JENA ECONOMIC RESEARCH PAPERS

2011 – 028

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www.jenecon.de

ISSN 1864-7057

The JENA ECONOMIC RESEARCH PAPERS is a joint publication of the Friedrich Schiller University and the Max Planck Institute of Economics, Jena, Germany. For editorial correspondence please contact markus.pasche@uni-jena.de.

Impressum:

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Carl-Zeiss-Str. 3
D-07743 Jena
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Jena Economic Research Papers 2011 - 028

Moral Emotions and Partnership

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October 7, 2013

Abstract

Actual behaviour is influenced in important ways by moral emotions, for instance guilt or shame. The framework of dynamic psychological games allows the economic modeling of such emotions. Our experimental study uses psychological scales to measure individuals' dispositions to experience guilt/shame and analyses the role these emotions play in a partnership situation that features moral hazard.

We find that – in addition to second-order beliefs and promises – individuals' disposition to guilt (specifically, their proneness to respond in an evaluative way to personal transgressions) is an important determinant of pro-social behaviour.

JEL classifications: C70, C91, D03, D82

Keywords: social preferences, pro-social behaviour, experiments, psychological game theory, guilt, shame

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We would like to thank seminar audiences at the BIC workshop St. Andrews, University of Strathclyde, meeting of the GfeW in Nuremberg, EEA-ESEM meeting in Oslo, TIBER workshop in Tilburg, Paris School of Economics, University of Exeter and University of Bath for their feedback. We are grateful to Taya Cohen, Martin Dufwenberg, Astrid Gamba, Nicolas Rüsch and Adam Zylbersztejn for valuable comments. Markus Heinemann, Rico Löbel and Simone Ritter provided excellent research assistance.

1 Introduction

Our study examines experimentally how moral emotions – specifically guilt and shame – affect pro-social behaviour. It connects recent insights about moral emotions from psychology and economics. Psychological scales (Tangney et al., 2000; Cohen et al., 2011) reliably identify individuals' dispositions to experience guilt and shame, while the framework of dynamic psychological games (Battigalli and Dufwenberg, 2009) allows the economic modeling of such feelings. We combine these approaches and analyse the role moral emotions play in a partnership situation that features moral hazard.

Guilt and shame are two different ways in which people acknowledge an awareness that they have violated a norm or a value that they take to be important or significant. Guilt is a critical voice; it is our conscience. Shame is concerned with saving or losing face; it is concerned with appearance. We conjecture that people have different innate propensities to experience these emotions. In our study we measure these emotional traits a week before the experimental sessions, conduct a mini trust game and test whether the traits matter. In addition, our experimental design allows us to identify the effect of exposure (the perfect observability of an opportunistic action) and of different degrees of pre-play communication.

Our main findings are a correlation between guilt proneness and pro-social behaviour, and a substantial and significant exposure effect (10% more cooperation). These results add to the insights from Charness and Dufwenberg (2006). They found that pre-play communication, in particular promises, foster trust and cooperation in a partnership. We find that also individual traits make people behave pro-socially in such a context. Furthermore, our evidence is consistent with the guilt aversion model of Battigalli and Dufwenberg (2007). Subjects exhibit an aversion to disappoint someone (simple guilt) and they also seem to dislike others' inferences that they intentionally disappointed someone (guilt from blame).

The paper is organised as follows. Section 2 provides some background on the literature on moral emotions, from the social psychology as well as from the economics perspective. In section 3 we describe our study and derive behavioural predictions. Results are presented in section 4 and section 5 concludes.

2 Moral Emotions in Psychology and Economics

Scholars in social psychology agree that the process from moral standards/norms to actual behaviour is influenced in important ways by *moral emotions* (see, among others, Eisenberg, 2000; Tangney and Dearing, 2002; Tangney et al. 2007).[1] Individual differences in how people experience moral emotions likely play key roles in determining behaviour in real-life contexts. Moreover, the impact of moral emotions is not limited to actual behaviour but extends to the anticipation of likely emotional reactions when behavioural alternatives are considered (Tangney et al. 2007).

Among moral emotions shame and guilt are from the family of self-conscious emotions. They are evoked by self-reflection, an awareness that one has failed or done something wrong. Both shame and guilt are characterised by feelings of distress arising in response to personal transgressions (see, for instance, Baumeister et al., 1994; Tangney and Dearing, 2002; Tangney et al., 2007; Wolf et al., 2010). In everyday conversation the terms 'shame' and 'guilt' are often used interchangeably. Attempts to differentiate between shame and guilt focus on two categories: a distinction based on i) whether the emotion-eliciting event is considered as a failure of self or behaviour, and ii) the nature of the transgression (public versus private).

Lewis (1971) argues that shame is a negative evaluation of the transgressor's entire self that follows a moral transgression (*I* did that awful thing), whereas

[1] According to Tangney et al. (2007) moral emotions influence the connection between moral standards and moral behaviour. Haidt (2003) distinguishes four categories of moral emotions along the two dimensions of focus (self versus other) and valence (positive versus negative). Examples of negatively valenced 'self-conscious' emotions are shame, guilt, and embarrassment. Negatively valenced 'other-oriented' emotions include righteous anger, contempt, and disgust. Pride is a positively valenced 'self-conscious' emotion, while elevation and gratitude are positively valenced 'other-focused' emotions.

guilt is a negative evaluation of the transgressor's specific behaviour that follows a moral transgression (I *did* that awful thing). Both processes lead to negative feelings, but the stakes are different. While shame is about the exposed core of one's self, guilt is limited to the specific behaviour one has committed. According to Tangney et al. (2007) empirical research supports this differential emphasis on self versus behaviour. Guilt and shame lead to very different emotional experiences and very distinct patterns of motivations and subsequent behaviour. Generally, guilt is regarded as the more adaptive emotion as it motivates people to correct their mistakes and apologise for them. On the other hand, shame is considered to be often maladaptive (see, for instance, Tangney et al., 2007; or Stuewig et al., 2010) causing people to ignore the consequences of their transgression and withdraw (Tangney and Dearing, 2002).

Benedict (1946) distinguished shame and guilt by the type of situations that invoke them. A public context is associated with shame, a private one with guilt. Such a positive relationship between the reporting of shame and the extent of public exposure of a wrongful act has been found by Combs et al. (2010) among others. However, the public/private distinction is not undisputed in the literature as Tangney et al. (2007) refer to empirical evidence that contradicts it.

The Test of Self-Conscious Affect-3 (TOSCA-3) by Tangney et al. (2000) is arguably the most widely used way to elicit proneness to guilt and shame. It consists of 16 real life scenarios in which something goes wrong. For each situation subjects are presented a list of possible reactions (among them a shame and a guilt reaction) and for each they are asked to rate how likely they are to react in that way. The TOSCA-3 relies on the self-behaviour distinction between shame and guilt. Guilt responses are characterised by negative behaviour-evaluations (thinking "I made a mistake", for example), as well as repair action tendencies (like apologising). Shame responses are characterised by negative self-evaluations (thinking "I am a terrible person") and withdrawal action tendencies (e.g., hiding). The TOSCA-3 contains evaluative as well as behavioural

responses to transgressions, yet it does not differentiate between them within the guilt/shame sub scales. However, Wolf et al. (2010) show that there is a theoretical and empirical distinction between evaluative and behavioural responses.

