al. 1996, Buchan et al. 2002).

None of the mentioned studies that deal with investigations into trust behaviour between groups or organisations are concerned with identifying the personality traits of the people involved in the decisions. In fact we are not aware of any study which directly investigates potential correlations between personality traits and trust behaviour observed in an experiment. Such correlations would be quite valuable, e.g., for human resource managers, who have to rely on personality assessments to learn something about the applicant's predisposition to exhibit or enhance trust between organisations. As a common framework these personality assessments typically refer to the five-factor model, which is still seen as the workhorse of applied personality measurement despite some criticism in recent years (Funder, 2001, Smith et al., 2001). Linking personality measurements to actual behaviour observed in experiments can be seen as one way of validating these measurements to predict behaviour. Brandstätter (1993) was the first who suggested that also experimental investigations may profit from including versions of basic personality assessments since the insights from them might help to better explain experimental findings. In this spirit there already exist attempts to validate personality traits as derived from personality assessments with the behaviour in the laboratory. Brandstätter and Königstein (2001) innovatively relate personality traits – measured by a shorter version of the personality assessment than the one used in the present paper – to the bargaining behaviour in an ultimatum game with advanced production. They find support for hypotheses suggesting an influence of personality traits on the observed

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bargaining behaviour. Kurzban and Houser (2001) report correlations between several personality dimensions and types of contributors in a public good game. Boone et al. (1999) investigate the correlation between different measures of personality dimensions on cooperative behaviour by conducting prisoner's dilemma games. In contrast to the aforementioned studies and the present study Boone et al. use different scales and not the five-factor model.

In the two following sections we provide a brief introduction into the *Big Five* literature and suggest a classification of senders and responders from their behaviour in our representatives' trust game. Our experimental design and procedure are described in section 4 followed by the derivation of our hypotheses in section 5. Section 6 reports our experimental findings and section 7 concludes.

2. The *Big Five* – Eliciting personality traits

The five factor model is not primarily derived from a particular theoretical approach to structure personalities. It is more a result of early factor-analytic studies to organise multiple trait adjectives into a common taxonomic structure (cf. Norman, 1963, Funder, 2001). In addition, existing questionnaires were extended to resemble the structure of the adjective-based personality measures (John and Srivastava, 1999). Both, the lexical approach (Allport and Odbert, 1936) and the questionnaire-based research lead to a convergence to the *Big Five* personality dimensions in personality research (cf. McCrae and Costa, 1987, Costa and McCrae 1995, John and Srivastava, 1999).

In this paper we rely on a version of the *Big Five* presented as the 5 *global factors* in the German variant of the 16-PF-R (Schneewind and Graf, 1998). A brief description of the *global factors* is provided in Table 1. The answers to the questionnaire result in figures for 16 *primary factors* which each represent a more detailed personality trait. The values for the *primary factors* are then aggregated to the five *global factors*. Table A1 in the Appendix indicates the strength of the factor loadings.

Although most studies agree on the number of personality dimensions there is still no consensus on *which* personality traits should exactly be included into the *Big Five* and on the exact factor's meanings (John and Srivastava, 1999). In particular, when developing our hypotheses (see section 5) it is important to compare the 16 PF-R to a different – also very popular personality questionnaire: Table A2 in the Appendix shows the main correlations

between the five factors of the German 16 PF-R with the German version of the NEO Five-Factor Inventory (Borkenau and Ostendorf, 1993).

Table 1: The *Big Five* according to the 16 PF-R

Global factors	Description
Extraversion	Ability to be sociable, open to others and interested in the well-being of others. Extroverts enjoy drawing attention and are characterised as lively, spontaneous, and enthusiastic.
Anxiety	High values in this global factor characterise worried and affective persons, afflicted by self-doubt. Low values on the other side characterise self-confident and even-tempered persons.
Self-control	Individuals with a high values in self-control are very concerned about social norms, dutiful and perfectionist. Low values in this scale characterize unreliable, unorganized persons without restraint.
Independence	High values in this global factor are measured for dominant individuals who form their own opinion and be emphatic on it among others. People with low values in the factor independence tend to accommodate others and try to avoid conflicts. These individuals are sensitive, warm-hearted and influence able.
Tough-mindedness	Tough-minded individuals are conservative in their views and insist on traditional ways to cope with new aspects. Individuals with low values in the factor tough-mindedness are curious and eager for knowledge. They could be characterised as intuitive, creative and open to new ideas.

The *global factors* are described according to Schneewind and Graf (1998).

3. Classification of senders and responders

Besides the direct measure of trust exhibited by the sender – given by the amount sent to the responder – we make use of guesses about the expected return amounts to come up with a more elaborate classification. This enables us to differentiate between investment intentions and altruistic motives.

In particular, by considering the actually sent amount together with the associated guessed return amount we are able to categorise three types of senders (Table 2a). We denote senders who send nothing as being *selfish*. Senders who send a positive amount but do not expect to increase their final payoff by their decisions are labelled as *altruistic*. A sender who trusts that the responder will reciprocate on a strictly positive amount sent and thereby hopes to increase the final payoff by this investment is called *trusting*. Note, that it might well be possible, that

senders expecting high return transfers are additionally driven by altruistic motives. On the side of responders we are particularly interested in how far the responders react on the amount sent to them. To classify responders' behaviour is complicated by the fact that in general only the return amount on the *same* sent amount allows a direct comparison of responders' intentions. We tackle this problem by employing the strategy method, i.e., we ask each responder to state the return amount for every possible positive transfer before actually knowing the concrete transfer from the sender. Thereby we are able to measure their inclination to behave reciprocally. This is done by calculating for each responder the slope of a curve fitting the returned amounts to every amount potentially transferred by the sender. We term this measure *return-sensitivity*. Formally, the return-sensitivity is given by β which is measured in a regression of the following form: $y(x) = \alpha + \beta x + \varepsilon$ where x denotes the possible transfers by the sender and $y(x)$ indicates the returned amount. Because it requires a minimum transfer of $x = 3$ for the responder to be able to generate equal payoffs by the return decision we only include observations on transfers greater or equal to 3, i.e. 8 data points per individual responder in the regression to determine the return sensitivity β. We end up with three categories of responders defined on the basis of β as depicted in Table 2b.

