Does trust break even? A trust-game experiment with negative endowments☆

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A B S T R A C T

The Trust Game literature is quite extensive; those experimental studies consider situations where a trustor risks an endowment to become wealthier when trustworthiness pays off. In the worst case, the trustor leaves the experiment with no payment. Our study contrasts that situation to a treatment in which trust and trustworthiness might help to escape an inevitable financial loss. Both the trustor and trustee might break even or even leave the experiment with a positive outcome. We find slightly more trust in our treatment than in the established design; however, we find no difference in trustworthiness.

1. Introduction

Many experimental studies consider trust and trustworthiness, undoubtedly due to their importance for the economy (Dincer & Uslaner, 2010; Knack & Keefer, 1997; Zak & Knack, 2001). A vehicle for the experimental investigations is the "Trust Game", introduced by Berg et al. (2005). A trustor decides how much money to *transfer* to a trustee. The trustee, however, receives the tripled amount transferred from the trustor. This element makes sure that trust generates economic gains. However, the trustee has complete control over these gains and eventually decides how much to *return* to the trustor. The trustor is thus vulnerable to the trustee's willingness to reciprocate the trust.

Trust-demanding situations abound in social, economic, and political interactions. Hence, a better understanding of conditions that generate trust is highly relevant. Literature on Trust Game experiments attests to the contribution of the experimental approaches to this question, and more than 200 studies consider a variation of that experimental design.[1] However, these experiments addressed trust in "good times", i.e., situations in which non-negative endowments always yielded positive or at least zero payments.

Economic environments are not always friendly, and people must make essential trust decisions after adversity hits. Examples are economic interactions after a natural disaster, having lost all livelihood, or in times of economic downtu22rn, after losing a job and income. In these situations, people experience financial losses but might remove them by trusting others and being on the receiving side of their positive reciprocity. Such interactions also play a role in markets. When a firm experiences a downturn, its departments can trust each other and invest in a joint future to share trust and trustworthiness. Would trust prevail in such dire situations? What about trustworthiness; would trustees reciprocate trust even when facing a loss?

To address these questions, we study the Trust Game in a situation where the trustor and trustee face an inevitable loss. However, with sufficient trust and trustworthiness, the actors can break even to remove their losses and even leave the game with a positive amount. Hence, we implement the Trust Game in the loss and gain context. The trustor can transfer money to generate an economic surplus, thereby delegating the power to divide these spoils of trust to the trustee. The only aspect we vary in the experimental treatments is the payment condition after the interaction. We compare behaviour when the trustor and trustee interact

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[1] Johnson and Mislin (2011) conducted a large trust game meta-study with more than 160 studies.

in "good times" – the end-of-interaction payment is positive and equals the highest amount the trustor can transfer, to the behaviour in "bad times" – the end-of-interaction payment is negative. The first treatment is similar to the standard Trust Game. The second treatment can be seen as a Trust Game with a negative endowment.[2]

Despite extensive research on decisions involving trust, we know little about trust and trustworthiness when interactions start with experiencing losses, especially when compared to the wealth of information when trust takes place in the domain of gains. Hence, our study aims to address this gap in the literature with a simple experimental design. Decision-making under adverse conditions might differ from what we have learned about trust under non-negative endowments due to a wide range of behavioural mechanisms identified with decision-making under losses. Therefore, we cannot overgeneralize our insights on trust to what happens after the interacting parties suffer economic losses. Other experimental studies consider related environments. Houser and Xiao (2015) compare the standard Trust Game to an environment where subjects risk their own money. We see their experiment as a treatment between the standard and our design. Kvaløy et al. (2017) implemented a loss treatment differently; they modified the game by changing the default into full trust and allowing the first mover to insure any amount of the endowment. Non-experimental literature considers trust behaviour in naturally occurring loss contexts such as natural disasters or war (e.g. Fleming et al., 2014; Cassar et al., 2017; Kang et al., 2018; Toya & Skidmore, 2014). However, we think that experiments can isolate the relevant effects due to the inconclusive results related to unobservable variables (Kang et al., 2018; Toya & Skidmore, 2014). We also contribute to the methodological discussion on implementing losses in experimental studies (e.g. Etchart-Vincent & L'Haridon, 2011).

2. Literature overview

Trust is the expectation of positive reciprocity in the absence of the enforcement of positive reciprocity on the side of the trustee (James, 2002). This expectation of positive reciprocity, especially social expectation linked to the beliefs about the behaviour of others and associated social risk aversion (Ashraf et al., 2006; Fairley et al., 2016), was shown to drive the trust decisions in Trust Games where trustor and trustee both start with a positive endowment. In that sense, trust is "calculative" in the gain domain and depends on the risks associated with not receiving the trustee's reciprocal response. Trustors are particularly attentive to the possibility of being exploited in that way, a phenomenon dubbed betrayal aversion (Bohnet & Zeckhauser, 2004).

Even more, trust in the Trust Game relates to measures of individual preferences, such as prosocial and risk attitudes (Sapienza et al., 2013). For example, risk attitudes elicited with lottery tasks show varying success in predicting the behaviour of the trustor (Chetty et al., 2021; Corgnet et al., 2016; Eckel & Wilson, 2004). What trustors do thus depends to some extent on what trustees are expected to do and how uncertain trustors are in predicting their behaviour. This behaviour of trustees, in turn, was found to be a mix of altruism and positive reciprocity, i.e. repayment of the intentional trust decision of the trustor (Cox et al., 2016; McCabe et al., 2003). Additionally, trustees turn out to be sensitive to the cost of betrayal they impose on the trustor if they do not reciprocate positively (Aimone & Houser, 2013); they reciprocate more when these costs are higher.

The experience of losses in economic interactions upsets decision-making in a plethora of ways. A well-known concept is Prospect Theory (Kahneman & Tversky, 1979). On the one hand, people take higher

risks in the loss domain, and on the other hand, losses loom larger than gains, i.e., any change in payoffs in the loss domain has a more substantial impact than a similar change in payoffs in the gain domain. Hence, more risk-taking under losses might translate into more trust in the Trust Game with loss endowments (Cassar et al., 2017; Weller et al., 2007). However, when the trustor and trustee start their interaction with losses, the trustor must contemplate the consequences of bestowing trust on the trustee – and potentially enlarging his own monetary losses above the initial loss. The higher willingness to take risks weighs against the expectations of reciprocity. Observations from a hypothetical Trust Game with binary outcomes in the loss vs gain domain show that people become less calculative in the loss domain (Evans & van Beest, 2017). They seem to trust more and reciprocate more than in the gain domain. It is not clear, though, what this means for situations when trust could remove losses, i.e. when the trustee has the option to repay the trust by removing the trustor's loss.

A mix of prosocial and reciprocal incentives for trustees drives how much to send back to a trustor. The decision to reciprocate or not involves contemplating whether to impose the costs of a betrayal on the trustor. Such costs are higher when imposing a higher loss than when imposing a lower gain. This argument might explain why trustees repay trust more in the loss domain, avoiding to impose these costs on the trustor (Aimone & Houser, 2011). Existing evidence would thus suggest that the trustee returns more when reciprocity reduces the trustor's loss instead of increasing the trustor's gain.

Next to the reciprocity motives, unconditional altruistic motives also play a role in trustees' behaviour in the gain domains. People seem to act more selfishly in the loss context as dictators (Neumann, Kierspel, Windrich, Berger, & Vogt, 2018; Poppe & Valkenberg, 2003; Windrich, Kierspel, Neumann, Berger, & Vogt, 2022). In contrast, other studies found more generous behaviour in the loss context as proposers in the Ultimatum Game (Neumann et al., 2017) or as dictators (Baquero, Smit, & Wathieu, 2013; Cochard, Flage, Grolleau, & Sutan, 2020).