Based on these insights Cohen et al. (2011) developed the Guilt And Shame Proneness scale (GASP), an innovative scale that incorporates the public-private and the self-behaviour conceptualizations simultaneously, and additionally distinguishes evaluative responses from action orientations. They assume that private transgressions trigger feelings of guilt, while public transgressions trigger feelings of shame. Hence, their guilt scenarios are all set in the private domain, and the shame scenarios are always public situations. In total the GASP contains 16 real life scenarios. Subjects are asked to imagine they were in that situation and indicate the likelihood that they would react in the way described at the end of the scenario. For guilt there are 4 scenarios with negative behaviour-evaluations (NBE) and 4 scenarios with repair responses (REP). For shame there are 4 scenarios with negative self-evaluations (NSE) and 4 scenarios for withdrawal responses (WIT). See Appendix A for details of the GASP questionnaire.

In economics *belief-dependant models of social preferences* are one approach to explain other-regarding behaviour. They use the framework of psychological games pioneered by Geanakoplos, Pearce and Stacchetti (1989), and Battigalli and Dufwenberg (2009). This allows to consider various emotions by incorporating higher order beliefs and actions into the utility function. The underlying idea is that "[e]motions ... are triggered by beliefs" (Elster, 1998). Charness and Dufwenberg (2006) illustrate the role of emotions for the case of two persons (sender, recipient) in a mini trust game. They propose that the recipient's feelings of guilt depend on how much she believes the sender believes her to play pro-social. That is, the more she believes the sender to be disappointed if she were to play opportunistically, the more guilt she would experience. If this

psychological cost (the belief component multiplied by the payoff difference the sender would lose and weighted by the recipient's sensitivity to guilt) outweighs the recipient's material gain of playing opportunistically, she would choose the pro-social option. Essentially, the recipient's decision of playing pro-socially or opportunistically is influenced by the anticipated feeling of guilt that would result from playing opportunistically.

Taking this modeled process of avoiding anticipated guilt back to the psychological background on moral emotions it seems reasonable that the ability to evaluate own behaviour (captured by the NBE sub-scale of the GASP) should be most indicative for pro-social guilt-driven behaviour. High scores in NBE mean individuals "anticipate feeling guilty about their mistakes" (Cohen et al., 2011). Likewise, the evaluative sub-scale for shame (NSE) should be indicative for an ability to anticipate feeling ashamed.

Our study connects these recent insights about moral emotions from psychology and economics. We elicit individuals' dispositions to experience guilt and shame and test the relevance of these measures in economic modeling.

3 Study

A lab experiment is at the core of our study. It is preceded by an online survey that was administered through an Internet platform one week before the experiment. A questionnaire followed immediately after the experiment. See Table 1 for the timeline of our study and the variables we collected at each stage.

3.1 Experimental Design

Our experimental design is motivated by the role moral emotions play in a partnership, in particular under different degrees of i) *exposure* of B's action to A, and ii) *pre-play communication* from B to A on the choice of B.

Subjects played the binary investment game (sometimes also called mini trust game) used by Charness and Dufwenberg (2006). Participant A first chose

between an outside option (payoffs for A and B: 5 experimental currency units (ECU), 5 ECU) and the investment. Participant B was asked to choose between DON'T ROLL (opportunism) (payoffs: 0, 14) and ROLL (pro-social behaviour) which results in a 5/6 chance of success (payoffs: 12, 10), and a 1/6 chance of failure (payoffs: 0, 10) of the project, independently of whether A actually decided to invest. Neutral terms were used to label the decisions. In sessions 7 to 12 subjects were instructed that after phase 1 (the game as described above), they would also play a second phase for which instructions would be provided after phase 1 ended. In phase 2 the same game was played but with different roles (As were now Bs and Bs played as As). No feedback about phase 1 was given before phase 2 started and subjects knew that they would not play again with the subject they faced in phase 1.

We analyse the interaction between the disposition to shame/guilt, exposure and pre-play communication in a 2x3 design. In the *NoEXP* condition A only learned her payoff, while in the *EXP* condition A got to know her payoff and B's action. This variation allows us to test whether a more public context leads to Bs behaving more pro-socially and to what extent this is driven by moral emotions. It has been found that communication, in particular promises, play a role in one-shot cooperation games with unique equilibrium (e.g., Dawes et al., 1977; Sally, 1995; Ellingsen and Johannesson, 2004; Charness and Dufwenberg, 2006). Hence, we varied which type of message participant B could send to A: no message (*NoMSG*), a pre-formulated one (*PreFORM*), or a free-form message (*FreeFORM*). Essentially, our design adds to the (5, 5) treatments of Charness and Dufwenberg (2006) a treatment with a pre-formulated message, and a condition that guarantees exposure of B's action to A.[2] See Figure 1 for

[2]In our design only the corresponding A is informed about the action of B, and B knows that. It is a valid concern, whether this situation is already 'public enough'. The results in Tadelis (2011) indicate that this is indeed sufficient. Participants play a trust game variant and the experiment varies the extent to which the action of the trustee (cooperate or defect) is revealed. It is either i) kept private to the trustee, ii) revealed to the trustor, or iii) announced to the entire lab. Trustees cooperate significantly less often in the first condition than in the others, but there is no difference between the second and the third condition. Based on these results there is already an effect, when only one other person is informed about an opportunistic action.

the NoEXP and EXP games. We followed Charness and Dufwenberg (2006) closely for the free-form message treatments. In the pre-formulated message treatment Bs had to complete the sentence "If participant A chooses 'IN', then I intend to select" with either ROLL or DON'T ROLL. Leaving it blank was not possible.[3] The completed sentence was then transmitted to A before A had to take a decision.

[Figure 1 about here]

3.2 Variables

A week before the actual lab experiment subjects participated in an online survey administered through an Internet platform. The aim of the survey was to assess subjects' *dispositions with respect to guilt and shame*. As explained in section 2 the TOSCA-3 focuses on the self/behaviour distinction between shame and guilt. The GASP also adheres to this approach, but in addition aims to distinguish as well between different types of shame/guilt, namely evaluative responses (of the self or one's own behaviour) and action orientations (withdrawal or repair). We decided to use the well-established TOSCA-3 (sessions 1-6) as well as the new and innovative GASP (sessions 7-12). In order to make both scales comparable we aggregated the GASP's two shame/guilt sub scales into a single shame/guilt scale and used the Z-score which quantifies the original score in terms of the number of standard deviations that that score is from the mean of the distribution. Thus, we obtained one measure for guilt/shame proneness across all sessions.

After game choices were made we elicited probabilistic (or distributional) first- and second-order *beliefs* of each participant. For participants A this is

[3] One design issue of the pre-formulated-message condition is whether Bs should be allowed to send no message at all. Bracht and Feltovich (2009) had communication sessions in which they allowed 'blank messages' and sessions in which they required participants to promise a concrete action. In the data, they found no systematic differences between the two conditions. This finding prompted us to require that messages in the pre-formulated-message conditions were either ROLL or DON'T ROLL. On the contrary, in our free-form-message treatment, participants could abstain from making a promise altogether. For a discussion of the effects of different communication protocols, see Charness and Dufwenberg (2010).

the belief about the percentage of Bs who choose ROLL (first-order belief), and the belief about the percentage of participants B who expect participants A to choose IN (second-order belief). The probabilistic beliefs were collected as vectors for a series of intervals. Participants could distribute their first- and second-order belief to the following intervals: $[0, 10), [10, 20), [20, 30), ..., [90, 100]$ percent. The software made sure that the numbers a participant assigned sum up to 100 percent. The 'correctness' of the first-order beliefs resulted from comparing beliefs of B and actual actions of participants A in the respective session. Likewise, second-order beliefs of B were compared to first-order beliefs of participants A. Beliefs were elicited using a quadratic scoring rule.[4]

Besides participants' dispositions with respect to guilt and shame – their traits – we also elicited participants' *shame/guilt states*. This second emotions measure provides a way to test whether individual traits (our main focus) and emotional states experienced in the moment are correlated.[5] We asked participants to answer the state shame and guilt scale (SSGS) of Tangney and Dearing (2002) after they made the decision (and before beliefs were elicited). The SSGS consists of 15 statements. Participants are asked to rate on a 5-point scale whether they feel this way not at all (1) or very strongly (5). Shame, guilt, and pride are the three items that are scored in the SSGS. This gives us a participant's *shame/guilt state* after the choice (which could be opportunistic (DON'T ROLL) or pro-social (ROLL)). In addition we elicited participants' counterfactual guilt/shame (one would have felt if the other option were chosen). We asked them about the respective hypothetical shame/guilt/pride states in the post-experimental questionnaire. That is, a participant who made a pro-social choice in the experiment was told to think back to the decision she took as B,

[4]In contrast to a linear scoring rule a quadratic one is incentive compatible. This may result in more accurate predictions, see Palfrey and Wang (2009) for a comparison. Since it is also more difficult to comprehend, additional care is required when participants are instructed, see Artinger et al. (2010). We used examples and an online test to make sure that participants understood the procedure.

