Small Talk and Theory of Mind in Strategic Decision-Making

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Abstract

Small talk is a ubiquitous feature of social interaction but almost by definition seems to have little strategic importance and has hardly been studied within the social sciences. In a laboratory setting with 338 subjects, we show that short seemingly unimportant communication between players who know nothing about the games that are to follow (and so cannot engage in cheap talk) nevertheless has a dramatic and important effect. Through small talk players were able to better predict the personalities of their partners (especially their level of extraverion) building a sensible "theory of mind" which in turn boosted their payoffs in subsequent public goods and level-k reasoning games. Important psychological factors such as perceived similarity and self-projection also proved important. Additional insight is provided by text analysis on the language used during communication which indicates how theory of mind can be developed through trivial and seemingly irrelevant small talk.

JEL codes: D91, D83, C92.

Keywords: theory of mind, small talk, cheap talk, communication, level-k reasoning, public goods game, cooperation, extraversion, perceived similarity, self-projection bias, laboratory experiment, text analysis.

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"Small talk is the biggest talk we do."

Susan RoAne

"After more than a week of slow progress, the diplomat noted on a Wednesday that he would need to return home on Friday afternoon for an evening at the opera with his wife. Immediately, a connection was formed on two fronts: a shared dislike of opera and a shared interest in keeping spouses happy... The pace picked up, and the diplomat went home as scheduled on Friday afternoon—with a signed agreement in hand."

Harvard Law School Daily Blog.[1]

1 Introduction

Much has been written about the potential scope for cheap talk to change behaviour in strategic situations but by contrast there is very little on the role of "small talk". To understand the difference consider two individuals who will be playing a game in the future: perhaps they are soon to form a partnership in which there is potential to shirk and free-ride or to commit resources for mutual benefit in something like a public goods game. Cheap talk would involve statements such as "I intend to fully commit to the relationship and invest everything I have for the mutual good". There is no commitment attached to this or it would be more than cheap talk, but there is still the assumption that the person who made the statement understands the game to be played, knows with whom they will be playing and the stakes that are involved. They know everything they need to know to play the game at the point they engage in cheap talk. Contrast this with *small talk*: "very cold today, isn't it?" or "did you have a good weekend?" or in our quoted example of a diplomatic negotiation, a sudden digression into opera.[2] Small talk is completely devoid of strategic content: there is no discussion of which strategies are to be played since the conversation rarely relates to any planned future strategic interaction. When engaging in *cheap talk*, even without commitment you might wish to consider what it might mean for your own strategy, but how can *small talk* have any impact in a subsequent game, one that you do not even realise you are about to play?

Now imagine meeting someone for the first time, perhaps a new colleague at work. An initial conversation that is little more than small talk might not seem to leave a lasting impression, but most likely you will have (perhaps subconsciously) started to form beliefs about the sort of person you have just met. Intelligent or dumb? Fair or biased? Extravert or introvert? Similar to you or very different? In thinking about the characteristics of

[1]Harvard Law School daily blog "Program on Negotiation, https://www.pon.harvard.edu/daily/business-negotiations/small-talk-big-gains/, 24 November 2018

[2]For some direct examples of small talk seen in our study see Part C of the Appendix.

others in this way you have started to build a mental model of another person, one that will develop the more you interact or think about them and one that you can start to use to predict their behaviour. This process of mental modelling, of thinking about others' thoughts and mental states enabling you to better predict their intentions and actions, is commonly referred to within the psychological sciences as "theory of mind" (Coricelli and Nagel (2009)). The ability to better predict the behaviour of other people will certainly be useful when it comes to interacting with them in a strategic setting and this is exactly the route through which we envisage small talk having a potential impact. Consider again the diplomatic negotiation example and the apparent role of perceived similarity that became clear only through small talk.[3]

The goal of this paper is to analyse when and how small talk communication can foster the development of theory of mind, and how this can change actions in strategic settings. We use laboratory experimentation to give us control over what is known by subjects when they are asked to communicate or make decisions, and to randomly determine whether they engage in small talk communication or not. With the only difference between subject groups being whether they engage in small talk communication, we are able to pinpoint the role it plays including tracking how it changes beliefs and enables the formation of theory of mind, and how this in turn changes actions and payoffs in the games to follow.

We measure theory of mind using a direct and an indirect approach. The direct approach involves asking participants to take the *Reading the Mind in Eyes Test* or "Eyes Test", widely used within Psychology (Baron-Cohen et al. (2001)), in which the participant has to select the best description of an actor's mental state from an image of their eyes. The indirect approach involves asking participants for their beliefs about their partner's cognitive and non-cognitive abilities, and beliefs about their actions in an experimental setting. Beliefs about non-cognitive abilities are elicited by means of beliefs about the partner's *personality*, and beliefs about cognitive abilities are measured by asking for beliefs about partner's performance in an IQ task. Both the direct and indirect approaches are incentivized as there are measurable correct answers.[4] Within the psycho-

[3]We will return to the important role of perceived similarity when we discuss level-k reasoning below.

[4]Theory of mind has two distinct components - a social perceptual component and a social cognitive component (Sabbagh (2004), Tager-Flusberg and Sullivan (2000)). The social-perceptual component of theory of mind is the ability to detect the mental states of others, by using immediately available cues such as facial expressions and bodily movements. The Eyes Test is a widely used measure of the social perceptual component of theory of mind. The social-cognitive component is related to the ability to reason about the content of another individual's mental state and use it to predict or explain their behaviour. While the social cognitive element of theory of mind is associated with one's personality and sex, the social perceptual component is independent of both (Nettle and Liddle (2008)). Measurement of the social-cognitive component of theory of mind generally involves hearing stories or scenarios, and making correct inferences about what the individuals involved know or believe. Hence, while the direct measure of theory of mind used in this experiment measures the social perceptual component, the indirect measure is more in line with the social cognitive component.

logical sciences personality is often categorized into 5 traits, commonly called the "Big Five" (John and Srivastava (1999)). Of these, our paper focusses on the two so-called fundamental traits: extraversion and neuroticism (Costa and McCrae (1980), Guilford et al. (1976), Cattell (1973)). These two traits have 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 characterized by sociability, enthusiasm, tempo and vigour: features observed among high trait extraversion individuals and linked to high positive affect. On the other hand, the temperamental traits of high emotion, fearfulness, hostility and impulsivity, are associated with the neuroticism trait, and are related to high negative affect, which might also be detectable in a brief conversation.[5]

To omit learning effects the experiment is restricted to one-shot games. The design involves the use of two archetypal and well-understood games: the two-person public goods game and the 11-20 money request game. While the former examines social preferences, the 11-20 money request game (Arad and Rubinstein (2012)) is a simple two player game which triggers level-k reasoning. The public goods game offers the perfect setup to analyse how decisions involving social preferences are affected by beliefs formed about others in a social dilemma. For instance: should I help in a communal task or just attempt to free-ride on the efforts of my partner? The 11-20 game on the other hand 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 provides the perfect framework for examining strategic decisions where people try to out-reason or out-think an opponent: for instance campaigning decisions by political parties before elections, playing competitive sports or a game of chess. The design allows for small talk between partners before they are made aware of the games using on-screen chat boxes. It is hypothesized that the language used during interaction between partners is the tool through which players develop theory of mind. A novel aspect of our work is a direct text analysis of the small talk between players which proves to be an important part of our understanding of how theory of mind (or beliefs) about others can be developed through communication.

Our results indicate that small talk can influence decisions made in outcome interdependent games and the mechanism is indeed the formation of beliefs about others' types. However, the manner in which beliefs about types influence decision making depends on the nature of the game. In the level-k reasoning task, where the objective is to out-think your partner, we find that the perceived difference between the player and their partner's

[5]The other three traits are unlikely to be detected so quickly and in an effort to avoid presenting spurious correlations as important results we tied out hands in advance by registering our focus on extraversion and neuroticism with the AEA RCT registry, https://www.socialscienceregistry.org/trials/2903.

type influences decision-making. In particular, the level chosen in the 11-20 money request game is influenced by perceived similarity, or differences, 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 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, believing that the partner will reason likewise and choose a higher level themselves. This makes it harder for a player to best respond to the distribution of level-k beliefs when the perceived difference between the player and the partner is small, as it becomes harder to out-think the opponent.

In contrast, choices made in the social preferences game are influenced by the absolute value of the perceived type of the partner. We find that cooperation in the public goods game increases when the partner is believed to be extraverted. This is in line with the known association of trait extraversion with pro-social behaviours like cooperation (Graziano and Eisenberg (1997); Graziano (1994)). Moreover, we find that *beliefs* about partner's type has a greater effect on the decision to cooperate relative to *own* type.

Since small talk communication is the only means that players have to build a coherent theory of mind and the opportunity to communicate is the only difference between the control and treatment sessions in the experiment, it is important to understand how small talk can transmit information about a partner's type. A direct examination of the text used during small talk indicates that partners who use a higher number of words, words which evoke more arousal and dominance, and words which are more humorous in nature are believed to be extraverted. On the other hand, partners who use fewer words, words with lower valence, arousal and dominance content, words that are abstract rather than concrete, and words which are less humorous are associated with higher levels of neuroticism. The number of words used is especially helpful as a mechanism for detecting extraverts, providing a reasonable forecast of type, but there remains a persistent own-type bias, in particular, extraverts are prone to *complementary self projection bias* which makes them more likely to overstate the extraversion in their partners.

To the best of our knowledge, this is the first paper to address small talk extensively in the Economics literature. Outside Economics there is a small literature on the role of small talk in building solidarity and trust in work places (Pullin (2010); Thomas et al. (2009)), on the impact of small talk by small investors on stock message boards (Das and Chen (2007)) and the role of small talk in improving medical outcomes (Hudak and Maynard (2011)), but the role of small talk in interactive strategic settings has not been examined, nor has the relationship between small talk and theory of mind.

This paper also touches on a variety of related work in the study of theory of mind, strategic sophistication, communication and the relationship between language and personality. Our work contributes to each of these literatures in very different ways. The first branch of literature analyses the impact of theory of mind on strategic decision making (Fe and Gill (2018); Yoshida et al. (2008); Coricelli and Nagel (2009)). Such studies measure theory of mind using existing psychometric tests such as the "Imposing Memory Task" (Fe and Gill (2018)), Heider-Simmel test (Bruguier et al. (2010)) and "Eyes Test" (De Martino et al. (2013)). Our paper adds to this literature by providing a new and indirect approach to measuring theory of mind. This indirect method is concerned with capturing the mental model or beliefs one forms about others' type while interacting with them, directly through belief-elicitation.

Second, the paper contributes to the literature on strategic sophistication which finds that individuals adjust strategies given the information they have about the opponents (Fe and Gill (2018); Gill and Prowse (2014); Georganas et al. (2015)). The existing literature finds that people adjust strategies based on *exogenous* information provided, or information learnt through repeated play and feedback. For example, Fe and Gill (2018) conduct an experiment where children are told whether their opponent has above or below median cognitive ability. The authors find that older children are more likely to adjust behaviour in a level-k reasoning game, based on the exogenous information about their opponent's cognitive ability. 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.

