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Small talk and theory of mind in strategic decision-making

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The Role of Personality Beliefs and "Small Talk" in Strategic Behaviour*

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Abstract

Humans are predisposed to forming "first impressions" about the people we encounter including impressions about their personality traits. While the relationship between personality and strategic decision-making has been widely explored, we examine the role of *personality impressions* in predicting strategic behaviour and devising behavioural responses. In a laboratory setting, after only 4-minutes of "small talk", subjects developed a sense of the personality of their partners, particularly extraversion, which consequently changed their behaviour in future interactions. Subjects cooperated more in public goods games when they believed their partner to be extraverted and found it more difficult to out-guess opponents they perceived as similar to themselves in a level-k reasoning task, having engaged in conversation with them. We trace how language can generate these effects using text analysis, showing that talking more makes individuals appear extraverted and pro-social which in turn engenders pro-social behaviour in others.

1 Introduction

It is human nature to form "first impressions" or perceptions about the people we meet based on observable verbal and non-verbal behaviours. Social psychologists suggest that the central unit used to understand the behaviour of those around us is closely bound to our perceptions about personality traits (Moskowitz and Olcaysoy Okten, 2016). Information about others' traits plays an integral role when inferring their behaviour in a new setting

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(Hoffman et al., 1981), which in turn can help us prepare our own behavioural response when we interact with them. The implication is that anything that helps us learn about the personality of others can and will change our behaviour towards them in the future.

Personality impressions can be based on a wide variety of elements, such as conversations, manner of speaking, non-verbal actions and physical appearance. Much of the prior literature has focused on personality beliefs formulated from observed physical appearance (Naumann et al., 2009), recorded expressions or behaviour (Hall et al., 2008) and face-to-face interactions (Eaton and Funder, 2003). In our experimental study, we focus on personality beliefs formed in a brief (4-minute) period of "small talk" communication conducted using instant messaging software, together with the ensuing impact of such beliefs on behaviour in later strategic interactions in the laboratory. The emphasis on small talk follows from its ubiquitous role in any social interaction. In a period of negotiation there is often an initial burst of small talk, during a typical working day office workers might chat next to the water cooler or in the office corridor, and appointments with a doctor or financial adviser might begin with pleasantries and a mention of the weather. Opting for instant messaging in the laboratory allows us to omit any confounding effects originating from visual and auditory stimuli. Also, by allowing communication only before the nature of future interactions is known we avoid discussions about future strategies.

Personality theory has become a useful tool in Economics to explain strategic behaviour (Proto, Rustichini, and Sofianos, 2019; Proto and Rustichini, 2014; Rustichini et al., 2016; Johnson et al., 2009; Hirsh and Peterson, 2009). We hope to expand on the usefulness of personality theory by exploring the impact of impressions about another individual's personality on subsequent strategic interactions with them. Given our controlled laboratory setting and the brevity of the communication, our analysis focuses on the two broadest and most fundamental personality traits, extraversion and neuroticism (Costa and McCrae, 1980). Extraversion and neuroticism, which are associated with positive and negative affect, respectively (Costa and McCrae, 1980; Canli, 2004; Watson, Wiese, et al., 1999; Watson and Clark, 1992) are most likely to be detected in a short bout of interaction due to their pervasive nature. Extraverts, characterised by sociability, warmth, gregariousness and positive emotions (McCrae and Costa, 1999), stand out in most social settings. On the other hand, the temperamental traits of high emotions, fear, anger and poor inhibition of impulse, associated with neuroticism (Costa and McCrae, 1980), could also be distinctive in a brief interaction.[1]

Our research strategy is to consider free-form communication: subjects in our labora-

[1]In line with this literature, our results confirm that beliefs about the other three "Big Five" traits, openness, conscientiousness and agreeableness cannot be accurately detected in our experiment. In fact our results suggest that, of the two fundamental traits, subjects could only form reasonably accurate beliefs about extraversion after a short conversation.

tory experiment were not aware that they would eventually face each other in strategic settings, but even if they realised that it was likely they had no inkling of the rules of the games to follow. Nevertheless, in the treatment setting they were given the opportunity to communicate with each other: an opportunity not made available to those in the control setting, who instead produced text in an unrelated placebo task. The advantage of this setting is of course that any variation in behaviour between treatment and control groups must be linked causally to the treatment. A second key feature is the brevity of the communication itself: communication was restricted to a mere 4 minutes: a period of time that is purposefully kept short to reflect the briefest of first impressions or to reflect the kind of small talk that occurs in daily life. The brevity of communication should make the impact of communication all the more remarkable.

Subjects were asked to complete both a standard personality test (the Big Five Inventory or BFI (John and Srivastava, 1999)) as well as an IQ test.[2] They then communicate with a partner for 4 minutes in the treatment, or undertake a placebo task in the control. After this phase they are asked to guess how their partner might have answered the same personality and IQ questions. This guess enabled us to measure the role of a very brief period of communication in developing a cohesive set of beliefs about the personality of their partner. Subjects were also asked to take the "Eyes Test" (Baron-Cohen et al., 2001), which served as a measure of the mental modelling of others, otherwise known as "Theory of Mind" (Coricelli and Nagel, 2009), which could potentially affect the accuracy of belief formation. The Eyes Test and belief elicitation are incentivised as there are measurable correct answers.

Following belief elicitation, subjects engaged in two archetypal and well-understood games: the two-person public goods game and the 11-20 money request game. The public goods game examines social preferences and free-riding and can also be seen as the simplest possible setting in which there is tension between team-work and individual rationality. The 11-20 money request game (Arad and Rubinstein, 2012), on the other hand, is a simple two player game which triggers level-k reasoning (Costa-Gomes et al., 2001) and tests cognitive ability in a competitive environment (Fe et al., 2019). The public goods game requires players to specify how much they are willing to contribute to a communal pot (Fehr and Gaechter, 2002; Herrmann et al., 2008). While both players benefit from contributions, the individually rational choice is to contribute nothing, hoping to free-ride on the other player's contributions. The 11-20 game grants players payment equal to their numerical choice but with a high bonus if they pick a number one below that of their rival. The game is normally modelled using level-k reasoning: if level 0 (L0) involves the

[2]The Big Five personality traits are extraversion, neuroticism, agreeableness, conscientiousness and openness.

non-strategic choice of 20, then L1 (defined as the best response to L0) would be to pick 19. More generally LK, best responding to LK-1 necessitates a choice of 20-K, enabling us to infer the cognitive level of a player through their numerical choice. To omit learning effects the experiment is restricted to one-shot games. Just prior to playing these games, players were asked to predict how their partners might play which was again incentivised: giving us an insight into belief formation. In this way we form a direct link from communication to belief formation to behaviour in two distinct settings.

Our results indicate that beliefs about others' personalities, formed after engaging in small talk with them, can influence decisions made in outcome interdependent games[3]. However, the manner in which personality beliefs influence decision-making depends on the nature of the game. In the level-k reasoning task, where the objective is to out-think the partner, what matters is the perceived difference between the player and their partner's personalities, which may be due to the human tendency of anchoring to self-knowledge when inferring the choices of similar others (Tamir and Mitchell, 2013). In particular, the level chosen in the 11-20 money request game is influenced by the perceived similarity (or difference) between the player and their partner's extraversion. The smaller the perceived difference, the higher the level chosen. This result is consistent with the *perceived similarity hypothesis* (Thomas et al., 2014). The hypothesis posits that individuals believe that those perceived as similar to themselves will think and act like them when faced with the same situation. When the perceived difference between the player and the partner's personality is small, the player chooses a higher level, suspecting that the partner will reason likewise and choose a higher level themselves. When the perceived difference between the player and the partner is small it is harder for a player to best respond to the distribution of level-k beliefs, as it becomes harder to out-think the opponent[4].

In contrast, choices in the social preferences game are influenced by the absolute value of the partner's perceived type. We find that, for players who engage in small talk with their partner, cooperation in the public goods game increases when the partner is believed to be extraverted. This result is in line with the known association of trait extraversion with pro-social behaviours like cooperation (Carlo et al., 2005; Burke and Hall, 1986). Moreover, *beliefs* about partner's extraversion has a greater effect on cooperation relative to *own* extraversion, a finding robust to whether we use Ordinary Least Squares (OLS) or 2-stage least squares (2SLS) instrumental variable regression specification.

[3]The impact of personality beliefs on strategic behaviour was significantly more pronounced among the treated subjects who engaged in small talk, compared to the control, who had no information upon which to base predictions about their partner's personality.

[4]In the paper we use the terms *opponent* and *partner* interchangeably to refer to the individual the subject was randomly matched with, as the study involved both competitive and cooperative tasks. However, to keep the language neutral, during the experiment the partner or opponent was referred to as 'the other player' (see the experiment script in Appendix D).

Since small talk communication is the only means that players have to develop personality beliefs in the study, and the opportunity to communicate is the only difference between the control and treatment groups, we conducted a direct examination of the text used during small talk. We observed that the more talkative partners are believed to be extraverted, consistent with Mehl et al., 2006, who found that personality judges rated talkative individuals higher on extraversion. While the number of words used is especially helpful as a mechanism for detecting extraverts, providing a reasonably accurate forecast of type, there remains a persistent own-type bias: particularly, extraverts are prone to *complementary self projection bias* making them likely to overstate the extraversion in their partners.

Extraversion is particularly relevant when examining the role of personality beliefs in influencing strategic behaviour. Of all the personality traits, subjects could only form reasonably accurate beliefs about a stranger's extraversion, after engaging in small talk with them for a brief period. Extraverts, due to their sociability, vigour and outgoing friendliness, are distinctive by nature, making them the most detectable in a brief interaction. Accurate impressions about the other personality dimensions might require future research involving longer interaction times in real-world settings.

Alongside our main contribution on the role of personality beliefs on strategic behaviour, we contribute to research exploring *personality attribution*, by focusing on impressions formed from instant messaging rather than physical appearance or face-to-face interaction (Eaton and Funder, 2003; Little and Perrett, 2007; Naumann et al., 2009; Albright et al., 1988). We also add to the existing modest research on the role of small talk which has focused on topics such as building solidarity in work places (Pullin, 2010), examining investor sentiment using discussions on stock message boards (Das and Chen, 2007) and improving medical outcomes (Ragan, 2014).[5] Our study instead focuses on the role of small talk on unknown future strategic settings and in particular on the relationship with personality theory which in turn feeds into belief formation. Our focus is therefore on the mechanism that allows unstructured communication to alter behaviour and outcomes that are unknown at the time of communication. Lastly, our study contributes to the literature on strategic sophistication which finds that individuals adjust strategies given the information they have about the opponents (Fe et al., 2019; Georganas et al., 2015; Gill and Prowse, 2016). Existing work finds that people adjust strategies based on *exogenous*

[5]We should also contrast the literature on "small talk" with the the large literature on communication with *prior knowledge* of what is to follow (Charness and Dufwenberg, 2006; Bochet et al., 2006; Cooper et al., 1992; Dawes et al., 1977) in which individuals can send messages that relate to future decision-making. In contrast to this "cheap talk" literature, our paper studies how communication between players can affect behaviour when the nature of any future interaction ("rules of the game") is unknown to the players which makes it harder to incorporate strategic content into communication, forcing our subjects to engage in small talk.

information provided such as information about the opponent's cognitive ability (Fe et al., 2019). We add to this literature through a novel examination of how individuals adjust their behaviour in the light of *endogenous* belief formation about the opponent's personality.

The rest of the paper is structured as follows. Section 2 details the experimental design and the core hypotheses. Section 3 presents the results from the experiment. Section 4 concludes. As the very first study of the interaction between personality beliefs, small talk and strategic behaviour, our work will be necessarily exploratory. Thus, the study can act as a first step before further research: we discuss our results further in a speculative discussion presented in Appendix D.

2 Methodology

2.1 Experimental Design

The experiment was conducted in a laboratory setting.[6]

First, at the onset of the experiment each subject was asked to take the 44-item Big Five Inventory personality test or BFI (John and Srivastava, 1999). The answers to the BFI questionnaire were used to compute an average score for each of the 5 personality traits and the trait scores were then standardised (so each trait distribution had mean 0 and standard deviation 1).

Second, the BFI was followed by an incentivised cognitive ability test, taken from the Raven's Progressive Matrices test (Raven, 2003), in which subjects were asked to attempt 30 visual puzzles (adapted from Proto, Rustichini, and Sofianos, 2019). The test was incentivised to motivate cognitive effort required in the task, as is the standard approach within Economics (Proto, Rustichini, and Sofianos, 2019; Proto, Sgroi, et al., 2019).

Third, after the Raven's test the subjects were asked their beliefs about their own performance in the test which was also incentivised.

Next, each subject was randomly allocated to one of two groups and randomly paired with a partner from the same group as follows:

Control: Players were not allowed to communicate with their partners in this condition. Subjects were asked to take part in a placebo task for 4 minutes (full experiment instructions are provided in Appendix D). Then the players were asked their beliefs about their partner's personality and cognitive abilities. For the former, beliefs were elicited using an 11-item short version of the BFI questionnaire, adapted from Rammstedt and John, 2007 and modified to allow subjects to indicate how they felt their partners would answer the

[6]University of Warwick Departmental IRB approval (12-03-2018). All subjects were required to provide written consent prior to participation.

questions (the personality belief questionnaire is presented in Appendix E).[7] We could then form personality beliefs directly from the answers they provided. For the latter, subjects were asked how they felt their partner's performed in the Raven's task. After answering the questions related to beliefs, subjects were told the rules of the first game. They were asked for their beliefs about their partner's strategy followed by their own decision in the game. After completing the first game they were told the rules of the second game. As with game 1, they were asked their beliefs about the partner's strategy and their own decision in the game. The partner remained the same for both games. The outcomes of both games were announced at the end of the experiment. Beliefs about the partner's cognitive abilities and personality, and beliefs about their strategies were incentivised.

Treatment: The procedure in the treatment group was the same as the control except, instead of the placebo task, subjects were allowed to electronically communicate with their partners through a chat box on their screens. Note that crucially communication occurred before the nature of future decisions were apparent which makes it difficult to incorporate strategic content specific to the game into communication. Communication time was limited to 4 minutes. Following communication, the players were asked to answer the same belief questions as the control group. After answering the questions, the subjects were told the rules of the first game and asked to play the game. The process was repeated with the second game, as with the control condition.

Subjects were asked to play 2 games, the public goods game and the 11-20 money request game. In the *public goods game* each subject was allocated 20 Experimental Pounds (EP) and, along with their partner, were asked to choose (simultaneously) how much to contribute (c_i) to a joint project. c_i was restricted to be an integer between 0 and 20. Payoffs were determined as: $\pi_i = (20 - c_i) + \frac{3}{4}(c_i + c_j)$ where i and j were the two players. Higher contributions while more costly, were more socially beneficial.[8] In the public goods game, the selfish equilibrium is 0 and the mutually cooperative response is 20. In the *11-20 money request game* participants were asked to play the basic version of the game (Arad and Rubinstein, 2012). Each player was randomly matched with another player. They were both asked to request an amount of money, an integer between 11 and 20 EP. Each player received the amount they requested. A player received an additional amount of 20

[7] In essence, players were asked to retake the BFI, albeit a shorter version, but rather than considering how they would answer each question, they were instead asked how their partner would answer. The responses to this task allow us to form a belief in much the same way as we formed implied trait values. The 11-item questionnaire consists of 2 items each for the traits extraversion, conscientiousness, openness and neuroticism and 3 items for the agreeableness trait. An average score was computed for each trait and the trait scores were then standardised.