Table 2a: Classification of senders

Type	Sender's action and payoff according to own beliefs
selfish	$x = 0$
altruistic	$x > 0$ and $[\hat{y}(x) - x] \leq 0$
trusting	$x > 0$ and $[\hat{y}(x) - x] > 0$

Note: $[\hat{y}(x) - x]$ denotes the sender's final payoff where $\hat{y}(x)$ is the guessed returned amount corresponding to the actually transferred amount x.

Table 2b: Classification of responders

Type	Responder's behaviour
equalizer/ strong reciprocator	return-sensitivity ≥ 2
weak reciprocator	return-sensitivity < 2 and return-sensitivity > 0
egoist	return-sensitivity ≤ 0 and $y(x) \leq 1$ for all x

The return sensitivity is given by β which is measured in a regression of the following form: $y(x) = \alpha + \beta x + \varepsilon$, for values $x \geq 3$.

A few comments are in order to explain the definition of the category of egoists among the responders. A negative return-sensitivity is possible when a responder returns higher amounts for small transfers and smaller amounts for higher transfers. Additionally, a return-sensitivity of zero could in principle also be obtained by a constant return, for example a return of 9 Euros on every transfer between 3 and 10 Euros. This behaviour, however, can hardly be classified as egoistic. Therefore, we included an additional restriction on the size of the return-amounts, i.e., $y(x) \leq 1$ for all x.[2]

4. Experimental design and procedure

As mentioned above we implemented a one-shot trust game which corresponds to the investment game of Berg, Dickhaut, and McCabe (1995). In this game a first mover (the *sender*) received an endowment of 10 Euro while the second mover (*responder*) was endowed with 0 Euros. The sender could transfer any positive amount $x \in \{0, 1, 2, \ldots, 10\}$ to the responder. The transfer was tripled, i.e., the responder received an amount of $3x$. The responder subsequently decided on an amount $y \in \{0, \ldots, 3x\}$ he wanted to send back to the sender. The final payoffs were given by $(10 - x + y)$ for the sender and $(3x - y)$ for the responder. The only subgame perfect equilibrium of the game is constituted by a sent amount of 0 and return amounts of 0 on every possible transfer.

We ensured complete anonymity of individuals within *and* between the groups which each consisted of four members. Each group member was asked to decide as a representative of the own group. Senders had to decide on the amount they wanted to send and responders were simultaneously asked for return amounts on all possible transfers by the sender. After submitting their decisions all group members were equally likely to become their group's representative, i.e., the decision of an individual sender or responder was decisive for the group with probability 0.25. Additionally, we asked the senders to reveal their guesses about the decisions of the matched representative responder, i.e., about the return amounts for all possible transfers. Similarly the responders had to submit their guesses about what the matched representative sender would transfer. By asking all participants simultaneously for their complete strategy we were able to obtain a larger number of independent observations since all individual decisions are independent from each other.

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[2] In fact in the experiment we observe one responder with a negative return-sensitivity. The negative return-sensitivity in this case results from a non-monotone behaviour in the sense that this particular responder increased returns up to a transfer of 6 while returning very small amounts or nothing on high transfers. We also observed only a single responder with strictly positive returns and a return-sensitivity of zero. This participant decided to return an amount of only 1 Euro on every possible transfer.

The two sessions for the experiment took place on the 19th and 20th of April 2005 in the Cologne Laboratory for Economic Research. Subjects were recruited with the online recruiting system ORSEE (Greiner 2004) and were mainly students of Economics and Business Administration. While some had already participated in experiments we ensured that no one had been involved in a trust game before. Each session consisted of 24 individuals where 12 became members of a sender group and 12 of a responder group. Since individuals were put together in groups of four, this resulted in three groups in the role of the sender and three groups in the role of the responder per session.

After arriving in the laboratory individuals drew cards by which they were assigned to cubicles. Before being seated individuals were gathered in a corner of the laboratory room. Instructions were read aloud to the participants. Participants were told that they will find the instruction sheets (see appendix) in their cubicles, which they could read again afterwards. They could also ask clarifying questions which were answered in private by the experimenters. Participants were explicitly told that they will only take part in a single game. They were assured that the second part of the experiment will not be related to the decision in the first part of the experiment. In fact, till the end of the first part of the experiment they only knew that the first part will be followed by a second part but they did not know anything about its nature. The experiment was computerised and implemented with the experimental software z-tree (Fischbacher 1999). After having been seated in cubicles, roles and matching to groups were determined randomly by the software. Participants were asked to type in their decisions and guesses. On the decision screen a striking box reminded each participant of being randomly selected as the representative for the own group with a probability of 25 percent. As a result the own decision would then become decisive for all members of the group. After all participants had entered their decisions, the second part of the experiment started with the distribution of the instructions for the personality questionnaire (see appendix). The participants again had the chance to ask questions which would have been answered in private. However, none asked any question concerning the second part of the experiment. In total they had 50 minutes for answering the questionnaire, which comprised 186 questions. At a time one question appeared on the screen and a participant had to mark the answer which best fitted the own general behaviour. In both sessions filling in the personality questionnaire took no longer than 35 minutes. After all participants had completed the personality questionnaire they were informed on the screen about the actual decision of their group representative, the decision of the representative of the group they were matched

to and about their payoffs. Additionally, participants were invited to submit additional information about their age, gender and their subject of study or profession.[3]

At the end of the experiment subjects were paid in private according to their payoffs in the trust game as well as to the accuracy of their guesses about the behaviour of the representative player from their matched group. The average payments were 16.09 Euros (standard deviation: 3.73) for senders and 13.48 Euros (standard deviation: 4.88) for responders including 2.50 Euros show-up fee and a bonus earned for guessing the transfer/return-transfer in the experiment. The experiment lasted for about 90 minutes per session.

5. Hypotheses

When deriving hypotheses about participants' behaviour one has to take into account different aspects of their decision tasks: On the one hand a participant has to decide on whether to exhibit trust or reciprocate on a trusting move of another participant. In this respect the participants take decisions like in a dyadic interaction. On the other hand the fact that a participant decides as a representative of a group – whose decisions have monetary consequences not only for themselves but also for all group members – brings aspects of group behaviour into play, for example intergroup biases (Hewstone et al. 2002). Given these aspects we will draw on previous research findings on both, the individual-level and the group level to derive our hypotheses. Additionally we will rely on the descriptions of the global factors of the 16 PF-R (Schneewind and Graf, 1998).