[5]Some studies use state measures of moral emotions to predict subsequent behaviour in experimental games, see Miettinen and Suetens (2008), Hopfensitz and Reuben (2009) and Cubitt et al. (2011). Instead, our purpose is to check whether the emotional state corresponds to the traits measure.

was reminded that (s)he selected ROLL, and was then told to imagine (s)he had chosen DON'T ROLL. Then the SSGS statements needed to be rated. Analogously, a participant who made an opportunistic choice was told to imagine she had chosen ROLL and asked to rate the statements.

3.3 Behavioural Predictions

As illustrated in Battigalli and Dufwenberg (2009) belief-dependant models allow for the analysis of decisions that are affected by emotions such as guilt or shame. Based on the framework of Battigalli and Dufwenberg (2009) and the insights from research on moral emotions as described in section 2 we derive testable predictions for our experimental design. Predictions 1 and 2 reiterate the findings of Charness and Dufwenberg (2006) and others.[6] Whether B makes a pro-social choice is positively correlated with her second-order belief conditional on A choosing IN, and also whether she promised A to ROLL. The remaining predictions are about the paper's main theme: the role moral emotions, guilt and shame, play in a partnership situation that features moral hazard. Battigalli and Dufwenberg (2007) model guilt aversion in two ways. *Simple guilt* – felt when one believes he disappoints someone else – predicts that B's disposition with respect to guilt should positively affect whether he makes a pro-social choice. *Guilt from blame* – introducing a psychological cost for intentionally disappointing someone – additionally predicts more pro-social behaviour in EXP than in NoEXP. Alternatively, shame aversion predicts that

[6] A positive correlation between beliefs and pro-social behaviour has been found by Dufwenberg and Gneezy (2000), and Bacharach et al. (2007). In the context of belief-dependant models also Dufwenberg et al. (2011) find a positive correlation of pro-social behaviour and second-order beliefs. A frequent critique of belief-dependant models, first brought forward by Vanberg (2008) but already acknowledged by Charness and Dufwenberg (2006), is that a false consensus effect may be the reason for the correlation between beliefs and behaviour, and not a causal relationship from beliefs to behaviour as belief-dependant models suggest. Results in Ellingsen et al. (2009) hint at the relevance of such alternative explanations. However, Bellemare et al. (2011) control for false consensus effects (which turn out to be substantial), and find that guilt aversion is still significant. Other studies that test for the false consensus effect but still find that beliefs cause behaviour include Fischbacher et al. (2001), Croson and Miller (2004), Frey and Meier (2004), Reuben et al. (2009), Fischbacher and Gächter (2010), Costa-Gomes et al. (2010), Fischbacher et al. (2012) and Smith (2013). Hence, it seems reasonable to assume that a causal relationship between beliefs and behaviour exists. In any case, the focus of our study is on the effect of moral emotions, not on beliefs.

B's disposition with respect to shame affects behaviour in a positive way, in particular in NoEXP.

Let α_A be A's initial belief about the probability that B picks ROLL. Then β_B denotes B's interim (conditional on A choosing IN) belief regarding α_A. Furthermore, let $\hat{\alpha}_A^x$ be A's ex post belief about the probability that B ROLLed given A's payoff $x \in \{0, 12\}$. B's intention to disappoint, $\hat{\beta}_B$, is denoted by B's interim belief about $\hat{\alpha}_A^x$. We will also use A's ex post belief about $\hat{\beta}_B$, denoted by $\hat{\gamma}_A$, and B's interim belief about $\hat{\gamma}_A$, denoted by δ_B and referred to as believed extent of intent, that is, beliefs to the third and fourth order. Finally, B's proneness to guilt is denoted by $\theta_B \geq 0$.

Simple guilt expresses the psychological cost of disappointing someone. Given that B is rational she will prefer ROLL to DON'T ROLL, if the following inequality holds:[7]

$$U_B^{DR} = 14 - \theta_B \cdot 10 \cdot \beta_B \quad < \quad 10 = U_B^R \tag{1}$$

Prediction 1: ROLL choices are more common, ceteris paribus, the higher B's second-order belief is.

Previous research on pre-play communication (e.g., Ellingsen and Johannesson, 2004; Charness and Dufwenberg, 2006) also suggests that promises might have an effect on B's decision to ROLL.

Prediction 2: When B makes a promise to ROLL, B is, ceteris paribus, more likely to actually choose ROLL.

From inequality 1 it follows that B's disposition with respect to guilt θ_B should positively affect whether she makes a pro-social choice.

Prediction 3: ROLL choices are more common, ceteris paribus, the higher B's proneness to guilt is.

[7] See appendix B for details. Note that $\theta_B = 0$ represents the model's special case of pure self-interest.

In addition to the cost of disappointing someone (simple guilt), Battigalli and Dufwenberg (2007) consider the intentions involved in disappointing someone in their second guilt aversion model. The *guilt from blame* one experiences depends on how much one is blamed by someone else for being willing to disappoint this person.

In the context of our game it means that B considers how much A blames B for intentionally causing A's unexpectedly low payoff. This psychological cost of being blamed is incorporated via $\hat{\beta}_B$, B's intention to disappoint, and δ_B, B's belief about A's ex post belief about $\hat{\beta}_B$. In *EXP* A is informed about B's choice and, thus, A either knows for sure that B was fully willing to intentionally disappoint A or she knows B is not to blame even if A got zero. In contrast, in *NoEXP* A can only use her payoff to form her ex post belief about B's intention to disappoint. See appendix C for a detailed analysis of B's decision making considering guilt from blame. Essentially, exposure of B's action to A guarantees blame if B does NOT ROLL and eliminates blame if B ROLLs, while without exposure there is a chance B is not blamed if he did NOT ROLL and he might get blamed if he actually ROLLed. Hence, it is more attractive for B to ROLL in *EXP* compared to *NoEXP*.

> *Prediction 4: ROLL choices are more common, ceteris paribus, in EXP than in NoEXP.*

Based on the psychological insights described in section 2 *shame* focuses on the self and tends to matter mostly in a public context. In the framework of dynamic psychological games shame may be modeled by introducing a concern for appearing as a bad person into the utility function. We do not provide a formal model here and instead refer to Battigalli and Dufwenberg (2009). On the observational level incorporating shame predicts the same effect of increased exposure as guilt aversion (expressed in prediction 4). On a motivational level B's disposition with respect to shame should positively affect whether she makes a pro-social choice.

Prediction 5: ROLL choices are more common, ceteris paribus, the higher B's proneness to shame is.