[8] Note that the multiplier for cooperation (0.75) is a little higher than the typical 0.4-0.5 in an effort to raise the likelihood of cooperation in our setting since it is not the overall incidence of cooperation we are interested in but rather the differential effect of our treatment it was important to ensure a high enough take-up of the opportunity to cooperate.

EP if they asked for exactly one less than the other player. This game has been used to study cognitive hierarchy and in particular level-k thinking. In level-k hierarchy models (Nagel, 1995; Stahl and Wilson, 1995; Stahl and Wilson, 1994) players' levels or types are heterogeneous but they are assumed to be drawn from the same distribution. Peoples' beliefs are based on naive initial assessment of others' likely response called level-0 (or L0) and then beliefs are modified via iterated best response. So level 1 (L1) best responds to L0, L2 to L1 and so on. Arad and Rubinstein, 2012 argue that setting L0 as 20 is the instinctive and salient choice since 20 generates the highest payoff absent any strategic considerations and we follow them in also setting L0 to be 20. This L0 choice implies that a choice of 19 is the L1 choice as it best responds to the L0 strategy and in general the level-X choice is to request 20-X. In the level-k model, the level chosen by a subject is a measure of their strategic sophistication or *type* or rather a measure of the player's beliefs about the partner's strategic sophistication or type (Georganas et al., 2015). The game has no pure Nash equilibrium. The order of the 2 games was randomised across sessions.

Following the two games, subjects were asked to take the *Eyes Test* (Baron-Cohen et al., 2001). For this test, subjects were shown 36 close-up photographs of the eyes and surrounding areas of the face of celebrities and were provided with 4 response options (such as playful, terrified, joking etc.) per photograph. The participants were asked to pick the option which most closely described the mental state of the person in the photograph. Subjects were then asked to answer a list of 30 questions about their risk attitude, the Domain Specific Risk Taking Scale or DOSPERT (Blais and Weber, 2006). Each subject was then asked a series of socio-demographic questions including age, gender and native language.

2.2 Logistics

The experiment was conducted between May and November 2018. Subjects were recruited through the SONA online recruitment system at the University of Warwick in the UK. The participants were undergraduate, postgraduate and (non-academic) staff members at the University. The experiment was implemented using Z-tree (Fischbacher, 2007) and pre-registered with the AEA RCT registry (Sgroi, 2018). The experiment received ethical approval from Economics Department Internal Ethical Approval Process, University of Warwick. 338 subjects took part in the study, with 170 subjects in the control condition and 168 in the treatment group.[9] Out of the 170 control group subjects, 110 subjects played the public goods game first, followed by the 11-20 money request game, and 60 subjects played the games in reverse order. Out of 168 treatment group subjects, 106 played the

[9]We originally recruited around 200 for the treatment and 200 for the control but 2 sessions were removed due to technical errors (which resulted in participants dropping out prior to completion).

public goods game first and 62 played the 11-20 money request game first. There were 17 sessions conducted, 20 subjects per session on average. An experimental session lasted for approximately 75 minutes.

The final payoff for subjects in the experiment was made up of several components. Firstly, there was a show-up fee of £4. Second, the players received payoffs based on performance in either the public goods game or 11-20 money request game (chosen randomly). The payoffs for the games were in experimental pounds (EP) with the exchange rate as 5 EP = £1. Third, 2 questions out of the 36 questions of the Eyes Test and 2 puzzles of the 30 puzzles of the Raven's test were randomly selected with each correct answer accruing a further £1. Lastly, belief questions (about own-cognitive ability, partner's personality and cognitive ability, and beliefs about partner's decisions in the 2 tasks) were also incentivised. For the personality beliefs, 1 out of 11 questions was randomly picked and if the answer matched that of the partner then the subject was awarded £1. For the other 4 belief questions, subject was awarded £1 for each correct answer. The socio-demographic questions were not incentivised. The average earnings from the study was £13.20 (including the show-up fee of £4), with a minimum earning of £8.35 and maximum of £18.

2.3 Hypotheses

Of the "Big Five" personality traits, the scope of our paper is limited to the two broadest, most fundamental and pervasive traits: extraversion and neuroticism (Costa and McCrae, 1980). These two traits were the original "Big Two" personality dimensions (Eysenck, 1947). Extraversion and neuroticism, have garnered much attention in the literature owing to their well-established association with positive and negative affect, respectively (Canli, 2004; Watson, Wiese, et al., 1999; Watson and Clark, 1992; Costa and McCrae, 1980) which gives these two traits the greatest chance to be detected in a short bout of communication.

Extraverts by their nature stand out and even in a few minutes it may become clear that you are dealing with someone who is characterised by sociability, gregariousness, assertiveness, warmth, activity and overall positive emotions (McCrae and Costa, 1999). On the other hand, the temperamental traits of general emotionality, fearfulness, anger and impulsivity, are associated with the neuroticism trait, and are related to high negative affect (Costa and McCrae, 1980), which might also be detectable in a brief conversation. These prior observations in the literature make any short communication, such as in our study, more suited to developing reliable beliefs about the partner's (or the opponent's) extraversion and neuroticism traits, which can be interpreted by the perceiver as positive and negative vibe given off by the opponent, respectively. However, a brief small talk conversation seems insufficient to form beliefs about the partner's remaining three Big Five traits. While a brief chat is sufficient to form an overall positive (*extraversion*) or negative

(*neuroticism*) view about someone, it is not adequate to convey any usable information about whether the opponent is trusting (an aspect of trait *agreeableness*) or lazy (an aspect of trait *conscientiousness*) or imaginative (an aspect of trait *openness*). Thus, we will limit our hypotheses to the effect of the fundamental personality traits on belief formation and strategic decision making.[10] Our experimental setup gives us the following testable hypotheses.

Hypothesis 1: *Personality beliefs about the opponent are not only influenced by the opponent's true personality measure, but the beliefs are also influenced by the player's own personality.*

This hypothesis is consistent with the conceptual framework for the impact of social environment on personality proposed by Eaton and Funder, 2003, which posits that perceptions (or predictions) about any individual's personality trait can be influenced by the degree to which the predictor possesses that specific trait themselves. The suggestion in Eaton and Funder, 2003 seems particularly true for extraverts who stimulate a positive social environment around them due to their own positivity, making them prone to projecting their extraversion or sociability onto others (Eaton and Funder, 2003; Thorne, 1987). For our study, we would only expect to see personality projection in the treatment group since any personality beliefs that appear in the control group must be spurious (given the control group have no information whatsoever upon which to base predictions about their partner's personality).

Hypothesis 2: *Strategic decision making in outcome interdependent tasks is affected by the individual's beliefs about the opponent's personality, an effect which is significantly more pronounced among treatment group subjects who engage in small talk communication.*

We also formulate individual hypotheses about the unique way in which personality beliefs can affect the two different tasks.

Hypothesis 2a: *In the 11-20 money request game, rather than one's own personality or beliefs about the opponent's personality, we hypothesise that choices in the game will be influenced by the perceived differences in the pair's personalities.*

Due to the strategic nature of the 11-20 money request game, the objective of this level-k reasoning game is to correctly gauge the opponent's choice and then attempt to out-think them. Thus, the game does not solely depend on one's own type, but success in the game is determined by the ability to out-guess the opponent by assessing their type. Despite the well established link between IQ and level-k reasoning (Gill and Prowse, 2016), *beliefs* about opponent's IQ might seem like an unreliable measure of the opponent's

[10]With respect to beliefs about the opponent's IQ, we will refrain from formulating any hypotheses given the lack of available literature and where appropriate we will present our results about IQ beliefs as more speculative.

strategic sophistication or type in the limited interaction time available. Beliefs about the opponent's fundamental personality traits on the other hand can appear as a more reliable measure of the opponent's type due to the increased likelihood of them being detected through a brief chat. While personality itself lacks any association with level-k reasoning, any difference (or similarity) between the pair's types (which for our study is personality types) can be interpreted by the player as an indicator of the opponent's behaviour and thus, in turn, can act as a determinant of own decision making. Consistent with simulation theories of social cognition, individuals tend to anchor on self-knowledge to form mental images about similar others (Tamir and Mitchell, 2013). The *perceived similarity hypothesis* states that the greater the perceived similarity between the individual and their opponent the more likely it is that the individual will believe their opponent to think and act like themselves (Thomas et al., 2014), making perceived similarity or differences a potential contributor to iterative reasoning processes.

Hypothesis 2b: *Players who believe their opponents (or partners) are extraverted, will believe that their opponents will cooperate more and then they in turn will cooperate more themselves.*

This hypothesis seems reasonable given the known association between extraversion and pro-social behaviours like cooperation (Carlo et al., 2005; Burke and Hall, 1986). This association might encourage the individual to cooperate more, with the hope of mutual cooperation boosting earnings.

Hypothesis 3: *More talkative opponents are believed to be extraverted.*

In this paper, we randomly allocate players either to a treatment in which they engage in small talk with their partners or to a control in which they do not. Since small talk is the only interaction the subjects engage in before eliciting beliefs about the partners' personalities, it must form the basis for these beliefs. From the player's perspective the number of words is relatively simple to calculate, arguably easier than say considering the emotional content of words in a very brief conversation. Thus, it is hypothesised that subjects using more words will be rated higher on the extraversion scale as extraverts are usually characterised by their sociability and talkativeness (Goldberg, 1990; Costa and McCrae, 1992). Further, in a study of personality traits in its natural habitat, personality judges rated talkative participants as more extraverted (Mehl et al., 2006). We will also evaluate other linguistic features, namely valence, arousal and dominance content of the words spoken by the partner. Valence refers to the pleasantness of a stimulus, arousal is the intensity of emotion provoked by a stimulus, and dominance is the degree of control exerted by a stimulus (Warriner et al., 2013).

Note, while the hypotheses related to personality beliefs (*hypothesis 1*) and the strategic decision making tasks (*hypotheses 2a* and *2b*) were formulated before the experimental

trials (based on the pertinent literature cited), the results from the text analysis (*hypothesis 3*) were harder to predict prior to the study owing to the novelty of the setup and were thus more exploratory in nature.

3 Results

This section tests our core hypotheses. Section A offers a more in-depth discussion of the key findings of the paper. All regressions reported were run with standardised variables with standard errors clustered at the pair level. The summary statistics of the variables used in the paper are presented in the table A.2 and the balance tests for the intervention groups are provided in table A.3.

3.1 Result 1: Personality projection

We begin by looking at the factors that might affect the beliefs which players develop about their partners' personality traits. The aim is to examine *hypothesis 1* which proposes that beliefs about an individual's personality depend not only on their true personality traits but are also affected by the predictor's personality.

Table 1 reports the results of an OLS regression model. The dependent variable is the belief reported by the player about their partner's level of extraversion and neuroticism.[11] The independent variables in columns 1 and 3 are the player's own personality scores, the partner's true personality scores (as reported by the partner using the BFI), and their interactions with the treatment dummy which equals 1 if the player was in the small talk condition and 0 otherwise. Columns 2 and 4 also control for the subject's IQ, Eyes Test score, age, a dummy variable for being female, and risk aversion (along with the interactions of the control variables with the treatment dummy). Column 2 shows that in the treatment group, an increase in the *player's own extraversion* by 1 standard deviation increases the beliefs about *partner's extraversion* by 0.3 standard deviations more than in the control group (p-value < 0.05). Furthermore, an increase in 1 standard deviation in partner's true extraversion increases the player's beliefs about their partner's extraversion by 0.4 standard deviations more in the treatment group than in the control group (p-value < 0.01). Note that the negative coefficient in the control group for Partner's extraversion (in columns 1 and 2) is spurious and a statistical artifact driven by noise, since in the control group subjects had no reliable source of information about their partners' true extraversion. This finding biases the coefficient for Partner's Extraversion $\times$ Treatment

[11] Recall that beliefs are formed in much the same way as underlying values: while personality is assessed using the BFI questionnaire, personality beliefs are elicited using a shorter version of the BFI (Rammstedt and John, 2007). For both, average trait scores are calculated and the standardised values are used in the regressions.

Table 1: Impact of own personality and partner's true personality on beliefs about partner's personality

	Extraversion Belief		Neuroticism Belief	
	(1)	(2)	(3)	(4)
Own Extraversion × Treatment	0.2139*	0.2962**	-0.1105	-0.1241
	(0.117)	(0.125)	(0.117)	(0.130)
Own Neuroticism × Treatment	0.1484	0.1531	-0.0470	-0.0418
	(0.125)	(0.131)	(0.110)	(0.109)
Partner's Extraversion × Treatment	0.4108***	0.4199***		
	(0.108)	(0.110)		
Partner's Neuroticism × Treatment			0.0269	-0.0005
			(0.103)	(0.102)
Own Extraversion	0.0209	0.0248	-0.0822	-0.0718
	(0.073)	(0.080)	(0.073)	(0.075)
Own Neuroticism	-0.0075	0.0008	0.0462	0.0600
	(0.085)	(0.087)	(0.083)	(0.080)
Partner's Extraversion	-0.1280*	-0.1339*		
	(0.070)	(0.075)		
Partner's Neuroticism			0.0866	0.1069
			(0.071)	(0.070)
Treatment	0.3539***	-0.3127	-0.5100***	-0.1983
	(0.098)	(0.632)	(0.102)	(0.550)
Controls	No	Yes	No	Yes
N	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The specification for the OLS regressions is:

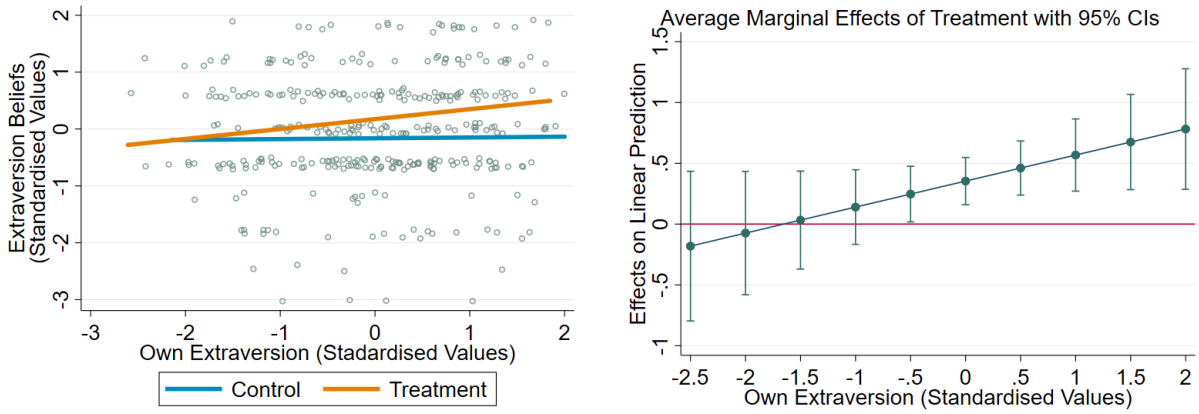
$$E_i(pers_j) = \beta_1 pers_i \times Treat + \beta_2 pers_j \times Treat + \gamma_1 pers_i + \gamma_2 pers_j + \phi z_i \times Treat + \lambda Treat + \omega z_i + \epsilon_i \quad (1)$$

$pers_i$ is player i's personality, $E_i(pers_j)$ is player i's beliefs about partner j's personality and $pers_j$ is partner j's true personality. Also, $Treat$ is the treatment dummy which equals 1 if the player is in the small talk group and 0 otherwise, z_i are individual characteristics of i (i.e. the control variables, namely player i's IQ, Eyes Test score, age, a dummy variable for being female, and risk aversion) and ε_i is an idiosyncratic error term.

upwards. However, the effect of partner's true extraversion on beliefs developed about the partner's extraversion remains significant when limiting the analysis just to the treatment group, even after adding the control variables, with coefficient .286 and p-value < 0.01. This coefficient reflects the impact of partner's true extraversion on extraversion beliefs, as compared to an 'ideal' control group with a coefficient of 0 (which of course is impossible to replicate using human subjects).

