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Abstract

Repeated experiments with a time span of one week between repetitions are used in order to test two related hypotheses. The first is the *moral self-licensing effect*, which describes people's tendency to allow themselves to act more selfishly on the back of previous prosocial or selfless behavior. The second is the *direct touch effect*, which describes the difference between experiences perceived directly by the senses and those perceived in a more hypothetical or abstract way. As games in which both effects can be detected we use the standard trust game and the mutual gift-giving game. Preferences were elicited by the strategy method and both games were played with and without feedback information between the waves. In both games, the *moral self-licensing effect* as well as the *direct touch effect* could be observed. Finally, we use a solidarity game to check whether these effects also determine behavior in situations with a different social norm. We find that this is not the case.

JEL-Code: C910, C730.

Keywords: trust game, moral self-licensing effect, direct touch effect.

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1 Introduction

Over the last two decades, research in behavioral economics has shown very clearly that humans do not solely maximize their own material payoffs but also consider other people's well-being in social dilemma situations. Extensive research aims at understanding the underlying preferences of such behavior.[1] In addition to altruistic motives, fairness concerns and reciprocity are key explanations for observed prosocial behavior in many human interactions.[2] All experimental evidence and likewise all attempts at developing a theory for other-regarding behavior are based on static situations, e.g., findings from experiments that have been conducted only once at a certain point in time. This is a notable abstraction from reality in the sense that such situations in which other-regarding preferences (understood as a very broad concept) are potentially important are generally not singular but recurrent occasions. Very often considerable time intervals lie between two occurrences. For this reason, it is debatable whether experiments in which the same game is played repeatedly within a single session are able to shed light on the dynamics of prosocial behavior as subjects might not perceive the repetitions as truly independent decisions but a single interrelated decision context.

It is fair to say that little is known about the *dynamics* of prosocial preferences. Stability over time is a common and necessary implicit assumption regarding any kind of preferences. This means that a decision maker will arrive at the same result when he or she faces an identical decision situation at two different points in time. Recent experimental evidence though casts doubts on the validity of this assumption. Brosig et al. (2007) report that subjects behave more selfishly towards the end of a series of modified dictator games. Sass et al. (2014) confirm this finding. Furthermore, Sass and Weimann (2014) observe a significant decline in voluntary contributions towards a public good over time. Schmitz (2013) conducts two identical charity donation experiments and reports that subjects give substantially less at the second time of asking.

One possible explanation for the decline of prosocial preferences is the so-called *moral self-licensing* effect (see Merritt et al. (2010) for a recent survey). This effect refers to people's tendency to allow themselves to act more selfishly on the back of previous prosocial or selfless behavior. In our study, we address the question, which requirements need to be fulfilled in order to feel entitled to act in a more selfish way. We are particularly interested in investi-

[1] Starting with Rabin (1993), the theory of „other regarding preferences" has developed in a dynamic way. See, e.g., Bolton and Ockenfeld (2000); Fehr and Schmidt (1999); Charness and Rabin (2002).
[2] See, e.g., Falk and Fischbacher (2006)

gating how the potentially self-licensing activity needs to be *perceived* to come into effect. Is it sufficient to know abstractly that an action has been prosocial or is it necessary to perceive the result of that action more directly in order to activate moral self-licensing? This question carries a lot of weight, given that feedback mechanisms in many social dilemma situations differ or can be modified to a certain extent. Consider, for example, the case of charitable giving. Donating to the Red Cross does not allow for a very direct perception of having behaved prosocially as the donation is simply put towards a large donation pool and the effect on total donations is only marginal. On the other hand, taking on the sponsorship of a foster child inarguably creates a stronger direct perception upon receiving a picture of the child and regular reports on its well-being afterwards. There are many other situations in which people might also behave fairly without realizing directly the effect of their behavior on others. For example, people may behave fairly when driving a car without realizing whether other drivers appreciate this. And even though conditional cooperation might be agreed upon in contractual relationships, it is not always imminently obvious to everybody involved whether a prosocial mutual gift exchange has indeed materialized.