Third, this paper is related to the literature on communication before strategic decision making, which has focused on communication with prior knowledge of what's about to follow (Krupka et al. (2017); Bochet et al. (2006); Dawes et al. (1977)). Cheap talk before strategic interaction has been observed to have a profound effect on behaviour. For example, communication can increase the frequency with which people choose joint income-maximising strategies (Ostrom et al. (1992); Bochet et al. (2006); Dawes et al. (1977); Krupka et al. (2017)) in social dilemmas, and the efficient equilibrium strategy in coordination games (Kriss et al. (2016); Blume and Ortmann (2007); Cooper et al. (1992, 1989)). Communication has also been known to affect behaviour in dictator games (Andreoni and Rao (2011)), trust games (Charness and Dufwenberg (2006)) and others (Ellman and Pezanis-Christou (2010)). A common feature of these studies is that the nature of the imminent strategic decision was known to all parties involved *before* communication. Under such a scenario, communication before playing outcome-interdependent games can lead to the formation of non-binding informal agreements. Although, these agreements are non-binding there may be a cost incurred while breaking them. Several

studies have suggested different rationales for this cost such as social norms (Kessler and Leider (2012)), guilt aversion (Charness and Dufwenberg (2006)) and lying aversion (Ellingsen and Johannesson (2004)). In stark contrast to the literature on cheap talk, our paper studies how communication between players can affect behaviour even if the nature of the decision to be made (or "rules of the game") is unknown to the players which makes it difficult to incorporate strategic content into communication.

The study also adds to the literature on examining the role of personality theory in strategic decision making. Several studies have highlighted the role of own-personality on decision making, especially cooperation decisions (Proto and Rustichini (2014); Johnson et al. (2009); Hirsh and Peterson (2009)). Our innovation is to expand on the role of personality by adding beliefs about a partner's personality generated via communication. The final strand of related literature shows that language is a powerful indicator of personality (Pennebaker and King (1999), Furnham (1990), Weintraub (1989), Scherer and Giles (1979)). This study contributes to this field by proposing that language used by an individual is the tool through which beliefs can be formulated about them by others who engage them in small talk communication.

Perhaps the most important contribution of this study is to show how seemingly irrelevant communication prior to any knowledge of the game to be played can still play an important role in belief formation and strategy choice and so our work links very closely to the literatures on theory of mind, level-k reasoning and personality. However, while psychometric measures of theory of mind have recently gained prominence as an explanation for level-k reasoning, to the best of our knowledge there are no existing papers investigating the role of theory of mind - as measured via beliefs about opponent's cognitive and non-cognitive abilities - in choices reflecting level-k reasoning as well as in social preferences. Nor is there work examining how such beliefs are formed. Given the ubiquitous nature of small talk and the importance of belief formation in interactive settings establishing a link between the two seems important.

The rest of the paper is structured as follows. Section 2 proposes a simple framework for belief formation and decision-making. Section 3 details the experiment design used to test the hypotheses formulated by the authors. Section 4 presents the results obtained from analysing the experimental data. Section 5 analyses the language used by the players during pre-game communication. Section 6 concludes.

2 A Simple Framework

2.1 Framework for Belief formation

Let a_i be the ability of individual i, either non-cognitive or cognitive, as reported by i themselves. For non-cognitive abilities or characteristics, a_i is the personality of individual i derived from a "Big Five" personality questionnaire[6]. For cognitive abilities, a_i is the fluid intelligence of individual i as measured via a cognitive ability test. Individual i engages in small talk with partner j before performing two one-shot tasks. Through the medium of this communication, individual i forms certain beliefs or predictions about partner j's non-cognitive and cognitive abilities. These beliefs help individual i infer or predict partner j's behaviour during the course of the experiment.

At the end of the communication, individual i is asked questions to elicit her beliefs about partner j's personality and IQ. For a rational individual i, her beliefs about the personality or IQ of partner j, $E_i(a_j)$, should depend solely on partner j's personality or IQ, as given by partner j's non-cognitive abilities a_j derived from a "Big Five" personality questionnaire. So an *unbiased* belief would be:

$$E_i(a_j) = f(a_j) + e_i \tag{1}$$

Where, $f()$ is a general function to show how j's abilities affect i's beliefs about j, and e_i is an idiosyncratic error term. This paper, however, proposes that, the beliefs formed by i about partner j, are *not* unbiased. The beliefs are, to some extent, *biased* by i's own personality or IQ, a_i. Thus, the beliefs should be given by:

$$E_i(a_j) = f(a_j) + g_i(a_i) + \epsilon_i \tag{2}$$

Where g_i is a function which governs the extent to which predictions are biased by one's own personality or IQ. It should be noted that g_i is not necessarily equal to g_j, meaning that impact of own personality or IQ on beliefs about the partner, varies across individuals. Thus, for example, an extravert, will perceive the personality of her partner differently, compared to an introvert. The underlying idea, here, is that small talk between partners, shapes i's views about j and j's views about i, differently. This difference in perception is explained by individual differences in the players' characteristics. Without loss of generality, equation 2 can be re-written as:

[6]The "Big Five" personality traits measured using such a questionnaire include extraversion, agreeableness, conscientiousness, neuroticism and openness, John and Srivastava (1999). We will focus on extraversion and neuroticism as the key non-cognitive abilities, or perhaps better, "non-cognitive characteristics", for the reasons outlined earlier.

$$E_i(a_j) - a_j = h_i(a_i) + error_i \tag{3}$$

where $E_i(a_j) - a_j$ is the inaccuracy in beliefs formed. This inaccuracy variable measures the quantity by which players *overstate* or *exaggerate* their partners' personalities or IQ. The function $h_i()$ modulates the extent to which i overstates j's personality traits or IQ.

2.2 Framework for Decision-making

Conventionally, decision-making has been associated with an individual's abilities such as intelligence, individual characteristics such as gender, age etc. and preferences, for instance those related to risk or time. More recently within Economics, personality theory has gained prominence in explaining decision-making (Rustichini et al. (2016); Proto and Rustichini (2014); Johnson et al. (2009)). Thus, individual i's decision in a task, depends not only on their cognitive abilities but also their non-cognitive characteristics such as personality traits. These cognitive and non-cognitive characteristics are represented by a_i. The choice of the individual i, $Choice_i$, will also be affected by other factors guiding i's judgement, such as age, gender, IQ, risk preferences, etc., all grouped under z_i. Therefore:

$$Choice_i = \lambda(a_i) + z_i + \mu_i \tag{4}$$

Where, $\lambda()$ is a function explaining the impact of i's non-cognitive and cognitive characteristics on i's decision and μ_i is a white noise error. This paper takes a step further and proposes that, individual i's decision in any task, is not *just* explained by i's own abilities. The decision *also* depends on i's beliefs about partner j's non-cognitive and cognitive abilities i.e. $E_i(a_j)$. So equation 4 is modified to:

$$Choice_i = \lambda(a_i) + \gamma(E_i(a_j)) + z_i) + \varepsilon_i \tag{5}$$

Where, $\gamma()$ is a function controlling the impact of beliefs about partner j's personality and IQ, on player i's decision, and ε_i is an error term. Further, as proposed earlier, i's beliefs about j's abilities is not solely dependent on j's true abilities. i's perception about j's personality and IQ is also influenced by i's own personality and IQ (equation 2). Therefore, equation 5 can be re-written as:

$$Choice_i = \lambda(a_i) + \gamma(E_i(a_j)[a_j, a_i]) + z_i + \varepsilon_i \tag{6}$$

3 Experimental Design

3.1 Overview

The experiment was conducted between May and November 2018. Subjects were recruited through the SONA online recruitment system at the University of Warwick. The participants were undergraduate, postgraduate and staff members at the University. The experiment was implemented using Z-tree (Fischbacher (2007)). In total 338 subjects took part in the study, with 170 subjects in the control condition and 168 in the treatment group. There were 17 sessions conducted, 20 subjects per session on average. An experimental session lasted for approximately 75 minutes. The average earnings from the study was £13.20, including a show-up fee of £4. The design was registered with the AEA social science registry before conducting the experiment.[7]

3.2 Procedure

At the onset of the experiment each subject was asked to take a personality test (The Big Five Inventory or BFI (John and Srivastava (1999))), followed by an incentivized cognitive ability test (the Raven Progressive Matrices test).[8]. After the Raven test the subjects were asked their beliefs about their own performance in the test which was also incentivized. Each subject was then randomly allocated to one of two groups and randomly paired with a partner from the same group. The two groups were:

1. 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 (Appendix D). Then the players were asked their beliefs about their partner's non-cognitive and cognitive abilities. For the former, beliefs were elicited using an 11 item short version of the BFI questionnaire, proposed by Rammstedt and John (2007) modified to allow subjects to indicate how they felt their partners would answer the questions. 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 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 outcomes of both games were announced at the end of the experiment. All questions about

[7]The AEA registry can be found here: https://www.socialscienceregistry.org/trials/2903
[8]The raven test is a set of 30 visual puzzles designed to measure one's cognitive ability.

beliefs - beliefs about the partner's cognitive and non-cognitive abilities and beliefs about her strategies - were incentivized.

2. 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 (Appendix D). The 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.

Following the two games, subjects were asked to take the *Eyes Test* (Baron-Cohen et al. (2001)) which is an advanced test of theory of mind. 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 (Appendix B). 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 demographic and other questions such as age, gender, native language and nationality and also asked to rate their life satisfaction on a 7-point Likert Scale where 1 was not satisfied at all and 7 was completely satisfied.

3.3 Description of the Games

1. *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 follows: $\pi_i = (20 - c_i) + {}^3\!/_4(c_i + c_j)$ where i and j were the two players. Higher contributions while more costly, were more socially beneficial. In the public goods game, the selfish equilibrium is 0 and the mutually cooperative response is 20.

2. *11-20 Money Request Game*: Participants were asked to play the basic version of the game, as proposed by Arad and Rubinstein (2012). Each player was randomly matched with another player. They were both asked to request an amount of money. The amount of money had to be (an integer) between 11 and 20 EP. Each player received the amount she requested. A player received an additional amount of 20 EP

if she asked for exactly one less than the other player. In this game, 20 is considered the salient and level-0 choice since it requires no strategic thinking about the other player's choice. This implies that 19 is the level-1 choice as it best responds to the level-0 strategy, 18 is the level-2 choice, and so on, so in general the level-X choice is to request 20-X. The game has no pure Nash equilibrium.

The order of the two tasks was randomized across sessions. 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 it in the reverse order. Out of 168 treatment group subjects, 106 played the public goods game first and 62 played the 11-20 money request game first.

3.4 Payment

The final payoff was made up of several components. Firstly, there was a show-up fee of £4 for the experiment. Second, the players received payoffs based on performance in either the public goods game or 11-20 money request game (selected randomly). The payoffs for the games were in experimental pounds 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 test were randomly selected with correct answers accruing a further £1. Lastly, belief questions (own-cognitive ability, partner's personality and cognitive ability and beliefs about partner's decisions in the two tasks) were also incentivized. 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 overall payoffs ranged between £6.2 and £20.8.

4 Results

Overall, the results imply that small talk affects strategic decision making through the formation of beliefs. However, the way in which beliefs about others' types affect choices varies across games. While the absolute value of the opponent's perceived type matters most for the public goods game, it was the perceived difference between own and opponent's type which most affected decision making in the 11-20 money request game. The results are classified into 3 categories - results from belief formation, results from the 11-20 money request game and results from the public goods game. All regressions reported were run with standardized variables and the standard errors were clustered at the pair

level. A separate text analysis of the small talk from the treatment sessions is carried out in Section 5.