Column 4 shows that in the treatment group, an increase in the player's extraversion by 1 standard deviation decreases the beliefs about partner's neuroticism by 0.1 standard

deviations more than in the control group, although the differential effect is statistically insignificant. Column 4 also shows that a partner's true neuroticism has no significant effect on beliefs developed about their neuroticism trait. Thus, we find that a 4-minute small talk chat can lead to reliable beliefs about a partner's extraversion but *not* neuroticism. The relation between own extraversion and beliefs about partner's extraversion is depicted in Figure 1. Consistent with *hypothesis 1*, we observe that extraverts project their positive affect onto their partners.



(a) (b)

Figure 1: Relationship between the player's beliefs about partner's extraversion and the player's own extraversion score. (a) shows that individuals are more likely to project their own extraversion on to their partners in the Treatment group compared to Control. (b) shows that this difference in extraversion projection between the Treatment and the Control group increases with the value of the predictor's own extraversion.

For the other 3 Big Five Traits, agreeableness, conscientiousness and openness, the Pearson correlation coefficients between beliefs and true values in the treatment group were trivial and statistically insignificant, with coefficients (r) 0.0372 (p-value = 0.6319), 0.0403 (p-value = 0.6044) and -0.0588 (p-value = 0.4491), respectively. Only for extraversion did we observe significant correlation (r = 0.2513, p-value = 0.0010) between beliefs and true scores in the treatment group, while the coefficient for neuroticism was also insignificant (r = 0.1169, p-value = 0.1314).

We also observed that overestimation of partner's extraversion increases with the player's own extraversion (Table A.4). This overestimation is significantly (p-value < 0.05) more pronounced in the treatment group, compared to the control. Further, we found that with increasing performance in the eyes test, the inaccuracy in the player's beliefs about partner's extraversion is significantly (p-value < 0.10) lower in the treatment group compared to the control. This finding is consistent with the literature on the eyes test (Baron-Cohen et al., 2001), which posits that better performance in the eyes test indicates increased theory of mind ability, which in turn leads to improved understanding of others' mental

states. With regards to beliefs about partners' cognitive abilities, it was observed that players project beliefs about their own IQ onto beliefs about partners' IQ, irrespective of whether they are in the control or treatment group (Table A.5).

3.2 Result 2: Strategic decision-making and personality

Since we divided hypothesis 2 into two parts, each associated with one of our two games, we will also divide our results in the same way.

3.2.1 Result 2a: Level-k reasoning and perceived similarity

Recall that *hypothesis 2a* claims that level-k reasoning is influenced by the perceived differences (or similarities) in the player and their opponent's types (which for our study is personality types). In our data, L2 is the most frequently played strategy in both conditions: where 20.6% players choose L2 in the control condition and over 26% do so in the treatment condition (Figure 2). The Kolmogorov-Smirnov test revealed that there is no statistical difference between the distribution of levels of the 2 groups. Further, there is no significant difference between the payoffs earned in the 11-20 game by the control and the treatment group subjects (while the treatment group earns 19.7 EP on average, the control group earns 19.6 EP). Since the level-k game is a competitive game, so long as the communication is two-sided, small talk is unlikely to benefit either player.

Table 2 reports the results of OLS regressions. In columns 1-3 the dependent variable is the player's beliefs about the level-k strategy chosen by the partner and in columns 4-6 the dependent variable is the level-k strategy chosen by the player. The independent variables are perceived differences between player's own personality and the partner's personality, and the interaction of perceived differences with the treatment dummy. The perceived differences are computed by taking the standardised absolute difference between the player's own personality trait scores and the player's beliefs about the partner's personality trait scores. Columns 2 and 4 also include the player's own personality and the personality measures interacted with the treatment dummy as explanatory variables. Columns 3 and 6 include sensible control variables i.e. player's eyes test score, IQ, gender, the player's beliefs about partner's IQ and the order of play of the two games, which is a dummy that equals 1 when the 11-20 game is played first and 0 when the public goods game is played first (along with the variables interacted with the treatment dummy). Columns 3 and 6 also include the control variables - player's age and risk aversion, along with their interactions with the treatment dummy. Column 3 shows that an increase in 1 standard deviation in perceived difference in extraversion decreases the player's beliefs about partner's level choice by 0.5 more in the treatment group than in the control group (p-value < 0.10). Column 6 shows that an increase in 1 standard deviation in perceived difference in extraversion decreases

Table 2: Impact of (absolute) difference between own personality and beliefs about partner's personality on level-k strategy chosen

	Level Belief			Level Chosen		
	(1)	(2)	(3)	(4)	(5)	(6)
DiffExtraversion × Treatment	-0.5302*	-0.5562*	-0.5260*	-0.6597***	-0.7373***	-0.6442**
	(0.269)	(0.283)	(0.289)	(0.237)	(0.242)	(0.254)
DiffNeuroticism × Treatment	0.1879	0.2460	0.3734	-0.0415	0.0235	0.1925
	(0.248)	(0.258)	(0.292)	(0.248)	(0.243)	(0.265)
DiffExtraversion	0.1470	0.1430	0.1036	0.2046	0.1792	0.1345
	(0.198)	(0.194)	(0.197)	(0.177)	(0.172)	(0.175)
DiffNeuroticism	-0.1579	-0.1632	-0.2618	-0.1604	-0.1620	-0.2974
	(0.183)	(0.188)	(0.213)	(0.174)	(0.178)	(0.186)
Treatment	0.1668	0.1515	-2.8375	0.0677	0.0330	-2.2355
	(0.267)	(0.268)	(2.058)	(0.279)	(0.276)	(1.860)
Own Extraversion × Treatment		-0.0312	0.0404		-0.1293	0.0116
		(0.294)	(0.344)		(0.290)	(0.312)
Own Neuroticism × Treatment		-0.2018	-0.1717		-0.4371	-0.4405
		(0.279)	(0.306)		(0.278)	(0.279)
Own Extraversion		-0.0532	-0.1518		-0.1726	-0.2696
		(0.195)	(0.201)		(0.211)	(0.212)
Own Neuroticism		0.0132	-0.1102		0.1998	0.0391
		(0.198)	(0.216)		(0.198)	(0.196)
Eyes Test Score × Treatment			0.5507*			0.6041*
			(0.303)			(0.309)
Own IQ × Treatment			-0.2617			-0.2965
			(0.292)			(0.299)
IQ Belief × Treatment			0.3253			0.1933
			(0.311)			(0.264)
Female × Treatment			-0.7230			-0.8284
			(0.611)			(0.555)
Order × Treatment			1.0992*			1.0541*
			(0.576)			(0.592)
Eyes Test Score			-0.4245*			-0.4401*
			(0.247)			(0.248)
Own IQ			0.1777			0.2357
			(0.200)			(0.210)
IQ Belief			-0.3339			-0.3220*
			(0.204)			(0.192)
Female			1.1333***			1.4426***
			(0.431)			(0.384)
Order			-0.7822**			-1.0035**
			(0.392)			(0.408)
Controls	No	No	Yes	No	No	Yes
N	338	338	338	338	338	338

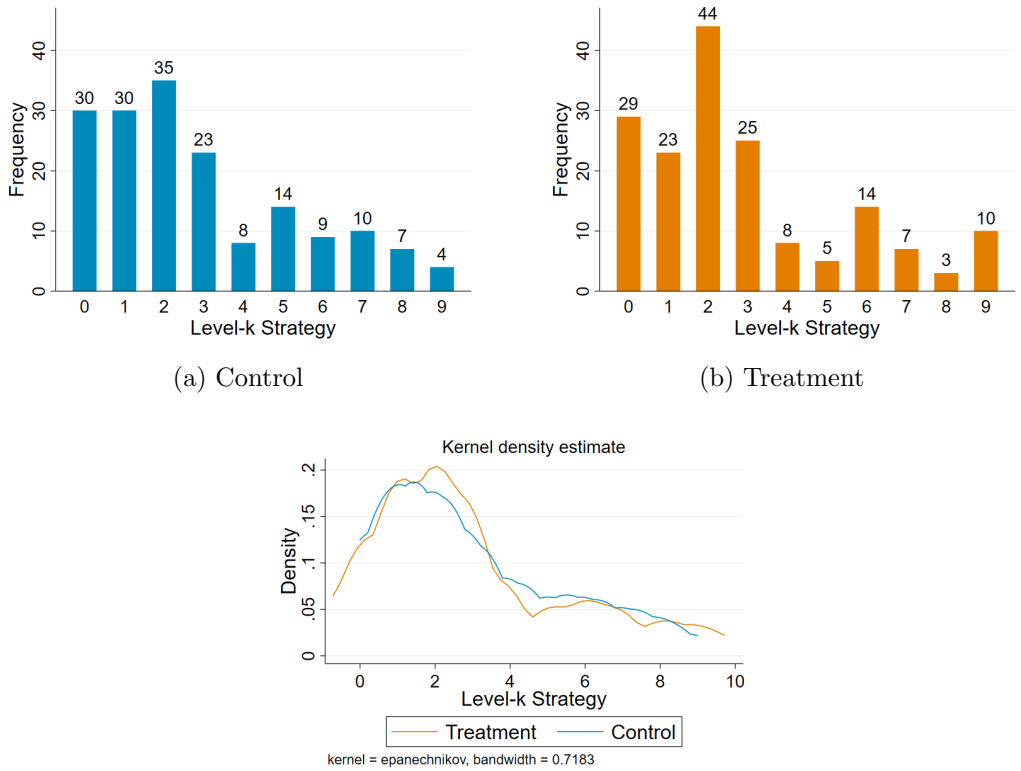
Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The specification for the OLS regressions is:

$$Y_i = \nu Diffpers_i \times Treat + \tau Diffpers_i + \eta Treat + \kappa pers_i \times Treat + \theta pers_i + \rho z_i \times Treat + \psi z_i + \xi_i \quad (2)$$

Y_i is player i's beliefs about partner j's level chosen in the 11-20 game in columns 1-3. For columns 4-6 Y_i is the level chosen by player i in the game. $Diffpers_i$ i.e. the absolute difference in i and j's personalities as perceived by i i.e. $|E_i(pers_j) - pers_i|$ where $pers_i$ is player i's personality, $E_i(pers_j)$ is player i's beliefs about partner j's personality and $pers_j$ is partner j's true personality. Also, $Treat$ is the treatment dummy, z_i are individual characteristics of i and ξ_i is an idiosyncratic error term. z_i includes player i's eyes test score, IQ, gender, the i's beliefs about partner j's IQ, the order of play of the two games, which is a dummy that equals 1 when the 11-20 game is played first and 0 when the public goods game is played first and the additional control variables, player i's age and risk aversion.



(a) Control

(b) Treatment

(c) Kernel Density Plot

Figure 2: The distribution of level-k strategy chosen in the 11-20 money request game
Note: The level 0 choice in the 11-20 money request game is to request 20, level 1 choice is to request 19 and so on. In general the level-X choice is to request 20-X.

the player's own level-k strategy by 0.6 more in the treatment group than in the control group (p-value < 0.05).

Thus, there is an inverse relationship between the perceived difference in extraversion between the players, and the player's level-k strategy, as well as the player's beliefs about their partner's level-k strategy choice. Hence, the smaller the perceived difference between the two players the greater the beliefs about partner's level choice and the greater the level chosen by the player.[12] This result supports *hypothesis 2a* and is consistent with the *perceived similarity hypothesis* which posits that people project their own thinking and decision-making process to predict how their partners might think and act when individuals believe their partners to possess attributes similar to their own (Thomas et al., 2014). Thus, when players believe their partners to be similar to themselves (small perceived difference), they believe their partners will reason more and choose a higher level (i.e. lower number in the 11-20 game). This logic in turn makes the player choose a higher level. Similar results were not observed for perceived difference between player's own IQ and partner's IQ.

Being female enhances beliefs about partner's level-k choice, as well as player's own

[12]Note that the results remain similar when we control for beliefs about partner's personality. The results are omitted here for parsimony but presented in Table A.6.

level-k choice, although there is no significant differential treatment effect.[13] Further, an increase in the eyes test score by 1 standard deviation increases level belief and level chosen by 0.5 and 0.6 more in the treatment than in the control group, respectively, which supports the finding (Fe et al., 2019; Georganas et al., 2015) that greater engagement in theory of mind is associated with superior level-k reasoning, though in this study the effect is significantly (p-value < 0.10) stronger in the treatment group when the players are able to engage in small talk with their partners, compared to the control group. In the control group, order of the tasks has a negative effect on the level-k belief and their own level-k action, whereas in the treatment group the coefficients are positive.

Next, the paper looks at the distribution of the players' beliefs about the level-k strategy chosen by their partners (Figure 3). The distribution is presented in Table 3, along with the unique mixed strategy Nash equilibrium distribution for risk-neutral players. The distributions of beliefs observed in both treatment and control groups are different from the equilibrium distribution. In both groups, L1 (i.e choosing 19) is the most frequently believed level-k choice by partners. Table 4 calculates the expected payoffs based on the distribution of level-k beliefs observed. For both control and treatment groups, L2 (choosing 18) has the highest associated expected payoffs.[14]

Table 3: Distribution of Level-k beliefs

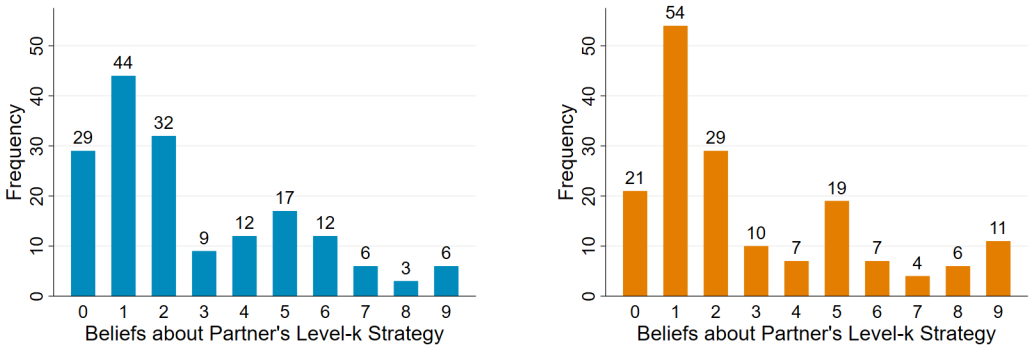
Level	0	1	2	3	4	5	6	7	8	9
Equilibrium (%)	5	10	15	20	25	25				
Treatment (%)	12.50	**32.14**	17.26	5.95	4.17	11.31	4.17	2.38	3.57	6.55
Control (%)	17.06	**25.88**	18.82	5.29	7.06	10.00	7.06	3.53	1.76	3.53

Table 4: Expected payoffs from the distribution of Level-k beliefs

Level	0	1	2	3	4	5	6	7	8	9
Treatment (EP)	20.00	21.50	**24.43**	20.45	17.19	15.83	16.26	13.83	12.48	11.71
Control (EP)	20.00	22.41	**23.18**	20.76	17.06	16.41	16.00	14.41	12.71	11.35

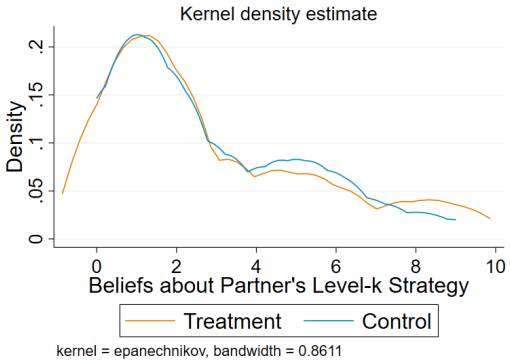
[13]Nettle and Liddle, 2008 and Stiller and Dunbar, 2007 have found that women score higher on the social-cognitive element of theory of mind, indicating greater ability to reason about others' mental states. This result could explain why women choose higher levels.