The loss context also interacts with social preferences such as inequity aversion motives. The trustee's return decreases the positive inequality of trustee vis-a-vis trustor, created through the trust decision. Past research suggests that inequity aversion is lower when subjects share losses and subjects sacrifice less payoff to remove inequality in a loss frame than in a gain frame (Boun My et al., 2018). In these studies, however, all decisions resulted in loss outcomes for decision-makers and recipients, and the question was how a dictator allocates the losses. We investigate a situation in which the trustee distributes gains after the trustor incurred a higher loss to generate them.

Overall, the literature documented a range of behavioural differences when subjects deal with losses rather than gains. Those studies seem to point to a higher transfer and a higher return in the Trust Game with a loss frame. We implement an incentivized laboratory study to confront this reading of the existing research.

3. Method

3.1. Tasks and measurement

3.1.1. Trust Game

Our experimental design considers the standard Trust Game (Berg et al., 1995). Two players, a trustor (subject A, a "he") and trustee (subject B, a "She"), each receive an endowment $E > 0$. A trustor decides on a *transfer* $X \in \{0, M\}$ which is tripled and transferred to an anonymous trustee. The trustee now has the opportunity to *return* an amount $Y \in \{0, \ldots, 3X\}$ This interaction yields the payoff $\pi_A = E - X + Y$ for the trustor and $\pi_B = E + 3X - Y$ for the trustee.[3] We manipulate E and allow

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it to be negative while keeping the action space defined by $X \in \{0, M\}$ unchanged across treatments.[4]

In the studies so far, the participants cannot end up with losses as $E > 0$ and $M = E$. Hence, the literature considers a situation in the gain domain only. Instead, we consider a situation in which the players' endowment is in the loss domain; only trust and trustworthiness can help circumvent a negative outcome for both players. How does behaviour look like when both players start interacting with a negative endowment compared to when they start with a positive endowment? We answer the question by comparing a *Gain treatment* (G), in which players know that a positive amount is added to the interaction, and a *Loss treatment* (L), in which that amount is negative. The payoff functions implemented in the two treatments are the same, up to the initial symmetric endowment for the trustor and trustee.

Trustor and trustee know to either receive 1000 in the Gain treatment ($E_G = 1000$), or to lose 500 in the Loss treatment ($E_L = -500$). In both treatments, the trustor transfers an amount X to the trustee, $X \in \{0, 100, 200, \ldots, 1000\}$, and the trustee can return any amount $Y \in \{0, 1, 2, \ldots, 3X\}$. The payoffs are $\pi_A^G = 1000 - X + Y$ and $\pi_B^G = 1000 + 3X - Y$ in the Gain treatment, and $\pi_A^L = -500 - X + Y$ and $\pi_B^L = -500 + 3X - Y$ in Loss treatment. While in the Gain treatment, the payoffs cannot become negative, $\pi_i^G \in [0, 4000]$, they can become negative in the Loss treatment, $\pi_i^L \in [-1500, 2500]$. Assuming that the trustee's first action is to cover losses, her payoff can only turn positive when $X \geq 200$. The trustor's payoff can only become positive if $Y > 500$. Hence, both can break even if $X_{BE} = 500$ and $Y_{BE} = 1000$ with $\pi_A^L = 0 = -500 - 500 + 1000$ and $\pi_B^L = 0 = -500 + 1500 - 1000$. A positive amount for both is only possible when $X > 500$. A table in the appendix shows all X-Y combinations such that both can end up with a positive payoff.

The trustee's willingness to return was collected using the strategy elicitation method. The trustee indicated a return for every possible transfer X (as implemented in, e.g. Füllbrunn et al., 2011). Trustees thus submitted a complete strategy Y_X where $Y_X \in \{0, 1, \ldots, 3X\}$. The use of the strategy method for trustees assures that we obtain comparable information across treatments, even in the face of possible differences in transfers by the trustors across treatments. Moreover, this information allows us to identify whether the size of a transfer affects the trustee's decisions.

We informed both trustors and trustees about the payoff functions of both players in the public reading of the instructions. Afterwards, the computer randomly allocated the two roles. The trustors were not informed about the strategy elicitation method. The trustors received this role-specific information after learning about their role.

The main design issue was the credible implementation of losses. In the experimental economics paradigm of paying for performance, experiments yielding negative payments come with serious concerns (Etchart-Vincent & L'Haridon, 2011). For ethical reasons, experimenters cannot make subjects pay for real at the end of an experiment without pointing this fact out in the invitation to the experiment. As a consequence, a severe selection bias might affect the experimental results. Moreover, the subjects have the right to withdraw at any time without penalty (BPS, 2014); they might withdraw from the experiment when realizing a loss. Nonetheless, some experimental studies allow subjects to risk their own money in an experiment. For example, Houser and Xiao (2015) show that risking own money leads to lower investment in the Trust Game.

One possible solution to avoid these problems is hypothetical experiments, i.e., running the experiment with a fixed participation fee without performance-related consequences. This approach opens the question of whether and how hypothetical and incentivized decisions differ from each other. Existing evidence comparing hypothetical and

incentivized decisions suggests that the differences do not necessarily arise in all contexts and domains. However, when hypothetical choices in the gain and loss domain have different effects, a treatment effect might not be due to the Trust Game but to such hypothetical payoffs. Moreover, trust studied in hypothetical and incentivized experiments was found to differ when examined in the laboratory (Holm & Nystedt, 2008), though the comparison of incentivized and hypothetical MTurk experiments showed no deviations in trust and trustworthiness (Amir et al., 2012).

An alternative solution is to pay the participants an initial endowment from which potential losses will be deducted (*covered loss procedure*, CLP). The endowment makes it possible to account for the losses accrued in the subsequent loss treatment without requiring that subjects pay money out of their pocket. This approach raises the possibility that subjects might be biased through playing with 'the house money', or they might integrate the initial endowment and thus take the decision over gains rather than over losses (see, e.g. Thaler and Johnson, 1990; or more recently Kroll et al., 2014). Nevertheless, this procedure still seems to be the most practical way of implementing loss treatments. It has been successfully implemented in a large multi-country study (Vieider et al., 2015); others found no difference between a version paying lump-sum right at the experiment or two weeks before (Rosenboim & Shavit, 2012).

We chose to implement the CLP approach while paying attention to minimizing the risk of payoff integration. To allow for positive experimental payments in both treatments, we varied the show-up fee in the two treatments (Ispano & Schwardmann, 2017). However, to reduce the integration effect, we disentangled the Trust Game and the endowment as follows. In the general instructions at the start of the experiment, we offered a show-up fee in euro. The actual instruction for the Trust Game was in "points", which we exchanged for euros at the end of the experiment. We thus separated the mental account for euro (show-up) and points (Trust Game). The show-up fee was four euros in the Gain treatment, while it was ten euros in the Loss treatment. The final payment in euros was the number of points achieved at the end of the experiment divided by 250 plus the show-up fee. To separate the mental account further, we elicited additional measures such as risk preferences, loss aversion, and numeracy between the general instructions at the beginning of the experiment and the Trust Game.

3.1.2. Controls

Throughout the experiment, we elicited different sorts of information from the participants. Please find the respective screenshots with the implementation in zTree in the appendix.

We elicited risk preferences in line with Eckel and Grossman (2008). Subjects choose one out of six lotteries with two possible outcomes, each obtained with equal probability. We paid out the chosen lottery. The first lottery offered a payoff of 500 for both outcomes. Each subsequent option increased the "good" payoff by 200 points and decreased the "bad" payoff by 150, with the last lottery's payoffs being 1500 and -250 points. Concurrently, the expected value increased from 500 to 625, increasing the variance in the payoffs to be obtained and thus risk. In the analysis, the variable "*option*" ranges between 1 and 6 such that a higher value indicates a higher willingness to take risks.