4.1 Belief Formation

This section discusses the factors that might affect the beliefs the players develop about their partner's non-cognitive and cognitive abilities. Table 1 reports the results of an OLS regression model. The dependent variable is the belief reported by the player about their partner's personality traits. The beliefs were elicited using the 11-item short version of the BFI as proposed by Rammstedt and John (2007): in essence players were asked to retake the BFI but rather than considering how they would answer each question, they were instead asked how his or her partner would answer. This allows 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 standardized (so that each trait distribution had mean 0 and standard deviation 1). The independent variables are the player's own personality scores, the partner's true personality scores, as reported by the partner, and the treatment dummy which equals 1 if the player was in the small talk condition and 0 otherwise. In accordance with the AEA registry, the paper will only focus on the results for the extraversion and neuroticism traits, the two fundamental personality traits: it would be hard to justify an individual forming reasonable beliefs about the other 3 traits in the time allowed and so any patterns are likely to be spurious.[9] The regression also controls for the variables subject's IQ, score in the Eyes Test, age, gender (a dummy which equals 1 if the subject was female) and risk aversion.

Columns 1 and 2 of Table 1 show that the player's beliefs about the partner's extraversion increases with the player's own extraversion in the treatment group. In the treatment group, an increase in the player's extraversion by 1 standard deviation increases the beliefs about partner's extraversion by 0.2 standard deviations more than in the control group. The true extraversion of the partner also significantly (at the 1% level) impacts beliefs about partner's extraversion in the treatment group suggesting that (brief) small talk communication is a valuable way to learn about extraversion. An increase in 1 standard deviation in partner's true extraversion increases player's beliefs about partner's extraversion by 0.3-0.4 standard deviations more in the treatment group than in the control group.

[9]This is of course a important advantage of pre-registration: it prevents spurious relationships from being seized upon. As it happens it turned out that there were no meaningful results involving differences in belies about agreeableness, conscientiousness or openness between the treatment and control exactly as we would expect.

Columns 3 and 4 show that the effect persists and remains significant even after taking into account control variables. Column 5 of Table 1 shows that the player's beliefs about the partner's neuroticism decreases with the players own extraversion in the treatment group. In the treatment group, an increase in the player's extraversion by 1 standard deviation decreases the beliefs about partner's neuroticism by 0.2 standard deviations more than in the control group. However, columns 6-8 show that this impact falls and becomes insignificant when the regressions take into account control variables. The partner's true neuroticism has no significant impact on the player's beliefs about partner's neuroticism. Thus, an extravert believes their partner is more extraverted and less neurotic. Furthermore, while a partner's true extraversion can be detected by the player to some extent through small talk interaction, partner's true neuroticism is not detected.

Table 2 examines the inaccuracy of personality beliefs. The dependant variable (inaccuracy 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 standardized. The dependent variable is thus a measure of overestimation of the partner's personality by the player (see equation 3). The independent variables are the player's own personality traits, the treatment dummy and the player's eyes test score. 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 of Table 2 show that overestimation of partner's extraversion increases with the player's own extraversion in the treatment group. A 1 standard deviation increase in the player's extraversion increases the overestimation of the partner's extraversion by 0.3 standard deviations more in the treatment group than in the control group. The player's performance in the eyes test has no significant impact on the accuracy of beliefs. Columns 3 and 4 show that the overestimation of the partner's neuroticism decreases with the player's own extraversion in the treatment group. However, the impact is insignificant.

Table 3 examines beliefs about the partner's cognitive abilities. Column 1 examines the impact of the player's beliefs about own IQ, partner's true IQ and 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 independent variables, the player's true IQ as measured by the Raven test, the player's eyes test score and the control variables - player's age, gender and risk aversion - as well as the 3 control variables interacted with the treatment dummy. An increase in own IQ belief by 1 standard deviation increases the beliefs about partner's IQ by 0.7 standard deviations for both control and treatment groups combined. Columns 3-6 examine the inaccuracy of the IQ beliefs formed by the player. For columns 3 and 4 the dependant variable is the standardized difference between the beliefs about partner's

IQ and the partner's true IQ (as measured by the partner's performance in the Raven test). For columns 5 and 6 the dependant variable is the standardized *absolute* difference between the same two values. Hence, for columns 3 and 4 the dependant variable is a measure of the degree by which the player overestimates their partner's IQ. On the other hand, for columns 5 and 6 the dependant variable is how far apart the player's beliefs about partner's IQ is from the partner's true 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. Columns 5 and 6 indicate that an increase in 1 standard deviation of the player's own IQ belief leads to a decrease in the difference between partner's IQ belief and partner's true IQ by 0.2-0.3 standard deviations.

To summarize, extraverts tend to believe that their partners are also extraverts as well as less neurotic. This effect is significantly stronger in the treatment group than in the control group. This links closely with the psychological literature on extraversion: an extraverted person, who is subject to positive emotions, fosters a positive social environment (Eaton and Funder (2003)) and judges neutral events more positively (Uziel (2006)), she is prone to *complementary self projection bias* which causes her to project her positivity onto people she interacts with. This projection of positive emotions also causes her to overlook the negativity in others. Thus, extraverts find their partners to be more extraverted and less neurotic. In our own results, this projection is significantly stronger in the treatment group where the players engage in small talk communication with their partner. With regards to beliefs about partner's cognitive abilities, it was observed that players' project beliefs about their own IQ onto beliefs about partner's IQ, irrespective of whether they are in the control or treatment group. Further, it was found that an increase in the player's beliefs about own IQ leads to more accurate predictions about partner's IQ in the treatment group than in the control group.

4.2 The 11-20 Money Request Game

Figure 1 shows the distribution of levels chosen by the control and treatment groups in the 11-20 money request game. The Kolmogorov-Smirnov test revealed that there is no statistical difference between the distribution of levels of the 2 groups. Level-2 is the most frequently played strategy in both conditions.

In accordance with the framework proposed earlier in Section 2, this section examines if strategy choice in the 11-20 money request game is affected by the player's own personality, as well as beliefs formed by the player about the partner's personality. The 11-20 money request game is generally interpreted as a level-k reasoning game. In level-k models (Nagel (1995); Stahl and Wilson (1995, 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 (henceforth L1) best responds to L0, L2 to L1 and so on. As per Arad and Rubinstein (2012), this paper assumes that in the 11-20 money request game 20 is the salient or L0 choice since it requires no consideration of the actions of others and provides the maximum payoff without considering the bonus payment. An L1 player will best respond to their beliefs by choosing one less i.e. 19 (and hence receiving a bonus of 20), an L2 player will best respond by choosing 18. In general an LX player best responds by choosing 20-X. The level-k model suggests that the level chosen by a subject is a measure of her strategic sophistication or *type* or more precisely a measure of the player's beliefs about the partner's type (Georganas et al. (2015)). This paper examines if the *perceived* similarity between player's own personality or type and the partner's personality or type, influence strategy choice. The results are presented in Table 4.

In columns 1-3 of Table 4, the dependent variable is the player's beliefs about the level chosen by the partner and in columns 4-6 the dependent variable is the player's strategy choice. The independent variables are perceived differences between player's own personality and the partner's personality.[10] This is computed by taking the standardized 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 5 also look at the impact of the player's beliefs about partner's IQ, player's eyes test score, gender, order of play of the two games (which equals 1 if the 11-20 game was played first and 0 otherwise) and the control variables, player's age and risk aversion.

Beliefs about partner's level, as well as own level, decrease with increases in the perceived difference in trait extraversion in the treatment group. An increase in 1 standard deviation in perceived difference in extraversion decreases the player's beliefs about partner's level by 0.5 more in the treatment group than in the control group. An increase in 1 standard deviation in perceived difference in extraversion decreases the player's own level by 0.6 more in the treatment group than in the control group. 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. This result supports 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, they believe their partners will reason more and choose a higher level. This in turn makes them choose a higher level.

[10]Similar results were not observed for perceived difference between player's own IQ and partner's IQ.

Columns 3 and 6 of Table 4 examine if high levels of extraversion or introversion generate a differential impact on the dependant variables. For this, the regression incorporates interaction effects of the player's extraversion with a categorical variable equalling the quartile in which the player's extraversion score lies. The results remain similar. Furthermore, Table 4 shows that 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 it has a positive effect. This implies that playing the 11-20 game first increases level-k belief and their own level-k action when the player gets to engage in small talk communication with their partner, but the reverse happens when there is no small talk.

Being female enhances beliefs about partner's level, as well as player's own level, in both control and treatment conditions. It has been observed (Nettle and Liddle (2008); Stiller and Dunbar (2007)) that women score higher on the social-cognitive element of theory of mind, indicating greater ability to reason about others' mental states. This could explain why women choose higher levels. Further, an increase in the eyes test score by 1 standard deviation increases level belief and level chosen both by 0.4 more in the treatment than in the control group. This supports the finding (Fe and Gill (2018); 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 only observed when the players are able to engage in small talk communication with their partners. A player's beliefs about their partner's IQ has no significant effect on level-k belief or their own level-k action in the treatment group.

Next, the paper looks at the distribution of the players' beliefs about the levels chosen by their partners. The distribution is presented in Table 5, 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 6 calculates the expected payoffs based on the distribution of level-k beliefs observed. For both control and treatment groups, L2 (i.e choosing 18) has the highest associated expected payoffs. 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 chose 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.

Table 7 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 in this case is L2 for both control and treatment conditions. Column 3 shows that the probability of best responding increases significantly (at the 1% level) by 8 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. This implies that the greater the similarity between the player and their partner, as perceived by the player, the lower are the chances of the player best responding in the treatment group. This result is consistent with Table 4 which supported the perceived similarity hypothesis. When the perceived difference in extraversion is small, the player believes that their partner will act similar to themselves. This makes it harder to out-think or out-reason the opponent, thus reducing the probability of best responding. This result holds only when the players engage in small talk communication as otherwise the player has nothing on which to base their personality beliefs 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 tasks. In the control group, increase in the player's IQ by 1 standard deviation increases the probability of best responding by 6 percentage points. Table 7 is replicated using a logit model, showing similar results and is presented in Appendix A. When the control and treatment groups are pooled together (using interaction terms) the results are replicated using a linear probability model, and are also presented in Appendix A.

To summarise, this subsection shows that the perceived similarity or difference between the player's and their partner's personalities influences decision making in level-k reasoning games. In level-k reasoning games a player's strategy is reflective of the player's beliefs about the opponent's type. The player then best responds to these beliefs, attempting to out-reason or out-think the opponent. Hence, in level-k games, the perceived similarity or differences between the player and their partner's types plays a crucial role in deciding strategy choice. When the player believes the partner's type is similar to her own, it becomes harder for her to out-reason her partner. This is due to the *perceived similarity hypothesis* which states that when a player believes they are faced by a similar opponent, they believe the opponent will think and act in ways similar to themself. This makes the player believe 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 high level as well. Consequently, when the player believes their partner's type is similar to their own, the probability of them best responding to the distribution of level-k beliefs falls.