Hypotheses on the behaviour of senders

Personalities with high values in *extraversion* tend to take an interest in the needs of others (Schneewind and Graf, 1998). There is evidence that high values in *extraversion* promote positive and cooperative interactions (Hogan and Holland, 2003), especially by increasing contextual performance[4] in settings of real team work, which is not explicitly modelled in our experiment (Morgeson et al., 2005). In an *extraversion-agreeableness* framework it is argued that individuals with low *extraversion* behave more cooperatively than high extraverts. This

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[3] Information about gender and age is of particular importance to translate the raw values from the personality assessment into "stenvalues". "Stenvalue" refers to "standardised ten" and describes the transformation of the raw values derived from the questionnaire with the help of so called "norm-tables" to a general scale, which is between 1 and 10. Norm-tables are constructed with the answers to the questionnaire of age and gender specific test-samples. A value of 5.5 represents the mean value for the respective global factor with a standard deviation of 2.

[4] Contextual performance encompasses activities that support the organisational, social, and psychological environment in a team setting and thereby facilitates effective team functioning (Morgeson et al., 2005).

somehow contradictory prediction is mainly due to the fact that friendly connotations of *extraversion* are entirely subsumed under the *agreeableness* dimension in the *extraversion-agreeableness* framework (Koole et al., 2001). In our context it is not obvious whether senders with high *extraversion* are inclined to take more interest in the need of the own group members or tend to take care of the members of the matched responder group. In the light of this inconclusive evidence with regard to our experimental setting we refrain from stating a clear behavioural hypothesis concerning the *extraversion* personality dimension.

Personalities with a high level in the global factor *anxiety* are apprehensive and shy away from taking risks (Schneewind and Graf, 1998). In our setting the only risk-free decision for the sender is to retain the endowment of 10 Euro. The mere nature of trust, however, is constituted by putting oneself at risk with the amount sent. It is therefore unlikely that an anxious sender will send high amounts if anything to the responders. This is even more the case in our setting since the sender puts not only himself at risk but also all other members of the group. High values in *anxiety* have been shown to be related with an emotional vulnerability (Table A1, John and Srivastava, 1999). In a sense the decision to send some money to the responder group makes the sender vulnerable on the transferred amount and thereby potentially causes disappointment. This effect might also be reinforced in our setting as the sender additionally decides on behalf of the other group members. In contrast *altruistic* senders might not expect to fully recoup their transferrals and therefore tend to be less vulnerable when sending a positive amount. Similarly, trusting senders might perceive the risk of sending a positive amount to be too high. We therefore state the following hypotheses:

> *Hypothesis 1a:Anxiety is negatively correlated with the amount sent by senders in the trust game.*

> *Hypothesis 1b:Selfish senders have higher values in anxiety than altruistic senders.*

> *Hypothesis 1c:Selfish senders have higher values in anxiety than trusting senders.*

Individuals with high values in the global factor *self-control* are obedient to social norms (Schneewind and Graf, 1998). The social norms relevant in our setting are not immediately obvious. On the one hand the fact that other group members depend on the decisions of the representatives could evoke a social norm of group responsibility. On the other hand in the dyadic interaction between the sender and the responder the social norms of cooperation and fairness could prevail. *Consciousness*, a NEO-FFI personality trait found to be significantly correlated with *self-control* (see Table A2), is also known to exhibit a strong correlation with individual job performance and team performance (see Barrick et al., 1998 and the references

therein). These team performance effects root in positive effects of *consciousness* on contextual performance (Morgeson et al., 2005) which might be only of minor importance in our setting. In a meta-analysis regarding predictors of organisational citizenship behaviour, *consciousness* has been the only dispositional variable which exhibits a major and significant association with organisational citizenship behaviour (Organ and Ryan, 1995). In particular, a positive correlation is found with back up behaviour[5] (Porter et al., 2003) and (self-reported) altruism (Organ and Ryan, 1995). Thus, it appears that high values in self-control indicate more pronounced cooperative behaviour. We derive the following hypotheses:

> *Hypothesis 2a: Self-control is positively correlated with the amount sent by senders in the trust game.*

> *Hypothesis 2b: Selfish senders have lower values in self-control than altruistic senders.*

> *Hypothesis 2c: Selfish senders have lower values in self-control than trusting senders.*

A low value in the global factor *independence* characterises individuals who rather accommodate to others and avoid conflicts if possible (Schneewind and Graf, 1998). From Table A2 we know that *independence* in the 16 PF-R is negatively correlated with *neuroticism* and *agreeableness* in the NEO-FFI. As reflected in the high negative correlation with the factor *agreeableness* in the NEO-FFI low *independence* goes along with warm-heartedness and sensitivity. *Agreeableness* is positively correlated with contextual performance in teams and cooperative behaviour (Mohammed et al., 2002 and Morgeson et al., 2005). Because contextual performance plays virtually no role in our setting and the fact that *neuroticism* rather promotes selfish behaviour in the specific role of senders we refrain from stating a clear hypothesis regarding the influence of *independence* on the behaviour of senders.

Curiosity and openness to experience are associated with low values in the factor *tough-mindedness* (Schneewind and Graf, 1998). How these characteristics might influence the senders' behaviour is not straightforward. Therefore, we are not able to come up with a corresponding hypothesis.

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[5] Backing up behaviour is generally defined as helping others to fulfil their role, e.g. helping others to correct mistakes (Porter et al., 2003).

Hypotheses on the behaviour of responders

In the following we will use the return-sensitivity as a measure for the willingness of an individual to reciprocate. A different measure for reciprocity is defined by the amount returned on "full trust" (Jacobsen and Sadrieh, 1996), i.e., on an investment of 10 Euros.

There is no unambiguous prediction on the extent of cooperation of responders from high values in the global factor *extraversion*. Brandstätter and Königstein (2001) follow the framework of Brandstätter and Waldhör (1992) in stating a hypothesis of high (negative) reciprocity orientation if a person scores high on *extraversion* combined with low *emotional stability* (which is roughly equivalent to the antonym of the factor *anxiety*) on negative reciprocity. Perugini et al. (2003) have investigated correlations between combinations of different levels of *extraversion* and *emotional stability* with positive reciprocal behaviour. They end up with the – to some extent – puzzling result that the correlation between *extraversion* and positive reciprocity changes its sign depending on the level of *emotional stability* (Perugini et al., 2003). Given these findings we forbear from hypothesizing on the influence of *extraversion* on the behaviour of responders in our context.

The strategic situation of responders is fundamentally different from that of senders which lead to a different reasoning concerning the influence of the personality dimension *anxiety* on the send back behaviour of responders. A decision to return money does not involve a risk for the representative responder in the sense that the responder makes himself vulnerable to the sender. However, the literature reports that individuals with high values of the global factor *anxiety* are less cooperative (Barrick et al, 1998, Morgeson et al., 2005).