The conjecture that the perception of a game's outcome could be a crucial determinant of prosocial behavior is taken from a finding by Brosig et al. (2003) regarding the utilization of Selten's strategy elicitation method (1967). It is shown in that study that, owing to circumstances, a subject's decision to punish the behavior of another player in a simple bargaining game is dependent on whether the decision is made through a direct response (hot) or the strategy method (cold). In the hot treatments, players were far more likely to go through with non-credible threats to punish their counterparts than in the cold treatments. Evidently, then, the instantaneous direct perception of the other player's behavior changes the willingness to forgo one's own earnings for the sake of punishing somebody else.

A related finding is the "realization effect" described by Imas (2014). This effect relates to the impact losses have on the willingness to invest in risky assets. Imas (2014) convincingly shows that it depends on the perception of a former loss whether the subsequent decisions are more or less risky than the decisions that caused the loss. If the loss is not realized as a real loss of money (e.g. the money is physically taken away from the subject) but only as a "paper loss", then subjects react to the loss by *increasing* their investment in risky assets. If the loss is realized by actually taking money from the subjects, they subsequently invest less in the risky assets. Both findings support the suggestion that being "*directly touched*" plays an important role in determining responses to others' and one's own past decisions.

In this study, we are interested in whether being directly touched by the actual consequences of one's own behavior triggers a change of prosocial preferences. Does the perception of having increased another player's earnings by behaving selflessly affect the willingness to do the same again? Consequently, we investigate two related hypotheses in this paper. The first is that being 'nice' to someone may trigger a moral self-licensing effect, which leads to more selfish subsequent decisions. The second hypothesis is that this effect is stronger if subjects are directly in touch with the consequences of their 'nice' behavior.

To test these two hypotheses, the focus is not on feedback that allows subjects to learn, but on feedback that solely carries information on a game's outcome and the effect one's own behavior has on others. In our study, we employ two games well-known from the experimental literature, the trust game (Berg et al. (1995)) and the mutual gift-giving game (Güth et al. (2003)). We play these games four times with one week between repetitions. The essential treatment variable in both games is the information our subjects receive after each repetition. Our trust game experiments are designed in such a way that feedback information about the trustor's behavior does not in any way actually enable the trustee to make a better or more sophisticated decision at the next repetition. First, the trustees do not need to form a belief based on the trustor's behavior, since the strategy elicitation method enables them to condition their own decision perfectly. Second, the trustees cannot derive any relevant underlying social norm from feedback on the trustor's behavior, because the players' roles are asymmetric. In the symmetric mutual gift-giving game, however, information on the other player's behavior does indeed help to learn the relevant social norm. We therefore use the mutual gift-giving game as a sort of control experiment that allows for a robustness check, given that the perception of having successfully established a mutual gift exchange can both decrease gifts due to the activation of moral self-licensing and increase or decrease gifts due to learning that the norm actually requires higher or lower gifts.

2 Games and hypotheses

In the trust game (Berg et al. (1995)), both players receive an identical monetary endowment E. In our experiment, we choose E = EUR 10. The first-mover (called the trustor) can send any amount $0 \leq x \leq E$ to the second-mover (called the trustee). The amount sent is tripled by the experimenter such that the trustee actually receives $3xE$. The trustee then decides how much of the total endowment $0 \leq y \leq E + 3xE$ he or she wants to send back to the trustor. The efficient outcome of the game requires the trustor to send the entire initial endowment to

the trustee. The trustee finds himself in a dictator position in which he or she can decide upon the division of the pie that was provided by the trustor. In the Nash equilibrium of the game, the trustor anticipates that the trustee has a strictly dominant strategy not to give anything back and will therefore not send anything to the trustee in the first place.

We employ the strategy elicitation method (Selten (1967)) in our experiments. The trustee, who is unaware of the trustor's actual decision, indicates for every possible level of x (limited to integer values) how much of the resulting total endowment he or she wants to return. We run repeated one-shot experiments at intervals of one week. The initial experiment is repeated three times, so we have four experiments (hereafter called *waves*) in total. In each wave, the trustees are matched with freshly recruited new subjects who take part in one wave only. The downside of this experimental design is a loss of control because it cannot be known what the subjects experience between two waves. For this reason, we focus on treatment effects only and ensure that subjects have no contact with each other before, during and after the experiment. We vary the information our subjects receive after each wave. In the feedback treatment, after having submitted their strategy to the experimenter, subjects receive information on the trustor's choice and the resulting payoffs to both players. In the no-feedback treatment, subjects do not receive any information at all until after the end of the final wave.