4.3 The Public Goods Game

This subsection will discuss the results of the public goods game. The unique pure strategy Nash Equilibrium of the game is to contribute nothing, whereas the joint profit maximization strategy is to contribute everything: this makes the public goods game a particularly stark example of a game of cooperation and social preferences. The average beliefs about a partner's contribution and the player's own contribution are presented in Figure 2. It was found that the treatment group subjects on average believed that their partners would contribute more and the players themselves contributed more, as compared to the control group. The average contribution belief in the treatment group was 13 experimental pounds (EP), where as in the control group it was 10.3 EP. This difference is significantly different at the 1% significance level with p-value 0.0003 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 significantly different at the 1% significance level with p-value 0.0005 and a t-statistic of -3.525. This is consistent with the existing literature (Ostrom et al. (1992); Bochet et al. (2006); Dawes et al. (1977); Krupka et al. (2017)) which finds that pre-game communication of any form increases cooperation rates. Figure 3 shows the distribution of contribution beliefs and the contribution.

The regressions reported in this section will only consider the observations in which the subjects played the public goods game before the level-k reasoning game. The rationale for this choice 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 (Arad and Rubinstein (2012)), the results of the 11-20 game are not biased by playing the public goods game first. The results from the public goods game, for those who played the 11-20 game first are presented in Appendix A.

This paper is interested in examining the impact of own personality and beliefs about partner's personality on decision making in the public goods game. Of the personality traits, this paper is interested in extraversion as, of the two fundamental traits, extraversion is most associated with pro-social traits (Graziano and Eisenberg (1997), Graziano (1994)).[11] Hence, it is hypothesized that players who believe their partner's are extraverted, will believe that their partners will cooperate more and then they in turn will cooperate more themselves. This hypothesis is examined using equation 7. $Choice_i$ is player i's choice in the public goods game, $personality_i$ is player i's personality, $E_i(personality_j)$ 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.

[11] Also, Table A.5 in Appendix A finds that beliefs about partner's neuroticism has no significant effect on decision making in the public goods game.

$$Choice_i = \beta_1 personality_i + \beta_2 E_i(personality_j) + \gamma z_i + \varepsilon_i \tag{7}$$

$$E_i(personality_j) = \lambda_1 personality_j + \lambda_2 personality_i + \rho z_i + \epsilon_i \tag{8}$$

However, Table 1 shows that player i's personality can influence i's beliefs about partner j's personality in the treatment group. This creates an endogeneity issue and estimation of equation 7 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 4.1. These two components 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 8 is the first stage or reduced form equation. $personality_j$ is the partner j's true personality.

The first stage results are presented in Table 8. Partner's true extraversion significantly enhances beliefs about partner's extraversion in the treatment, but not in the control group. Table 9 presents the results of a two-stage least squares instrumental variable (IV) regression. 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 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. Since the endogeneity bias only exists for the treatment group, equation 7 is estimated without an instrumental variable for the control group as well, and is presented in columns 1 and 2 of Table 9.

Columns 5 and 6 of Table 9 show that in the treatment group, beliefs about the partner's extraversion has a significant positive effect (at the 5% significance level) on beliefs about partner's contribution as well as on own-contribution. However, the player's own extraversion score has a negative impact on both. 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. On the other hand, an increase in 1 standard deviation in own-extraversion decreases beliefs about partner's contribution and the player's contribution by 0.3 (significant at 5% level) 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 (at 5% level) and negatively impacts the contribution. Beliefs about partner's extraversion has no significant effect on both beliefs about partner's con-

tribution and own-contribution in the control group. Columns 5 and 6 can essentially be summarized as showing that there are two forces at work in determining how the contribution level is effected 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 but both are important.

The result that an extravert is expected to cooperate more in a 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), Graziano and Eisenberg (1997), Burke and Hall (1986)). Thus, the player themselves cooperate, expecting cooperation from their partner. In contrast, with regards to the effect of a subject's own extraversion on cooperation, the literature is conflicted. While Hirsh and Peterson (2009); Ross et al. (2003) and Lu and Argyle (1991) find a positive effect of extraversion on cooperation, Koole et al. (2001); McNeil (1995) and Mills et al. (1985) find the opposite. Hirsh and Peterson (2009) posit that individuals who score high on the enthusiasm aspect of extraversion cooperate more. Individuals that score high on the enthusiasm facet tend to be more positive and are more sensitive to rewards (Depue and Collins (1999)). Hence, they view cooperation as rewarding and owing to their positivity expect others to cooperate as well. The opposing argument is that introverts, and not extraverts, are likely to cooperate more as they are more inclined to avoid conflicts. 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.

Following Soto and John (2009), this paper divides extraversion of the player into two facets, assertiveness and activity. This is done to examine which particular facet of extraversion is responsible for driving cooperation decisions. Assertiveness is an attribute which helps individuals meet societal demands and thrive amidst other people. An assertive person is one with strong interpersonal communication skills. Activity or enthusiasm, on the other hand, describes both positive emotions and outgoing friendliness or sociability (DeYoung et al. (2007)). Table 10 reports the results of the facet analysis. Columns 1 and 2 report the OLS regression results for the control group and columns 3 and 4 report the instrumental variable regression results. Column 2 shows that the players own assertiveness has a negative significant effect (at the 5% level) on contribution levels whereas facet activity has an insignificant positive effect. An increase in 1 standard deviation in the player's assertiveness score reduces their contribution level by 0.2 standard deviations. None of the facets significantly impact beliefs about partner's contribution. The instrumental variable regressions reflect the same results.

For the treatment group, columns 5 and 6 show that beliefs about a partner's extraversion positively and significantly (at the 5% level) effect 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 (at the 5% level) on both contribution belief and own-contribution, whereas facet activity has an insignificant positive effect.

With regards to payoffs earned in the public goods game, average earnings for the treatment group was 26.3 EP whereas for the control group it was 24.9 EP. A two-sided null of no difference in average earnings was rejected at the 5% significance level with a p-value 0.0210 and t-statistic of -2.3189. In the treatment group, average earnings were higher for those that could be reasonably categorized as extraverts (those with an above median extraversion score) who earned 27 EP than introverts (with a below median extraversion score) who earned 25.5 EP. Two sided null of no difference was rejected at 10% significance level with a p-value 0.0715 and a t-statistic of -1.8137. No significant difference was found between average earnings earned by extraverts and introverts (again defined as above or below median extraversion respectively) in the control group.

To summarize, when a player believes that their partner is extraverted, they believe that their partner will cooperate more. This seems likely to be because extraversion is associated with pro-social behaviour such as cooperation. This in turn encourages the players to cooperate more themselves. Contrastingly, a player's own extraversion has a negative effect on beliefs about their partner's likelihood to cooperate, as well as their own cooperation. This negative effect of extraversion is driven by the assertive facet of an extravert's personality. Lastly, beliefs about partner'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.

5 Text Analysis

In this paper, we randomly allocate some players to a treatment in which they engage in small talk with their partners and some to a control in which they do not. In accordance with experimental method it is hard not to conclude that the treatment has a pronounced effect on behaviour and on payoffs. In other words, small talk matters. Our results also support the idea that the mechanism works through theory of mind (or belief formation). The next logical step is to investigate directly how small talk communication is supporting theory of mind at a practical level: how are subjects in the experiment who talk about seemingly irrelevant topics for a few minutes improving their ability to play in the games that follow?

A first pass approach is to look at the text that is used during the small talk be-

tween players. We know that language can be reflective of their personalities and social behaviour so this seems to have potential. We provide some examples of the text used in Appendix C. What becomes immediately apparent is how seemingly irrelevant these conversations can be with large numbers of "heys" and "hahas" together with sudden digressions into themes such as goldfish and exams. Figure 4 represents the most frequently spoken words by the subjects during the pre-game communication, depicting the very general and trivial nature of small talk.

Figures 5 a-d attempt to distinguish between the most frequently used words by subjects believed to have different personalities. Through a simple examination at 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 5 a and b). Figures 5 c and d show a similar story for neuroticism beliefs. This is not surprising given the unstructured nature of the small talk but we know from our results and experimental design that somehow language is playing an important role. In the rest of this section we provide a deeper examination of the different characteristics of language used by players and how these characteristics *can* shed light into how and why players develop specific beliefs about each other.

We will divide our analysis into different approaches. First we will look at the number of words used: can simply noting how many words your partner uses give you a better understanding of the sort of person they might be? Next we will examine the use and characteristics of words: do different words generate different perceptions of who is using them, and to what extent are the resultant beliefs about type accurate? Finally we will consider the age of acquisition of words: do the use of words learnt earlier or later in life give any guidance to type, and again is this accurate?

5.1 The Number of Words

Perhaps the simplest way to examine the text data is to look at whether beliefs about any personality trait are associated with the total number of words spoken. 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. Table 11 reports the results: column 1 shows that beliefs about partner's extraversion increase with the number of words spoken by the partner. Extraversion is characterized by attributes like sociability, gregariousness, enthusiasm and overall positive affect and so it is not surprising

that those who speak more, appear more social, and are believed to be extraverted.

There are a number of controls which we can add but which do not blunt the core result that using more words is linked to extraversion. Column 2 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 (which equals 1 if the player is a non-native English speaker and 0 otherwise) and a dummy for first speaker (which equals 1 if the subject started the conversation and 0 otherwise). Columns 3 and 4 show that beliefs about partner's neuroticism decrease with the number of words spoken by the partner, although the impact is insignificant. Age has a significant positive effect (at the 5% level) and a significant negative effect (at the 5% level) on beliefs about partner's extraversion and neuroticism respectively. This implies that younger people are more likely to believe that their partner's are more extraverted and less neurotic. The average age of the subjects in this dataset is 21 with a standard deviation of 3.62. It was also found that non-native speakers are more likely to find their partners extraverted. Lastly, those who spoke first were less likely to be believed to be neurotic.

Next we consider whether the beliefs formed by examining the number of words used in communication provides an accurate picture of someone's true personality type. What we see from the results in Table 12 is that extraverts genuinely do seem to use more words, a result which is true at the 10% level in conversation with and without the addition of sensible control variables.[12] As we will see in the analysis to follow, regardless of how we analyse text, the number of words is always a useful predictor of true personality type.

5.2 Language Characteristics

We 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). 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. Table A.7 shows that beliefs about partner's neuroticism decrease with the valence rating of the partner's speech.[13] 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. Since the trait of neuroticism is associated with negative emotions, beliefs about a partner's neuroticism decrease with the pleasantness of the words they use. Table A.8 shows that beliefs about partner's extraversion increase, and beliefs about

[12]Recall that the small talk communication lasts only 4 minutes which means that each player might be communicating for around 2 minutes. While this reflects the reality of casual small talk it also makes higher levels of significance difficult to obtain.

[13]Since, as we shall see, the key tables relate to the number of words spoken, other tables relating to text analysis are relegated to the Appendix.

neuroticism decrease, with the arousal rating of the text used by the partner. The arousal rating of a word is the degree of arousal evoked by it, with the value increasing from calm to excited. An increase in the degree of excitement conveyed by words used by the partner increases beliefs about partner's extraversion and decreases beliefs about partner's neuroticism. Table A.9 shows that beliefs about a partner's extraversion increase, and beliefs about neuroticism decrease, with the dominance rating of the text used by the partner. The dominance rating of a word increases when the degree to which it conveys the emotion of *being in control* increases. Extraversion is associated with leadership and social dominance (Watson and Clark (1992)), while neuroticism is associated with insecurity and self-consciousness (Judge et al. (1999)). Thus, those believed to convey the message of being in control, or being dominant, through the words they use, are believed to be more extraverted and less neurotic by their partners. The relationship between beliefs about partner's personality and the three affective components of the partner's language hold even after controlling for the number of words spoken by the partner and the player's individual characteristics.