> *Hypothesis 3a: Anxiety is negatively correlated with the return-sensitivity.*

> *Hypothesis 3b: Equalisers have lower values in anxiety than weak reciprocators.*

> *Hypothesis 3c: Equalisers have lower values in anxiety than egoists.*

Following the arguments discussed above concerning the personality dimension *self-control* we hypothesise that high values in *self-control* lead to more pronounced reciprocal behaviour on the side of responders. *Conscientious* individuals are likely to avoid social loafing and free-riding (Morgeson et al., 2005 and the references therein). Social norms on cooperation are likely to govern the behaviour of responders and curb their temptation to gain from the sender's transferral.

> *Hypothesis 4a: Self-control is positively correlated with the return-sensitivity.*

> *Hypothesis 4b: Egoistic responders have lower values in self-control than weak reciprocators.*

Hypothesis 4c: Egoistic responders have lower values in self-control than equalisers.

Ashton et al. (1997) hypothesise that high values in the NEO-FFI *agreeableness* – which is negatively correlated with *independence* (see Table A2) – are associated with reciprocal altruism. Perugini et al. (1997) find that *agreeableness* is positively correlated with positive reciprocity. With all necessary wariness given the somewhat ambiguous content of the global factor *independence* we expect this personality dimension to be negatively correlated with reciprocal behaviour on the side of responders:

Hypothesis 5a: Independence is negatively correlated with the return-sensitivity.

Hypothesis 5b: Egoistic responders have higher values in independence than weak reciprocators.

Hypothesis 5c: Egoistic responders have higher values in independence than equalisers.

It is difficult to derive a clear prediction on responders' behaviour from values in the personality dimension *tough-mindedness*. If at all we would expect *tough-minded* responders to send back only small amounts and have a low return-sensitivity. However, given that the literature provides no evidence on the relation between the personality trait *tough-mindedness* and cooperative behaviour we have no hypothesis on the influence of that particular personality trait on responders' behaviour.

6. Results

6.1 Behaviour observed in the representatives' trust game

Figure 1a shows the frequencies of transfers by senders as well as the responders' guesses observed in our representatives' trust experiment. More than 20 percent of the senders invest nothing which constitutes a slightly higher percentage than in the original trust experiment by Berg et al. (1995). More than 16 percent of the senders invest everything which is a comparable fraction to the original experiment. The average investment of 5.84 Euros of those who transfer a positive amount lies within the bandwidth of 40 percent and 60 percent of average investments that are typically observed in standard trust experiments (Camerer 2003). The guesses of responders and the actual transfers of senders are not significantly different at a conventional significance level (Mann-Whitney-U-test).
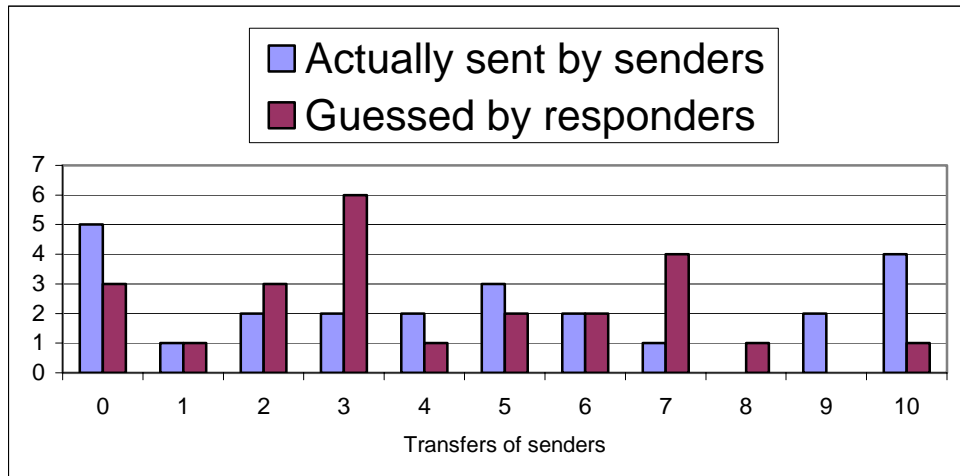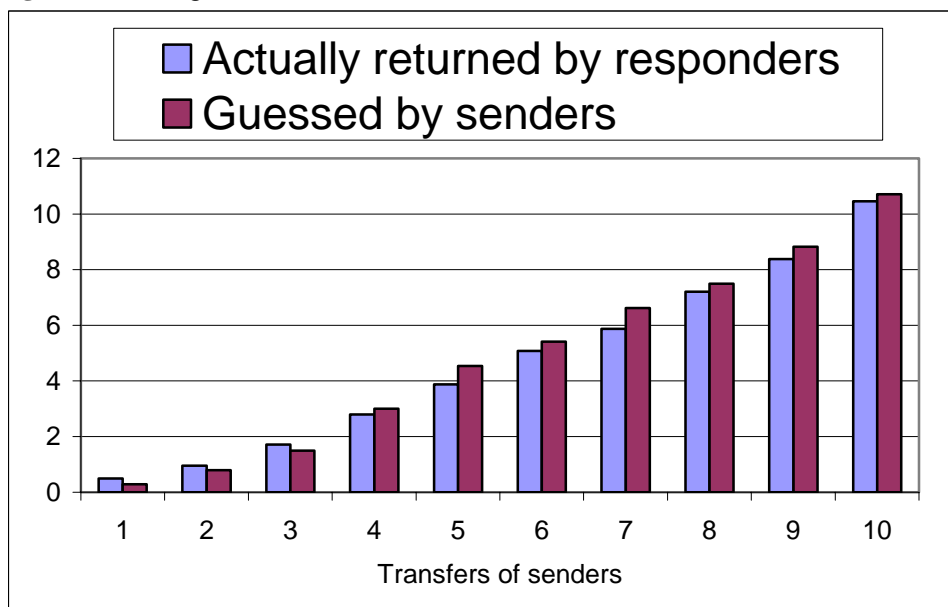
Figure 1a: Transfer frequencies

Figure 1b: Average returned amounts

The returns on every possible transfer as well as senders' guesses are graphically displayed in Figure 1b. While on first sight the average guessed returns appear to be slightly higher than the actual returns by the responders it turns out that they are not significantly different at a conventional significance level (Mann-Whitney-U-test).