We elicited loss aversion by a sequence of six decisions to reject or play a lottery with a good outcome of 1000 points and a bad outcome starting with -200 and decreasing by 200 in each subsequent decision, similar to Füllbrunn and Luhan (2017). Each subject thus made six decisions between earning a sure zero payoff rejecting the lottery, or accepting the lottery with an expected payoff starting at 400 and decreasing to -100. The fewer lotteries the subject accepts, the more loss averse she is. The variable "*loss aversion*" in the analysis thus ranges

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[4] Note that the players are technically not endowed but receive or make an inevitable payment after the interaction.

from 0 to 6; a higher value indicates higher loss aversion.[5]

Cognitive ability relates to a package of cognitive skills ranging from processing information up to the ability to suppress affect and impulse and elaborate on the decision before acting. Such ability has been linked to profitable behaviour previously. Particularly interesting for our study, decisions in the domain of losses were referred to as more instinctive, guided by emotions. However, at the same time, risk-taking in the domain of losses is less likely to be disrupted for patients with lesions in brain areas implied in emotion processing (Weller et al., 2007). The measure of numeracy/cognitive ability is a collection of questions where intuitive (automatic, fast) reasoning is incorrect, and the correct answer is only obtained if the subject is able to reflect on their own impulse and correct it by reasoning deliberatively (Frederick, 2005). We applied a version of Weller et al. (2013), which scored from 0 (no correct answer) to 9 (all answers correct).

We also collected self-reported emotions that the subjects experienced when obtaining information on the other player's decision, addressing the experiences of positive or negative emotions across treatments. We elicited the trustor's emotions when he observed the profit and the return of the trustee and the trustee's emotions when she observed the amount transferred by the trustor. Subjects could indicate whether they felt an emotion "*not at all*" to "*very intensely*" using a seven-point Likert scale. The emotions considered were *Anger, Gratitude, Guilt, Happiness, Irritation, Shame,* and *Surprise* (Hopfenspits and Reuben, 2009).

In the post-experimental questionnaire, we collected data on demographics relevant to trust relationships. Next to gender and age, we asked about religious affiliation and service, membership of groups, beliefs about others regarding fairness, general risk attitudes (SOEP panel question), a general trust question, belief in destiny, beliefs in whether subjects think that they get what they deserve and whether they think that they have control over their life. We use such characteristics as controls in the regressions.

3.2. Predictions

According to standard economic theory, the self-interested money-maximizing trustee returns no points independent of the treatment and the amount received. Of course, the trustor is expecting such behaviour and will not transfer any amount. Hence, the outcome of the game does not differ between treatments. However, the Trust Game meta-study of Johnson and Mislin (2011) documented the trustors to transfer, on average, about 50% of the endowment ($X/E = 50\%$), and trustees returning about 37% of the received amount in games with multiplication factor of 3 ($Y/3X = 37\%$).

Several behavioural mechanisms observed in the literature (see above) suggest more trust in the Loss treatment, $X_L > X_G$. The trustors are expected to be more risk-seeking over losses. The context of losses imposes higher costs of betrayal on trustees so that trustors can expect higher reciprocity from trustees. An interesting aspect of the Loss treatment is that the trustor is not likely to avoid losses by making low transfers to the trustee. In the Gain treatment, transferring any small amount could result in some gain. However, in the Loss treatment, the subjects can obtain positive payoffs only if the trustor transfers a "sufficiently" high amount. Transferring $X = 300$, i.e., the trustee has 900 to distribute, technically allows for non-negative payments for either the trustor or trustee but not for both. Moreover, in light of previous research on reciprocity, we know that most trustees only marginally repay trust. If trustees behave similarly in the Loss treatment, the range of transfers that could allow trustors to escape losses requires that the trustor transfers at least 500 points in the Loss treatment. Therefore, we

expect that the motivation to avoid losses increases the transfers in the Loss treatment compared to the Gain treatment. This loss avoidance would be mainly detected when $X \geq 500$.

Hypothesis 1a. Trust is higher in the Loss treatment.

Hypothesis 1b. The frequency of transfers smaller than 500 is lower in the Loss treatment.

Trustees' strategies could also be affected by the possibility of incurring losses. Looking at the trustee's behaviour in light of previous experimental research, we might expect several strategies from the trustee. She can be selfish ($Y = 0$) or pursue a conditional cooperative strategy (Fischbacher et al., 2001), increasing the return with the amount transferred by the trustor. The extent of generosity might differ amongst conditional co-operators; for example, repaying the trustors transfer without any reward ($Y = X$), or rewarding the transfer and choosing a fair split ($Y = 2X$).

However, in the Loss treatment, the trustee can return points to the trustor without ending up with a negative payoff when the transfer is at least $X = 200$ points. This situation could result in threshold strategies where the return remains at zero unless the trustee can afford positive returns without losses for herself. At the same time, it might serve as a signal to avoid losses for both parties. We thus expect the trustees to cover their losses first and transfer the remainder to help the trustor cover her losses. However, only when the transfer exceeds 500, the trustee's strategy might be to let the trustor break even. Hence, we expect increasing reciprocity with increasing transfer amounts.

Hypothesis 2. In the Loss treatment, the strategy reflects increasing reciprocity with increasing transfers of the trustor.

3.3. Procedures

Fig. 1 captures the experimental design. When entering the laboratory, subjects signed an informed consent form for participation in the experiment, got seated at a computer box, and read general instructions on the computer screen. Then, they submitted decisions in the risk elicitation task, the first part of the cognitive ability tasks, the loss aversion task, and the second part of the cognitive ability tasks.

Afterwards, the instructor read the Trust Game instruction aloud to generate common information on the game. Half the subjects became trustors (type A). They chose an amount ranging from 0, 100,…, up to 1000 that was transferred to the trustee. The remainder decided as trustees, referred to as type B. Via the strategy elicitation method, type B indicated what amount to return to the trustor for each possible amount the trustor could have transferred. However, after type B learned the actual amount transferred, she was able to revise her amount to send back. We wanted to find out whether the trustees revise their opinion after observing the actual amount. We found no systematic revision, though.

Afterwards, A and B learned the payoff consequences of the other players' decisions. Now they indicated their emotions associated with the decision of the other player. Then, the total payoff from risk elicitation, loss aversion, and Trust Game were presented. Before payment, the subjects answered the remaining demographic questions.

3.4. Participants

We ran the experiments in the Individual Decision Laboratory of the Institute for Management Research at Radboud University in Nijmegen, The Netherlands. We recruited the subjects using ORSEE (Greiner, 2015) and programmed the experiment in z-Tree (Fischbacher,2007). Data was collected in four sessions for each treatment, yielding 58 trustor decisions and 56 trustee decisions in each treatment, a total of 228 observations. In some sessions with an odd number of subjects, a trustor leftover was randomly matched with a trustee strategy and paid out
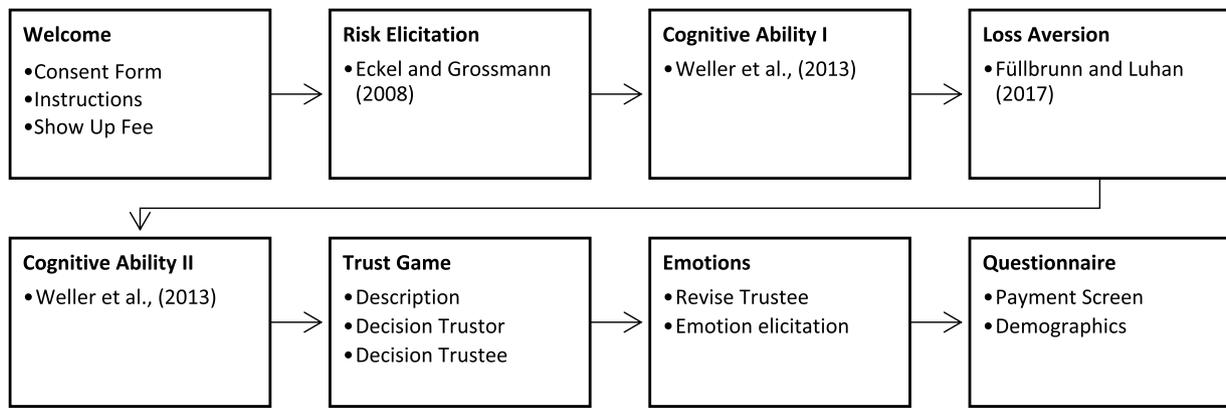
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[5] The choices can also be transferred to the loss aversion parameter lambda. Refer to Füllbrunn and Luhan (2017) who implemented the Gächter et al. (2010) consideration.