We also examined the effect of the use of *humour* by a subject on beliefs formed about their personality. This was accomplished by calculating humour ratings of the text used by each subject, using the humour ratings proposed by Engelthaler and Hills (2018). Table A.11 shows that an increase in 1 standard deviation in the humour rating of the language used by the partner increases beliefs about their extraversion by 0.15 standard deviations (significant at the 1% level) and decreases beliefs about their neuroticism by 0.1 standard deviations. This suggests that humour is associated with the presence of positive emotions or extraversion and the absence of negative emotions or neuroticism. This is consistent with the literature which finds that higher levels of humour is associated with greater positive affect (Cann and Collette (2014); Martin et al. (1993)).

Next we consider whether beliefs about partner's personality are related to the *concreteness* rating of the partner's speech. Concreteness refers to a word's ability to make specific and definite reference to particular objects (Hills et al. (2016)). The total concreteness score of the language used by the partner is calculated using the list of concreteness ratings proposed by Brysbaert et al. (2014). Compared to abstract words, concrete words are easier to learn (De Groot and Keijzer (2000)), recall, recognize (Paivio (1990)), comprehend (Sadoski (2001); Moeser (1974)) and pronounce (De Groot (1989)). Table A.10 shows that an increase in the concreteness rating of the partner's speech increase beliefs about partner's extraversion (insignificant effect) and decreases beliefs about partner's neuroticism (significant at 5% level). This shows that players associate the use of concrete words with extraversion and abstract words with neuroticism.

We see a clear pattern from word usage of a partner to beliefs about the type of partner

which suggests that word usage is facilitating belief-formation. However, once again the next logical question to ask is whether these beliefs are accurate? It turns out that in this case we find little evidence to support the association between the perceived personality types of partner's based on the various language characteristics examined so far and their true personality (as declared via the Big Fine inventory). Glancing at Tables A.13 to A.17 we can see no statistical significance between any of the language characteristics and true personality and indeed in the case of humour the only relationship we can see moves in the wrong direction with extraverts displaying lower levels of humour in their communication. The number of words used remains an accurate and significant predictor when considered alongside language characteristics.

5.3 The Age of Acquisition of Words

The age of acquisition of a word is the age at which the word is learnt: some will be learnt early in life while others are generally associated with latter stages of life. Words learnt earlier in life are easier to recall than words learnt later (Izura et al. (2011), Monaghan and Ellis (2010)) as their meaning is more accessible (Sailor et al. (2011), Brysbaert et al. (2000)) and so may be more salient. There are also words which are generally picked up later in life and which may convey a different personality (high levels of maturity for instance). We can analyse *age of acquisition* ratings from the text data by using the rating proposed by ratings for Kuperman et al. (2012). What we see in Table A.12 is that partners who use more words which have a lower age of acquisition (or equivalently which are easier to recall) are believed to be more extraverted and less neurotic. However,if we attempt to marry these results to true personality types we find no evidence that the views that are formed are accurate. Table A.18 shows no significant relationship between age of acquisition and true personality type. Once again, the number of words used remains an accurate and significant predictor in Table A.18.

5.4 Summary

From our main results, by differentiating between treatment and control we know that language is playing a vital role in changing behaviour and payoffs. We examine a series of different ways to analyse language and find clear patterns that provoke different beliefs about extraversion and neuroticism. In particular, partners who use higher numbers of words and words which evoke more arousal and dominance are believed to be extraverted. On the other hand, partners who use fewer words, words with lower valence, arousal and dominance content and more abstract rather than concrete words are associated with neuroticism. This shows how and why even unstructured small talk contains a

variety of ways to form beliefs about partner's type. However, although certain language characteristics are believed to be associated with specific personality traits, these language characteristics are not necessarily predictive of those traits except in the case of the number of words used: in that case individuals do seem to form accurate predictions about their partner's type.

6 Concluding Remarks

To the best of the authors' knowledge this paper is the first to attempt to study the relevance of small talk in interactive strategic scenarios. While the impact of cheap talk i.e. communication with full knowledge of the rules of the game to be played, has been extensively studied, the strategic impact of small talk i.e. communication about seemingly unimportant topics, is a novel concept. However, small talk is the most ubiquitous of all forms of communication: if small talk turns out to be important then it is hard to argue that any form of communication is completely payoff-irrelevant.

This paper examines the impact of small talk on decision making in two one-shot games. The first game is the 11-20 money request game which is a pure level-k reasoning game and resembles real world scenarios where payoffs depend on having to outwit others, such as competitive sports or partisan politics. The second game is a public goods game which is a game of cooperation and resembles real world scenarios involving social dilemmas such as deciding whether to cooperate to combat climate change, knowing that the outcome will depend on collective action.

The paper shows that small talk enables the development of beliefs (or *theory of mind*) about others' types despite the apparent irrelevance of the topics of communication. These beliefs or perceptions of others' types affect choices made in strategic games. However, the way in which beliefs affect choice varies across games. In the social preferences game, it is the absolute value of the opponent's perceived type which matters for decision making. On the other hand, for the level-k reasoning game, where the objective is to out-reason the opponent, it is the perceived difference in types which affects choice.

Extraversion plays a crucial role as one of the most easily detectable personality traits: the level chosen in the 11-20 game is impacted by perceived similarity between player and their partner's extraversion. The smaller the perceived difference, the higher the level chosen. This result follows from the *perceived similarity hypothesis* which states that people expect perceivably like-minded people to act similarly, when faced with the same situation. Hence, when a player believes that their opponent is similar to them, the player reasons more and chooses a higher level, expecting the opponent to reason more as well. Also, believing that their partner is similar to them, reduces the probability of the player

best-responding to the distribution of beliefs. In the public goods game, when players believe their partners to be extraverted, they expect their partner to be more likely to cooperate. This is due to the association of extraversion with pro-social behaviours such as cooperation. This in turn, enhances the player's own level of cooperation. Moreover, in the public goods game, it was found that beliefs about partner's type had a larger impact on cooperation, relative to own type.

Small talk occurred before players knew they would be playing games together. Nevertheless communication was vital as the only way in which players could develop theory of mind. It was therefore important that the communication could be used to derive information about the personality and intelligence of their partners. Analysis of the language used by players during the pre-game communication revealed that players were indeed drawing inferences from the words used by their partners. Partners who use a higher number of words, words which evoke more arousal and dominance and words which are more humorous, are believed to be extraverted. On the other hand, partners who use fewer words, words with lower valence, arousal and dominance content, more abstract rather than concrete words and words which are less humorous are believed to be neurotic. Of these different ways to assess language it is he number of words that provides the best link between language, perceived beliefs and the true personality of the partner.

Perhaps the most general message that derives from our findings concerns the importance of communication in settings where it might seem irrelevant. To make this clear, it might be worth considering a hypothetical situation. Think of someone you know and now consider a strategic setting that you have never discussed or played with that person before (so there is not even scope for *cheap talk*). Do you think you are better placed to predict how that person would behave in that strategic context than a stranger? If so then this is consistent with our key result: communication need not be *about* future strategic interaction in order for it be important *for* future strategic interaction. Small talk covering even the most trivial things can help people to learn about each other which in turn helps them to predict how others are likely to behave in strategic situations. Our paper shows not only that this is indeed the case but also provides a mechanism through which this process can work in two very different games as well as providing a novel text analysis of the language used.

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)	(5)	(6)	(7)	(8)
OwnExtraversion × Treatment	0.2348**	0.2139*	0.2157*	0.2962**	-0.1927**	-0.1105	-0.1241	-0.0575
	(0.092)	(0.117)	(0.120)	(0.125)	(0.091)	(0.117)	(0.130)	(0.122)
OwnNeuroticism × Treatment	0.1409	0.1484	0.1516	0.1531	-0.0008	-0.0470	-0.0418	-0.0445
	(0.091)	(0.125)	(0.125)	(0.131)	(0.073)	(0.110)	(0.109)	(0.109)
PartnerExtraversion × Treatment	0.2827***	0.4108***	0.4021***	0.4199***				
	(0.082)	(0.108)	(0.110)	(0.110)				
PartnerNeuroticism × Treatment					0.1135	0.0269	-0.0005	0.0193
					(0.075)	(0.103)	(0.102)	(0.100)
Own Extraversion		0.0209	0.0607	0.0248		-0.0822	-0.0718	-0.0880
		(0.073)	(0.079)	(0.080)		(0.073)	(0.075)	(0.073)
Own Neuroticism		-0.0075	0.0079	0.0008		0.0462	0.0600	0.0697
		(0.085)	(0.087)	(0.087)		(0.083)	(0.080)	(0.081)
Partner's Extraversion		-0.1280*	-0.1245*	-0.1339*				
		(0.070)	(0.074)	(0.075)				
Partner's Neuroticism						0.0866	0.1069	0.0949
						(0.071)	(0.070)	(0.069)
Treatment	0.3539***	0.3539***	0.3263***	-0.3127	-0.5100***	-0.5100***	-0.1983	-0.5042***
	(0.098)	(0.098)	(0.101)	(0.632)	(0.102)	(0.102)	(0.550)	(0.102)
Controls × Treatment	No	No	No	Yes	No	No	Yes	No
Controls	No	No	Yes	Yes	No	No	Yes	Yes
N	338	338	338	338	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

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

Table 2: Inaccuracy of personality beliefs

	Inaccuracy of Extraversion Belief		Inaccuracy of Neuroticism Belief	
	(1)	(2)	(3)	(4)
OwnExtraversion × Treatment	0.2517*	0.3045**	-0.0679	-0.0694
	(0.137)	(0.144)	(0.117)	(0.119)
OwnNeuroticism × Treatment	0.1670	0.1922	-0.0946	-0.0811
	(0.116)	(0.128)	(0.121)	(0.127)
Own Extraversion	-0.0638	-0.0336	-0.0893	-0.0668
	(0.113)	(0.117)	(0.077)	(0.070)
Own Neuroticism	-0.0713	-0.0816	0.0849	0.0866
	(0.082)	(0.093)	(0.085)	(0.088)
Treatment	0.3321***	-0.0578	-0.3529***	-0.1068
	(0.104)	(0.678)	(0.109)	(0.637)
Eyes Test Score × Treatment	0.0486	0.0897	0.0900	0.1475
	(0.094)	(0.095)	(0.127)	(0.132)
Eyes Test Score	-0.0112	-0.0463	-0.1119	-0.1777**
	(0.071)	(0.074)	(0.081)	(0.087)
Controls	No	Yes	No	Yes
N	338	338	338	338

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

Table 3: Impact of beliefs about own cognitive ability on beliefs about partner's cognitive ability