Finally, the collection of participants' dispositions (one week prior to the actual experiment) and emotional responses (their guilt/shame states during the experiment) allows us to check, whether individual traits and measured emotional states experienced in the moment are indeed consistent.

Prediction 6: Dispositions of B are correlated with actual emotional states of B.

3.4 Participants and Procedures

The experiment took place at the laboratory of the Max Planck Institute of Economics in Jena, Germany. 384 participants were recruited among students from various disciplines at the University of Jena using the ORSEE software (Greiner, 2004). In each of the 12 sessions gender composition was approximately balanced and subjects took part only in one session. The experiment was programmed in z-Tree (Fischbacher, 2007) and took, on average, 60 minutes. The average earnings have been €13.56 (including a €2.50 show-up fee and an additional €5 for the online questionnaire).

Subjects were randomly assigned to one of the computer terminals. Each computer terminal is in a cubicle that does not allow communication or visual interaction between the participants. Participants were given time to read the instructions. There was enough time to privately ask for clarifications. Subjects had to answer several control questions before the experiment started in order to make sure that they understood the instructions properly. At the end of the experiment subjects were paid in cash according to their performance. Privacy was guaranteed during the payment phase.

4 Results

4.1 Descriptive Analysis

Table 2 shows treatment comparisons of B's choice of ROLL. Treatments that allow for the sending of a message have a significantly positive effect on the choice of B for EXP (ranksum test, $p = .007$) as well as for NoEXP ($p = .02$). There is no significant difference between the two message treatments, though.

In PreFORM participants could either make a promise to roll or they could say they would not roll. In FreeFORM participants could write freely to A. These messages were categorised into promises (a clear statement that one intends to choose ROLL), no promises (messages without a clear promise), and empty messages (participants who decided not to write anything). See Table 3 for the distributions. While in PreFORM 90 out of 96 participants made a promise, only 57 out of 96 promised to roll in FreeFORM. A substantial number of participants sent a message but did not include a promise (25) or decided not to write anything (14).

The choices of As are shown in Table 4. In NoMSG 35% of As chose IN, substantially less than when B made a promise to A (60% in PreFORM, 75% in FreeFORM). The difference between PreFORM and FreeFORM is significant at the 5%-level. Table 5 presents the choices of Bs. 37% chose ROLL in NoMSG. In PreFORM 64% of those who made a promise to ROLL actually did so, while in FreeFORM 74% kept their promise. The difference between PreFORM and FreeFORM is not statistically significant.[8]

Figure 2 contains histograms of the GASP sub scales measured in the online survey prior to the lab experiment. Besides separating guilt and shame the GASP distinguishes between evaluative responses and action orientations. This results in the two guilt sub scales NBE and REP, and the two shame sub scales NSE and WIT.

[8]These rates are in line with the results in Charness and Dufwenberg (2006). In their 'no message' treatment 44% of Bs ROLLed, and in their 'message' treatment 56%/75% ROLLed when they made no/a promise (the exact comparison would be our FreeFORM/NoEXP treatment with a ROLL rate of 32%/72% when no/a promise was made).

[Figure 2 about here]

4.2 Regression Analysis

The choice of participants B consisted of selecting ROLL (resulting in an expected payoff of 10 for both) or DON'T ROLL (A receives nothing, B gets 14). Tables 6 and 7 show the results of linear probability model regressions with heteroskedasticity-robust standard errors.[9] The dependant variable is always whether participant B played pro-socially (1) or not (0). The previous analysis has shown that the option to make a promise via the message is not used by everybody. It is rather the content of the message – whether a promise has been made or not – that should have an effect on behaviour. Hence, we use a dummy variable for whether a promise was given. We control for possible order effects in sessions 7 to 12 as well as for the age of participants, their gender, whether they study business/economics and for the number of times they previously participated in allocation game experiments.[10]

The specification in column I of table 6 uses second-order beliefs, the promise dummy and a dummy for the EXP condition as explanatory variables. The coefficients for the second-order belief as well as for whether a promise was given are positive and highly significant.[11] This is in line with predictions 1 and 2 and confirms the findings of previous studies.

Result 1 *There is a significantly positive correlation between second-order beliefs and behaving pro-socially.*

Result 2 *There is a significantly positive correlation between having given a promise and behaving pro-socially.*

[9] Alternatively, probit models could be used. This does not change the significance levels of the reported results.

[10] Partly based on data from this study Matthey and Regner (2013) show that pro-social behaviour and previous participations in allocation game experiments are correlated.

[11] An additional analysis of the relationship between promises, second-order beliefs and the decision to ROLL shows that the effect of promises on pro-social behaviour is partly mediated by second-order beliefs.

Whether A is informed of B's action also has a positive effect (at the 1%-level) which confirms prediction 4.

Result 3 *Subjects in the Exposure condition behave more pro-socially than in the NoExposure condition.*

The specification in column II of table 6 adds the disposition to guilt as an explanatory variable. We implement the multiplicative term of second-order beliefs and the disposition to guilt by taking the logarithm of both variables and the dependant variable. This allows us to separate the effect of second-order beliefs and the disposition to guilt. The significance of the coefficients for the second-order belief, the EXP condition and whether a promise was given remain at the 1%-level. The coefficient for the disposition to guilt is positive and significant at the 10%-level.[12]

In column III we show results of a specification including both the disposition to guilt and shame. In order to look at the effect of both guilt and shame we use additive terms of the second-order beliefs and the dispositions to guilt/shame. The coefficient of the disposition to guilt is positive and significant at the 5%-level. In contrast, the coefficient of the disposition to shame is not significantly different from zero. We find no support for prediction 5. In additional specifications we included interaction terms (between the disposition to guilt and the EXP dummy as well as whether a promise has been made, and between the disposition to shame and the EXP dummy) but no significant interaction has been found. None of the control variables is significant at the 5%-level, except the dummy for gender.

In table 7's regression specifications we focus on the GASP data and include the 4 sub scales of the GASP as regressors. We distinguish between the *NoEXP* condition in column I, and *EXP* in column II. Coefficients for the second-order

[12]In an alternative specification we employ an additive term of second-order beliefs and the disposition to guilt. Results are equivalent with respect to significance levels and goodness of fit. The additive specification allows us to include more than one trait measure as regressors. Subsequent regressions will use additive specifications in order to compare the impact of several measures. The question whether a multiplicative or an additive term is more appropriate to model the relationship between the disposition to guilt and second-order beliefs is beyond the scope of this paper and might be an interesting topic for future research.

belief as well as for whether a promise was given are positive and highly significant in both I and II. In NoEXP the coefficient for NBE is positive and significant at the 5%-level. The coefficients of the other sub scales are not significantly different from zero.[13] These results are in line with prediction 3, i. e., an individual's proneness to guilt appears to be a substantial determinant of pro-social behaviour. However, there is still no indication of an effect of an individual's proneness to shame (prediction 5), even when using the more fine-grained GASP. Interestingly, the coefficient for whether a promise was given is smaller in EXP, despite the fact that making a promise and then playing opportunistically means getting caught out lying, albeit in anonymity.

Result 4 *There is a significantly positive correlation between a subject's disposition to guilt, especially the evaluative sub-scale NBE, and behaving pro-socially.*

4.3 Analysis of Emotional States

In sessions 7 - 12 participants were asked about their shame/guilt/pride states via the SSGS i) after they made their decision, and ii) in the post-experimental questionnaire regarding the hypothetical choice they did not make in the experiment. For instance, for the person that actually played pro-socially this provides us the guilt that would have been experienced by playing opportunistically. The difference between the guilt one anticipates to feel when choosing DON'T ROLL, and the guilt one expects to experience when choosing ROLL (equal to zero strictly theoretically speaking) should be indicative of actual behaviour. Table 8 shows the averages of shame and guilt scores of participants split by the decision they just made.[14] Wilcoxon rank-sum tests confirm that there is a significant difference (1%-level) between participants who chose ROLL ($N = 98$) and those who picked DON'T ROLL ($N = 94$). A choice of ROLL leads to significantly less guilt and shame than a choice of DON'T ROLL.