Fig. 1. Experimental procedures.

accordingly. Each session lasted about one hour. The average earnings were 10.10 euros (SD 3.51) for the trustors and 15.77 euros (SD 4.77) for the trustees.

4. Results

Table 1 shows an overview of the results on trust (the amount transferred) and trustworthiness (as an average percentage of the actual amount returned).

4.1. Trustor behaviour

To illustrate the distribution of transfers, we show the histogram of the amount transferred by the trustor in Fig. 2. The average transfer is 443 (SD 339) in the Gain treatment and 547 (SD 353) in the Loss treatment, i.e. higher in the Loss treatment. The number of zero transfers is similar in both treatments. Subjects also invested the highest amount substantially more often in the Loss (26%) than in the Gain treatment (16%). In the Loss treatment, the second peak is at $X = 500$. It seems, though, that those who go beyond this threshold are willing to invest the full amount instead of choosing intermediate transfers. The fraction of transfers for the investment levels below 500 – i.e., transfers that are unlikely to remove the loss of the trustor – is lower in the Loss treatment for all but one investment level. Neglecting those who do not transfer at all, we find more transfers in the gain treatment in that range (38%) than in the loss treatment (29%). When looking at the payoff, we see that in comparison to the benchmark, the trustors in the Gain treatment lose on average 216 while those in the Loss treatment lose 204.

To explain the decision to trust, we estimate an ordered logistic regression with eleven transfer levels as the dependent variable, a treatment dummy for the treatment being Loss treatment, and control variables. Table 2 shows the results. The treatment effect is significant and tells us that we expect at least a 0.51 increase in log odds of choosing a higher transfer in the Loss treatment.

However, in line with the histogram above, we can assume that the

Table 1
Overview of results.

	Gain		Loss	
Trust	443	(339)	547	(353)
Trustworthiness	0.5946	(0.7398)	0.6152	(0.7806)
Payoff Trustor	784	(390)	−704	(495)
Payoff Trustee	2040	(904)	833	(971)

Note. The table shows the mean and standard deviation of money trusted (X), the realized return ratio (Y/X between 0 and 3), and the trustors' and responders' payoff. Trust includes 58 observations each. Trustworthiness includes 48 and 49 observations (due to zero transfers).
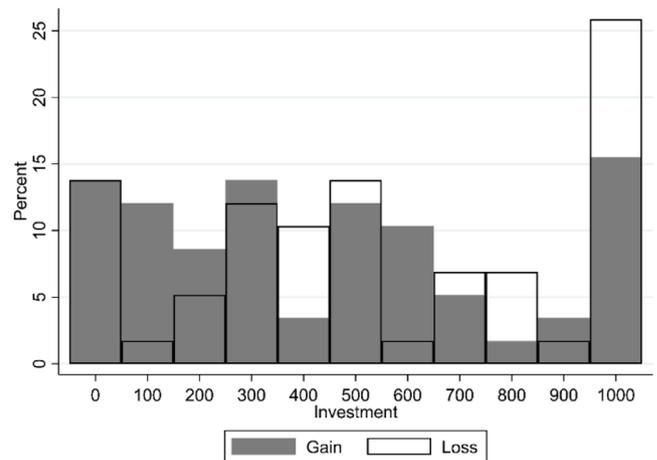

Fig. 2. Histogram of transfers
Notes. The y-axis shows the percentages of transfers chosen by treatment. The x-axis shows the possible transfer levels.

Table 2
Ordered logistic regression.

	(1)	(2)	(3)
Loss treatment	0.51***	0.66***	0.69***
	(0.18)	(0.11)	(0.23)
Loss Aversion		−0.37**	−0.18
		(0.16)	(0.20)
Option		0.13	0.06
		(0.08)	(0.12)
Numeracy		−0.02	−0.11
		(0.11)	(0.16)
Demographics	No	No	Yes

Notes. The dependant variable is the eleven transfer levels 0,…, 1000. The independent variables are the treatment dummy (1 if loss), "*Loss Aversion*" is the number of rejected lotteries (the higher, the more loss averse), "*Option*" is 1 if risk-averse and 6 if risk-seeking, "*Numeracy*" is 0 if no question correct and 8 if all questions correct, Demographics include several variables elicited at the end of the experiment. The appendix provides the completed table.
* $p < 0.10$.
** < 0.05.
*** < 0.01.

proportional odds assumption does not hold. The assumption states that going from category 100 to 200 has the same meaning as going from category 900 to 1000. Therefore we present the marginal treatment effects in Table 3. The estimations in line with model (1) show that subjects in the Loss treatment are less likely to transfer amounts that are

Table 3
Marginal treatment effects.

Investment	0	100	200	300	400	500	600	700	800	900	1000
Difference	−0.060	−0.023	−0.018	−0.021	−0.004	0.005	0.008	0.012	0.011	0.007	0.083

Notes. The numbers show the estimated percentage points difference between the loss and the gain treatment.

unlikely to remove losses compared to the gain domain. The differences for $X < 500$ are negative, while the differences for $X \geq 500$ are positive. Overall, the results corroborate hypothesis 1b. However, they are more likely to transfer higher amounts, opening a possibility for the trustee to remove the trustor's loss as well. Subjects in the Loss treatment are 8.3 percentage points more likely to transfer the maximum than subjects in the Gain treatment.

However, while the analysis above supports our hypotheses, a simple Mann-Whitney U test finds no significant difference in the distribution of transfers ($p = 0.12$), which is to some extent expected as in both treatments, we observe each investment level at least once.[6] We conclude as follows.

Observation Trustor: *Trustors seem to invest more in the Loss than in the Gain treatment. In particular, trustors are less likely to transfer amounts that keep their own losses intact.*

4.2. Trustee behaviour

Fig. 3 provides an overview of the trustees' response functions in both treatments ($n = 56$ in each). We categorize about 30% in both treatments as purely selfish ($Y = 0$). The fraction of trustees who return less than X is about 20% in both treatments ($0 < Y < X$). Some trustees send back exactly $X = Y$ (9% in Gain vs 4% in Loss). Hence, in both treatments, for about 57% of the trustors, trust does not pay off. We also observe that some trustees are willing to reward the trustors by returning more than X. Of those, about 5% exactly split the amount but in the Gain treatment only. The remaining subjects show erratic behaviour, i.e. Y falls in different areas around X. In the Loss treatment, 40% do not fall in the other categories, while for the Gain treatment, it is 30%. Even though in the latter category, most of the trustees first cover their losses before transferring back to the trustor, the overall pattern does not allow for such a general conclusion.