[14]It should be noted that the number of people who best-responded to their own belief about their partner's level choice i.e. chose to request an amount which was exactly 1 lower than what they believed their partner would choose was 184 out of 334 (94 in the control group and 90 in the treatment group) i.e. 54.4%. The low proportion of people best-responding to their own belief suggests that rather than having an exact belief about their partner's level choice, they may have formed a distribution of beliefs. The Pearson correlation correlation between a binary variable which takes the value 1 if the subject requested an amount which was exactly 1 lower than what they believed their partner would choose in the 11-20 game and 0 otherwise and the subject's IQ was 0.1 with p-value = 0.05.



(a) Control

(b) Treatment



(c) Kernel Density Plot

Figure 3: The distribution of the player's beliefs about partner's level-k strategy in the 11-20 money request game

Note: The level 0 choice in the 11-20 money request game is to request 20, level 1 choice is to request 19 and so on. In general the level-X choice is to request 20-X.

Table 5 uses a probit model to examine the effect of perceived differences in the player's and their partner's personalities on the probability of best responding to the distribution of level-k beliefs, in the control and treatment groups separately. The dependent variable is the probability of choosing the best response to the distribution of beliefs which is L2 for both control and treatment groups. Column 4 shows that the probability of best responding increases significantly (p-value < 0.01) by 9 percentage points with a 1 standard deviation increase in the perceived difference in extraversion in the treatment group. The effect is negative and insignificant in the control group. Hence, greater the perceived difference in extraversion, higher the chances of best responding by the player in the treatment group. Alternatively, this finding implies that greater the *perceived similarity* between the player and their partner, lower are the chances of the player best responding in the treatment group. This result is consistent with *hypothesis 2a* which supports the perceived similarity hypothesis. When the perceived difference in extraversion is small, the player believes that their partner will act similar to themselves which makes it harder to out-think or out-reason the opponent, thus reducing the probability of best responding. This result

Table 5: Impact of (absolute) difference between own personality and beliefs about partner's personality on the probability of choosing the best response - Probit Model

	Control		Treatment	
	(1) Pr(Level=2)	(2) Pr(Level=2)	(3) Pr(Level=2)	(4) Pr(Level=2)
DiffExtraversion	-0.0453	-0.0492	0.0846***	0.0945***
	(0.038)	(0.036)	(0.030)	(0.032)
DiffNeuroticism	-0.0008	-0.0078	-0.0459	-0.0362
	(0.031)	(0.031)	(0.032)	(0.034)
Own Extraversion		0.0115		0.0017
		(0.029)		(0.045)
Own Neuroticism		0.0573*		-0.0399
		(0.032)		(0.037)
Own IQ		0.0655*		0.0566
		(0.035)		(0.039)
IQ Belief		-0.0482*		-0.0070
		(0.029)		(0.035)
Eyes Test Score		0.0541		0.0498
		(0.038)		(0.032)
Controls	No	Yes	No	Yes
N	170	170	168	168

Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

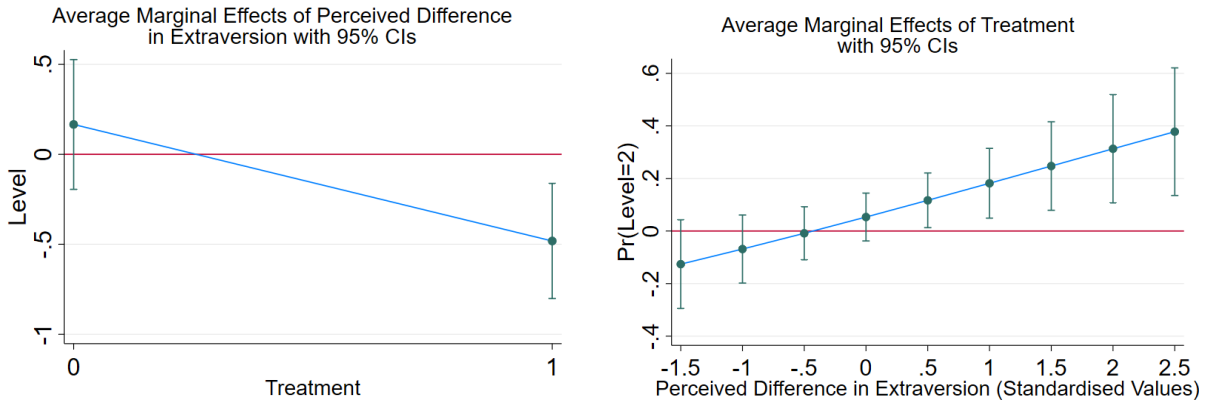
The table reports the average marginal effects from Probit regressions. 'Controls' imply the player's age, gender, risk aversion, and the order of the two games played.

holds only when the players engage in small talk as otherwise the players have nothing to base their personality beliefs on and so absent small talk, their beliefs are unlikely to affect decision making.

The results hold even after controlling for the player's IQ and eyes test score, the player's beliefs about partner's IQ and other controls - player's age, gender, risk aversion and the order of games played. In the control group, increase in the player's IQ by 1 standard deviation increases the probability of best responding by 6 percentage points where as increase in beliefs about the partner's IQ decreases the probability of best responding by 5 percentage points. The player's own neuroticism measure also has a significantly (p-value < 0.10) positive effect on the probability of best responding in the control group.[15] The relationship between level choice and perceived difference in extraversion is depicted in

[15]Note that the results are robust to the inclusion of personality beliefs as control variables, which are omitted here for parsimony, but are presented in Table A.7. The results also remain similar when a logit model is used instead of probit as shown in Table A.8.

Figure 4.



(a) (b)

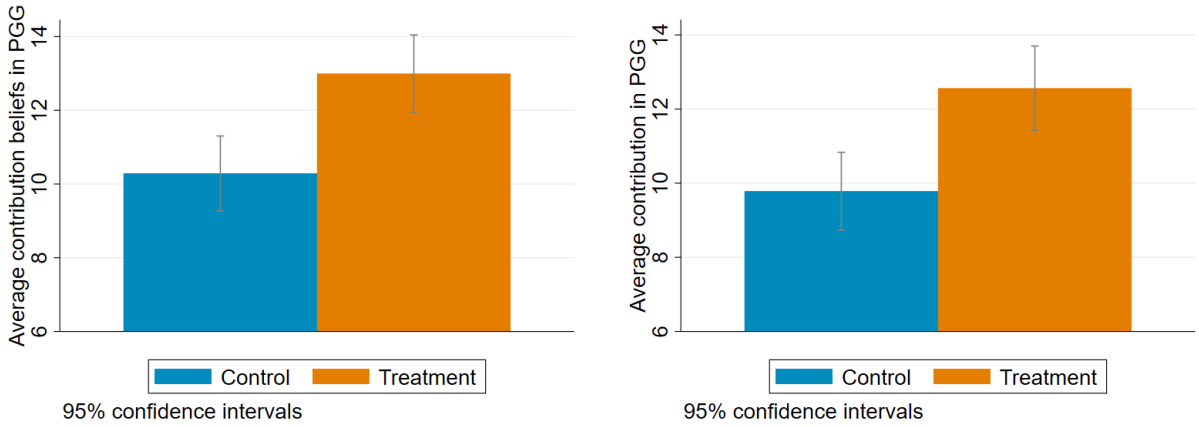
Figure 4: Perceived differences in the players and their partners' extraversion, and level-k choices made. (a) Effect of perceived difference in extraversion on level choice in control and treatment groups. The figure shows that perceived difference in extraversion has a significant negative effect on the player's level-k choice in the treatment group. (b) shows that the effect of small talk treatment on probability of best responding to the distribution of level beliefs increases as the perceived difference in extraversion increases.

3.2.2 Result 2b: Cooperation and extraversion beliefs

Next, we examine the results of the public goods game to test *hypothesis 2b* which states that a player's cooperation in the game will increase with their beliefs about their opponent's extraversion, since the player will expect an extraverted opponent to cooperate more. Of the two fundamental personality traits, we expect extraversion to be especially relevant for the public goods game, since it is extraversion that is most associated with pro-social behaviours (Carlo et al., 2005; Burke and Hall, 1986).[16]

In the public goods game, the average beliefs about partner's contribution in the treatment group was 13 experimental pounds (EP), where as in the control group it was 10.3 EP. This difference is statistically significant with p-value < 0.01 and a t-statistic of -3.640. The average contribution in the treatment group was 12.6 EP, whereas in the control group it was 9.8 EP. This difference is statistically significant with p-value < 0.01 and a t-statistic of -3.525 (Figure 5). The Kolmogorov-Smirnov tests for equality of distributions of own contribution as well as beliefs about partner's contribution between the treatment and control groups were rejected with p-value < 0.01 for both. This finding is consistent with the existing literature which finds that pre-game communication of any form increases cooperation rates (Dawes et al., 1977; Bochet et al., 2006).

[16]We also see from Table A.9 that beliefs about partner's neuroticism has no significant effect on decision making in the public goods game.



(a) Contribution Belief

(b) Own-Contribution

Figure 5: (a) Average Beliefs about Partner's Contribution and (b) Average Contribution in the Public Goods Game

Our analysis for the public goods game will only consider the observations in which the subjects played the public goods game before the level-k reasoning game. The rationale is that playing the level-k game first seems to trigger level-k reasoning (Georganas et al., 2015), thus biasing decision-making in the social preferences task. On the other hand, since the level-k game strictly requires level-k reasoning, without invoking any social preferences (a point made explicitly in Arad and Rubinstein, 2012), the results of the 11-20 game are not biased by playing the public goods game first. Further, treated subjects contribute significantly more on average compared to control group subjects, only when the public goods game is played first, where as the difference is insignificant when the public goods game is played second (Figure A.2). The results from the public goods game, for those who played the 11-20 game first are presented in Figure A.3 and Table A.12.[17]

We examine *hypothesis 2b* using equation 3. $Choice_i$ is player i's choice (or contribution) in the public goods game, $pers_i$ is player i's personality, $E_i(pers_j)$ is player i's beliefs about partner j's personality, z_i are individual characteristics of i and ε_i is an idiosyncratic error term.

$$Choice_i = \beta_1 pers_i + \beta_2 E_i(pers_j) + \gamma z_i + \varepsilon_i \tag{3}$$

$$E_i(pers_j) = \lambda_1 pers_j + \lambda_2 pers_i + \rho z_i + \epsilon_i \tag{4}$$

Players' tendency to project their own extraversion onto their partners creates an endogeneity issue (result 1), and as such estimation of equation 3 requires valid instruments. Beliefs about partner's extraversion depend on two components - the player's own extraversion and the partner's true extraversion, as discussed in section 3.1. These two components

[17]Further, the results from the public goods game for both orders of play combined are provided in Table A.13 in Appendix B.

are independent as the two players are randomly matched. Therefore, beliefs about partner's extraversion can be instrumented with the partner's true extraversion. Equation 4 is the first stage. $pers_j$ is the partner j's true personality.

The first stage results presented in Table 6 show that partner's true extraversion significantly enhances beliefs about partner's extraversion in the treatment, but not in the control group, since in the control group the player has no interaction with their partner.[18] Table 7 presents the results of a two-stage least squares instrumental variable (IV) regression for the treatment group. Since the endogeneity bias only exists for the treatment group, equation 3 is estimated without an instrumental variable for the control group, and is presented in columns 1 and 2 of Table 7.

Table 6: First Stage: Extraversion beliefs and Public goods game

	Control		Treatment	
	(1) Extraversion Belief	(2) Extraversion Belief	(3) Extraversion Belief	(4) Extraversion Belief
Own Extraversion	0.0299	0.0333	0.2147**	0.2614**
	(0.086)	(0.102)	(0.106)	(0.103)
Partner's Extraversion	-0.1015	-0.0977	0.3541***	0.3648***
	(0.081)	(0.092)	(0.093)	(0.094)
Own IQ		-0.1034		0.0121
		(0.103)		(0.102)
IQ Belief		-0.0559		0.0166
		(0.147)		(0.095)
Eyes Test Score		-0.0470		0.1195
		(0.107)		(0.073)
Controls	No	Yes	No	Yes
N	110	110	106	106

Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
'Controls' refers to the player's age, gender and risk aversion.

Columns 3 and 4 of Table 7 show that in the treatment group, an increase in 1 standard deviation in extraversion belief, increases beliefs about partner's contribution and own-contribution by 0.6 and 0.5 standard deviations, respectively (p-value < 0.05 for both).

[18] To test for weak instruments, a Wald test is conducted, which tests the null that the coefficients of the endogenous regressors are zero. The null for the treatment group, is rejected at the 5% level. This finding suggests that weak instruments are not an issue here. Further, the F-statistic in the first stage regression (for two-stage least squares) is greater than 10, which indicates that the instruments are strong (Staiger and Stock, 1997) for the treatment group.

Table 7: Impact of beliefs about partner's personality and own personality on beliefs about partner's contribution and own contribution in Public Goods Game

	Control OLS		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution
Extraversion Belief	0.0601	0.1110	0.6091**	0.5184**
	(0.082)	(0.092)	(0.264)	(0.262)
Own Extraversion	-0.0733	-0.2041**	-0.3074**	-0.2018
	(0.095)	(0.088)	(0.134)	(0.138)
Own IQ	-0.0583	-0.0417	0.0856	0.1548
	(0.096)	(0.084)	(0.094)	(0.103)
IQ Belief	0.1250	0.1140	0.0871	0.2402***
	(0.091)	(0.100)	(0.086)	(0.088)
Eyes Test Score	-0.0431	-0.0015	0.1043	0.1502
	(0.096)	(0.118)	(0.117)	(0.139)
Controls	Yes	Yes	Yes	Yes
N	110	110	106	106

Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
'Controls' refers to the player's age, gender and risk aversion.

On the other hand, an increase in 1 standard deviation in own-extraversion decreases beliefs about partner's contribution, as well as the player's own-contribution by 0.3 (p-value $<$ 0.05) and 0.2 (insignificant) standard deviations, respectively. Thus, beliefs about partner's extraversion has a positive and relatively larger effect, compared to own-extraversion, on decision-making in the public goods game in the treatment group. For the control group, column 2 shows that the player's extraversion significantly (p-value < 0.05) and negatively impacts contribution level. Beliefs about partner's extraversion has no significant effect on both beliefs about partner's contribution and own-contribution in the control group (which makes perfect sense since in the control group, where there is no interaction, players have no basis upon which to form sensible beliefs about their partners). Columns 3 and 4 can essentially be summarised as showing that there are two forces at work in determining how the contribution level is affected by extraversion: a direct and negative effect of own-extraversion, and an indirect and positive effect that works through beliefs about the partner's extraversion. Overall, the role of beliefs seems stronger than own-extraversion

though both are important.[19] Moreover, consistent with *hypothesis 2b*, we find that players cooperate more in the public goods game when they believe their partners to be extraverted.