Following the classification of senders suggested in Table 2a we classify 5 of the 24 senders in the experiment as *selfish*, 10 as *altruistic* and 9 as *trusting* according to their sending behaviour and their guesses. According to the classification in Table 2b 7 of the 24 responders are classified as *equalisers* or *strong reciprocators*, 12 are classified as *weak reciprocators* and 5 as *egoists*. As one can expect from the definitions of the types, *trusting* senders – i.e., those expecting to increase their payoffs by their investment – transfer weakly significantly higher amounts (on average 7.22 Euros) than *altruists*, with an average investment of 4.60

Euros (two-sided exact, Mann-Whitney U-test, $z = 1.81$, $p = 0.07$)[6]. The higher return expectations of *trustors* are reflected in an average guessed return-sensitivity of 1.43 which is higher than the average guess of *altruists* (1.07) and the average guess of *selfish* senders (0.49).[7] In particular, *trustors* expect on average a return transfer of 13.07 Euros on the full investment of 10 Euros, *altruist* 9.80 Euros and *selfish* senders 5 Euros.[8] The average return-sensitivity for the different responder groups reflects the respective classification (see Table 2b). The average return-sensitivity is 1.19, *equalisers* have a return-sensitivity of 2.18 (a value of 2.00 would represent a strategy of exact equalising payoffs), *weak reciprocators* of 1.12. *Egoists* with an average return-sensitivity of -0.03 keep their return transfers almost constant and do not adapt to an increased investment of the sender.

6.2 Personality factors and trust behaviour

In the following we analyse possible correlations between global factors and behaviour in the trust game measured as (*i*) the transfers of senders, (*ii*) return-sensitivity of responders and the (*iii*) the return amounts of responders to a transfer of 10 Euros ("full trust"). For senders the only noteworthy – however only weakly significant – (negative) correlation is observed between the transfer and the values for the factor *anxiety* (one-sided Spearman's rank correlation rho $= – 0.30$, $p=0.08$). While we find weak support in favour of hypothesis 1a, we find almost no correlation between transfers and the value of the factor *self-control* and therefore have to reject hypothesis 2a. For responders we find a significant correlation between the return-sensitivities and the personality dimension *anxiety* (one-sided Spearman's rank correlation rho$= – 0.38$, $p=0.03$) which supports hypothesis 3a. *Anxiety* is also negatively but only weakly significantly ($p=0.09$) correlated with the return to a transfer of 10 Euro. The hypotheses 4a (*self-control*) and 5a (*independence*) cannot be supported.

When comparing the personality factors for different types we find support for hypothesis 1b: *Selfish* senders obtain significantly higher values of *anxiety* compared to *altruistic* senders (one-sided exact U-test: $z=2.28$, $p=0.01$). *Selfish* senders (7.02) have weakly significantly higher average values of *anxiety* compared to *trustors* (5.11, one-sided exact U-test: $z=1.67$, $p=0.05$). Thus, we find weak evidence in favour of hypothesis 1c. As conjectured in

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[6] When applying the Wilcoxon-Mann-Whitney U-test in this paper we also calculate the Kolmogorov-Smirnov equality-of-distributions test. The two tests always produce similar results.

[7] The differences in the guesses of the return sensitivity between *trustors* and *altruists* (two-sided exact U-test, $z=2.45$, $p=0.01$) and *trustors* and *selfish* senders ($z=3.0$, $p=0.001$) are both significant.

[8] Again pair wise differences between guesses of *trustors* and *altruists* and *trustors* and *selfish* senders are significant and highly significant, respectively.

hypothesis 2b the average value for *self-control* of *selfish* senders (5.04) is lower than that of *altruistic* senders (6.22), but the difference is not significant. *Selfish* senders have significantly lower values in *self-control* than *trusting* senders (6.80, one-sided exact U-test: $z=2.07$, $p=0.02$) which supports hypothesis 2c.

Concerning the hypotheses regarding personality and responders' behaviour in the trust game we find evidence in favour of hypothesis 3b. Participants with higher values in the personality trait *anxiety* are significantly less likely to be found among *equalisers* compared to *weak reciprocators* (one-sided U-test, exact: $z=2.28$, $p=0.01$). The average standardised value for *anxiety* among the *egoistic* responders is 5.9 compared to 4.47 among the *equalisers*. The difference is weakly significant (one-sided U-test, exact: $z=1.55$, $p=0.07$) and thus hypothesis 3c can weakly be supported. We find no evidence for hypotheses 4b and 4c: While *egoists* have an insignificantly slightly higher average value for *self-control* than *equalisers*, the average value for *weak reciprocators* is even higher than that for *egoists* (5.48 compared to 5.1). *Egoistic* responders have significantly higher values in the personality trait *independence* (average value of 5.92) than *weak reciprocators* (average value 4.38; one-sided U-test, exact: $z=1.95$, $p=0.03$) which supports hypothesis 5b. The pair wise comparisons with the average standardised values for *independence* for *equalisers* (5.09) is not significant. Thus, hypothesis 5c cannot be supported.

6.3 Multiple Regression Analysis

To provide additional insights into our findings we report a multiple regression analysis. Results are presented in Table 3. Regarding our hypotheses on the correlations between personality factors and the amount sent by senders in the trust game (Hypotheses 1a and 2a) we cannot reject the null hypothesis of no correlation between the respective personality factor and the transfers of senders. These findings are not surprising given the relatively weak support in favour or hypothesis 1a on the basis of the non-parametric tests reported above. However, an F-test rejects highly significantly the null hypothesis that the joint influence of the *Big Five* on the decision of senders in specification (2) is zero (F=4.56, p=0.008). According to the R^2 of 13% in specification 1 the explanatory power of a model that explains senders' behaviour on the basis of personality alone is still substantial. We find a strong positive correlation between the expected return-sensitivity which is estimated on the basis of expectations by senders of return-transfers by responders and transfers of senders. This finding indicates that senders have chosen their transfers consistent with their expectations.

According to columns 3 and 4 in Table 3 we can reject the null hypothesis of no correlation in favour of hypothesis 3a but find no evidence in favour of hypothesis 4a and 5a. Interestingly, we find that those expecting the other groups' representative to send higher amounts exert reciprocal behaviour as measured in the highly significant positive correlation between the expected transfer and return-sensitivity. The explanatory power of personality on responders' behaviour is with a R^2 of 19% higher than the corresponding value for senders and substantial.