To quantify the amount of trustworthiness, we consider the overall willingness to return as the sum of all conditional returns, i.e. $S = \sum_{i=1}^{10} Y_{100 \times i}$, per subject, which is $S = 0$ if $Y_{100 \times i} = 0$ for all transfer levels, or $S = 16,500$ if $Y_{100 \times i} = 3 \times 100 \times i$, i.e. when the trustee returned the entire amount. The average sums are $S_G = 3,391$ (SD 3950) and $S_L = 3,439$ (SD 3909). Comparing the two distributions, we find no significantly different between treatments when applying a Mann-Whitney U test ($p = 0.998$). Otherwise, the trustee might return higher amounts for higher transfers to reward trust. We also expected the trustees to return less for low transfers in the Loss treatment. We address this by running an OLS regression with the return on transfer for each transfer level ($ROI = (Y - X)/X$) as the dependant variable and the transfer X (assuming it to be continuous) and a treatment dummy *Loss* as the independent variable, together with an interaction term (*Int*), clustering at the subject ID. The regression results (1) show a significant negative *ROI* overall. We find the interaction effect of being significantly positive but small, while the other coefficients are insignificant. The results for the Loss treatment suggest a significant increase in *ROI* over transfers compared to the Gain treatment, supporting Hypothesis 2.

$$ROI = -0.3667^{**} - 0.0000\,X - 0.2214\,Loss + 0.0003^{**}Int \quad (1)$$
$$(0.1030)\ (0.0000)\ (0.1391)\ (0.0001)$$

For the realised *ROI*, the actual amount returned based on the

amount received, the subjects' average was -0.41 (SD 0.74) in the Gain treatment and -0.38 (SD 0.78) in the Loss treatment. Using a Mann Whitney U test, we found no significant difference in the distribution of realised *ROI* (Mann Whitney $p = 0.976$).[7]

We also surprised the trustees by asking whether they wanted to change their decision on how much to return after observing the amount X. In both treatments, about 65–70% decided not to change. Nearly half of those who changed their decisions returned less, and about half returned more, independent of the treatment. A similar OLS regression (see appendix) as above with the change in returns leads to insignificant coefficients.

We conclude this section as follows.

Observation trustee: Trustees do not repay trust in both treatments. Strategies submitted in the Loss treatment reflect less reciprocity for low transfers and more reciprocity for high transfers. The effect is small, though.

4.3. Emotions

Finally, we briefly elaborate on the elicited emotions. After observing the amount transferred, the trustees responded by indicating the strength of their emotions for each of the five categories. We ran a principal factor analysis for the trustees, which was partly in line with the results from Hopfensitz and Reuben (2009). The first factor relates to anger-like emotions, and the second factor to guilt-like emotions. However, this result does barely hold for the Loss treatment, and more generally, the KMO value is relatively low.

To see whether the trustees react differently to the transferred amounts in the two treatments, we consider a multivariate multiple regression with seven output variables using the model $Emotion_i = \beta_0 + \beta_1\,Transfer + \beta_2\,Loss\,Dummy + \beta_3\,Transfer \times Loss\,Dummy + \varepsilon$ (reported in the appendix). We find higher investment levels to reduce *Anger* and *Irritation* and to increase *Gratitude, Guilt* and *Happiness*, which seems reasonable. The treatment itself did not affect emotions, nor did the interaction. However, for "*surprise*", we find the interaction to be significant. The results might be spurious as we find no significant results for the others. A further aspect might be that the trustees change their amount to transfer back when they recognize that they received a small amount or a smaller amount than expected (what we did not measure). A relationship with higher *anger* for a smaller amount could lead to a decrease in ROI. However, a Spearman test reveals no significant correlation between *anger* and the change in returns. Overall, we conclude that emotional reactions do not differ between treatments.

5. Discussion

We study trust in a loss environment using the Trust Game. The trustor and trustee start the interaction by expecting a symmetric negative payment. This approach is not identical to experimental designs where isomorphic games are created by a shift in the default – the starting position of the players – while the payoffs from interactions take place in the domain of gains (Khadjavi & Lange, 2015; Kvaløy et al., 2017; List, 2007).

In a new Trust Game design with "negative endowments", the players jointly could circumvent an inevitable loss by getting into a trust

---

[6] Note that the MWU test only claims that one distribution does not first-order stochastically dominate the other.

[7] However, the post-hoc power is quite low to make a claim regarding differences.

$Y = 0$ Gain: 28.57%   Loss: 32.14%

$0 < Y < X$ Gain: 19.64%   Loss: 21.43%

$Y = X$ Gain: 8.93%   Loss: 3.57%

$X < Y < 2X$ Gain: 7.14%   Loss: 3.57%

$Y = 2X$ Gain: 5.36%   Loss: 0.00%
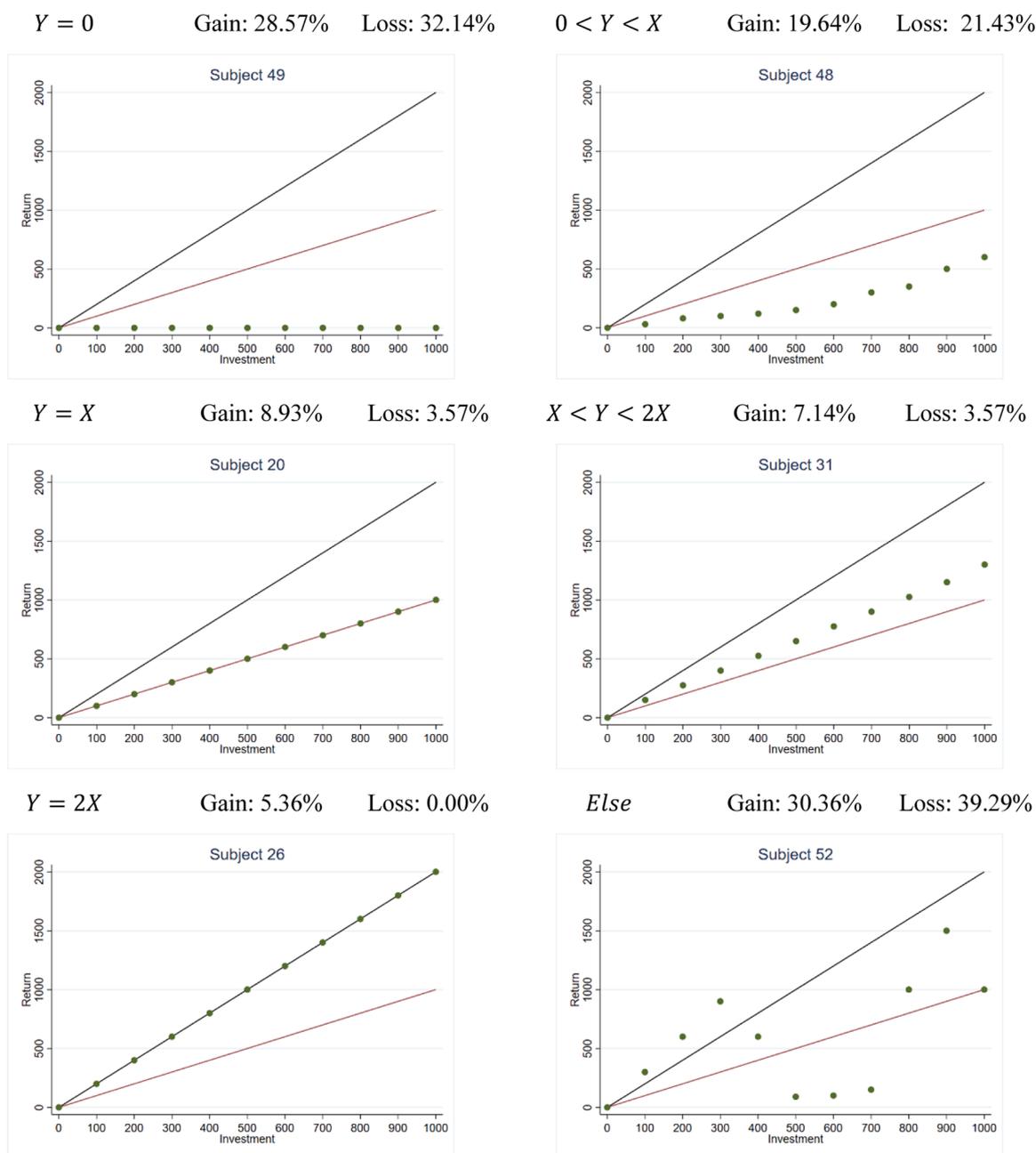
Else   Gain: 30.36%   Loss: 39.29%