As a result of employing the strategy elicitation method, a subject does not need to form a belief based on the trustor's behavior and can condition his or her own behavior perfectly on that other player's decision. Therefore, receiving information on what the trustor did in the last wave should not lead to a change in behavior due to learning and being able to better anticipate the trustor's behavior in the next wave – especially since trustees know that they will be matched with freshly recruited new trustors in the subsequent wave anyway. Whether or not the trustee decides to send money back to the trustor and what amount he or she wants to return should therefore only depend on the trustee's preferences or willingness to comply to the social norm the trustee perceives to be relevant, but not on the information on the outcome of the experiment in the previous wave. Under the assumption that giving a positive amount back to the trustor does not trigger a moral self-licensing effect, behavior should not vary over the four waves and there should be no difference between the feedback and the no-feedback treatment. If moral self-licensing takes place but is independent of the perception of the game's outcome, the amount given back to the trustor should decrease over the course of the four waves in both treatments. If, in addition to the moral self-licensing effect, the direct touch effect is also at work, the amount given back should decrease more dramatically in the feedback treatment.

In the mutual gift-giving game (MGG, Güth et al. (2003)), two players simultaneously decide on the share of the initial monetary endowment of E (E = EUR 10 in our experiments) they want to give to the other player. The amount given is then doubled by the experimenter. Thus, the efficient outcome of the game requires both players to give their entire endowment to the other player, such that the joint payoff reaches its maximum at EUR 40. Individually, however, it is rational for both players to keep everything to themselves. The MGG experiments are conducted in the same way as the trust game experiments, i.e. four one-shot experiments at intervals of one week. The strategy elicitation method is employed again, although in the MGG experiments there is also a direct response task, which is explained in detail in Section 3.1. As in the trust game experiments, a feedback and a no-feedback treatment are conducted. Those subjects who play the MGG four times are matched with freshly recruited new subjects in each wave. These new subjects only take part once in one single wave.

The MGG game is quite similar to the trust game in many facets. Notably, both games create a conflict between individually rational behavior (as indicated by the Nash equilibrium) and collectively rational behavior (maximum joint payoffs). However, in one very important aspect for our research question, the MGG differs from the trust game. In the MGG game, the players are in a perfectly symmetric decision situation. This means that subjects in the feedback treatment learn how another player behaved in the exact same situation. One can easily imagine that social norms are relevant determinants of prosocial behavior in the MGG but that subjects might be unsure to what extent the norm requires them to behave prosocially. Information on the other player's choice thus potentially enables subjects to update their idea of what the norm is. Another way of learning arises when subjects have preferences for imperfect conditional cooperation (Fischbacher and Gächter (2010)). In this case, the feedback information in the MGG serves as a means to exercise such preferences (with a time lag of one week). The repeated MGG experiments thus allow us to examine the extent to which a potential direct touch effect still persists in the light of the feedback information enabling subjects to *learn*. Our hypothesis for the MGG experiments is thus that there is a difference between both treatments. While behavior in the no-feedback treatment should be stationary, behavior in the feedback treatment can change due to learning. In the feedback treatment, we expect to find systematic interrelations between the content of the feedback information and the subjects' behavior in the subsequent wave. Nevertheless, a moral self-licensing effect may also play a role in the MGG. If this effect is at work, we should observe that the positive link between the giving of others and one's own giving (if such a link exists) becomes weaker over

the four waves. This effect will be more pronounced in the feedback treatment if the direct touch effect is also active.

We expect that the extent of prosocial behavior in both series of experiments does not increase on average over the four waves. This projection is taken from previous evidence on repeated experiments (Brosig et al. (2007), Sass and Weimann (2014), Sass et al. (2014)).