Following Soto and John, 2009, we divide extraversion of the player into 2 facets, assertiveness and activity.[20] This division is carried out to examine which particular facet of extraversion is responsible for driving cooperation decisions. While assertiveness can be defined as preference for exerting control in a group setting (Soto and John, 2012), activity (or enthusiasm) describes both positive emotions and outgoing friendliness or sociability (DeYoung et al., 2007). The facet analysis (Table A.11) revealed that of the 2 facets of extraversion, it is facet assertiveness which is responsible for the negative effect of the player's extraversion on beliefs about partner's contribution, as well as own contribution in the public goods game.

4 Conclusion

The link between personality and strategic behaviour has garnered much attention in recent Economic literature. We expand on this relationship by providing evidence of the impact of impressions about others' personalities on subsequent strategic interactions with them. In a laboratory setting we show that, when subjects engage in brief small talk interaction with strangers via an instant messaging software, they develop beliefs about the stranger's personality traits, particularly extraversion, which affect their ensuing strategic behaviour. Extraverts, who are characterised by sociability and gregariousness, tend to be distinctive by nature, making extraversion the most detectable trait in a short bout of communication. Perceptions of trait extraversion, thus, played a crucial role in two well-known strategic decision making tasks - the 11-20 money request game which examines level-k reasoning and the public goods game which is a game of cooperation. Analysis of the pre-game interaction revealed that subjects use the number of words spoken as a a mechanism for detecting extraverts, which does indeed provide a reasonably accurate forecast of type. However, perceptions about extraversion can be coloured by *complementary self projection bias* which makes extraverts prone to projecting their extraversion or positive affect onto those they interact with. Overall, we hope that this study paves the way for future research exploring the association between personality impressions and strategic behaviour in a variety of tasks and real-world contexts.

[19]Estimating equation 3 for the treatment group using OLS, and not an IV approach, yields similar results where, in the treatment group, beliefs about partner's extraversion has a significant positive effect on both beliefs about partner's contribution as well as own contribution in the public goods game and own-extraversion has an insignificant negative impact on both (Table A.10). However, given the scope for endogeneity bias, the IV approach is likely to be more appropriate.

[20]Soto and John, 2009 propose forming 10 facet scores, 2 for each of the Big Five traits, by dividing the 44 items in the BFI questionnaire. Assertiveness and activity facet scores are formed for each individual based on their responses to specific items in the BFI.

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Appendix

A Discussion

While the association between an individual's personality and strategic behaviour has been well established within Economics (Proto, Rustichini, and Sofianos, 2019; Proto and Rustichini, 2014; Rustichini et al., 2016; Johnson et al., 2009; Hirsh and Peterson, 2009), what remains unexplored is the impact of perceptions about another individual's personality and how these perceptions might influence subsequent strategic interactions. We examine this potential impact by providing subjects the opportunity to develop beliefs about the fundamental personality traits of their partner in a controlled laboratory setting, through a brief (4-minute) chat via their computer screens. We label this type of communication as *small talk* since there is no prior knowledge of the definitive rules of any future strategic interaction between the pair and also based on our observations of the nature of the communication. Following the short period of small talk and subsequent personality belief elicitation, the pair engage in two well-known one-shot strategic decision making tasks: the 11-20 money request game (Arad and Rubinstein, 2012), which examines level-k choices, and the public goods game, which is a game of cooperation. We examine the causal effect of beliefs about the partner's personality on decisions made in the two tasks through comparison with a control group, where subjects participated in an independent placebo task instead of engaging in small talk.

An examination of personality beliefs in section 3.1 revealed that beliefs about an individual's extraversion are not only determined by their true extraversion trait, but are also enhanced by the predictor's extraversion: extraverts tend to believe that their partners are also extraverted. This finding lends support to our first hypothesis which states that while formulating beliefs about someone's personality, individuals tend to project their own traits. This effect is significantly stronger in the treatment group than in the control group. This finding also links closely with the psychological literature on extraversion: an extraverted person, who is subject to positive emotions, fosters a positive social environment around them and projects their extraversion or sociability onto others (Eaton and Funder, 2003; Thorne, 1987), making them prone to *complementary self projection bias*. No such projection was observed for neuroticism.[21] We also found that personality beliefs developed about a partner, after engaging in small talk with them, were only a reliable or accurate measure of the partner's extraversion, but not their neuroticism. This

[21] This finding on neuroticism is contradictory to the theory of *neurotic projection* which is a form of defence mechanism through which people tend to project negative feelings, motives or behaviour they might possess and are uncomfortable with, onto others. Our results could be attributed to the negative connotations of the trait neuroticism. Individuals are less keen to project trait neuroticism as it is likely to draw attention to their own neuroticism.

result is consistent with the findings of Eaton and Funder, 2003 who also observed accurate perceptions about a stranger's extraversion after a 5-minute in-person face-to-face conversation.

In section 3.2.1 *result 2a*, we observed that the perceived similarity or difference between the personalities of the players and their partners influenced decision making in level-k reasoning games, consistent with *hypothesis 2a*. Particularly, perceived differences in the pair's extraversion traits inversely affect the player's level-k choice, an effect which is significantly stronger in the treatment group, compared to the control. In level-k reasoning games a player's strategy reflects the player's beliefs about the opponent's type. The player best responds to these beliefs, attempting to out-reason or out-think their opponent. In accordance with simulation-based theories of mental modelling, perceptions anchor onto own-reasoning processes and likely choices and are then adjusted for any discrepancy between self and other, while inferring choices of similar others (Tamir and Mitchell, 2013). Thus, in level-k games, the perceived similarity or differences between the type of player and their partner, play a crucial role in predicting how the opponent might behave and in turn determine own strategy choice. The *perceived similarity hypothesis* (Thomas et al., 2014) states that when a player thinks they are faced by a similar opponent, they believe the opponent will reason and act in ways similar to themselves. Thus, when the player assumes the partner's type is similar to their own, it becomes harder for them to out-reason the partner in the level-k game. When faced by a similar other, player believes that the opponent, undergoing the same thinking process, will reason harder and pick a higher level which in turn should make the player choose a higher level as well. Consequently, when the player suspects their partner's type is similar to their own, the probability of them best responding to the distribution of level-k beliefs falls. This result holds only when the players engage in small talk as in the control condition the player has no reliable indicator of perceived similarity with the opponent.

In section 3.2.2 *result 2b*, we found that when a player thinks that their opponent is extraverted, they believe that their opponent will cooperate more, a result only observed in the small talk treatment. The result that extraverts are expected to cooperate more in social situations, is consistent with the finding in psychology that higher levels of the extraversion trait are associated with pro-social behaviour (Carlo et al., 2005; Burke and Hall, 1986). Thus, the player themselves cooperate, expecting cooperation from their opponent. In contrast, the literature is conflicted on the effect of a subject's own extraversion on cooperation. While Hirsh and Peterson, 2009 and Ross et al., 2003 find a positive effect of extraversion on cooperation, Koole et al., 2001 find the opposite. Hirsh and Peterson, 2009 posit that individuals who score highly on the enthusiasm facet of extraversion, owing to their positive outlook, view cooperation as rewarding and expect cooperative behaviour

from their partners as well. The opposing argument is that introverts, and not extraverts, are likely to cooperate more as they are more inclined to avoid conflicts (Koole et al., 2001). This paper supports the latter argument. We would also argue that some of the contradictions seen in the literature stem from missing the subtle interactions with beliefs that are highlighted in our results. Further, this negative effect of extraversion is driven by the assertive facet of an extravert's personality. Lastly, beliefs about opponent's extraversion have a relatively larger effect on decision-making in the public goods game than own-extraversion. Since these effects work in opposite directions they may partly explain the apparent contradictions seen in the general literature on extraversion and cooperation since they only become apparent when we disentangle the impact of beliefs and own-characteristics.

Consistent with *hypothesis 2*, we show that beliefs about a partner's personality - specifically beliefs about partner's extraversion - developed after engaging in small talk, significantly impact choices made in subsequent strategic interactions. The reason why extraversion plays a big role in our study is likely because, out of the two fundamental personality traits, subjects could only form reasonably accurate beliefs about the partner's extraversion. Extraverts, characterised by their sociability, enthusiasm and gregariousness, tend to stand out by nature, making extraversion the most detectable trait, especially after a brief chat. Extraversion, as one of the principal dimensions of personality, can explain a wide variety of outcomes, such as subjective well-being measures (Costa and McCrae, 1980), health outcomes (Lai and Qin, 2018), relationship satisfaction (Tov et al., 2016) and occupational choices (King et al., 2017). These features of extraversion may explain why beliefs about the extraversion of a partner is crucial for explaining strategic behaviour in our study.

The brief period of small talk, as the key experimental manipulation in our study, was the only opportunity for the players to interact and hence the primary basis for developing personality beliefs. We might ask how such a brief period of communication could change beliefs about personality. One way to consider this question would to examine the text data present in the small talk directly. In particular, in line with *hypothesis 3* we will focus on the effect of the number of words spoken by the partner on beliefs to check whether more talkative players are indeed believed to be extraverted. The number of words is perhaps the easiest language characteristic to calculate. We also examine the scores for three affective or emotional components of the partner's language use, namely *valence*, *arousal* and *dominance*, using the score-ratings proposed by Warriner et al., 2013. The valence rating of a word refers to the pleasant emotion conveyed by a word, with the rating increasing as it moves from unhappy to happy. Arousal rating of a word increases with the degree of excitement emoted by it. Finally, the dominance rating of a word increases with

the degree to which it conveys the emotion of *being in control*.[22]

Table A.1 reports the results for the quantitative language characteristics that we consider. The dependant variables are beliefs about the partner's fundamental personality traits. Column 1 shows that beliefs about partner's extraversion increase with the number of words spoken by the partner (p-value < 0.01), consistent with *hypothesis 3* and the findings of Mehl et al., 2006 who also find talkative subjects are rated as more extraverted. The coefficient for number of words remains similar even after adding valence, arousal and dominance as explanatory variables in column 2. Column 3 shows that the result persists even after controlling for the player's IQ, eyes test score, age, gender, beliefs about partner's IQ, a dummy for non-native speaker (equals 1 if the player is a non-native English speaker and 0 otherwise) and a dummy for first speaker (equals 1 if the player started the conversation and 0 otherwise). Columns 4-6 show that beliefs about partner's neuroticism decrease with the number of words spoken by the partner, although the impact is insignificant. Valence, arousal and dominance ratings did not have a significant impact on beliefs about either of the two fundamental personality traits. We also consider whether the beliefs formed by examining the number of words used in communication provide an *accurate* picture of someone's true personality type. What we see from the results in Table A.14 is that extraverts genuinely do seem to use more words, a result which is significant (p-value < 0.05), with and without the addition of valence, arousal and dominance as explanatory variables and a list of sensible control variables.

Overall, we find evidence suggesting that beliefs about a partner's fundamental personality traits, particularly extraversion, are a significant determinant of decisions made in any subsequent strategic interaction with them. This impact of beliefs on choices can either be through the absolute value of beliefs about partner's extraversion (as in the public goods game) or the perceived differences in the pair's extraversion (as in the 11-20 money request game). We hope that our study might open avenues for future research exploring how beliefs about other's personality traits affect choices made in various strategic interactions with them. Being the first study of its kind, our work is limited in scope due to the controlled laboratory setting and limited communication time, making it impossible to

[22]We might also consider the choice of words used by participants. Figure A.4 shows a word cloud of the words spoken by the subjects during the pre-game small talk communication which depicts the very general and trivial nature of small talk. Figure A.5 attempts to distinguish between the most frequently used words by subjects believed to have different personalities. Through a simple examination of word usage, it's hard to distinguish between the nature of language used by subjects believed to have different personalities. Those who are believed to be highly extraverted (believed to have above median extraversion scores) have a similar set of most frequently used words when compared to those who are believed to be less extraverted (believed to have below median extraversion scores) which are likely to reflect the social norms of small talk (Figures A.5 (a) and (b)). Figures A.5 (c) and (d) show a similar story for neuroticism beliefs. This finding is not surprising given the unstructured nature of the small talk but we know from our results and experimental design that language is playing an important role, so we will focus on more quantitative measures here.

Table A.1: Impact of number of words and emotional content of the text spoken by the partner on beliefs about partner's personality

	Extraversion Belief			Neuroticism Belief		
	(1)	(2)	(3)	(4)	(5)	(6)
Number of Words	0.2744***	0.2604***	0.2355***	-0.0573	-0.0368	-0.0455
	(0.079)	(0.076)	(0.078)	(0.072)	(0.076)	(0.073)
Valence		-0.2723	-0.2545		-0.0578	0.0328
		(0.233)	(0.234)		(0.263)	(0.267)
Arousal		0.1718	0.2191		-0.0763	-0.1241
		(0.149)	(0.147)		(0.116)	(0.115)
Dominance		0.1918	0.1728		0.0361	-0.0407
		(0.256)	(0.253)		(0.256)	(0.255)
Own IQ			-0.1178			0.1278
			(0.086)			(0.079)
Eyes Test Score			0.0603			0.0276
			(0.058)			(0.097)
Age			0.0227			-0.0429**
			(0.022)			(0.020)
Female			-0.0659			-0.1659
			(0.157)			(0.157)
IQ Belief			0.1327			-0.0978
			(0.081)			(0.086)
Non-Native Speaker			0.3788**			-0.2491
			(0.151)			(0.158)
First Speaker			-0.0036			-0.3199**
			(0.140)			(0.152)
N	168	168	168	168	168	168

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The explanatory variables, namely number of words, and valence, arousal and dominance ratings are standardised for comparability across coefficients.

examine the role of the remaining personality traits, agreeableness, conscientiousness and openness, and even intelligence. In order to give these traits a more reasonable chance of playing a role, a longer, more sustained series of small talk conversations, something more akin to what occurs in the real-world seems sensible, which is only going to be feasible in the setting of a field experiment. Our hope is that our results will give impetus to new research that looks at repeated interactions in a more realistic setting.

B Additional Tables and Figures

Here we present additional tables and figures referenced in the main text or discussion.