Fig. 3. Trustee – response functions.

relationship. When implementing the experimental design, we had to make some choices. We decided not to elicit beliefs in this experiment. On the one hand, we didn't want to confuse the subjects or generate extra experimenter demand, and on the other hand, there is no straightforward way to do so (Bacharach et al., 2007; Blanco et al., 2010; Guerra & John Zizzo, 2004). Therefore, after our study, an open question remains to what extent the increased trust in the Loss treatment is driven by the preference to avoid losses or changing beliefs. There are at least some reasons to suspect that beliefs might be affected: we know that the costs of betrayal are higher in the Loss treatment, which might lead trustors to believe that the betrayal is less likely because of that and affect their beliefs. The impact of the incurred losses before trust interaction on the beliefs of trustors remains open to future investigation.

Further, we used the strategy elicitation method to collect the trustee's strategies. Casari and Cason (2009) find similar levels of trust but lower trustworthiness in the strategy elicitation method. However, the meta-study by Johnson and Mislin (2011)) finds no effect. Hence, we

expect that our elicited strategies might be a lower bound on trustworthiness. Importantly we were interested in comparison cross treatments, and this comparison is obtained by using the same method of data collection across treatments, eliminating the impact of the method. We have no reason to believe that the strategy method interacts differently with the Gain or Loss treatment.

Overall, our aggregate results suggest a treatment effect on trust but no effect on trustworthiness. However, regression (1) suggests that strategies in the Loss treatment are somewhat more reciprocal when considering the return on investments over investment levels.[8] How does this link to other studies? We find that trustors are willing to take more risk if this removes the prospect of losses. In a field experiment, participants after a significant flood were more willing to take the lottery

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[8] When considering the ROI after the revision the effect disappears. See appendix Section 3.

with a small probability of winning instead of a small safe payoff (Page et al., 2014; Said et al., 2015). Furthermore, trustors transferred more when they have a smaller endowment than the second-mover (Lei & Vesely, 2010, Hargreaves-Heap et al. 2013, Calabuig et al. 2016, Rodriguez-Lara 2018). Such behaviour could link to the inequity aversion effects of the Loss treatment.

The impact of a loss has also been linked to emotions accompanying the loss. So have happiness and anger been associated with more risk-taking and fear with less risk-taking (Armando, 2019; Malmendier & Nagel, 2011). Investigating the emotional state at the moment of decision-making is, therefore, open to research. We did not consider this question, as eliciting emotions in questionnaires might intervene with decision-making. Other methods, such as skin conductivity or face recognition techniques, seem a more promising route for this research question (Potts et al., 2019).

It was also observed that trustees return more to poor trustors than to rich trustors (Lei & Vesely, 2010), possibly in relation to the betrayal aversion costs higher in that case. However, in a comparable strategy method Trust Game study, only 5% of trustees use the purely selfish strategy (Ahmed, 2011), while in our experiment, it is 40%.

We only know about one related study that also considers sort of a loss environment in a Trust Game. In Kvaløy et al. (2017), the Gain treatment corresponds to the standard Trust Game, while the loss treatment modified the game by changing the default into full trust and allowing the first mover to insure any amount of the endowment at the cost of two units per each unit insured. The trustee then can take any amount of the uninsured amount. This loss treatment induced the same monetary incentives as the gain treatment. The authors find lower levels of trust and trustworthiness in the so-called "loss treatment". Interestingly, reciprocity–the relationship between money transferred by the trustor and money returned by the trustee–was stronger in their loss treatment. Our study had a different focus and design, though.

From section Section 3.1.1, we learn that implementing loss frames in the laboratory is a difficult endeavour. Hence, our results come with some caveats. They only hold when the loss frame is credible. The other question might be whether we see a loss effect at all or whether we just see an endowment-shift effect.[9] We shifted the endowment by 1500, from $E = 1000$ to $E = -500$, but kept the action space constant ($X \in \{0, \ldots, 1000\}$). Future studies can find out whether wealth levels indeed play a role by simply varying E. We didn't find a reference for that consideration and leave that question for future research. In studies that consider endowment, or stake-size, effects, the action space varies with the endowment; the results are mixed even though the tendency shows no stake-size effects (Johnson & Mislin, 2011).

Some aspects affecting behaviour remain unaddressed in our study. Inequality has been shown to affect trust amongst low-income decision-makers negatively. When trustors and trustees come from a population with high-income differences, trust is thus negatively affected. However, we do not address the question of how inequality combines with loss (Gallego, 2016).

6. Conclusion

Does trust help to mitigate inevitable losses? After natural disasters, trust was linked to various factors such as past received help, scarcity of resources, and competition for resources. Thanks to experimental approaches, we can remove the influence of such factors, to understand the pure impact of an incurred financial loss by the trustor and trustee on their ability to sustain trust – one could say, in situations when trust is needed the most. What if only a joint venture can help overcome losses so that the trustor invests in a project, the trustee shares the gains from the project fairly, and both players overcome an adverse situation? Trust is needed to prevent losses. However, the trustee would make a considerable gain if not sharing the benefits of the trustor's trust, leaving the trustor with even higher losses than the initial situation. Do trustors accept the risk of increasing their own losses? Do trustees share the gains from trust to mitigate the trustors' losses, or do they exploit the trust to reduce their own losses? These are the questions we wanted to address in this study.

As of now, using the data we collected, we can discard individual characteristics like risk aversion (Houser et al., 2010) or loss aversion (when including demographics), or cognitive skills (Corgnet et al., 2016) as significant drivers of trust.

Our main result is that trust in a loss environment, i.e. expecting a sure loss, is higher than trust when expecting a gain. One reason might be the motivation to remove losses. The loss context thus not only opens many critical questions about the ability to sustain trust but also seems to create incentives to trust. Loss avoidance might then serve as an incentive to trust. We observe about 10% more maximum transfers in the Loss treatment. There was also a shift of transfers from small (inconsequential) transfers that would not remove the loss from both players if sharing equally into a domain where the possibility arises that both interacting partners will remove losses and even end up with gains.

At the same time, there is no matching impact of Loss treatment on overall trustworthiness. However, in the Loss treatment, the returns increase with the transfers, which is less strong for the Gain treatment. Nonetheless, both treatments show a negative return on transfer and the treatment effect is relatively small. When we categorize the strategies of the trustees, we see that in both treatments about 30% do not send back anything and that about 57% send back, at most, what the trustor invested. The actual realizations show that the trustors in both treatments lose more than 200 on average, while the trustees gain 1040 in the Gain treatment and 1333 in the Loss treatment. Trust is thus not profitable in either of the treatment.

In a nutshell, the loss context seems to increase the amount of trust but does not affect overall reciprocity.

Data availability

Data will be made available on request.

Appendix

1. Payoff table in loss treatment

The table shows the players payoff functions for investments which can yield positive outcomes for the trustor. Only when X exceeds 400, both players can achieve a positive payoff (highlighted in grey).

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[9] We thank one of the anonymous referees for addressing this point.