[13] These results do not change if only one GASP sub-scale is used in the regression. NBE is highly significant, while NSE has a positive coefficient but is not significantly different from zero. REP and WIT have negative coefficients (not significantly different from zero).

[14] We do not report pride scores as they are not relevant for this study.

Table 9 shows the averages of the shame/guilt scores when participants were asked to answer the SSGS in the post-experimental questionnaire regarding the hypothetical choice they did not make in the experiment. Again, the data is split (by the decision they were asked to imagine, that is, the one they did not take in the experiment).

In order to measure the shame/guilt states of participants we compute the difference between their SSGS score for DON'T ROLL and the one for ROLL. This variable indicates the extent of shame/guilt a person experiences when playing opportunistically instead of pro-socially. Of course, it is partly based on a hypothetical component, but nevertheless it provides us with a measure of a participant's emotional state when playing opportunistically.

The correlations between the shame/guilt states and also the dispositions from GASP are shown in table 10. There is a very high positive correlation between shame and guilt states (the correlation between shame/guilt and pride states is highly negative). It does not seem participants had different guilt or shame feelings or were able to distinguish between shame and guilt in the very moment of making their decision. Comparing the state measures to participants' dispositions elicited separately prior to the experiment gives us an indication whether participants' shame/guilt proneness actually has an effect on their shame/guilt state in the situation of the experiment. As both shame and guilt states are significantly correlated with the evaluative response sub scales (NBE and NSE), it appears that there is indeed a clear link between the general ability to anticipate shame/guilt and the shame/guilt measure taken in the moment the decision is made. This confirms prediction 6. The correlation of the shame and guilt states with the action orientation sub scales (REP and WIT) is not significant at the 5%-level.

Result 5 *There is a significantly positive correlation between the evaluative response sub scales (NBE/NSE) and actual emotional states of guilt/shame.*

4.4 Discussion

In addition to the positive correlation between second-order beliefs and promises and pro-social behaviour, confirming the results in Charness and Dufwenberg (2006), our main finding is that individuals' proneness to *guilt* is an important determinant of pro-social behaviour.

*B*s in the EXP condition are more likely to take the pro-social choice replicating the exposure effect reported in Tadelis (2011). However, it seems that the driving force of more pro-social behaviour when A is informed about B's action is not *shame*. We find strong evidence for the effect of proneness to guilt (in the NoEXP as well as the EXP condition), but we do not find evidence of an effect of proneness to shame (neither in NoEXP nor in EXP). Our results suggest that shame has no significant impact on pro-social behaviour, while guilt has a significantly positive effect, independent of the context. It seems that the ability to anticipate guilt – measured as evaluative behaviour-related responses, i.e., the GASP sub-scale NBE – is the moral emotion that can affect behaviour no matter whether the context is private or public. Shame's lack of influence on cooperation in a two-player game has also been noted by de Hooge et al. (2007), while they find a significant effect of guilt. They used priming (participants were asked to report a personal experience in which they felt very guilty/ashamed) rather than looking at individual differences in dispositional guilt/shame.[15] Given our findings it seems important to stress the behaviour/self domain in order to distinguish between guilt and shame (as, for instance, considered in Battigalli and Dufwenberg, 2007; López-Pérez, 2010). The tested situation – behaviour in an experimental game – may not trigger feelings of shame as it does not affect the self as such. At least participants may not relate their decision to their self, after all it is behaviour in a game. A model of guilt, focusing on behaviour and incorporating the effects of exposure, i.e., guilt from blame, may be best suited to make good predictions in the anal-

[15] Only under very specific circumstances de Hooge et al. (2008) and Declerck et al. (2011) find positive effects of shame on pro-social behaviour. Both use priming to induce shame.

ysed partnership context. It seems that a situation must also contain a clear potential damage to the self for shame motives to matter.

The other factor of our experimental design is the extent of *pre-play communication*. In NoMSG, pre-play communication is not possible. In FreeFORM, B could transmit a message to A before both play the game. In PreFORM, B could make a pre-formulated promise to A. The literature suggests that communication might matter in one-shot cooperation games with unique equilibrium (e.g., Dawes et al., 1977; Sally, 1995). We confirm this finding. The existing literature also suggests that promises matter in these games (e.g., Ellingsen and Johannesson, 2004; Charness and Dufwenberg, 2006). Our results confirm this finding as well. Further investigation of the relationship between promises and second-order beliefs shows that the effect of promises on pro-social behaviour is partly mediated by second-order beliefs. A small set of publications suggests that scripted messages are less effective than free messages (Charness and Dufwenberg, 2010; Lundquist et al., 2009). We confirm this finding with a qualification: when promises are made in FreeFORM, they are indeed more effective. However, promises are less frequent in FreeFORM than in PreFORM. Overall, the effect is not clear. We did not find any indication that disposition to guilt affects the tendency to send a message or to make a promise. Finally, we do not find interactions between the extent of pre-play communication, the observability of the action (exposure effect), and proneness to guilt.

5 Conclusions

In this study we investigated the effect of the moral emotions guilt and shame in a partnership situation. Like Charness and Dufwenberg (2006) we use a principal-agent game to model such a partnership. It resembles a work context that is marred by hidden action. The partners could maximise overall benefit if they trusted. But since the principal cannot bind the agent to cooperate, there is an incentive for the agent to make an opportunistic choice. While

Charness and Dufwenberg (2006) focus on pre-play communication in order to show how promises (via beliefs) can foster cooperation, our main interest lies in the individual differences with respect to moral emotions and how they affect the tendency to behave pro-socially.

We used the recently developed Guilt And Shame Proneness scale (GASP), Cohen et al. (2011), to measure participants' dispositions to guilt and shame. The GASP's innovation compared to existing scales is that it incorporates the public/private and the self/behaviour conceptualizations of shame and guilt simultaneously, and additionally distinguishes evaluative responses from action orientations. This finer measure helps us to identify what drives pro-social behaviour in our experiment.

Only the GASP's NBE sub-scale, which accounts for evaluative behaviour-focused reactions to a moral transgression, seems to matter for pro-social behaviour (in addition to second-order beliefs and promises). NBE can be interpreted as the ability to "anticipate feeling guilty about their mistakes" (Cohen et al., 2011). Since avoiding anticipated guilt is one of the driving mechanisms in the guilt aversion framework it seems natural that the ability to evaluate own negative behaviour (captured by the GASP's NBE sub-scale) is indicative for pro-social behaviour. In this sense our results complement Charness and Dufwenberg (2006) who find a positive relationship between second-order beliefs, guilt aversion's other determinant, and pro-social behaviour.

In the EXP condition of the experiment we inform the principal about the action of the agent ex post (in contrast, in NoEXP the principal is not informed about the agent's action and cannot distinguish between opportunism or bad luck if she got a payoff of zero). Such increased exposure can be interpreted as a more public context. Tadelis (2011) or Ong (2011) propose to associate exposure with shame. While we do find a significant exposure effect (more pro-social behaviour when B's action is observed), shame proneness does not predict pro-social behaviour. Instead, it appears that NBE, the GASP measure of evaluative behaviour-related responses, is the main driver of pro-social behaviour

independently of the variation in observability. Hence, our results suggest that in a public setting it is rather a behaviour-related process, as expressed in the concept of guilt from blame by Battigalli and Dufwenberg (2007), instead of a self-related process like shame that motivates pro-social behaviour.