Table 3: Multiple regressions for the influence of personality on senders' and responders' behaviour in the representatives' trust game.

Dependent variable:	Senders transfer		Responders return-sensitivity	
	(1)	(2)	(1)	(2)
Extraversion	0.043	-0.382	0.031	0.069
	[0.479]	[0.423]	[0.140]	[0.112]
Anxiety	-0.613	-0.212	-0.330**	-0.218*
	[0.482]	[0.335]	[0.153]	[0.129]
Self-control	-0.313	-0.483	0.076	0.128
	[0.583]	[0.372]	[0.124]	[0.106]
Independence	0.223	0.745	-0.119	-0.066
	[0.666]	[0.479]	[0.117]	[0.090]
Tough-mindedness	-0.128	-0.375	0.043	0.014
	[0.523]	[0.375]	[0.076]	[0.064]
return-sensitivity[#]		3.991***	-	-
		[0.894]	-	-
expected transfer	-	-		0.185***
	-	-		[0.052]
Constant	9.075	3.84	2.880*	0.897
	[5.635]	[3.515]	[1.501]	[1.456]
Observations	24	24	24	24
R^2	0.13	0.59	0.19	0.51

Note: Robust standard errors in brackets
* significant at 10%; ** significant at 5%; *** significant at 1% in a one-sided test.
[#] The return-sensitivity is calculated on the basis of guessed returns.

The multiple regression model allows investigating the correlation of a particular personality factor with the decision of senders or responders holding the influence of other personality factors and expectations constant. However, one has to be aware that such a parametric statistical analysis is more demanding on the distributional assumptions. In fact it might be that in our setting the linearity assumption might be problematic. Unfortunately, we are unable to account for a potential non-linear relation between personality factors and transfers due to the substantial reduction of degrees of freedom when including categorical variables as explanatory variables.

6.4 Personality profiles and trust behaviour

Personality profiles, i.e., the *synopsis* of the values for all major personality dimensions of an individual are an essential tool for personnel psychologists (see for example Barrick and Mount, 1991). In the following we derive the personality profiles for different types of senders and responders as constituted by the *Big Five*. By averaging the values of the global factors over all subjects belonging to the same behavioural type in the representatives' trust game we obtain the types' personality profiles. If these personality profiles are significantly different between different types of senders and responders this would confirm that personality profiles could constitute a valuable tool for predicting actual behaviour. Moreover, a discussion of the main differences between personality profiles of different behavioural types of senders and responders mirrors the analysis in the previous section on the relationship between single personality dimensions and behaviour in the trust game.

Figure 2a: Personality types of senders, 16PF-R global factors

Note: Averages of global factors for sender types. 5.5 denotes the average score of the test sample to construct the personality assessment with a standard deviation of two (as marked by grid lines).
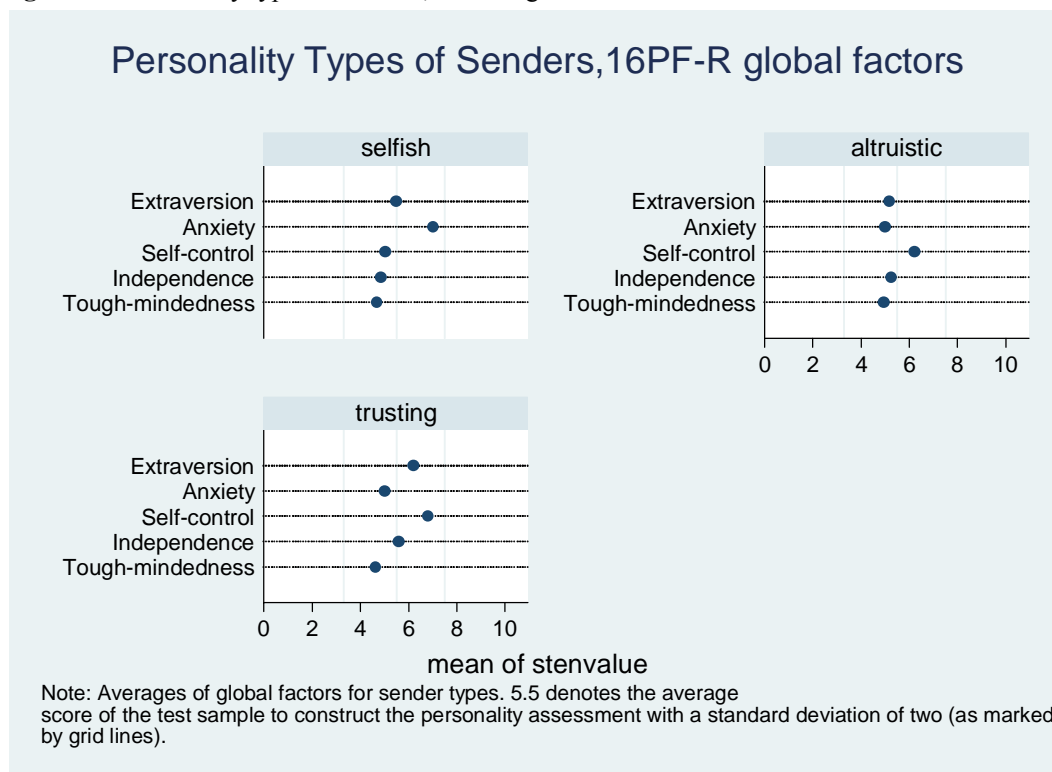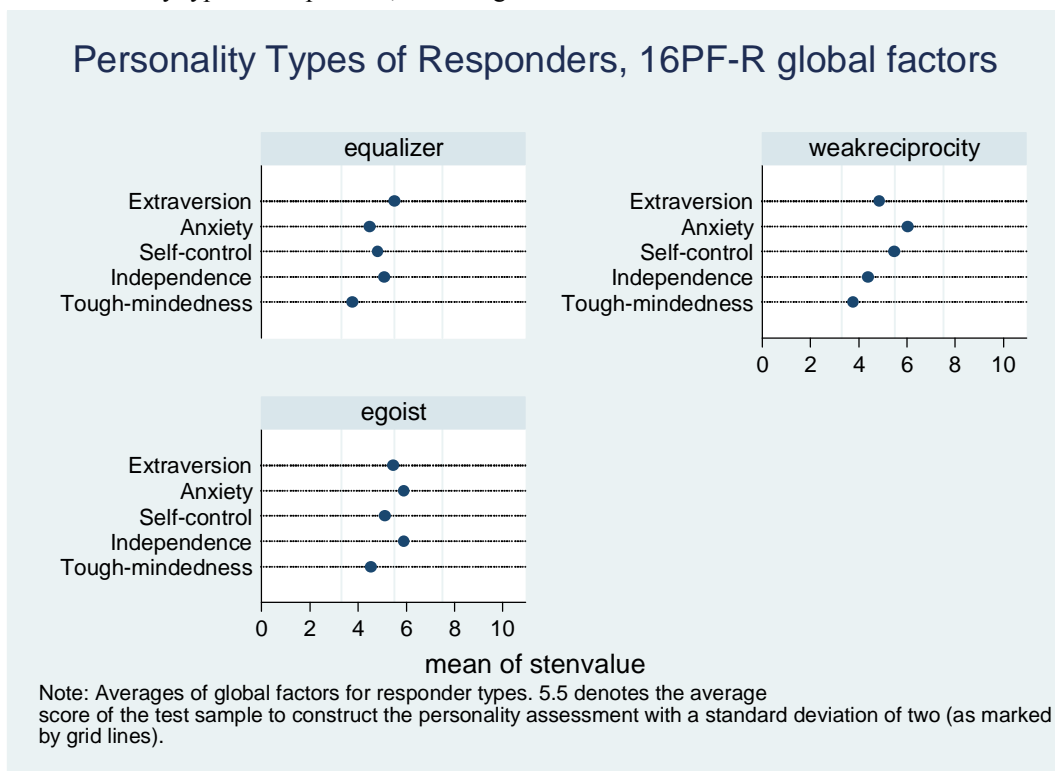
Figure 2a shows the personality profiles constituted by the global factors for all three sender types. A pair wise comparison of profiles shows a highly significant difference of the profile of *trustors* compared to *selfish* senders ($\chi^2 = 36.32$, $p<0.01$) as well as of *altruists* compared to *selfish* senders ($\chi^2 = 27.49$, $p<0.01$). The profiles of *trustors* and *altruists* differ significantly at the 5 percent level ($\chi^2 = 12.05$). The profiles of *trustors* are characterised by higher average values in the global factor *extraversion* (6.20) and *self-control* (6.80) than the profiles of