Payoff Table for X > 400

X	3X	Y															
		1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500
500	1500	0	100	200	300	400	500	.	.	.	.	.	.	.	.	.	.
		0	-100	-200	-300	-400	-500	.	.	.	.	.	.	.	.	.	.
600	1800	-100	0	100	200	300	400	500	600	700	.	.	.	.	.	.	.
		300	200	100	0	-100	-200	-300	-400	-500	.	.	.	.	.	.	.
700	2100	-200	-100	0	100	200	300	400	500	600	700	800	900	.	.	.	.
		600	500	400	300	200	100	0	-100	-200	-300	-400	-500	.	.	.	.
800	2400	-300	-200	-100	0	100	200	300	400	500	600	700	800	900	1000	1100	.
		900	800	700	600	500	400	300	200	100	0	-100	-200	-300	-400	-500	.
900	2700	-400	-300	-200	-100	0	100	200	300	400	500	600	700	800	900	1000	1100
		1200	1100	1000	900	800	700	600	500	400	300	200	100	0	-100	-200	-300
1000	3000	-500	-400	-300	-200	-100	0	100	200	300	400	500	600	700	800	900	1000
		1500	1400	1300	1200	1100	1000	900	800	700	600	500	400	300	200	100	0

Notes. The values show the payoffs for the trustor (first row) and the trustee (second row) for X-Y combinations for which both can achieve positive payoffs (grey area). For example, row 700 and column 1300 show a 100 payoff for the trustor and a 300 payoff for the trustee.

2. Regression with "Demographics" and further elicited questions

The table below completes Table 2 from the main text.

Complete Table 2: Ordered Logistic Regression

	(1)	(2)	(3)
Loss	0.51***	0.66***	0.69***
	(0.18)	(0.11)	(0.23)
Loss Aversion		−0.37**	−0.18
		(0.16)	(0.20)
Option		0.13	0.06
		(0.08)	(0.12)
Numeracy		−0.02	−0.11
		(0.11)	(0.16)
"Demographics"			
Female Dummy			−0.25
			(0.46)
Age			0.03
			(0.10)
Trust			−0.18
			(0.14)
Fate			0.07
			(0.14)
Free Choice			0.06
			(0.11)
Dummy Religion			1.60**
			(0.66)
Dummy religious Service			0.17
			(0.41)
Belong to student group			−1.21
			(0.77)
Fair People			−0.02
			(0.16)
Dummy get what deserve			0.78
			(1.66)
Risk			0.09
			(0.09)
N	116	112	100

Additional Notes. *Trust* (Generally speaking, would you say that most people can be trusted, or that you need to be very careful in dealing with people? 1–10), *Fate* (Some people believe that individuals can decide their own destiny, while other think that it is impossible to escape a predetermined fate. What comes closest to your view?1–10), *Free Choice* (Some people feel they have completely free choice and control over their lives, while other people feel that what they do has no real effect on what happens to them. Please indicate how much freedom of choice and control you feel you have over the way your life turns out.1–10), *Dummy Religion* (1 if belong to a religious group, 0 otherwise), *Dummy Religious Service* (How often do you attend religious services? 0 = never, 1 = otherwise), *Belong to student group* (Are you a member of a sorority or fraternity?), *Fair People* (Do you think that most people would try to take advantage of you if they got a chance, or would they try to be fair? 1–10), *Dummy get what deserve* (How much of the time do people get what they deserve in life? 0 = never, 1 = otherwise), *Risk* (Are you, generally speaking, a person who is fully prepared to take risks, or do you try to avoid taking risks ? 1–10)

Table 4

Multivariate multiple regression.

Emotion	Anger	Gratitude	Guilt	Happiness	Irritation	Shame	Surprise
R-sq	0.2358	0.4912	0.1131	0.2754	0.2298	0.0471	0.0943
Model p	<0.001	<0.001	0.005	<0.001	<0.001	0.155	0.013
Investment	−0.0021***	0.0031***	0.0019***	0.0022***	−0.0025***	0.0002	−0.0002
Loss Treatment	0.3620	−0.685	0.4888	−0.7202	0.3358	0.1485	−1.1006
Interaction	−0.0004	0.0014*	−0.0004	0.0009	−0.0003	0.0007	0.0025***
Constant	3.021***	2.6205***	1.9156***	3.4315***	3.7206***	2.2176***	4.1827***

3. Regressions on ROI

We run an OLS regression with the return on transfer for each transfer level ($ROI = (Y − X)/X$) as the dependant variable and the transfer X (assuming it to be continuous) and a treatment dummy *Loss* as the independent variable, together with an interaction term (*Int*), clustering at the subject ID (Regression 1). We also surprised the trustees by asking whether they want to change their decision on how much to return after observing the amount X. The same OLS regression with the new returns lead to insignificant coefficients (Regression 2).

Regression (1) and (2)		
	(1)	(2)
Amount Invested	−0.0000 (0.000)	−0.0000 (0.0003)
Loss Treatment	−0.2214 (0.1391)	−0.0695 (0.3085)
Interaction	0.0003** (0.0001)	0.0002 (0.0005)
Constant	−0.3667** (0.1030)	−0.4153** (0.1929)
N	1120	97
R^2	0.0077	0.0036

4. Factor analysis

The table show the factor loadings of the emotions elicited for the two treatments separately. The loadings are somewhat different between two treatments. The Gain treatment results seem not different than the results in Hopfensitz and Reuben (2009); the first factor can be interpreted as the anger-like emotions while the second factor as the guilt-like emotions. These factors are less obvious in the Loss treatment as the factor loadings are relatively high for all emotions, and the second factor for guilt-like emotions is less obvious. Overall, the analysis does not yield much insights as the Kaiser-Mayer-Olkin measures are quite low.

Factors Underlying the Subjects' Emotional Response								
	Gain - Trustees				**Loss - Trustees**			
Factors	1st	2nd	3rd	$1 - h^2$	1st	2nd	3rd	$1 - h^2$
Exp. Variance	0.37	0.27	0.17	-	0.45	0.23	0.16	-
Factor Loadings								
Anger	- 0.79	0.28	0.28	0.22	- 0.69	0.60	0.20	0.13
Gratitude	0.86	0.19	0.17	0.19	0.91	0.00	0.24	0.12
Guilt	0.20	0.83	- 0.33	0.15	0.58	0.52	- 0.44	0.20
Happiness	0.68	0.18	0.58	0.18	0.83	0.08	0.27	0.23
Irritation	- 0.84	0.30	0.13	0.19	- 0.64	0.65	0.25	0.12
Shame	0.11	0.83	- 0.39	0.15	0.46	0.67	- 0.44	0.15
Surprise	- 0.14	0.51	- 0.68	0.26	0.45	0.32	0.69	0.22
KMO test	0.6149		0.6294					
Notes.								

5. Multivariate multiple regression

We consider regressions of the form $Emotion_i = \beta_0 + \beta_1 Transfer + \beta_2 Loss Dummy + \beta_3 Transfer \times Loss Dummy + \varepsilon$. We used the mvreg function in STATA. The regression results in Table 4 show first that the investment level has expected signs and almost all coefficients are significant. Higher investment levels reduce *Anger* and *Irritation* while they increase *Gratitude, Guilt* and *Happiness*. The treatment itself had no effect on the emotions nor did the interaction. However, for *surprise* we find the interaction to be significant. The results might be spurious as we find no results for the others. The interpretation would mean that in the loss treatment higher investment levels lead to higher surprises.