	IQ Belief		Inaccuracy of IQ Belief		Inaccuracy of IQ Belief (absolute values)	
	(1)	(2)	(3)	(4)	(5)	(6)
Own IQ Belief × Treatment	-0.0588	-0.0626	0.0139	0.0185	-0.2024*	-0.3113**
	(0.086)	(0.116)	(0.097)	(0.125)	(0.111)	(0.142)
Partner's IQ × Treatment	-0.0345	-0.0186				
	(0.081)	(0.082)				
Own IQ belief	0.6706***	0.7319***	0.5005***	0.5558***	-0.0842	0.0202
	(0.060)	(0.078)	(0.063)	(0.083)	(0.077)	(0.105)
Partner's IQ	0.0937*	0.0894*				
	(0.050)	(0.050)				
Treatment	-0.0833	0.4362	-0.1849*	0.2949	0.0607	0.3929
	(0.082)	(0.506)	(0.096)	(0.568)	(0.107)	(0.604)
Own IQ × Treatment		-0.0172		-0.0037		0.1450
		(0.110)		(0.134)		(0.120)
Eyes Test Score × Treatment		0.0276	0.0916	0.0985	0.1697	0.1673
		(0.099)	(0.102)	(0.100)	(0.121)	(0.124)
Own IQ		-0.0714		-0.0796		-0.1211
		(0.069)		(0.094)		(0.086)
Eyes Test Score		0.0194	-0.0260	-0.0230	-0.1677**	-0.1878**
		(0.077)	(0.073)	(0.068)	(0.085)	(0.083)
Controls	No	Yes	No	Yes	No	Yes
N	338	338	338	338	338	338

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

Table 4: Impact of (absolute) difference between own personality and predicted on level chosen

	Level Belief			Level Chosen		
	(1)	(2)	(3)	(4)	(5)	(6)
DiffExtraversion × Treatment	-0.5302*	-0.4948*	-0.3846	-0.6597***	-0.6061**	-0.4930*
	(0.269)	(0.289)	(0.314)	(0.237)	(0.254)	(0.284)
DiffNeuroticism × Treatment	0.1879	0.2738	0.2855	-0.0415	0.0792	0.0716
	(0.248)	(0.272)	(0.279)	(0.248)	(0.268)	(0.270)
Treatment	0.1668	-2.7645	-2.2777	0.0677	-2.1026	-1.5003
	(0.267)	(2.047)	(2.113)	(0.279)	(1.833)	(1.864)
DiffExtraversion	0.1470	0.1000	0.1170	0.2046	0.1357	0.0362
	(0.198)	(0.196)	(0.208)	(0.177)	(0.176)	(0.193)
DiffNeuroticism	-0.1579	-0.2457	-0.2631	-0.1604	-0.3031*	-0.2876
	(0.183)	(0.199)	(0.204)	(0.174)	(0.178)	(0.182)
Own Extraversion × Treatment		0.1223	0.6575		0.1893	0.8496
		(0.325)	(0.652)		(0.296)	(0.659)
Own Extraversion		-0.1175	-0.0548		-0.2818	-0.6718
		(0.182)	(0.419)		(0.198)	(0.432)
Own IQ × Treatment		-0.2432	-0.2216		-0.2507	-0.2317
		(0.292)	(0.296)		(0.302)	(0.310)
IQ Belief × Treatment		0.3372	0.3149		0.1938	0.2191
		(0.311)	(0.312)		(0.266)	(0.269)
Eyes Test Score × Treatment		0.4966*	0.5011		0.5404*	0.5428*
		(0.297)	(0.306)		(0.305)	(0.310)
Female × Treatment		-0.7721	-0.7518		-0.9905*	-0.9789*
		(0.594)	(0.606)		(0.546)	(0.560)
Order × Treatment		1.1342**	1.1732**		1.0958*	1.1306*
		(0.572)	(0.581)		(0.584)	(0.589)
Own IQ		0.1886	0.1673		0.2319	0.1729
		(0.203)	(0.209)		(0.211)	(0.220)
IQ Belief		-0.3431*	-0.3514*		-0.3187	-0.3323*
		(0.203)	(0.204)		(0.193)	(0.200)
Eyes Test Score		-0.4170*	-0.4018		-0.4428*	-0.4370*
		(0.244)	(0.250)		(0.245)	(0.247)
Female		1.0815***	1.0963***		1.4610***	1.4796***
		(0.408)	(0.413)		(0.364)	(0.374)
Order		-0.7868**	-0.8305**		-1.0018**	-1.0201**
		(0.390)	(0.400)		(0.408)	(0.412)
Extraversion × Extraversion Quartile	No	No	Yes	No	No	Yes
Controls	No	Yes	Yes	No	Yes	Yes
N	338	338	338	338	338	338

Standard errors in parentheses. Statistical significance indicated as follows:

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

Table 5: 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 6: Expected Payoffs

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

Table 7: Impact of (absolute) difference between own personality and predicted on the probability of choosing the best response - Probit Model

	Control		Treatment	
	(1)	(2)	(3)	(4)
	Pr(Level=2)	Pr(Level=2)	Pr(Level=2)	Pr(Level=2)
DiffExtraversion	-0.0453	-0.0505	0.0846***	0.0919***
	(0.038)	(0.036)	(0.030)	(0.029)
DiffNeuroticism	-0.0008	-0.0135	-0.0459	-0.0451
	(0.031)	(0.032)	(0.032)	(0.033)
Own IQ		0.0623*		0.0561
		(0.036)		(0.037)
IQ Belief		-0.0446		-0.0054
		(0.029)		(0.036)
Eyes Test Score		0.0478		0.0423
		(0.038)		(0.032)
Controls	No	Yes	No	Yes
N	170	170	168	168

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

Table 8: First Stage

	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)
Control	No	Yes	No	Yes
N	110	110	106	106

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

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

	Control OLS		Control IV		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution	(5) Contribution Belief	(6) Own Contribution
ExtraversionBelief	0.0601	0.1110	-0.4030	-0.9443	0.6091**	0.5184**
	(0.082)	(0.092)	(1.016)	(1.317)	(0.264)	(0.262)
OwnExtraversion	-0.0733	-0.2041**	-0.0591	-0.1717	-0.3074**	-0.2018
	(0.095)	(0.088)	(0.123)	(0.173)	(0.134)	(0.138)
Own IQ	-0.0583	-0.0417	-0.1042	-0.1464	0.0856	0.1548
	(0.096)	(0.084)	(0.160)	(0.214)	(0.094)	(0.103)
IQ Belief	0.1250	0.1140	0.0968	0.0499	0.0871	0.2402***
	(0.091)	(0.100)	(0.134)	(0.199)	(0.086)	(0.088)
Eyes Test Score	-0.0431	-0.0015	-0.0608	-0.0418	0.1043	0.1502
	(0.096)	(0.118)	(0.092)	(0.182)	(0.117)	(0.139)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	110	110	110	110	106	106

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

Table 10: Impact of beliefs about partner's personality and own personality facets on beliefs about partner's contribution and own contribution in the public goods game

	Control OLS		Control IV		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution	(5) Contribution Belief	(6) Own Contribution
ExtraversionBelief	0.0542	0.1036	-0.3135	-0.8163	0.6169**	0.5262**
	(0.084)	(0.093)	(0.887)	(1.099)	(0.265)	(0.251)
OwnAssertiveness	-0.1258	-0.2271*	-0.1426	-0.2691*	-0.3287**	-0.3095**
	(0.113)	(0.114)	(0.117)	(0.139)	(0.128)	(0.124)
OwnActivity	0.0593	0.0333	0.0971	0.1279	0.0255	0.1562
	(0.122)	(0.123)	(0.170)	(0.212)	(0.125)	(0.106)
Own IQ	-0.0497	-0.0323	-0.0815	-0.1118	0.0781	0.1396
	(0.099)	(0.088)	(0.142)	(0.182)	(0.098)	(0.105)
IQ Belief	0.1391	0.1301	0.1223	0.0882	0.1041	0.2708***
	(0.089)	(0.102)	(0.117)	(0.181)	(0.091)	(0.092)
Eyes Test Score	-0.0342	0.0114	-0.0446	-0.0147	0.1193	0.1751
	(0.102)	(0.122)	(0.094)	(0.165)	(0.118)	(0.139)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	110	110	110	110	106	106

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

Table 11: Impact of number of words spoken by the partner on beliefs about partner's personality

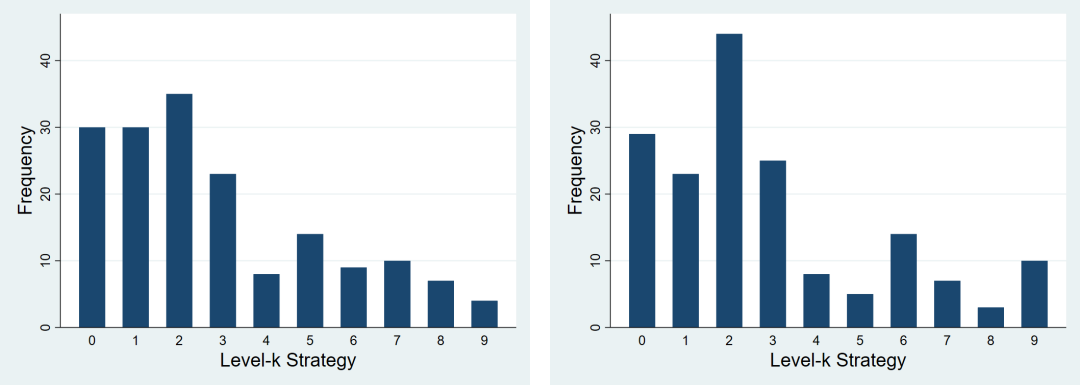
	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Number of Words	0.0094***	0.0088***	-0.0020	-0.0024
	(0.003)	(0.003)	(0.002)	(0.002)
Own IQ		-0.0739		0.0960
		(0.087)		(0.077)
Eyes Test Score		0.0643		0.0307
		(0.060)		(0.095)
Age		0.0266		-0.0453**
		(0.021)		(0.020)
Female		-0.0798		-0.1667
		(0.160)		(0.157)
IQ Belief		0.0976		-0.0672
		(0.082)		(0.083)
Non-Native Speaker		0.3460**		-0.2244
		(0.152)		(0.159)
First Speaker		-0.0143		-0.3160**
		(0.142)		(0.153)
N	168	168	168	168

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

Table 12: Relationship between number of words spoken and own personality

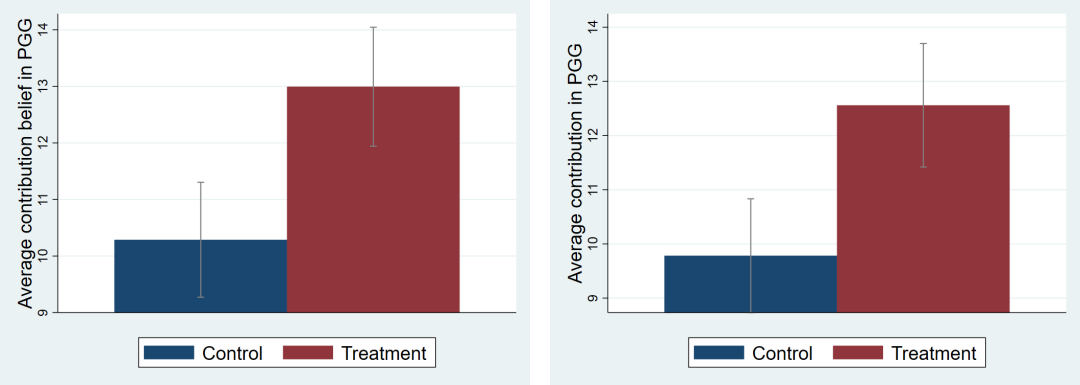
	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Number of Words	0.0049**	0.0049*	0.0044*	0.0030
	(0.002)	(0.003)	(0.002)	(0.003)
Own IQ		-0.1839**		0.0102
		(0.092)		(0.082)
Eyes Test Score		-0.0250		0.1536*
		(0.089)		(0.082)
Age		0.0113		0.0056
		(0.029)		(0.023)
Female		0.0692		0.3476**
		(0.166)		(0.155)
IQ Belief		0.0172		-0.0563
		(0.088)		(0.078)
Non-Native Speaker		0.0858		-0.1252
		(0.157)		(0.178)
First Speaker		0.1590		0.0954
		(0.157)		(0.162)
N	168	168	168	168