selfish senders (5.50 and 5.00) and *altruists* (5.20 and 6.20).[9] Following the description of these global factors in Schneewind and Graf (1998) we can characterise *trustors* as showing a strong orientation towards other individuals. They seem to internalise social norms of cooperation and act dutiful. *Selfish* senders, who – by definition – send nothing in the trust game, have particularly high values in *anxiety* (7.00 compared to 5.00 for *altruists* and *trustors*) and low levels in *self-control*. They seem to avoid taking any risks and have low frustration intolerance.

Figure 2b: Personality types of responders, 16PF-R global factors

Note: Averages of global factors for responder types. 5.5 denotes the average score of the test sample to construct the personality assessment with a standard deviation of two (as marked by grid lines).

The different personality profiles for the three types of responders are displayed in Figure 2b. A comparison reveals that the profiles of *weak reciprocators* differ highly significantly from those of *equalisers* and *egoists* according to χ^2-statistics (χ^2= 24.78 and χ^2= 15.80, respectively). *Weak reciprocators* have higher values in the global factor *anxiety* (average value 6.00) and *self-control* (avg. 5.50) compared to *equalisers* (4.50 and 4.80, respectively). *Weak reciprocators* are characterised by somewhat lower values in the factors *extraversion* and *tough-mindedness* compared to *egoists*, but they show much lower values in the factor *independence* (average value of 4.40 compared 5.90). Profiles of *equalisers* and *egoists* also

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[9] Personality profiles with primary factors also show highly significant differences in all pair wise comparisons between sender types. Detailed results are available from the authors upon request.

differ significantly ($\chi^2 = 13.80$). The main differences are clearly higher average values in the factor *anxiety* for *egoists* (5.90 compared to 4.50) and somewhat higher values for *egoists* in the factors *independence* (5.90 compared to 5.10) and *tough-mindedness* (4.50 compared to 3.80). By following Schneeweis and Graf (1998) in their description of the personality profiles obtained from *equalisers* and *egoists* we can portray the former as trustworthy and self-confident while the latter are rather dominant and react inflexible to unforeseen situations.

7. Discussion

Trust between organisations is known to largely facilitate exchange transactions. We model a rudimentary inter-organisational trust relationship by introducing an experimental *representatives' trust game*. The game resembles situations in which representatives take decisions on behalf of organisations. Similar to a standard trust game a sender representing one group can send money to a different group. The money is tripled by the experimenter and a responder representing the other group can decide whether to send an amount back to the sender group or not. A decision of a representative has the same (monetary) consequences for himself as for all members of the own group. The observed behaviour in the game enables us to classify senders as being *selfish*, *altruistic*, or *trusting* and responders as being *egoists*, *weak reciprocators*, or *strong reciprocators*. Additionally we elicited personality traits for each single participant via a personality questionnaire which is commonly employed in personnel psychology. By linking these personality traits to behaviour in the representatives' trust game we are able to derive personality profiles for each behavioural type of senders and responders.

Personality profiles turn out to be different for different types of behaviour. This can be seen as an encouraging result in favour of the assumption that personality assessments via questionnaires constitute a valid tool for screening individuals with abilities to exhibit trust and trustworthiness. Although the support for some of our hypotheses is mixed it appears that individuals with low *anxiety* might be especially qualified to enlarge trust between organisations. This seems to be true for senders as well as for responders. Senders should not be too anxious to go ahead with an investment into a relationship and take some risk associated with an exchange transaction even if potential (short-term) negative consequences are not only born by themselves but also by other members of their organisation. Analogously, responders should not be too anxious to reciprocate on generous transfers even if this causes (short-term) disadvantages for all members of their group. Senders could also

benefit from *self-control* which might incline them to obey social norms of cooperation. Behaving reciprocally in the role of responders seems to be easier for persons with relatively low values in *independence* since they are more inclined to accommodate to potentially perceived entitlements of senders.

Selecting the right people with personality traits qualifying for specific positions and tasks becomes increasingly important for the efficient functioning of organisations. Personality questionnaires are a common method employed to screen potential candidates, for example, to qualify for becoming a leader (Hogan et al., 1994) or to fit specific organisational cultures and virtues (Moberg, 1999). In general, however, the validation of personality questionnaires is quite difficult (Hogan and Holland, 2003). As we suggest in this paper, laboratory experiments might provide a valuable tool for validating questionnaires by relating their results to actually observable behaviour.