6. zTree elements

Order

- ⊞ 🌳 **Background**
- ⊞ 🗃 Welcome =|= (30)
- ⊞ 🗃 RISK TASK =|= (30)
- ⊞ 🗃 Intro -= (30)
- ⊞ 🗃 8item Q3 -= (30)N
- ⊞ 🗃 8Item Q8b -= (30)N
- ⊞ 🗃 8item crt2_machine -= (30)N
- ⊞ 🗃 8Item Q9 -= (30)N
- ⊞ 🗃 LOSS AVERSION TASK =|= (30)
- ⊞ 🗃 Intro2 -= (30)
- ⊞ 🗃 8item Q1 -= (30)N
- ⊞ 🗃 8item Q2 -= (30)N
- ⊞ 🗃 8item crt1_bat -= (30)N
- ⊞ 🗃 8item Q12 -= (30)
- ⊞ 🗃 8item crt3_patch -= (30)N
- ⊞ 🗃 TG General Description =|= (30)
- ⊞ 🗃 TG Proposer -= (30)N
- ⊞ 🗃 TG Responder -= (30)N
- ⊞ 🗃 TG Responder Change =|= (30)N
- ⊞ 🗃 TG Payment =|= (30)N
- ⊞ 🗃 Payment Screen =|= (30)N
- ⊞ 🗃 Survey - Demographic 1 -= (120)N
- ⊞ 🗃 Survey - Demographic 2 -= (120)N
- ⊞ 🗃 Survey - Demographic 3 -= (120)N

Risk Attitudes (Eckel and Grossman, 2008)

○ 50 chances in 100 of 500 points || 50 chances in 100 of 500 points
○ 50 chances in 100 of 700 points || 50 chances in 100 of 350 points
○ 50 chances in 100 of 900 points || 50 chances in 100 of 200 points
○ 50 chances in 100 of 1100 points || 50 chances in 100 of 50 points
○ 50 chances in 100 of 1300 points || 50 chances in 100 of -100 points
○ 50 chances in 100 of 1500 points || 50 chances in 100 of -250 points

Loss Aversion (Füllbrunn and Luhan, 2017)

If the coin turns up tails, you lose 200 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

If the coin turns up tails, you lose 400 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

If the coin turns up tails, you lose 600 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

If the coin turns up tails, you lose 800 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

If the coin turns up tails, you lose 1000 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

If the coin turns up tails, you lose 1200 points; if the coin turns up heads, you win 1000 points. ○ Accept lottery ○ Reject lottery

Cognitive Ability (Weller et al. 2013)

Q3. In the ACME PUBLISHING SWEEPSTAKES, the chance of winning a car is 1 in 1,000. What percent of tickets of ACME PUBLISHING SWEEPSTAKES win a car?

Q8b. If the chance of getting a disease is 10%, how many people would be expected to get the disease out of 1,100?

Crt2_machine. If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

Q9. If the chance of getting a disease is 20 out of 100, this would be the same as having a _____% chance of getting the disease.

Q1. Imagine that we roll a fair, six-sided die 1,000 times. Out of 1,000 rolls, how many times do you think the die would come up as an even number? Of the values below, which is the most likely outcome?

Q2. In the BIG BUCKS LOTTERY, the chances of winning a $10.00 prize are 1%. What is your best guess about how many people would win a $10.00 prize if 1000 people each buy a single ticket from BIG BUCKS?

Crt1_bat. A watch and a tie cost 110 Euro in total. The watch costs a hundred euro more than the tie. How much does the tie cost?

Q12. Suppose you have a close friend who has a lump in her breast and must have a mammogram. Of 100 women like her, 10 of them actually have a malignant tumor and 90 of them do not. Of the 10 women who actually have a tumor, the mammogram indicates correctly that 9 of them have a tumor and indicates incorrectly that 1 of them does not. Of the 90 women who do not have a tumor, the mammogram indicates correctly that 81 of them do not have a tumor and indicates incorrectly that 9 of them do have a tumor. The table summarizes the information provided. Imagine that your friend tests positive (as if she has a tumor). What is the likelihood that she actually has a tumor?

Crt3_patch. In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

General Instructions at the beginning of the experiment

General Instructions

This is an experiment in the economics of decision making. If you follow the instructions and make good decisions, you might earn a considerable amount of money, which will be paid to you in cash at the end of the experiment. The experiment will consist of several different parts, and instructions will be provided separately either on-screen or on paper. Before we start, fill out the consent form (keep a copy for yourself), sign it and the instructor will pick it up. In case you have questions, let the instructor know. Please fill out the receipt Date, Name in **block letters**, and sign it already. The amount will be added at the end of the experiment. At the end of the experiment, only take the receipt with you, your copy of the consent form and **leave everything else in the cube**. For the experiment today you get upfront [4, 10] euro; potential losses will be subtracted from this amount. During the experiment, we will make use of 'points'. The number of points achieved at the end of the experiment divided by 250 will be your payoff in euro which will be added to the upfront payment. Any questions? If you are ready, we can start with the first part.

Trust Game Instructions (Note. Loss treatment instructions are underlined brackets)

Situation

Participants in this room will be randomly organized in groups of two participants; one participant will be of type A and one participant will be of type B.

Both participants will make a decision. First, type A will decide on how many points to transfer to B, and afterwards, type B will decide on how many points to transfer to A.

Type A has the opportunity to transfer up to 1000 points to type B. This number will be multiplied by three and transferred to B, i.e. type B receives three times the points that type A has chosen to transfer to type B.

Now, type B has the opportunity to transfer any number of points between zero and the number of points received to type A.

However, the payment of this task not only depends on the transfer of points between A and B. Due to unforseen circumstances both types will receive in addition 1000 **[have to pay 500]** points.

Hence, the payments for both types will be as follows:

Type A's payment from this task will be:

PLUS 1000 **[MINUS 500]** points

MINUS the points transferred to type B

PLUS the points received from type B.

Type B's payment from this task will be:

PLUS 1000 **[MINUS 500]** points

PLUS three times the points transferred from type A

MINUS the points transferred to type A.

You are either of type A or type B, which you will learn on the next screen. You will make your decision only once!

If you have any questions, then raise your hand now and we will clarify. If not, wait for the instructor to provide the code and then click continue.

Enter code to proceed _____

Note. The instruction was repeated on the decision screen.

How many points do you want to transfer to type B?

- ○ 0
- ○ 100
- ○ 200
- ○ 300
- ○ 400
- ○ 500
- ○ 600
- ○ 700
- ○ 800
- ○ 900
- ○ 1000

Confirm Amount

Points transferred by type A	0	100	200	300	400	500	600	700	800	900	1000
	Please indicate the number of points you want to transfer to type A (if any).										
Points available to transfer to type A	0	300	600	900	1200	1500	1800	2100	2400	2700	3000
How many to transfer to type A?	0	120	234	345	454	678	983	1675	1987	2134	2871
Change the points that you want to transfer to type A (if you want to) and click the button to recalculate potential payoffs; otherwise, confirm below.					Recalculate Potential Payments						
Total payment for you	-500	-320	-134	55	246	322	317	-75	-87	66	-371
Total payment for type A (random other)	-500	-480	-466	-455	-446	-322	-117	475	687	734	1371

When you have finished your decision, please click the right buttom.   CONFIRM

Type A has transferred 400 points.
You did receive three times those points, i.e. 1200 points.
The points that you have decided to transfer to type A given that amount is 454.

Your total payment would be 246 points.
Type A's total payment would be -446.

Do you want to revise your decision?
You may change the number of points you want to transfer to type A by simply changing the amount in the box; due to type A's decision you can transfer up to 1200.
In case you would not want to change, just click the button to confirm your previous decision.

454

CONFIRM

Emotions – Hopfenspitz and Reuben (2009)

Indicate how intensely you feel each of the following emotions right now, after knowing the amount that type A transferred to you.

ANGER	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
GRATITUDE	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
GUILT	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
HAPPINESS	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
IRRITATION	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
SHAME	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely
SURPRISE	not at all ⌐⌐⌐⌐⌐⌐⌐	very intensely

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