These insights about the underlying processes leading to pro-social behaviour stress the role moral emotions play in a partnership context. Individuals with a high ability to anticipate guilt are the ones with whom to form a partnership. When actions are not contractable, the disposition to guilt appears to be a reliable factor to limit opportunism. The fact that one's actions can be observed increases pro-social behaviour, but guilt seems to drive this effect as well.

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Tables and Figures

Table 1: Timeline of the study

part of the study	variables collected
online survey	emotional traits via TOSCA-3/GASP
experiment	1) choices 2) emotional states via SSGS 3) first-order beliefs 4) second-order beliefs
post-experimental questionnaire	1) counterfactual emotional states via SSGS 2) socio-demographics

The online survey was administered one week before the experiment.

Table 2: Pro-social choices of Bs by treatment

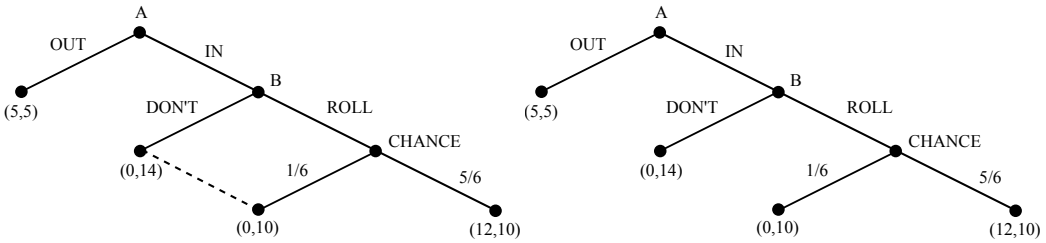
	NoExposure	Exposure
NoMSG	16/48	20/48
PreFORM	27/48	33/48
FreeFORM	27/48	31/48

Table 3: Categorisation of the communication

		promise to roll	no promise	no message	promise to not roll
Condition	PreFORM	90	n/a	n/a	6
	FreeFORM	57	25	14	n/a

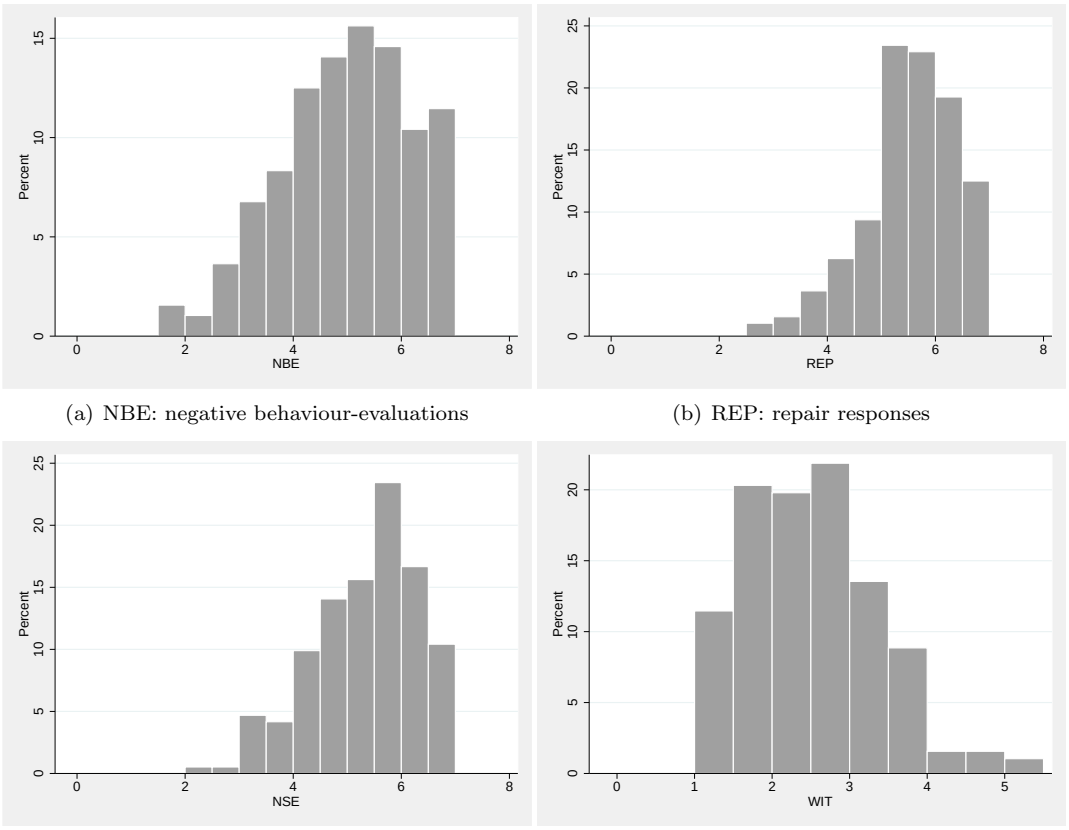
Table 4: Fraction of As who chose IN depending on B's message

	B's message	promise to roll	no promise	no message	promise to not roll
Condition	NoMSG	n/a	n/a	34/96	n/a
	PreFORM	54/90	n/a	n/a	0/6
	FreeFORM	43/57	16/25	2/14	n/a



(a) No Exposure of B's choice to A (b) Exposure of B's choice to A

Figure 1: The game in the NoEXP (a) and in the EXP (b) condition.



(a) NBE: negative behaviour-evaluations (b) REP: repair responses

(c) NSE: negative self-evaluations (d) WIT: withdrawal responses

Figure 2: Histograms of the GASP sub-scales measured in the online survey prior to the lab experiment. The GASP distinguishes between evaluative responses and action orientations which results in the two guilt sub scales NBE (negative behaviour-evaluations) and REP (repair responses), and the two shame sub scales NSE (negative self-evaluations) and WIT (withdrawal responses).

Table 5: Fraction of Bs who chose ROLL depending on their message

	B's message	promise to roll	no promise	no message	promise to not roll
Condition	NoMSG	n/a	n/a	36/96	n/a
	PreFORM	58/90	n/a	n/a	2/6
	FreeFORM	42/57	11/25	5/14	n/a

Table 6: Impact on the decision to ROLL

DV: choice of ROLL	I:		II:		III:	
	coeff.	st.error	coeff.	st.error	coeff.	st.error
2nd order belief	.6133	.1129 ***	–	–	.6108	.1116 ***
promise	.2124	.0442 ***	.2058	.0468 ***	.2217	.0438 ***
exposure	.0864	.0276 ***	.0877	.0265 ***	.0844	.025 ***
Log(2nd order belief)	–	–	.2053	.0298 ***	–	–
Log(Disposition to guilt)	–	–	.1548	.0804 *	–	–
Disposition to guilt	–	–	–	–	.0044	.0018 **
Disposition to shame	–	–	–	–	-.001	.002
econ	.1219	.0742	.1038	.0753	.1088	.0757
female	-.1129	.0478 **	-.1372	.0512 **	-.1308	.0558 **
age	.0215	.0099 *	.0206	.0105 *	.0196	.0098 *
period	-.0236	.0561	-.0218	.0543	-.0126	.0533
participations	-.0183	.009 *	-.0209	.0094 **	-.02	.0095 *
constant	-.2561	.2823	-.3136	.2923	-.2115	.2802
N	288		288		288	
R^2	0.254		0.258		0.26	

linear probability model with heteroskedasticity-robust standard errors;
significance levels: $***=1\%, **=5\%, *=10\%$

Appendix

A. Guilt and Shame Proneness Scale (GASP) of Cohen et al. (2011)

Instructions: In this questionnaire you will read about situations that people are likely to encounter in day-to-day life, followed by common reactions to those situations. As you read each scenario, try to imagine yourself in that situation. Then indicate the likelihood that you would react in the way described.