Table A.2: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.	N
Own Extraversion	3.372	0.814	1.25	5	338
Own Neuroticism	2.935	0.811	1	5	338
Extraversion Belief	3.499	0.827	1	5	338
Neuroticism Belief	2.818	0.865	1	5	338
Perceived diff Extraversion	0.882	0.689	0	3.25	338
Perceived diff Neuroticism	0.899	0.714	0	3.125	338
Level Chosen in 11-20 game	2.891	2.522	0	9	338
Level Belief in 11-20 game	2.787	2.566	0	9	338
Own Contribution in PGG	11.163	7.363	0	20	338
Contribution Belief in PGG	11.633	6.956	0	20	338
Own IQ	18.604	4.464	4	28	338
IQ Belief	18.213	4.825	1	30	338
Eyes Test Score	27.817	3.759	11	35	338
Age	21.154	3.622	17	42	338
Risk Aversion	4.317	0.767	1.533	6	338
Female	0.615	0.487	0	1	338
Non-native English speaker	0.349	0.477	0	1	338

Table A.3: Balance Test for Treatment and Control groups

Variable	(1) Control Mean/SE	(2) Treatment Mean/SE	T-test P-value
Own Extraversion	3.4213	3.3222	0.2632
	(0.0639)	(0.0612)	
Own Neuroticism	2.9529	2.9174	0.6880
	(0.0611)	(0.0639)	
Eyes Test Score	27.4706	28.1667	0.0888*
	(0.2516)	(0.3217)	
Age	20.9353	21.3750	0.2650
	(0.2765)	(0.2805)	
Female	0.6529	0.5774	0.1543
	(0.0366)	(0.0382)	
Own IQ	18.2059	19.0060	0.0996*
	(0.3434)	(0.3417)	
Risk Aversion	4.2863	4.3474	0.4645
	(0.0600)	(0.0580)	
Non-native English speaker	0.3588	0.3393	0.7074
	(0.0369)	(0.0366)	
N	170	168	
F-test of joint significance (p-value)			0.2363
F-test, number of observations			338

Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Overestimation and inaccuracy of personality beliefs

	Overestimation of Extraversion Belief		Inaccuracy of Extraversion Belief	Overestimation of Neuroticism Belief		Inaccuracy of Neuroticism Belief
	(1)	(2)	(3)	(4)	(5)	(6)
OwnExtraversion × Treatment	0.1601*	0.2170**	-0.0132	-0.0760	-0.0954	0.0489
	(0.086)	(0.092)	(0.112)	(0.092)	(0.100)	(0.118)
OwnNeuroticism × Treatment	0.1040	0.1121	0.1135	-0.0404	-0.0321	-0.0213
	(0.093)	(0.096)	(0.119)	(0.085)	(0.083)	(0.117)
PartnerExtraversion × Treatment	0.3031***	0.3075***	-0.3722***			
	(0.079)	(0.081)	(0.124)			
PartnerNeuroticism × Treatment				0.0169	-0.0004	0.4717***
				(0.078)	(0.078)	(0.131)
Eyes Test Score × Treatment	0.0663	0.0773	-0.1817*	0.1146	0.1503	-0.0833
	(0.072)	(0.072)	(0.105)	(0.099)	(0.102)	(0.125)
Own Extraversion	0.0101	0.0181	0.1391*	-0.0740	-0.0552	-0.0261
	(0.052)	(0.059)	(0.082)	(0.058)	(0.058)	(0.073)
Own Neuroticism	-0.0061	0.0006	0.0144	0.0343	0.0461	-0.0194
	(0.062)	(0.064)	(0.094)	(0.062)	(0.061)	(0.091)
Partner's Extraversion	-0.8160***	-0.8189***	-0.0259			
	(0.052)	(0.055)	(0.091)			
Partner's Neuroticism				-0.6530***	-0.6395***	-0.1162
				(0.053)	(0.054)	(0.098)
Eyes Test Score	-0.0459	-0.0368	0.1731**	-0.0930	-0.1352*	-0.0816
	(0.054)	(0.057)	(0.080)	(0.070)	(0.074)	(0.090)
Treatment	0.2609***	-0.2290	1.0108	-0.3866***	-0.1525	-0.4028
	(0.071)	(0.463)	(0.613)	(0.080)	(0.423)	(0.576)
Controls	No	Yes	Yes	No	Yes	Yes
N	338	338	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The dependant variable, Overestimation of personality beliefs, is computed by taking the difference between the player's beliefs about their partner's personality and the partner's true personality scores. This difference is then standardised. The dependent variable is thus a measure of exaggeration or overestimation of the partner's personality by the player. The dependent variable, Inaccuracy of personality beliefs, is computed by taking the absolute difference between the player's beliefs about their partner's personality and the partner's true personality scores. This difference is then standardised. This dependent variable is thus a measure of the error or inaccuracy in the player's beliefs about their partner's personality. The independent variables are the player's own personality traits, the true personality trait score of the partner, the player's eyes test score and these variables interacted with the treatment dummy. The control variables are the player's IQ, gender, age and risk aversion and these variables interacted with the treatment dummy. Columns 1 and 2 show that overestimation of partner's extraversion increases with the player's own extraversion, an effect which is significantly stronger in the treatment group compared to the control group. In column 3, the negative significant (p-value < 0.10) interaction term between the player's eyes test score and the treatment dummy shows that with increasing eyes test score, the inaccuracy in the player's beliefs about partner's extraversion is significantly lower in the treatment group compared to the control. Columns 4 and 5 show no significant effect of own extraversion or neuroticism on overestimation of the partner's neuroticism in either of the two groups. Column 6 shows that the player's performance in the eyes test has no significant impact on the inaccuracy of their beliefs about partner's neuroticism.

Table A.5: Impact of beliefs about own cognitive ability on beliefs about partner's cognitive ability

	IQ Belief		Overestimation of IQ Belief		Inaccuracy of IQ Belief	
	(1)	(2)	(3)	(4)	(5)	(6)
Own IQ Belief × Treatment	-0.0588	-0.0626	-0.0445	-0.0474	-0.1807	-0.3183**
	(0.086)	(0.116)	(0.065)	(0.088)	(0.112)	(0.143)
Partner's IQ × Treatment	-0.0345	-0.0186	-0.0261	-0.0141	0.0912	0.0881
	(0.081)	(0.082)	(0.061)	(0.062)	(0.148)	(0.145)
Own IQ belief	0.6706***	0.7319***	0.5077***	0.5541***	-0.1120	0.0198
	(0.060)	(0.078)	(0.045)	(0.059)	(0.079)	(0.105)
Partner's IQ	0.0937*	0.0894*	-0.6296***	-0.6328***	-0.1668**	-0.1588**
	(0.050)	(0.050)	(0.038)	(0.038)	(0.082)	(0.077)
Treatment	-0.0833	0.4362	-0.0631	0.3303	0.0693	0.3750
	(0.082)	(0.506)	(0.062)	(0.383)	(0.108)	(0.625)
Own IQ × Treatment		-0.0172		-0.0130		0.1404
		(0.110)		(0.083)		(0.122)
Eyes Test Score × Treatment		0.0276		0.0209		0.1534
		(0.099)		(0.075)		(0.122)
Own IQ		-0.0714		-0.0541		-0.1146
		(0.069)		(0.053)		(0.087)
Eyes Test Score		0.0194		0.0147		-0.1784**
		(0.077)		(0.058)		(0.082)
Controls	No	Yes	No	Yes	No	Yes
N	338	338	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Column 1 examines the impact of the player's beliefs about own IQ, partner's true IQ and their interaction with the treatment dummy, on beliefs about the partner's IQ. While own IQ belief interacted with treatment dummy has no significant effect, own IQ belief positively impacts beliefs about partner's IQ. Column 2 includes the player's (i.e. the predictor's) true IQ as measured by the Raven's test, the player's eyes test score, along with their interactions with the treatment dummy. Columns 2 also includes the control variables - player's age, gender and risk aversion - and the 3 control variables interacted with the treatment dummy. For columns 3 and 4 the dependant variable is the standardised difference between the beliefs about partner's IQ and the partner's true IQ (as measured by the partner's performance in the Raven's test). Hence, for columns 3 and 4 the dependant variable is a measure of the degree by which the player overestimates their partner's IQ. Columns 3 and 4 indicate that an increase in player's own IQ belief leads to overestimation of the partner's IQ, irrespective of being in the treatment or control group i.e. players project beliefs about their own IQ onto their partner. For columns 5 and 6 the dependant variable is the standardised absolute difference between the beliefs about partner's IQ and the partner's true IQ. Hence, for columns 5 and 6 the dependant variable is a measure of the inaccuracy in the player's beliefs about their partner's IQ. In column 6, the significant (p-value < 0.05) negative interaction between own IQ belief and the treatment dummy, implies that as own IQ belief increases, the inaccuracy in beliefs about partner's IQ is significantly lower in the treatment group compared to the control.

Table A.6: Impact of (absolute) difference between own personality and beliefs about partner's personality on level-k strategy chosen

	Level Belief			Level Chosen		
	(1)	(2)	(3)	(4)	(5)	(6)
DiffExtraversion × Treatment	-0.5302*	-0.5600*	-0.5396*	-0.6597***	-0.7395***	-0.6505**
	(0.269)	(0.290)	(0.299)	(0.237)	(0.242)	(0.254)
DiffNeuroticism × Treatment	0.1879	0.2106	0.3353	-0.0415	-0.0060	0.1645
	(0.248)	(0.263)	(0.292)	(0.248)	(0.244)	(0.262)
DiffExtraversion	0.1470	0.1806	0.1448	0.2046	0.2089	0.1663
	(0.198)	(0.201)	(0.204)	(0.177)	(0.180)	(0.183)
DiffNeuroticism	-0.1579	-0.1491	-0.2589	-0.1604	-0.1499	-0.2929
	(0.183)	(0.190)	(0.211)	(0.174)	(0.182)	(0.189)
Treatment	0.1668	0.0079	-2.9732	0.0677	-0.0799	-2.3533
	(0.267)	(0.285)	(2.048)	(0.279)	(0.286)	(1.854)
Own Extraversion × Treatment		-0.0578	0.0509		-0.1528	0.0320
		(0.306)	(0.364)		(0.289)	(0.317)
Own Neuroticism × Treatment		-0.1846	-0.1402		-0.4226	-0.4142
		(0.277)	(0.303)		(0.280)	(0.280)
Own Extraversion		-0.0612	-0.1633		-0.1773	-0.2771
		(0.196)	(0.203)		(0.214)	(0.216)
Own Neuroticism		0.0227	-0.0960		0.2069	0.0490
		(0.197)	(0.215)		(0.201)	(0.200)
Extraversion Belief × Treatment		-0.2863	-0.2942		-0.2422	-0.2628
		(0.272)	(0.284)		(0.255)	(0.263)
Neuroticism Belief × Treatment		-0.2533	-0.1483		-0.2287	-0.1007
		(0.292)	(0.303)		(0.282)	(0.297)
Extraversion Belief		0.1724	0.1403		0.1498	0.1261
		(0.194)	(0.197)		(0.183)	(0.179)
Neuroticism Belief		-0.1412	-0.1978		-0.0924	-0.1278
		(0.195)	(0.196)		(0.203)	(0.209)
Eyes Test Score × Treatment			0.5905*			0.6297**
			(0.301)			(0.311)
Own IQ × Treatment			-0.2809			-0.3072
			(0.296)			(0.307)
IQ Belief × Treatment			0.3462			0.2073
			(0.324)			(0.270)
Female × Treatment			-0.8057			-0.8928
			(0.612)			(0.564)
Order × Treatment			1.1902**			1.1083*
			(0.594)			(0.605)
Eyes Test Score			-0.4462*			-0.4522*
			(0.249)			(0.254)
Own IQ			0.2175			0.2606
			(0.203)			(0.220)
IQ Belief			-0.3538*			-0.3321*
			(0.210)			(0.200)
Female			1.1196**			1.4361***
			(0.435)			(0.388)
Order			-0.7462*			-0.9827**
			(0.401)			(0.420)
Controls	No	No	Yes	No	No	Yes
N	338	338	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Here, 'Controls' imply the player's risk aversion, age and their interactions with the treatment dummy.

Table A.7: Impact of (absolute) difference between own personality and beliefs about partner's personality on the probability of choosing the best response - Probit Model

	Control		Treatment	
	(1) Pr(Level=2)	(2) Pr(Level=2)	(3) Pr(Level=2)	(4) Pr(Level=2)
DiffExtraversion	-0.0453	-0.0550	0.0846***	0.0992***
	(0.038)	(0.035)	(0.030)	(0.032)
DiffNeuroticism	-0.0008	-0.0077	-0.0459	-0.0358
	(0.031)	(0.031)	(0.032)	(0.033)
Own Extraversion		0.0123		0.0168
		(0.030)		(0.046)
Own Neuroticism		0.0543*		-0.0438
		(0.032)		(0.036)
Extraversion Belief		-0.0165		-0.0109
		(0.035)		(0.031)
Neuroticism Belief		0.0296		0.0656*
		(0.033)		(0.035)
Own IQ		0.0587*		0.0558
		(0.036)		(0.038)
IQ Belief		-0.0441		-0.0028
		(0.029)		(0.036)
Eyes Test Score		0.0549		0.0497
		(0.037)		(0.031)
Controls	No	Yes	No	Yes
N	170	170	168	168

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The table reports the average marginal effects from Probit regressions. 'Controls' imply the player's age, gender, risk aversion and the order of play of the two games.

Table A.8: Impact of (absolute) difference between own personality and beliefs about partner's personality on the probability of choosing the best response - Logit Model

	Control		Treatment	
	(1) Pr(Level=2)	(2) Pr(Level=2)	(3) Pr(Level=2)	(4) Pr(Level=2)
DiffExtraversion	-0.0486	-0.0547	0.0843***	0.1016***
	(0.041)	(0.040)	(0.029)	(0.030)
DiffNeuroticism	-0.0019	-0.0074	-0.0459	-0.0370
	(0.030)	(0.031)	(0.032)	(0.032)
Own Extraversion		0.0093		0.0185
		(0.030)		(0.047)
Own Neuroticism		0.0548		-0.0422
		(0.034)		(0.037)
Extraversion Belief		-0.0154		-0.0102
		(0.039)		(0.032)
Neuroticism Belief		0.0321		0.0665*
		(0.035)		(0.035)
Own IQ		0.0618		0.0583
		(0.038)		(0.040)
IQ Belief		-0.0428		-0.0042
		(0.027)		(0.037)
Eyes Test Score		0.0531		0.0454
		(0.038)		(0.033)
Controls	No	Yes	No	Yes
N	170	170	168	168

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The table reports the average marginal effects from Logit regressions. 'Controls' imply the player's age, gender, risk aversion and the order of play of the two games.

Table A.9: Impact of beliefs about partner's personality on beliefs about partner's contribution and own contribution in the public goods game

	Control Order 1				Treatment Order 1			
	(1) Contribution Belief	(2) Contribution Belief	(3) Own Contribution	(4) Own Contribution	(5) Contribution Belief	(6) Contribution Belief	(7) Own Contribution	(8) Own Contribution
Extraversion Belief	0.0430	0.0575	0.0951	0.1042	0.1964*	0.1879*	0.1882**	0.1667*
	(0.083)	(0.082)	(0.087)	(0.101)	(0.101)	(0.100)	(0.087)	(0.083)
Neurotcisim Belief	0.0440	0.0456	-0.0207	-0.0275	0.1771	0.1627	0.1591	0.1697
	(0.090)	(0.109)	(0.087)	(0.101)	(0.111)	(0.109)	(0.117)	(0.112)
Own IQ		-0.0664		-0.0114		0.1265		0.1782*
		(0.106)		(0.087)		(0.088)		(0.101)
IQ Belief		0.1329		0.1016		0.0964		0.2512**
		(0.097)		(0.107)		(0.096)		(0.097)
Eyes Test Score		-0.0256		0.0221		0.1197		0.1694
		(0.096)		(0.130)		(0.090)		(0.117)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
N	110	110	110	110	106	106	106	106

Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table shows that of the two fundamental personality traits - extraversion and neuroticism - only beliefs about partner's extraversion affect decision making in the public goods game, for treatment group subjects. 'Controls' refers to the player's age, gender and risk aversion.

Table A.10: Impact of beliefs about partner's personality and own personality on beliefs about partner's contribution and own contribution in Public Goods Game - OLS approach

	Control OLS		Treatment OLS	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution
ExtraversionBelief	0.0601	0.1110	0.2036**	0.1599*
	(0.082)	(0.092)	(0.099)	(0.085)
OwnExtraversion	-0.0733	-0.2041**	-0.1831	-0.0919
	(0.095)	(0.088)	(0.118)	(0.117)
Own IQ	-0.0583	-0.0417	0.0783	0.1484
	(0.096)	(0.084)	(0.086)	(0.099)
IQ Belief	0.1250	0.1140	0.0953	0.2474**
	(0.091)	(0.100)	(0.096)	(0.099)
Eyes Test Score	-0.0431	-0.0015	0.1328	0.1754
	(0.096)	(0.118)	(0.099)	(0.127)
Controls	Yes	Yes	Yes	Yes
N	110	110	106	106

Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

'Controls' refers to the player's age, gender and risk aversion.