In addition to the repeated MGG experiments, we conduct yet another check-up experiment. One week after the final wave of the initial series of experiments, subjects take part in a solidarity game experiment (Selten and Ockenfels 1998), in which they are once again matched with freshly recruited new subjects who did not take part in any of the previous experiments. Both players can win EUR 10 with a probability of 2/3 or earn nothing with a probability of 1/3. Before the lottery is conducted, each player is asked to indicate what fraction of the potential winnings he or she wants to give to the other player if the other player does not win. This check-up experiment serves as a means to examine whether a change in prosocial behavior over time persists into a game with a fundamentally different structure. Do subjects who have become more selfish during the initial series of four trust games or MGG experiments also behave less solidarily than freshly recruited subjects? This questions addresses the motivational foundations of moral self-licensing. Does moral self-licensing happen due to having complied to a *specific* social norm or is having behaved prosocially *in general* a sufficient trigger? In the first case, moral self-licensing should not persist into the solidarity game experiment (due to different social norms underlying each game) whereas in the second case moral self-licensing should result in a lesser extent of solidarity shown by those subjects who took part in the initial series of the repeated trust game or MGG experiment.

3 Experimental design

The key feature of our study is the repetition of four identical experiments at intervals of one week between each two waves. As opposed to being in a setting in which the same game is played repeatedly within a single session, our subjects undergo the whole experience of taking part in an experiment multiple times. All experiments were conducted at the Magdeburg Experimental Laboratory (MaXLab). Participants were recruited using ORSEE (Greiner (2004)) from a subject pool consisting of graduate and undergraduate students mainly enrolled in management and economics. Upon registering for the experiments, subjects were asked in advance of the experiments to commit themselves for the time period needed to conduct all four waves. Subjects were not informed that each week the same game would be played.

We aimed at avoiding that subjects knew of each other's participation in the experiments as this would have increased the likelihood of participants talking to, and possibly influencing, each other between two waves. All the subjects were thus assigned an individual meeting point inside the faculty building where they were picked up individually by an experimenter before being escorted to a single, soundproof and opaque booth. All participants also left the laboratory on their own. This procedure ruled out that two subjects could meet before, during or after an experiment.

The subjects were not paid the total sum of their earnings from all four waves, but the earnings from a single, randomly chosen wave multiplied by four to reward them for the effort of coming to the laboratory four times. This meant that no subject was paid until after the final wave. We chose this payment mechanism for two important reasons. First, we were able to warn subjects that earnings would be forfeited if they were to miss one of the experiments. This resulted in a very low no-show rate and helped avoid distortionary selection effects. Second, paying subjects the earnings of each wave would have put them in a position to exercise portfolio choices, e.g., subjects could have followed a well-defined preplanned behavioral pattern over the course of the experiment without changes in behavior reflecting changes in social preferences. Note that this payment mechanism is likely to have a stabilizing effect on behavior, especially when subjects are risk averse.[3]

An additional mechanism was implemented in the trust game experiments to prevent portfolio choices and promote stable behavior: after each wave, three randomly determined subjects were eliminated from the experiment. Subjects knew of this from the written instructions before the start of the very first experiment (see Appendix A).

As mentioned above, the participants of the repeated experiments were matched with freshly recruited new subjects in each wave. These subjects could only take part once and were paid immediately after each experiment. All relevant information was explained to the participants before the start of each wave through written instructions (see Appendix A). All the sessions lasted between 20 and 30 minutes. Average earnings per wave were EUR 19.24 (EUR 18.46) in the feedback (no-feedback) treatment of the trust game and EUR 13.16 (EUR 12.84) in the MGG game.

[3] We actually tested this hypothesis in a different experiment (Sass et al. (2014)), comparing the dynamics of behavior in dictator games with and without the payment mechanism explained above. We indeed observed that behavior was significantly more stable when subjects were only paid the earnings of a randomly determined single wave.

3.1 Treatments

Both series of four repeated trust game and mutual gift-giving game experiments were conducted with a feedback treatment and a no-feedback treatment. In the no-feedback treatments, subjects entered the laboratory, played the game, and left without being informed about the outcome of the experiment. In the feedback treatments, subjects were informed about the choices made by their counterparts and the resulting earnings for both players.

We used the strategy elicitation method (Selten (1967)) in all the experiments as a means of data collection. Subjects thus had to specify a choice for every possible action taken by their counterparts without knowing or being told their actual decision. In all the experiments, this was done by handing out a sheet of paper that was filled out manually by the subjects. In the trust game experiments, the sheet of paper contained a row for each of the eleven integer values of possible choices (0-10) that the trustor could pick in the first step of the game and the resulting payoffs for each possible amount that the trustee could send back to the trustor (see Appendix A for details). The trustees were instructed to indicate their preferred payoff combination for each row.