Very Unlikely (1), Unlikely (2), Slightly Likely (3), Unlikely (4), About 50% Likely (5), Slightly Likely (6), Very Likely (7)

Table 7: Analysis of the GASP sub-scales

DV: choice of ROLL	I: NoExposure		II: Exposure	
	coeff.	st.error	coeff.	st.error
2nd order belief	.481	.1707 ***	.5732	.178 ***
promise	.3004	.0954 ***	.2082	.1005 **
Guilt (NBE)	.088	.0366 **	.1282	.0494 ***
Guilt (REP)	-.0213	.0431	-.0567	.0667
Shame (NSE)	-.043	.0591	.0527	.0703
Shame (WIT)	-.0752	.0583	-.0359	.0585
econ	-.0924	.142	.1737	.1213
female	-.1289	.1021	-.2123	.1029 **
age	.0312	.0184 *	.0117	.0125
period	-.0357	.1001	.0077	.0947
participations	-.0237	.0144	-.0154	.0203
constant	-.2838	.5943	-.4437	.5137
N	96		96	
R^2	0.29		0.31	

linear probability model with heteroskedasticity-robust standard errors; significance levels: $***=1\%, **=5\%, *=10\%$

Table 8: Average SSGS scores after the decision

	B decided to ...	
	ROLL	DON'T ROLL
Shame	5.51	8.67
Guilt	6.43	10.34
N	98	94

Table 9: Average SSGS scores for the hypothetical decision

	B was asked to imagine the choice was ...	
	ROLL	DON'T ROLL
Shame	6.40	12.17
Guilt	7.51	13.81
N	94	98

1. After realizing you have received too much change at a store, you decide to keep it because the salesclerk doesn't notice. What is the likelihood that you would feel uncomfortable about keeping the money?

2. You are privately informed that you are the only one in your group that did not make the honor society because you skipped too many days of

Table 10: Correlations between states (from SSGS) and dispositions (from GASP)

	shame	guilt	NBE	REP	NSE	WIT
shame	1					
guilt	0.8375	1				
NBE	0.3002	0.2844	1			
REP	0.0717	0.0911	0.2669	1		
NSE	0.2446	0.2608	0.5106	0.2897	1	
WIT	0.0997	0.1776	0.1884	-0.0215	0.4083	1

school. What is the likelihood that this would lead you to become more responsible about attending school?

3. You rip an article out of a journal in the library and take it with you. Your teacher discovers what you did and tells the librarian and your entire class. What is the likelihood that this would make you would feel like a bad person?

4. After making a big mistake on an important project at work in which people were depending on you, your boss criticizes you in front of your coworkers. What is the likelihood that you would feign sickness and leave work?

5. You reveal a friend's secret, though your friend never finds out. What is the likelihood that your failure to keep the secret would lead you to exert extra effort to keep secrets in the future?

6. You give a bad presentation at work. Afterwards your boss tells your coworkers it was your fault that your company lost the contract. What is the likelihood that you would feel incompetent?

7. A friend tells you that you boast a great deal. What is the likelihood that you would stop spending time with that friend?

8. Your home is very messy and unexpected guests knock on your door and invite themselves in. What is the likelihood that you would avoid the guests until they leave?

9. You secretly commit a felony. What is the likelihood that you would feel remorse about breaking the law?

10. You successfully exaggerate your damages in a lawsuit. Months later, your lies are discovered and you are charged with perjury. What is the likelihood that you would think you are a despicable human being?

11. You strongly defend a point of view in a discussion, and though nobody was aware of it, you realize that you were wrong. What is the likelihood that this would make you think more carefully before you speak?

12. You take office supplies home for personal use and are caught by your boss. What is the likelihood that this would lead you to quit your job?

13. You make a mistake at work and find out a coworker is blamed for the error. Later, your coworker confronts you about your mistake. What is the likelihood that you would feel like a coward?

14. At a coworker's housewarming party, you spill red wine on their new cream-colored carpet. You cover the stain with a chair so that nobody notices your mess. What is the likelihood that you would feel that the way you acted was pathetic?

15. While discussing a heated subject with friends, you suddenly realize you are shouting though nobody seems to notice. What is the likelihood that you would try to act more considerately toward your friends?

16. You lie to people but they never find out about it. What is the likelihood that you would feel terrible about the lies you told?

Scoring: The GASP is scored by averaging the four items in each sub-scale (NBE: 1, 9, 14, 16; REP: 2, 5, 11, 15; NSE: 3, 6, 10, 13; WIT: 4, 7, 8, 12)

B. Simple guilt

In order to measure how much B thinks she disappoints A in our game, we calculate the difference between A's expected payoff when B plays ROLL (weighted by the second-order belief β_B) and the payoff when B plays DON'T ROLL: $10 \cdot \beta_B - 0 = 10 \cdot \beta_B$. How much this actually affects B is expressed by taking her proneness to guilt θ_B into account. Hence, if B selects DON'T ROLL, she therefore experiences guilt of $\theta_B \cdot 10 \cdot \beta_B$, while there is no guilt in case B ROLLs. The psychological cost of guilt is then deducted from B's material payoff x: $U_B = x - \theta_B \cdot 10 \cdot \beta_B$

C. Guilt from blame

B's utility depends on his monetary payoff x minus guilt-from-blame, which is determined by B's proneness to guilt θ_B, the believed extent of intent δ_B, and A's loss in payoffs for which B is blamed multiplied by β_B (B's belief, conditional on A choosing IN, about A's belief α_A about the probability that B ROLLs): $U_B = x - \theta_B \cdot \delta_B \cdot 10 \cdot \beta_B$.

In EXP (denoted by $e = 1$) B's choice is exposed to A. A will use this information to update γ, her ex post belief about B's intention to disappoint. Then, B's second-order belief about his intention to disappoint is $\delta_B^{DR,e=1} = 1$ for DON'T ROLL and $\delta_B^{DR,e=1} = 0$ for ROLL. B will prefer ROLL to DON'T ROLL if the following inequality holds:

$$U_B^{DR,e=1} = 14 - \theta_B \cdot 10 \cdot \beta_B \quad < \quad 10 = U_B^{R,e=1} \tag{2}$$

Under the imperfect ex post information structure of NoEXP, denoted by $e = 0$, A only knows her payoff, not B's choice. B's intention to disappoint can be expressed as $1-\hat{\beta}_B$, B's belief about A's ex post belief that B did NOT ROLL. If A gets 12, B knows that A knows he must have ROLLed. Bad intentions can be excluded. If she gets 0, B knows that A knows that he either ROLLed but A got unlucky (the probability for this event is B's interim second-order belief β_B

times 1/6) or B chose opportunistically (probability: $1-\beta_B$). A would blame B only in the case of intent/opportunism and, therefore, $1-\hat{\beta}_B = \frac{1-\beta_B}{1-\beta_B+\beta_B \cdot 1/6}$. A's ex post belief of B's intention to disappoint, given that A's payoff is 0 and applying Bayes' rule, is $\gamma_A^{x=0} = E[\frac{1-\beta_B}{1-\beta_B+\beta_B \cdot 1/6}]$, while it is $\gamma_A^{x=12} = 0$ if A's payoff is 12.