Table A.11: Impact of beliefs about partner's personality and own personality facets on beliefs about partner's contribution and own contribution in Public Goods Game

	Control OLS		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution
ExtraversionBelief	0.0542	0.1036	0.6169**	0.5262**
	(0.084)	(0.093)	(0.265)	(0.251)
OwnAssertiveness	-0.1258	-0.2271*	-0.3287**	-0.3095**
	(0.113)	(0.114)	(0.128)	(0.124)
OwnActivity	0.0593	0.0333	0.0255	0.1562
	(0.122)	(0.123)	(0.125)	(0.106)
Own IQ	-0.0497	-0.0323	0.0781	0.1396
	(0.099)	(0.088)	(0.098)	(0.105)
IQ Belief	0.1391	0.1301	0.1041	0.2708***
	(0.089)	(0.102)	(0.091)	(0.092)
Eyes Test Score	-0.0342	0.0114	0.1193	0.1751
	(0.102)	(0.122)	(0.118)	(0.139)
Controls	Yes	Yes	Yes	Yes
N	110	110	106	106

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

'Controls' refers to the player's age, gender and risk aversion. Columns 1 and 2 report the OLS regression results for the control group. Column 2 shows that the players own assertiveness has a negative significant effect (p-value < 0.05) on contribution levels whereas facet activity has an insignificant positive effect. None of the facets significantly impact beliefs about partner's contribution. Columns 3 and 4 present the results from 2SLS IV regression for the treatment group. For the treated subjects, beliefs about partner's extraversion positively and significantly (p-value < 0.05) affects beliefs about partner's contribution as well as own-contribution. With regards to the player's own personality, facet assertiveness has a significant negative effect (p-value < 0.05) on both contribution belief and own-contribution, whereas facet activity has an insignificant positive effect.

Table A.12: Impact of beliefs about partner's personality and own personality on beliefs about partner's contribution and own contribution in Public Goods Game - Order 2

	Control OLS		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution
Extraversion Belief	-0.0357	-0.2345*	0.1273	1.2682
	(0.147)	(0.121)	(1.065)	(1.986)
Own Extraversion	0.1603	0.0317	0.1219	-0.1167
	(0.158)	(0.158)	(0.189)	(0.321)
Own IQ	0.1372	0.0435	-0.0345	-0.0495
	(0.203)	(0.162)	(0.120)	(0.223)
IQ Belief	0.1792	0.0170	-0.0657	-0.1679
	(0.159)	(0.133)	(0.142)	(0.209)
Eyes Test Score	-0.2673	0.2327	0.2574	0.0801
	(0.174)	(0.164)	(0.157)	(0.330)
Controls	Yes	Yes	Yes	Yes
N	60	60	62	62

Standard errors in parentheses. Statistical significance indicated as follows:

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table replicates the IV regression results from the main paper but only for those subjects which played the 11-20 game first. 'Controls' refers to the player's age, gender and risk aversion.

Table A.13: Impact of beliefs about partner's personality and own personality on beliefs about partner's contribution and own contribution in Public Goods Game - for both orders of play

	Control OLS		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution
ExtraversionBelief	0.0229	-0.0031	0.4261	0.5759*
	(0.071)	(0.075)	(0.275)	(0.301)
OwnExtraversion	-0.0007	-0.1202	-0.1269	-0.1544
	(0.083)	(0.080)	(0.107)	(0.115)
Own IQ	-0.0135	-0.0213	0.0437	0.0390
	(0.087)	(0.074)	(0.076)	(0.093)
IQ Belief	0.1426*	0.0827	0.0050	0.0824
	(0.081)	(0.082)	(0.072)	(0.087)
Eyes Test Score	-0.1205	0.0825	0.1323	0.1295
	(0.082)	(0.092)	(0.085)	(0.113)
Order	-0.0876	0.0501	-0.0520	-0.1242
	(0.181)	(0.162)	(0.190)	(0.208)
Controls	Yes	Yes	Yes	Yes
N	170	170	168	168

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

This table replicates the IV regression results from the main paper for both orders of play. Order is a dummy variable that equals 1 when the 11-20 game is played first and 0 when the public goods game is played first. 'Controls' refers to the player's age, gender and risk aversion. The table shows that playing the 11-20 game first has a negative impact on both beliefs about partner's contribution as well as own contribution in the public goods game for the Treatment group, although the effect is statistically insignificant.

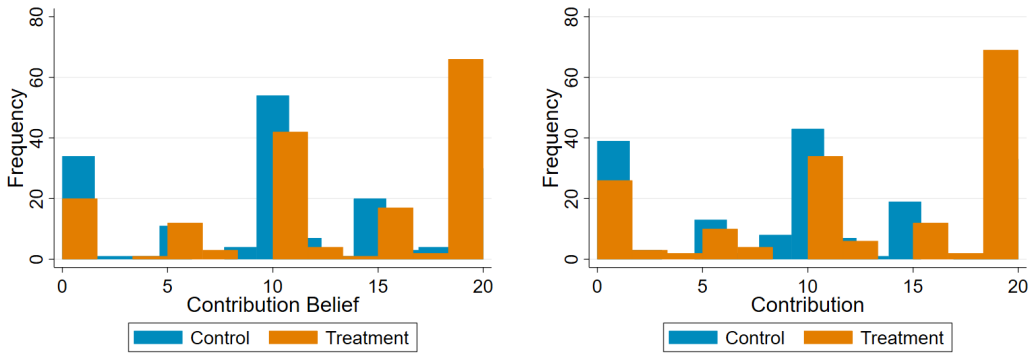
Table A.14: Relationship between number of words and emotional content of text spoken by the subject and the subject's own personality

	Own Extraversion			Own Neuroticism		
	(1)	(2)	(3)	(4)	(5)	(6)
Own Number of Words	0.1439**	0.1733**	0.1781**	0.1289*	0.1282*	0.0814
	(0.071)	(0.073)	(0.075)	(0.071)	(0.071)	(0.073)
Own Valence		-0.5325*	-0.5533**		0.2299	0.3302
		(0.284)	(0.276)		(0.269)	(0.255)
Own Arousal		0.0296	0.0358		-0.2117	-0.2409*
		(0.150)	(0.152)		(0.135)	(0.132)
Own Dominance		0.4011	0.4033		-0.0124	-0.0905
		(0.279)	(0.272)		(0.258)	(0.252)
Own IQ			-0.1804**			-0.0031
			(0.085)			(0.076)
Eyes Test Score			-0.0069			0.1478*
			(0.090)			(0.084)
Age			0.0210			0.0021
			(0.027)			(0.023)
Female			0.0201			0.3858**
			(0.169)			(0.162)
Non-Native Speaker			0.0798			-0.1319
			(0.156)			(0.174)
First Speaker			0.1562			0.1071
			(0.156)			(0.162)
N	168	168	168	168	168	168

Standard errors in parentheses

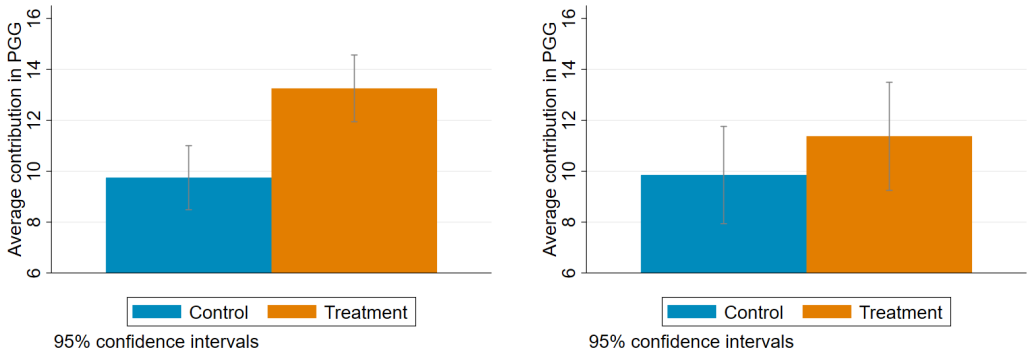
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The explanatory variables, namely the number of words spoken by the subject, and valence, arousal and dominance ratings of language used, are standardised for comparability across coefficients. Number of words used by the subject is a positive indicator of the subject's extraversion, even after adding valence, arousal and dominance ratings of the text used as explanatory variables. The result persists after controlling for the subject's IQ, eyes test score, age, gender, a dummy for non-native speaker (equals 1 if the subject is a non-native English speaker and 0 otherwise) and a dummy for first speaker (equals 1 if the subject started the conversation and 0 otherwise). Trait neuroticism also appears to be positively associated with number of words used, although the coefficient becomes insignificant after adding sensible control variables.



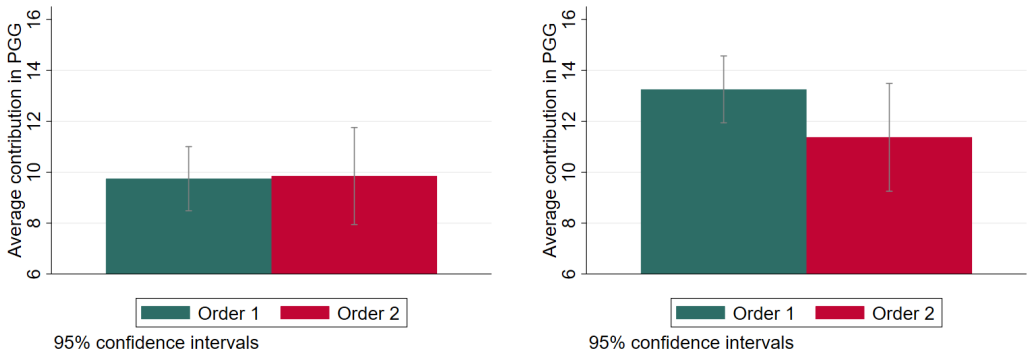
(a) Contribution Belief (b) Own Contribution

Figure A.1: Distribution of (a) Beliefs about Partner's Contribution and (b) Own Contribution in the Public Goods Game



(a) Order 1 (b) Order 2

Figure A.2: Average contribution in Public Goods Game (PGG) (a) when PGG is played first (order 1) and (b) when the 11-20 game is played first (order 2). Treated subjects contribute more than control group subjects in order 1. The average contribution of treated subjects is 13.2 EP where as that of control group subjects is 9.7 EP in order 1. The difference is statistically significant with t-statistic of -3.8060 and p-value < 0.01. There is no significant difference in contribution levels between the treatment and control groups in order 2.



(a) Control (b) Treatment

Figure A.3: Average contribution in Public Goods Game (PGG) for different orders of play of the two games for (a) Control and (b) Treatment groups. Order 1 is when PGG is played first and order 2 is when the 11-20 game is played first. On average players contribute more in the treatment group (figure (b)) when PGG is played first (order 1) compared to when 11-20 is played first (order 2). In a one-tailed t-test, we reject the null of no significant difference in contribution between treated players in order 1 and treated players in order 2 in favour of the alternative that treated players in order 1 contribute more at the 10% significance level (t-statistic = 1.5752, p-value =0.0586). There is no significant difference for control group subjects (figure (a)).

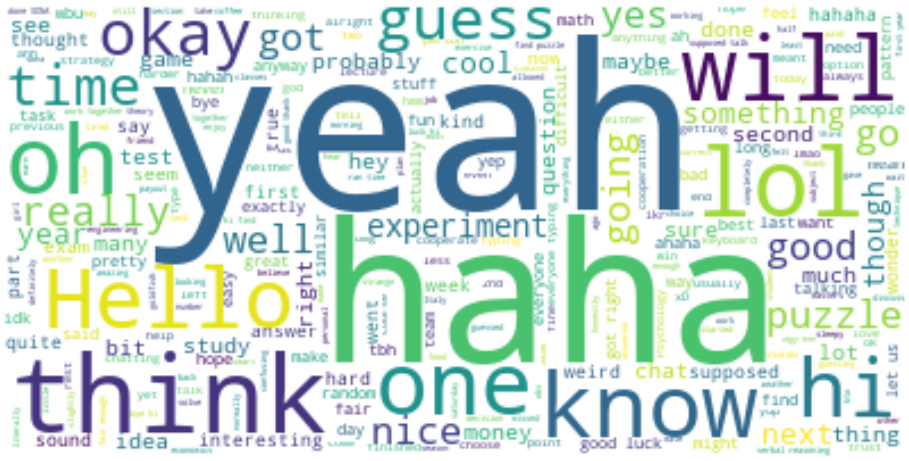


Figure A.4: Most frequently used words by subjects during small talk communication

(a) Highly Extraverted

(b) Less Extraverted

(c) Highly Neurotic

(d) Less Neurotic

Figure A.5: Most frequently used words during small talk communication by subjects who are believed to be (a) highly extraverted (b) less extraverted (c) highly neurotic and (d) less neurotic.

C Examples of Small Talk Communication

Example 1

Player 1: *hey*

Player 2: *Hey how are you doing :)*

Player 1: *lol alright*

Player 1: *you*

Player 2: *yeah fine haha*

Player 1: *tbh this is strange*

Player 2: *this is strange*

Player 2: *exactly haha*

Player 1: *omg*

Player 1: *so...*

Player 1: *do you have any pets?*

Player 2: *probably they want to see if we will cooperate depending on our chat or something haha*

Player 2: *nope and you?*

Player 1: *trying to make conversation :D*

Player 1: *yep, two cats*

Player 2: *I had fish when I was little haha*

Player 2: *What are their names?*

Player 1: *aww like goldfish?*

Player 1: *Cosmos and Titan*

Player 2: *Yes a goldfish and one more but I forgot the type lol*

Player 2: *That is great!*

Player 1: *i used to have goldfish*

Player 1: *but we could not keep them cause of the cats*

Player 2: *Goldfish live a long I think generally haha*

Player 2: *Oh no!*

Player 1: *we had 4 goldfish*

Player 2: *Cats is more interesting haha*

Player 2: *are**

Player 1: *yeah i know*

Player 1: *only problem is they scratch you*

Player 1: *a lot*

Player 2: *Ahaha yes*

Player 2: *scars all the time*

Player 1: *so now i have lots of marks on me*

Player 2: *This keyboard is so bad*

Player 2: *Oh no*

Player 2: *The pain of being a cat owner haha*

Player 1: *the keyboard never crossed my mind lol*

Player 2: *I barely can type on it haha*

Player 2: *It was nice chatting to you haha*

Player 1: *aww goodbye*

Example 2

Player 1: *hi*

Player 2: *hey*

Player 1: *what is up?*

Player 2: *not much, you?*

Player 1: *same, just waiting haha*

Player 2: *same, it is a bit dead is not it*

Player 1: *it really is...*

Player 2: *think I mucked up most of those puzzles tbh*

Player 1: *although everyone is now typing fervently*

Player 1: *you think you did that bad?*

Player 2: *not that bad, but some of them I just did not get*

Player 2: *or I almost got them and then the time ran out*

Player 1: *there were some really weird ones though*

Player 2: *yeah igy*

Player 1: *yeah same, 30 seconds is a bit too quick for some of those*

Player 2: *some just made no sense to me*

Player 1: *true that*

Player 1: *but they take 2/30 anyway,*

Player 2: *seems like a bit of a waste of time*

Player 2: *to do 30 and then only 2 count*

Player 1: *and for some reason \ q random \ q selection always ends up in me being paid nothing xD*

Player 2: *same haha*

Player 1: *Ikr*

Player 2: *or i am in a team and the team does really badly and i get almost no money*

Player 1: *but yeah, pretty much a waste*

Player 2: *really**

Player 1: *omg yes....*

Player 2: *its a bit annoying*

Player 1: *These dictator games where in the end one person decides whether I can keep my money or get nothing*

Player 2: *yes! so irritating*

Player 1: *Being paid £3 after 1,5 hours....*

Player 2: *what a drag*

Example 3

Player 1: *Hi*

Player 2: *Hello*

Player 1: *how are you?*

Player 2: *How are you?*

Player 2: *haha*

Player 1: *haha i'm good you?*

Player 2: *great*

Player 2: *How are exams going?*

Player 1: *yeah not too bad, some have gone worse that i had wanted, you?*

Player 2: *Most of them were alright, three more to go*

Player 2: *How about you?*

Player 2: *Any more left?*

Player 1: *i've got 1 more to go, thank god, i have 7 overall*

Player 1: *how many do you have overall?*

Player 2: *That's a lot. When is your last one?*

Player 2: *I have 6 in total*

Player 1: *next wednesday*

Player 1: *so i can go to circle and pop and celebrate by getting black out drunk haha*

Player 2: *Still some time to prepare. I have one this Saturday*

Player 2: *Yeah, pop is back on again next week*

Player 1: *that's grim, my boyfriend does to, i don't get why exams on saturday is a thing*

Player 1: **too*

Player 2: *None of your 7 exams were on Saturday?*

Player 1: *nope, i had 1 in week 3, 1 week 4, 3 last week, 1 this week and one next week*

Player 2: T*ime is running out heh*

D Experiment Script

This following part is read out by the experimenter (Note that the script presented includes certain comments in italics which were not shown to subjects during the experiment).