Of course, our study can only be a first step into the direction of identifying personality traits which are valuable for inter-organisational trust relationships. Future work needs to consider, for example, larger and representative subject pools and personality traits that facilitate building up reputation for being trustworthy. In this vein an interesting topic for future research is the question of how organisations as a whole – with their organisational culture and procedures – can succeed in establishing a reputation of trustworthiness. What kind of personality traits should employees have to establish such a reputation?

Additionally, in our view it will become essential for successful economic modelling to take different types of personalities into account. In this respect personality profiles suggest themselves as a natural way to differentiate between economic agents.

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Appendix

Instructions (Original were in German)

Instructions for the experiment (Part 1)

Basic Structure

- There are Players with Role A and those with Role B.

- In the beginning **Player A** receives an amount of 10 EUR and has to decide, how many Euro x (in whole numbers out of {0, 1, …, 10}) to transfer to the assigned Player B. Player A keeps the remaining amount (10-x).

- After a transfer of x Euro, Player B receives 3x Euro. Afterwards Player B can transfer an amount y (in whole numbers out of {0, 1, …, 3x}) to Player A. Player B keeps the rest of (3x-y). Player A receives the amount y.

- This results in the following **payoffs**:

Player A:	$10 - x + y$	**Player B**:	$3x - y$

Procedure

- Each participant is randomly assigned either the Role of Player A or the one of Player B.

- Each Player A decides on an amount x as a transfer to Player B.

- For every possible amount x, Player B decides on a transfer y.

Allocation and payoff

- At the beginning of the experiment, groups of four people each having the same role in the experiment are grouped together. The allocation to a group is random and remains unchanged throughout the experiment. Who of the participants forms a group is not announced.

- After each participant has made a decision, a representative will be drawn at random from each group. Each member of a group has the same chance to be determined as the representative. Who of the group members has become the representative will not be announced.

- The decision by the representative is taken as the decision for every single group member, which means that the decision of the representative is decisive for the payoff of every member of the group.

- Each „Player A"-group is randomly assigned to a „Player B"-Group. The payoffs for the members of each group result from the decisions of the respective representatives of each group. All members of a "Player A"-Group receive the identical amount resulting from the above rules. The same is true for all members of a "Player B"-Group.

- At the end of the experiment, you are paid in cash according to your payoff.

- Additionally, all participants receive a show-up fee of 2.50 EUR.

Conjectures

- After a Player A has made the transfer decision, we ask for the player's guesses about the amounts y a Player B will transfer conditional on each possible amount x.

- After Player B has made the transfer decision, we ask for a guess about the amount x transferred by Player A.

- The guesses will be compared with the actual decisions of the matched player. The closer the guesses are to the actual decision(s), the higher is an additional bonus paid to the guessing player. The bonus is 1 EUR at maximum and 0 EUR at minimum.

Please notice:
During the entire experiment no communication is allowed. If you have any questions, please raise your hand out of the cubicle. All decisions are made anonymously. This means that none of the participants will know the identity of another decision maker. The payoffs are paid out anonymously and nobody learns how much another player has earned.

Good luck!

Instructions to the experiment (Part 2)

We now ask you to answer a few questions.

Please notice:
The analysis of this questionnaire is meant to derive scientific conclusions. The answers are analysed anonymously. No connections whatsoever are dawn to you as person.

What it is about: Below you find a number of statements. The question are about your interests or about your opinions. The following examples try to illustrate this. Please read both examples and think about what your answer would be.

I	I like to watch sports on television.	o	correct
		o	?
		o	Not correct

II	I prefer to have friends, that…	o	are calm
		o	?
		o	are vivid

If you personally like to watch sports on television, then you should click with the mouse on the first answer (correct). And if you prefer vivid friends over those with a calm temper, you should click on the second choice at question II. Only one question will appear at a time. After you selected the appropriate answer, you should confirm your answer with „ok".

The other questions are similar to the two examples given above. Before you start, please pay attention to the following:

Please read every statement carefully and select the answer that best describes you personally. There are no "right" or "wrong" answers, answer according to what seems right for you personally.

Do not use too much time to think about a certain statement; give the first, natural answer that comes to your mind. Due to organisational reasons the time you are allowed to spend on all questions is limited. You can see the remaining time in seconds in top right corner. After the time has elapsed, the questionnaire stops.

Please try, as much as possible, to select either an „a"- or a „c- answer. The choice in the middle is a "?"; try to mark this answer only, if neither „a" nor „c" fits to yourself.

Answer honestly. It is important, that you answer as careful and as honest as possible. Only give an answer that fits to yourself. Do not give an answer, just because you think, one should say something like that or because you would like to be that way.

At the end of the questionnaire there is an additional set of questions, that demand a „right" or „wrong" answer – when this set of questions is ahead, you will be notified.
As already mentioned, however, in the beginning there are no „right" or „wrong" answers.

Tables

Table A1: Main ingredients of *global factors* from *primary factors* in the 16 PF-R

Primary factors:	Extraversion	Anxiety	Self-control	Independence	Tough-mindedness
Warmth	+ +				–
Reasoning					
Emotional stability		– –			
Dominance	+			+ +	
Liveliness	+ +				
Rule-consciousness			+ +		
Social boldness	+ +				
Sensitivity					– –
Vigilance					
Abstractedness					– –
Privateness	– –				
Apprehension		+ +		–	
Openness to Change					– –
Self-reliance	– –				
Perfectionism			+ +		
Tension		+ +			

Note: ++/+ and – –/– denote the sign of the main factor loadings (i.e. those > |0.30| of primary factors on global factors. ++ and – – denote strong positive and negative loadings (those > |0.50|), respectively. This is a modified version of Table 2.7.2 in Schneewind and Graf (1998).

Table A2: Main correlations between 16 PF-R global factors and the corresponding factors in the NEO-FFI

Personality inventory	*Big Five* dimensions				
16 PF-R	Extraversion	Anxiety	Self-control	Independence	Tough-mindedness
NEO-FFI	Extraversion (0.67)	Neuroticism (0.64)	Consciousness (0.50)	Neuroticism (- 0.40) Agreeableness (- 0.32)	Openness to experience (- 0.45)

Note: The table summarises results presented in table 5.2.1 in Schneewind and Graf (1998). Major significant correlations (i.e. those > |0.30| with $p < 0.01$) are reported in parentheses.