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



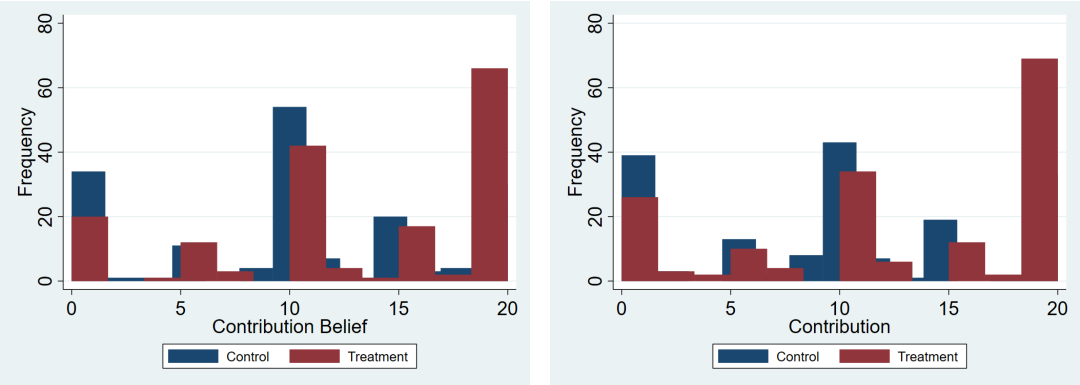
(a) Control (b) Treatment

Figure 1: The Distribution of Levels



(a) Contribution Belief (b) Own-Contribution

Figure 2: Average Contribution and Beliefs about Partner's Contribution in the Public Goods Game



(a) Contribution Belief (b) Own Contribution

Figure 3: Distribution of Contribution and Beliefs about Partner's Contribution in the Public Goods Game

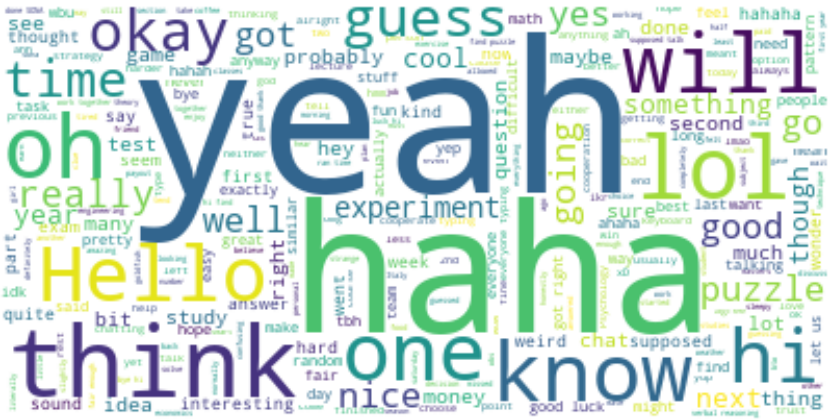
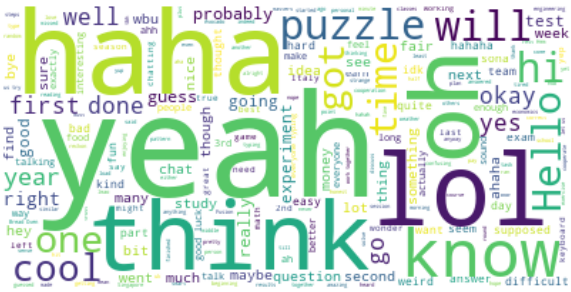


Figure 4: Most Frequently Used Words by Subjects

(a) Highly Extraverted

(b) Less Extraverted

(c) Highly Neurotic



(d) Less Neurotic

Figure 5: Most Frequently Used Words by Subjects Believed to have Different Personalities

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Appendix - For Online Publication

A Additional Tables and Figures

A.1 Summary Statistics

Table A.1: Summary Statistics for Independent Variables

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
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

Table A.2: Summary Statistics for Control Variables

Variable	Mean	Std. Dev.	Min.	Max.	N
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

A.2 11-20 money request game

Table A.3: Impact of (absolute) difference between own personality and predicted on the probability of choosing the best response - Logit Model

	Control		Treatment	
	(1)	(2)	(3)	(4)
	Pr(Level=2)	Pr(Level=2)	Pr(Level=2)	Pr(Level=2)
DiffExtraversion	-0.0486	-0.0475	0.0843***	0.0923***
	(0.041)	(0.041)	(0.029)	(0.028)
DiffNeuroticism	-0.0019	-0.0159	-0.0459	-0.0458
	(0.030)	(0.032)	(0.032)	(0.032)
Own IQ		0.0655*		0.0555
		(0.039)		(0.038)
IQ Belief		-0.0441		-0.0071
		(0.028)		(0.038)
Eyes Test Score		0.0502		0.0405
		(0.039)		(0.034)
Controls	No	Yes	No	Yes
N	170	170	168	168

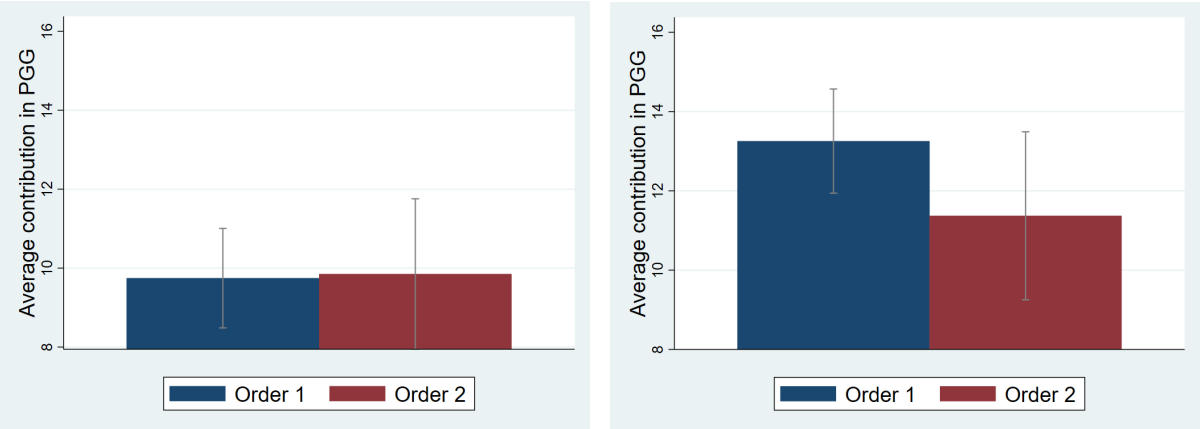
Standard errors in parentheses. Statistical significance indicated as follows:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.4: Impact of (absolute) difference between own personality and predicted on probability of best responding - Linear Probability Model

	Prob(Level=2)		
	(1)	(2)	(3)
DiffExtraversion × Treatment	0.1349***	0.1461***	0.1086*
	(0.049)	(0.052)	(0.057)
DiffNeuroticism × Treatment	-0.0422	-0.0279	-0.0242
	(0.042)	(0.046)	(0.046)
Treatment	0.0589	0.1343	0.0614
	(0.042)	(0.281)	(0.290)
DiffExtraversion	-0.0447	-0.0442	-0.0180
	(0.036)	(0.036)	(0.040)
DiffNeuroticism	-0.0008	-0.0143	-0.0225
	(0.031)	(0.032)	(0.031)
Own Extraversion × Treatment		0.0233	-0.0878
		(0.059)	(0.115)
Own Extraversion × Treatment			
Own Extraversion		-0.0078	0.0261
		(0.030)	(0.083)
Own IQ × Treatment		-0.0093	-0.0085
		(0.054)	(0.056)
IQ Belief × Treatment		0.0334	0.0282
		(0.048)	(0.048)
Eyes Test Score × Treatment		-0.0064	-0.0158
		(0.052)	(0.052)
Own IQ		0.0601	0.0604
		(0.036)	(0.038)
IQ Belief		-0.0386	-0.0334
		(0.028)	(0.028)
Eyes Test Score		0.0425	0.0460
		(0.041)	(0.041)
Extraversion × Extraversion Quartile	No	No	Yes
Controls	No	Yes	Yes
N	338	338	338

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

A.3 Public Goods Game



(a) Control (b) Treatment

Figure A.1: Average contribution in PGG. Order 1 is when PGG is played first. On average players contribute more in the treatment group when PGG is played first. There is no difference for control group subjects.

Table A.5: 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
ExtraversionBelief	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)
NeurotcisimBelief	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:
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A.6: Impact of beliefs about partner's personality and own personality on beliefs about partner's contribution and own contribution in the public goods game - Order 2

	Control OLS		Control IV		Treatment IV	
	(1) Contribution Belief	(2) Own Contribution	(3) Contribution Belief	(4) Own Contribution	(5) Contribution Belief	(6) Own Contribution
ExtraversionBelief	-0.0357	-0.2345*	0.5720	1.6049	0.1273	1.2682
	(0.147)	(0.121)	(1.107)	(2.131)	(1.065)	(1.986)
OwnExtraversion	0.1603	0.0317	0.1844	0.1048	0.1219	-0.1167
	(0.158)	(0.158)	(0.153)	(0.264)	(0.189)	(0.321)
Own IQ	0.1372	0.0435	0.0154	-0.3252	-0.0345	-0.0495
	(0.203)	(0.162)	(0.278)	(0.523)	(0.120)	(0.223)
IQ Belief	0.1792	0.0170	0.2166	0.1300	-0.0657	-0.1679
	(0.159)	(0.133)	(0.188)	(0.258)	(0.142)	(0.209)
Eyes Test Score	-0.2673	0.2327	-0.1987	0.4403	0.2574	0.0801
	(0.174)	(0.164)	(0.198)	(0.367)	(0.157)	(0.330)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	60	60	60	60	62	62

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

A.4 Text Analysis

Table A.7: Impact of Valence rating of the text used by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Valence	0.1029	0.0850	-0.0932**	-0.1047**
	(0.074)	(0.066)	(0.037)	(0.048)
Number of Words		0.0082***		-0.0017
		(0.003)		(0.002)
Own IQ		-0.0858		0.1108
		(0.089)		(0.077)
Eyes Test Score		0.0725		0.0206
		(0.060)		(0.097)
Age		0.0263		-0.0449**
		(0.021)		(0.020)
Female		-0.0824		-0.1635
		(0.161)		(0.156)
IQ Belief		0.1130		-0.0861
		(0.082)		(0.086)
Non-Native Speaker		0.3560**		-0.2367
		(0.150)		(0.156)
First Speaker		-0.0167		-0.3131**
		(0.142)		(0.152)
N	168	168	168	168