Recall that δ_B denotes B's interim belief about γ_A, A's ex post belief about B's intention to disappoint. If B selects DON'T ROLL, A's payoff will be 0, and it follows that $\delta_B^{DR} = E[\gamma_A^{x=0}]$. Alternatively, if B selects ROLL, A's payoff could be 0 with probability 1/6 (with probability 5/6 A's payoff would be 12 which causes no blame). Consequently, B's interim belief is $\delta_B^R = 5/6 \cdot 0 + 1/6 \cdot \delta_B^{DR} = \frac{\delta_B^{DR}}{6}$. Under imperfect ex post information B decides to ROLL if:

$$U_B^{DR,e=0} = 14 - \theta_B \cdot \delta_B^{DR} \cdot 10 \cdot \beta_B \quad < \quad 10 - \theta_B \cdot \frac{\delta_B^{DR}}{6} \cdot 10 \cdot \beta_B = U_B^{R,e=0} \quad (3)$$

Comparing expressions 2 and 3 it is easy to see that $U_B^{DR,e=0} = U_B^{DR,e=1}$ only if $\delta_B^{DR} = 1$, otherwise $U_B^{DR,e=0} > U_B^{DR,e=1}$. However, $\delta_B^{DR} = 1$ means that $U_B^{R,e=0} < U_B^{R,e=1}$ (assuming $\theta_B > 0$ and $\beta_B > 0$).

Experimental Instructions (EXP/FreeFORM treatment)

Welcome and thanks for participating in this experiment. In this experiment you can earn some money. How much depends on your and the other participants' decision. **Hence, it is important that you read the following instructions carefully.**

Please note that these instructions are only meant for you and that you are not allowed to exchange any information with the other participants. Similarly, during the entire experiment it is not allowed to talk to the other participants. If you have any questions or concerns, please raise your hand. We will answer your questions individually. Please do not ask your question(s) aloud. It is very important that you follow these rules; otherwise we have to stop the entire experiment. Please also turn off your mobile phone now.

General Procedure

The experiment takes about 60 minutes and consists of two parts. You will be making several decisions in each of those parts. Those will be explained to you briefly on the screen.

Only **one** of the two parts will be chosen randomly for your final payoff. You will be paid in cash according to the decisions you have made in the relevant part of the experiment. The exact procedure according to which your payoff is calculated is explained below. While you are making a decision for yourself, simultaneously other participants will also make decisions, which can possibly generate payoffs for you.

During the experiment you can earn money. Your payoff will be calculated in ECU (Experimental Currency Units) with 1 ECU = 0.75 EURO. At the end of today's session your earnings will be converted into EURO and you will be paid in cash. In addition you receive 2.50 Euro as a show-up fee and 5 Euro for completing the online survey.

After you completed a questionnaire, the experiment will be finished and you receive your payoff.

Here is the procedure as an overview:

1. Reading of the instructions, test questions (at the end of the instructions)
2. First part
3. Reading the instructions for the second part
4. Second part
5. Questionnaire
6. Payoff and end of the experiment

Details of the experiment

For this experiment there will always be two participants interacting with each other. They will be called participant A and participant B. Whether you are participant A or participant B will be determined randomly at the beginning of the experiment. Therefore, it is very important for you to **familiarise yourself with both roles.** The following decision situation **will only be played once**, hence, there will only be one round.

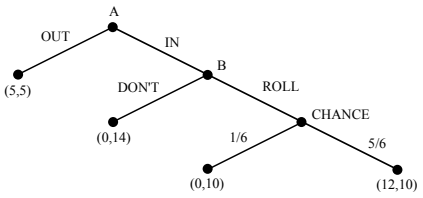
Decision Situations

In this game participant A will take a decision first. He/She can choose either option OUT or IN.

- The choice of OUT implicates the following payoff: 5 ECU for participant A and 5 ECU for participant B.
- If participant A chooses IN, the payoffs of both participants will be determined by participant B.
  - Participant B can then also choose between two options:
    - A decision of DON'T ROLL implicates the following payoff: 0 ECU for participant A and 14 ECU for participant B
    - A decision of ROLL implicates that:
      - ... with a probability of 1/6 (about 17%) participant A will receive 0 ECU participant B will receive 10 ECU.
      - ... with a probability of 5/6 (about 83%) participant A will receive 12 ECU and participant B will receive 10 ECU.

Participant B will be always asked for his/her decision, regardless of participant A having chosen OUT or IN.

The following chart illustrates the game and the payoffs which arise:



Hence, your payoff depends on the decisions of both participants, A as well as B. **At the end of the experiment you will learn about the other participant's decision (IN/OUT for A or DON'T ROLL/ROLL for B) as well as how much you earned in this decision situation.**

Message from B to A

Participant B has the possibility of sending a message to participant A, before A chooses either IN or OUT. Every participant B will be given enough time to type in his/her message on the computer.

- You are free to compose any content you like, but please be aware that you are not allowed to provide any hints which can be used to identify your name, seat number, gender or your appearance.
- You are not obliged to type in a message. This is optional.
- Typing/Sending a message will not result in any costs for participant B.

- The message does not constrain B to act according to the message's content.
- A chooses between IN or OUT only after B has sent the message.

Please also be aware of the information regarding typing and submitting the message, which will be given during the experiment.

Estimates

Besides your choices you will be asked for

- your expectations regarding the other participants' action
- your estimates of the other participants' expectations regarding your own action

Expectations of the other participants

As participant A as well as B you will be asked about your expectation concerning the decisions of participant B, respectively A. Additionally you will be asked to give an estimate regarding the expectations of participants B, respectively A, concerning your own decision.

You can distribute your estimate to intervals. Please indicate the estimated probability with a value between 0 and 100 and be aware that the sum of the probabilities must add up to 100.

You can earn money with these estimates (up to 4 ECU per estimate). **The closer you are to the real amount, the more you earn.** Therefore, it is important for you to read the instructions carefully.

Example for stating your estimates

You are working as a bouncer at a bar. Your boss will be with you at 11pm and wants to know the percentage of female guests. 100 people will have gone into the bar by 11pm.

You have paid close attention and know that there are 47 men and 53 women among the guests.

Your 'estimation' regarding the share of men and women should be as follows:

You enter 100 in the interval for 41-60% since you precisely know the distribution.

In the experiment, you will not know about the exact share, of course. You are being asked to estimate it. Generally, it works the same way, though.

Payoff

The amount you earn from these estimates depends on how close your estimates are to the real amount observed in this experiment. The closer you are to the real amount, the more you earn. **You can earn up to 4 ECU per estimate.** The real value is defined by considering all participants.

In any case, it is best for you to try and indicate your real estimations. After the experiment, you can ask the experimenters about how your earnings from these estimates are calculated in detail, if you like.

Your payoff from the experiment

Your payoff from this experiment results from the decision situation and the estimates. Your payoff will be paid in cash to you directly after the end of the experiment, i.e., after you completed the final questionnaire.

Comprehension questions:

Which role do you play in this part of the experiment?

o participant A
o participant B
o has not been decided yet

Participant A chooses IN and participant B chooses ROLL. Which payoffs could result from this situation?

o Participant A: 0 ; Participant B: 14
o Participant A: 12 ; Participant B: 10
o Participant A: 10 ; Participant B: 10
o Participant A: 0 ; Participant B: 10

Which payoffs result for participant A and B, if A chooses IN?

o Participant A: 0 ; Participant B: 14
o Participant A: 12 ; Participant B: 10
o Participant A: 5 ; Participant B: 5
o Participant A: 0 ; Participant B: 10

You are participant A and decide for the option IN. After the experiment you learn that you received 0 ECU. Can you infer from that whether B chose DON'T ROLL or ROLL?

o yes
o no

How many rounds will be played in part 1?

o 1
o 2
o 5
o 15