Thank you everyone for coming to our experiment today. Before we begin, please check that the number on the card handed to you matches with the number on the cubicle that you are seated in.

During the whole experiment, please do not speak with each other. If you do not understand something, please ask the experimenter by raising your hand. We will come to you and answer your question individually. Please also refrain from using your mobile phones during the experiment.

Also bear in mind that you may have to wait a few moments during the experiment, as we want everyone to finish at the same time. You will see the message 'Please wait until the experiment continues' on your screen when this is applicable.

Before we begin, I would just like to say, that your participation is very crucial for our research and we truly appreciate all of you being here. Thank you.

We will now begin the experiment.

General Instructions

In the laboratory experiment you are taking part in, you can - depending on your decisions and the decisions of your fellow players - earn money in addition to the show-up fee of £4. It is, therefore, of importance that you read these instructions carefully.

Today's experiment consists of the following: In the first section, you will be asked to answer a few questions and solve some puzzles. In the second section, you will be asked to make decisions in a few tasks. Lastly, there will be some questions for you to answer.

Please note that the experiment will not involve any deception and your answers today will remain strictly anonymous. The generated anonymous data will only be used for the purpose of our study. Therefore, we request you to answer to the best of your ability as it is integral to our research.

The outcomes from each task will be disclosed at the end of the experiment.

Detailed instructions for each part will follow.

We will now begin the experiment.

(a) Questionnaire: Personality (44 questions)

You will be asked to answer some questions about yourself. Your payment will not be affected by this. Just to remind you, your answers will remain anonymous so please answer as truthfully as possible as this is critically important for our research.

You will see a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who likes to spend time with others? Please pick an option next to each statement to indicate the extent to which you agree or disagree with

that statement.

I see myself as someone who...

START BFI QUESTIONNAIRE

(b) PUZZLES: Raven's Test (30 items)

You will be asked to solve some puzzles, a pattern game.

On the screen, you will see a set of abstract pictures with one of the pictures missing. You need to choose a picture from the choices given below to complete the pattern. You will have 30 seconds to complete each set of pictures. The first picture you will see will be an example, no input is required. You will then be asked to solve a total of 30 such puzzles. 2 of these 30 puzzles will randomly be selected. For each correct answer, from the random 2, you will receive £1. Please make sure to click 'submit answer', as otherwise your answer will not be recorded, and you might lose money.

START RAVEN TEST

Out of the 30 puzzles you just saw, how many puzzles do you think you correctly solved?

If your answer to this question is correct, then you will win an additional £1.

Now subjects will be allocated to one of 2 groups - control or treatment.

Control Group

Placebo Task[23]

Can you please indicate the title and summarize the story of the last movie you have seen? Please be as specific as possible and include as many details as possible. Please use a minimum of 250 characters. You will have 4 minutes to write the summary.

Please write the summary in the box provided on the next screen.

(next screen) Please make sure to click 'Submit' after you are done, as otherwise your answer will not be recorded.

Beliefs

You have been randomly and anonymously matched with another person in this room who is participating in the experiment. Please answer a few questions about the other player to the best of your ability, before you proceed with the tasks.

1. You will see a number of characteristics that may or may not apply to the other player. For example, do you agree that the other player is someone who likes to spend time with others? Please pick an option next to each statement to indicate the extent to which you agree or disagree with the statement regarding the other player.

   You will see 11 statements about the other player.

   1 out of these 11 statements will be randomly chosen and if your answer matches that of the other player, then you will win an additional £1.

   START PERSONALITY PREDICTION QUESTIONNAIRE

[23] This task has been adapted from the Placebo Task used in Bursztyn et al., 2017.

2. Recall the visual puzzle task from earlier in the experiment. On the screen, you saw a set of abstract pictures with one of the pictures missing. You had to choose a picture from the choices given below to complete the pattern. You had 30 seconds to complete each set of pictures. You were asked to solve a total of 30 such puzzles. How many puzzles do you think the other player, with whom you have been matched, correctly solved? Please indicate a (whole) number between 0 and 30.

   If your answer to this question is correct, then you will win an additional of £1.

Tasks (note that the order of the two tasks below were randomised)

You will now take part in a few decision-making tasks with the player with whom you have already been matched. Note that you will be participating in all tasks with the same player. Your payoff from these tasks will be calculated in Experimental Pounds (EP). The exchange rate between £ and EP is 1:5, i.e. 5 EP = £1.

The outcomes from each task will be disclosed at the end of the experiment. You will receive payment based on your results from one of the tasks randomly selected from the tasks in this part of the experiment. Please note that each task is equally likely to be chosen for payment.

Task 1: PGG

You will now participate in a task with the player with whom you have been matched. You have 20 EP and the other player has 20 EP as well. Your task in the game, and also the other player's task, is to decide how much to contribute to a joint project. You can choose to contribute any amount between 0 and 20 EP (only integer numbers). Your earnings from the project is the total contribution to the project, made by you and the other player, multiplied by a factor of 3/4. Your payoff from this task will be your earnings from the project, plus the amount you did not contribute. Thus, your final payoffs (in EP) will be given by:

Your payoff = (20 – your contribution)+3/4(your contribution + the other player's contribution)

Other player's payoff = (20 – the other player's contribution)+3/4(your contribution + the other player's contribution)

If for example, you contribute 20 EP to the project and the other player contributes 20 EP then,

Your payoff will be: $20–20 + 3/4(20 + 20) = 30$

The other player's payoff will be: $20–20 + 3/4(20 + 20) = 30$

If for example, you contribute 0 EP to the project and the other player contributes 20 EP then,

Your payoff will be: $20–0 + 3/4(0 + 20) = 35$

The other player's payoff will be: $20–20 + 3/4(0 + 20) = 15$

If you have a question, please raise your hand.

If you have read the instructions and do not have any questions, please click 'OK' to proceed to a practice quiz. The quiz is to make sure that you understand the task and your answers will not affect your payoffs from the experiment.

Suppose you choose to contribute 20 EP and the other player chooses to contribute 0 EP.

Your payoff will be:

The other player's payoff will be:

Suppose you choose to contribute 10 EP and the other player chooses to contribute 14 EP.

Your payoff will be:

The other player's payoff will be:

You have correctly answered the practice quiz. Click 'Continue' to proceed with the task.

How much money do you think the other player will contribute? Please indicate a number (an integer) between 0 and 20.

If your answer to this question matches that of the other player, then you will win an additional £1.

How much would you like to contribute? Please choose a number (an integer) between 0 and 20.

Task 2: 11-20 money request game

You will now participate in a different task with the same player.

You and the other player are playing a game in which each player requests an amount of money. The amount must be (an integer) between 11 and 20 Experimental Pounds. Each player will receive the amount he or she requests. A player will receive an additional amount of 20 Experimental Pounds if he or she asks for exactly one Experimental Pound less than the other player.

If for example, you request 19 EP and the other player requests 20 EP then,

Your payoff will be: $19 + 20 = 39$

The other player's payoff will be: 20

If for example, you request 17 EP and the other player requests 16 EP then,

Your payoff will be: 17

The other player's payoff will be: $16 + 20 = 36$

If you have a question, please raise your hand.

If you have read the instructions and do not have any questions, please click 'OK' to proceed to a practice quiz. The quiz is to make sure that you understand the task and your answers will not affect your payoffs from the experiment.

Suppose you choose to request 13 EP and the other player chooses to request 14 EP.

Your payoff will be:

The other player's payoff will be:

Suppose you choose to request 15 EP and the other player chooses to request 18 EP.

Your payoff will be:

The other player's payoff will be:

You have correctly answered the practice quiz. Click 'Continue' to proceed with the task.

How much money do you think the other player will request? Please indicate a number (an integer) between 11 and 20.

If your answer to this question matches that of the other player, then you will win an additional £1.

What amount of money would you request? Please choose a number (an integer) between 11 and 20.

Treatment Group

Chat Instructions

You have been randomly and anonymously matched with another person in this room who is participating in the experiment.

Before you proceed with the tasks, you are allowed to chat with the other player for 4 minutes. You can type in the box provided at the bottom of the screen and press Enter on your keyboard to send your messages.

Your message should not contain any personal information such as your name or your computer ID. The purpose is to preserve anonymity throughout the experiment. You are allowed to chat freely in English and in a non-abusive manner.

Beliefs

Now that you have chatted with the other player please answer a few questions about the other player, before you proceed with the tasks.

1. You will see a number of characteristics that may or may not apply to the other player. For example, do you agree that the other player is someone who likes to spend time with others? Please pick an option next to each statement to indicate the extent to which you agree or disagree with the statement regarding the other player.

   You will see 11 statements about the other player.

   1 out of these 11 statements will be randomly chosen and if your answer matches that of the other player, then you will win an additional £1.

   START PERSONALITY PREDICTION QUESTIONNAIRE

2. Recall the visual puzzle task from earlier in the experiment. On the screen, you saw a set

of abstract pictures with one of the pictures missing. You had to choose a picture from the choices given below to complete the pattern. You had 30 seconds to complete each set of pictures. You were asked to solve a total of 30 such puzzles. How many puzzles do you think the other player, with whom you chatted, correctly solved? Please indicate a (whole) number between 0 and 30.

If your answer to this question is correct, then you will win an additional £1.

Tasks (note that the order of the two tasks below were randomised)

You will now take part in a few decision-making tasks with the player you chatted with. Note that you will be participating in all tasks with the same player. Your payoff from these tasks will be calculated in Experimental Pounds (EP). The exchange rate between £ and EP is 1:5, i.e. 5 EP = £1.

The outcomes from each task will be disclosed at the end of the experiment. You will receive payment based on your results from one of the tasks randomly selected from the tasks in this part of the experiment. Please note that each task is equally likely to be chosen for payment.

Task 1: PGG

You will now participate in a task with the player you chatted with. You have 20 EP and the other player has 20 EP as well. Your task in the game, and also the other player's task, is to decide how much to contribute to a joint project. You can choose to contribute any amount between 0 and 20 EP (only integer numbers). Your earnings from the project is the total contribution to the project, made by you and the other player, multiplied by a factor of ¾. Your payoff from this task will be your earnings from the project, plus the amount you did not contribute. Thus, your final payoffs (in EP) will be given by:

Your payoff = (20– your contribution)+¾(your contribution + the other player's contribution)

Other player's payoff = (20– the other player's contribution)+¾(your contribution + the other player's contribution)

Examples and quiz related to the game, then partner's strategy belief and own choice

Task 2: 11-20 money request game

You will now participate in a different task with the same player.

You and the other player are playing a game in which each player requests an amount of money. The amount must be (an integer) between 11 and 20 Experimental Pounds. Each player will receive the amount he or she requests. A player will receive an additional amount of 20 Experimental Pounds if he or she asks for exactly one Experimental Pound less than the other player.

Examples and quiz related to the game, then partner's strategy belief and own choice

FOR BOTH CONTROL AND TREATMENT:

Eyes Test (36 questions)

In this section, you will be asked to look at 36 pictures of different pairs of eyes.

For each set of eyes, choose the word which best describes what the person in the picture is thinking or feeling. You may feel that more than one word is applicable but please choose just one word, the word which you consider to be most suitable. Before making your choice, make sure that you have read all 4 words. You should try to do the task as quickly as possible, but you will not be timed. If you do not know what a word means you can read the meaning of the word provided at the bottom of the screen.

2 of these 36 questions you answer will randomly be selected. For each correct answer, from the random 2, you will receive £1.

You will first see a practice question with four options. The correct option will be highlighted. After that you may proceed to the questions.

Which word best describes what the person in the picture is thinking or feeling?

START EYES TEST

Questionnaire

Thank you. Now, in the final section, you will be asked to answer some questions about yourself.

(a) Risk

Please indicate the likelihood that you would engage in the described activity or behaviour if you were to find yourself in that situation.

START DOSPERT

(b) Personal information

1. How old are you? (in years)
2. What is your year of study? (1, 2, 3, Post-graduate Other)
3. What is your gender? (M, F, Other, Prefer not to say)
4. What is your nationality?
5. Is English your Native language? (Yes, No)
6. What is your current degree course?
7. Would you consider your degree course mostly: (quantitative, qualitative)
8. Have you ever taken any game theory modules/courses? (Yes, No)
9. How dissatisfied or satisfied are you with your life in general? (1-7 scale from completely dissatisfied to completely satisfied)

Profit display screen

1. Number of correct answers from the visual puzzles task (out of 30):

2. Your payoff (in EP) from the first decision-making task:
3. Your payoff (in EP) from the second decision-making task:
4. Number of correct answers from the eyes task (out of 36):
5. Additional amount earned (in £):
6. Total earnings (in £):

Thank you for completing the experiment successfully. Please queue at the marked line once you are done, show the number card and collect your payment in cash.

E Personality Beliefs Questionnaire

The personality beliefs questionnaire used in the study was adapted from Rammstedt and John, 2007 and is presented below:

Please pick an option next to each statement to indicate the extent to which you agree or disagree with the statement **regarding the other player**.
For each of the below statements the subject could pick any one of five options - Disagree strongly, Disagree a little, Neither agree nor disagree, Agree a little and Agree strongly

1. The other player is reserved.
2. The other player is generally trusting.
3. The other player tends to be lazy.
4. The other player is relaxed, handles stress well.
5. The other player has few artistic interests.
6. The other player is outgoing, sociable.
7. The other player tends to find fault with others.
8. The other player does a thorough job.
9. The other player gets nervous easily.
10. The other player has an active imagination.
11. The other player is considerate and kind to almost everyone.