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

Table A.8: Impact of Arousal rating of the text used by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Arousal	0.1579**	0.1528***	-0.1016***	-0.1308***
	(0.061)	(0.052)	(0.037)	(0.045)
Number of Words		0.0077***		-0.0015
		(0.003)		(0.002)
Own IQ		-0.1109		0.1278
		(0.087)		(0.078)
Eyes Test Score		0.0672		0.0282
		(0.058)		(0.095)
Age		0.0237		-0.0428**
		(0.021)		(0.020)
Female		-0.0865		-0.1609
		(0.159)		(0.155)
IQ Belief		0.1344*		-0.0986
		(0.080)		(0.085)
Non-Native Speaker		0.3751**		-0.2493
		(0.149)		(0.157)
First Speaker		-0.0098		-0.3198**
		(0.141)		(0.151)
N	168	168	168	168

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

Table A.9: Impact of Dominance rating of the text used by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Dominance	0.1177**	0.1051**	-0.0881***	-0.1082***
	(0.059)	(0.051)	(0.029)	(0.039)
Number of Words		0.0081***		-0.0018
		(0.003)		(0.002)
Own IQ		-0.0901		0.1128
		(0.089)		(0.076)
Eyes Test Score		0.0742		0.0205
		(0.060)		(0.096)
Age		0.0262		-0.0449**
		(0.021)		(0.020)
Female		-0.0702		-0.1766
		(0.162)		(0.155)
IQ Belief		0.1149		-0.0850
		(0.082)		(0.085)
Non-Native Speaker		0.3588**		-0.2375
		(0.149)		(0.156)
First Speaker		-0.0160		-0.3142**
		(0.142)		(0.153)
N	168	168	168	168

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

Table A.10: Impact of Concreteness rating of the text spoken by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Concreteness	0.1090	0.0760	-0.1400***	-0.1187*
	(0.077)	(0.071)	(0.052)	(0.062)
Number of Words		0.0084***		-0.0018
		(0.003)		(0.002)
Own IQ		-0.0844		0.1125
		(0.089)		(0.078)
Eyes Test Score		0.0671		0.0263
		(0.060)		(0.094)
Age		0.0260		-0.0444**
		(0.021)		(0.020)
Female		-0.0915		-0.1484
		(0.159)		(0.155)
IQ Belief		0.1112		-0.0884
		(0.081)		(0.089)
Non-Native Speaker		0.3251**		-0.1917
		(0.149)		(0.164)
First Speaker		-0.0244		-0.3002*
		(0.142)		(0.155)
N	168	168	168	168

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

Table A.11: Impact of Humour rating of the text used by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Humour	0.1642***	0.1521***	-0.0789**	-0.1053***
	(0.047)	(0.043)	(0.036)	(0.039)
Number of Words		0.0077***		
		(0.003)		
Own IQ		-0.1058		0.1189
		(0.090)		(0.077)
Eyes Test Score		0.0744		0.0177
		(0.059)		(0.094)
Age		0.0256		-0.0454**
		(0.021)		(0.019)
Female		-0.0912		-0.1486
		(0.159)		(0.153)
IQ Belief		0.1282		-0.0897
		(0.081)		(0.086)
Non-Native Speaker		0.3603**		-0.2324
		(0.147)		(0.158)
First Speaker		-0.0159		-0.3085**
		(0.141)		(0.152)
N	168	168	168	168

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

Table A.12: Impact of Age of Acquisition rating of the text used by the partner on beliefs about partner's personality

	(1) Extraversion Belief	(2) Extraversion Belief	(3) Neuroticism Belief	(4) Neuroticism Belief
Age of Acquisition	0.2104***	0.1750***	-0.0952***	-0.0894*
	(0.041)	(0.048)	(0.035)	(0.052)
Number of Words		0.0073**		-0.0017
		(0.003)		(0.002)
Own IQ		-0.0934		0.1060
		(0.088)		(0.076)
Eyes Test Score		0.0731		0.0261
		(0.059)		(0.096)
Age		0.0225		-0.0432**
		(0.021)		(0.020)
Female		-0.0487		-0.1826
		(0.160)		(0.156)
IQ Belief		0.1071		-0.0720
		(0.081)		(0.082)
Non-Native Speaker		0.3778**		-0.2407
		(0.149)		(0.159)
First Speaker		-0.0569		-0.2943*
		(0.141)		(0.155)
N	168	168	168	168

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

Table A.13: Relationship between Valence rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Valence	-0.0912	-0.1348*	0.0696*	0.0454
	(0.063)	(0.071)	(0.036)	(0.039)
Number of Words		0.0058**		0.0027
		(0.003)		(0.003)
Own IQ		-0.1876**		0.0115
		(0.090)		(0.082)
Eyes Test Score		-0.0109		0.1488*
		(0.090)		(0.083)
Age		0.0162		0.0040
		(0.029)		(0.023)
Female		0.0504		0.3539**
		(0.167)		(0.156)
IQ Belief		0.0134		-0.0550
		(0.088)		(0.078)
Non-Native Speaker		0.0830		-0.1242
		(0.156)		(0.178)
First Speaker		0.1601		0.0950
		(0.155)		(0.163)
N	168	168	168	168

Standard errors in parentheses

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

Table A.14: Relationship between Arousal rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Arousal	-0.0434	-0.0820	-0.0077	-0.0461
	(0.050)	(0.058)	(0.057)	(0.054)
Number of Words		0.0055**		0.0033
		(0.003)		(0.003)
Own IQ		-0.1859**		0.0091
		(0.091)		(0.081)
Eyes Test Score		-0.0176		0.1578*
		(0.088)		(0.083)
Age		0.0139		0.0070
		(0.029)		(0.024)
Female		0.0672		0.3465**
		(0.165)		(0.155)
IQ Belief		0.0207		-0.0543
		(0.089)		(0.078)
Non-Native Speaker		0.0790		-0.1290
		(0.157)		(0.178)
First Speaker		0.1620		0.0971
		(0.157)		(0.163)
N	168	168	168	168

Standard errors in parentheses

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

Table A.15: Relationship between Dominance rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Dominance	-0.0531	-0.0908	0.0556*	0.0287
	(0.043)	(0.057)	(0.030)	(0.039)
Number of Words		0.0054**		0.0028
		(0.003)		(0.003)
Own IQ		-0.1890**		0.0118
		(0.092)		(0.082)
Eyes Test Score		-0.0168		0.1510*
		(0.090)		(0.083)
Age		0.0133		0.0050
		(0.029)		(0.023)
Female		0.0635		0.3494**
		(0.167)		(0.155)
IQ Belief		0.0204		-0.0573
		(0.088)		(0.079)
Non-Native Speaker		0.0858		-0.1252
		(0.157)		(0.179)
First Speaker		0.1606		0.0948
		(0.156)		(0.163)
N	168	168	168	168

Standard errors in parentheses

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

Table A.16: Relationship between Concreteness rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Concreteness	0.0161	0.0057	0.0702*	0.0579
	(0.041)	(0.047)	(0.041)	(0.047)
Number of Words		0.0049*		0.0027
		(0.003)		(0.003)
Own IQ		-0.1841**		0.0085
		(0.092)		(0.083)
Eyes Test Score		-0.0250		0.1532*
		(0.089)		(0.083)
Age		0.0112		0.0041
		(0.029)		(0.023)
Female		0.0689		0.3445**
		(0.166)		(0.156)
IQ Belief		0.0169		-0.0593
		(0.088)		(0.079)
Non-Native Speaker		0.0871		-0.1119
		(0.158)		(0.182)
First Speaker		0.1598		0.1039
		(0.159)		(0.163)
N	168	168	168	168

Standard errors in parentheses

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

Table A.17: Relationship between Humour rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Humour	-0.0710	-0.1141*	0.0055	0.0014
	(0.055)	(0.062)	(0.051)	(0.047)
Number of Words		0.0057**		
		(0.003)		
Own IQ		-0.1899**		0.0072
		(0.091)		(0.084)
Eyes Test Score		-0.0239		0.1699**
		(0.089)		(0.081)
Age		0.0126		0.0052
		(0.029)		(0.024)
Female		0.0658		0.3474**
		(0.164)		(0.154)
IQ Belief		0.0208		-0.0499
		(0.089)		(0.078)
Non-Native Speaker		0.0851		-0.1302
		(0.157)		(0.179)
First Speaker		0.1560		0.1099
		(0.157)		(0.161)
N	168	168	168	168

Standard errors in parentheses

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

Table A.18: Relationship between Age of Acquisition rating of the text spoken and own personality

	(1) Extraversion	(2) Extraversion	(3) Neuroticism	(4) Neuroticism
Age of Acquisition	0.0914	0.0735	-0.0103	-0.0227
	(0.066)	(0.079)	(0.069)	(0.067)
Number of Words		0.0044		0.0032
		(0.003)		(0.002)
Own IQ		-0.1790*		0.0087
		(0.092)		(0.082)
Eyes Test Score		-0.0285		0.1547*
		(0.089)		(0.083)
Age		0.0097		0.0061
		(0.029)		(0.024)
Female		0.0807		0.3441**
		(0.167)		(0.154)
IQ Belief		0.0024		-0.0517
		(0.090)		(0.080)
Non-Native Speaker		0.1040		-0.1308
		(0.160)		(0.181)
First Speaker		0.1679		0.0926
		(0.158)		(0.163)
N	168	168	168	168

Standard errors in parentheses

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

B Eyes Test (Baron-Cohen et al. (2001))

Two examples of the "Eyes Test" are provided below.

(a) (b)

Figure A.2: Adult Eyes Test

C Examples of Small Talk Communication in the Treatment Condition

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*

C.1 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*

C.2 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 Experimental Instructions

This following part is read out by the experimenter.

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.

D.1 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 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 treatment groups

D.2 Control Group

Placebo Task 1: (4 minutes)[14]

[14]This task has been adapted from the Placebo Task used in Bursztyn et al. (2017).

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

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.

D.3 Tasks

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.

D.4 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.

D.5 Tasks

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 strategy belief and task 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 strategy belief and task choice

FOR BOTH CONTROL AND TREATMENT:

D.6 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

D.7 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 Risk Preferences (Blais and Weber (2006))

For each of the following statements, please indicate the likelihood that you would engage in the described activity or behavior if you were to find yourself in that situation. Provide a rating from 1 to 7 where 1 is *Extremely Unlikely* and 7 is *Extremely Likely*.

1. Admitting that your tastes are different from those of a friend.
2. Going camping in the wilderness.
3. Betting a day's income at the horse races.
4. Investing 10% of your annual income in a moderate growth mutual fund.
5. Drinking heavily at a social function.
6. Taking some questionable deductions on your income tax return.
7. Disagreeing with an authority figure on a major issue.
8. Betting a day's income at a high-stake poker game.
9. Having an affair with a married man/woman.
10. Passing off somebody else's work as your own.
11. Going down a ski run that is beyond your ability.
12. Investing 5% of your annual income in a very speculative stock.
13. Going whitewater rafting at high water in the spring.
14. Betting a day's income on the outcome of a sporting event .
15. Engaging in unprotected sex.
16. Revealing a friend's secret to someone else.
17. Driving a car without wearing a seat belt.
18. Investing 10% of your annual income in a new business venture.
19. Taking a skydiving class.
20. Riding a motorcycle without a helmet.
21. Choosing a career that you truly enjoy over a more prestigious one.
22. Speaking your mind about an unpopular issue in a meeting at work.
23. Sunbathing without sunscreen.
24. Bungee jumping off a tall bridge.
25. Piloting a small plane.
26. Walking home alone at night in an unsafe area of town.

27. Moving to a city far away from your extended family.
28. Starting a new career in your mid-thirties.
29. Leaving your young children alone at home while running an errand.
30. Not returning a wallet you found that contains £200.