In the mutual gift-giving experiments, we wanted to ensure full symmetry amongst both subjects. Therefore the decision was split up into a direct response task and a conditional response task for both players (see Appendix B for details). In the conditional response task, subjects were asked to indicate the amount of money they preferred to be sent to their counterparts for every possible choice made by the other subject. The direct response task on the other hand simply asks the subjects to indicate their non-conditional preference. After all data is collected, it is randomly determined whose direct response and whose conditional responses are used for computing the payoffs. Feedback in the mutual gift-giving game experiments consisted of the direct response and the conditional responses made by the other subject (independent of whether the other subject's direct response or conditional responses were used to calculate payoffs), and of course the resulting payoffs to both players.

As in the trust game experiment, complete anonymity of every subject was ensured during the actual sessions. No two subjects interacting with each other were allowed to learn each other's identity. The following table lists all the treatments conducted for our study.

	Trust game	Mutual gift-giving game
Feedback	N=24	N=22
No feedback	N=48*	N=16**

* After collecting 24 observations, we checked for the robustness of the treatment effect by collecting another 24 observations in the no-feedback treatment.

** Due to a flu epidemic only 17 of 24 invited subjects showed up for the first wave (with one further subject not showing up for one of the repetitions).

Table 1: Treatment overview

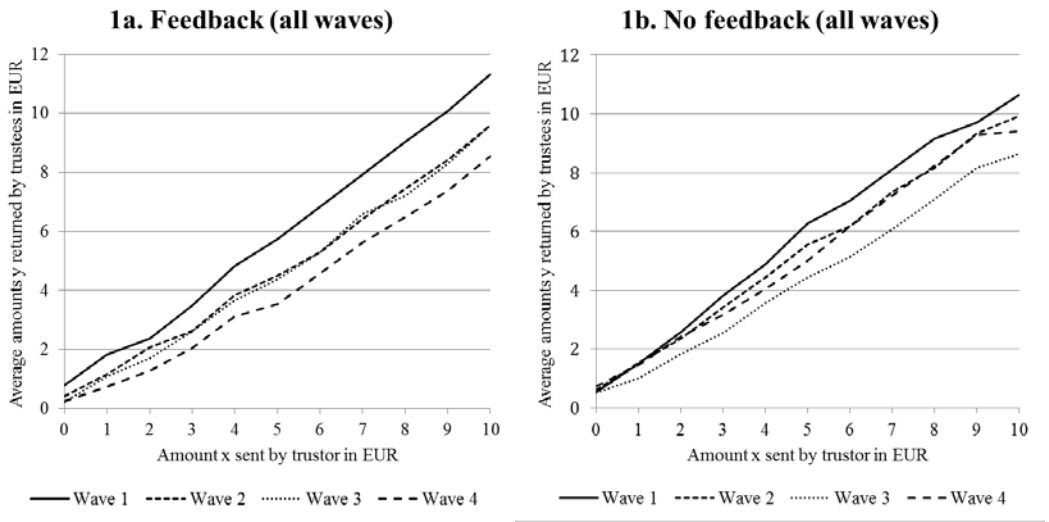
One week after the last repetition of the experiments all the subjects played a one-shot solidarity game against freshly recruited subjects. In this game, there was a probability of 2/3 of both players winning 10 Euro. Before the random draw was carried out, they both had to decide how much of their winnings they would hand over to the other player if the other player lost (see Appendix C).

4 Results

4.1 Trust game results

In all the waves and both treatments, trustees behaved conditionally prosocially on the aggregate level as indicated by the upward sloping lines in the top panels of figure 1a – 1d, in which the average amounts of money returned by the trustees (as elicited by the strategy method) are plotted against the amount of money sent by the trustor.

In the feedback treatment (1a, 1c, 1e), we observe a significant and monotonic decline in prosocial behavior over time. The decay from the first to the fourth wave is graphically illustrated by a substantial downward shift in 1c. Table 2 shows that the decay is statistically significant.



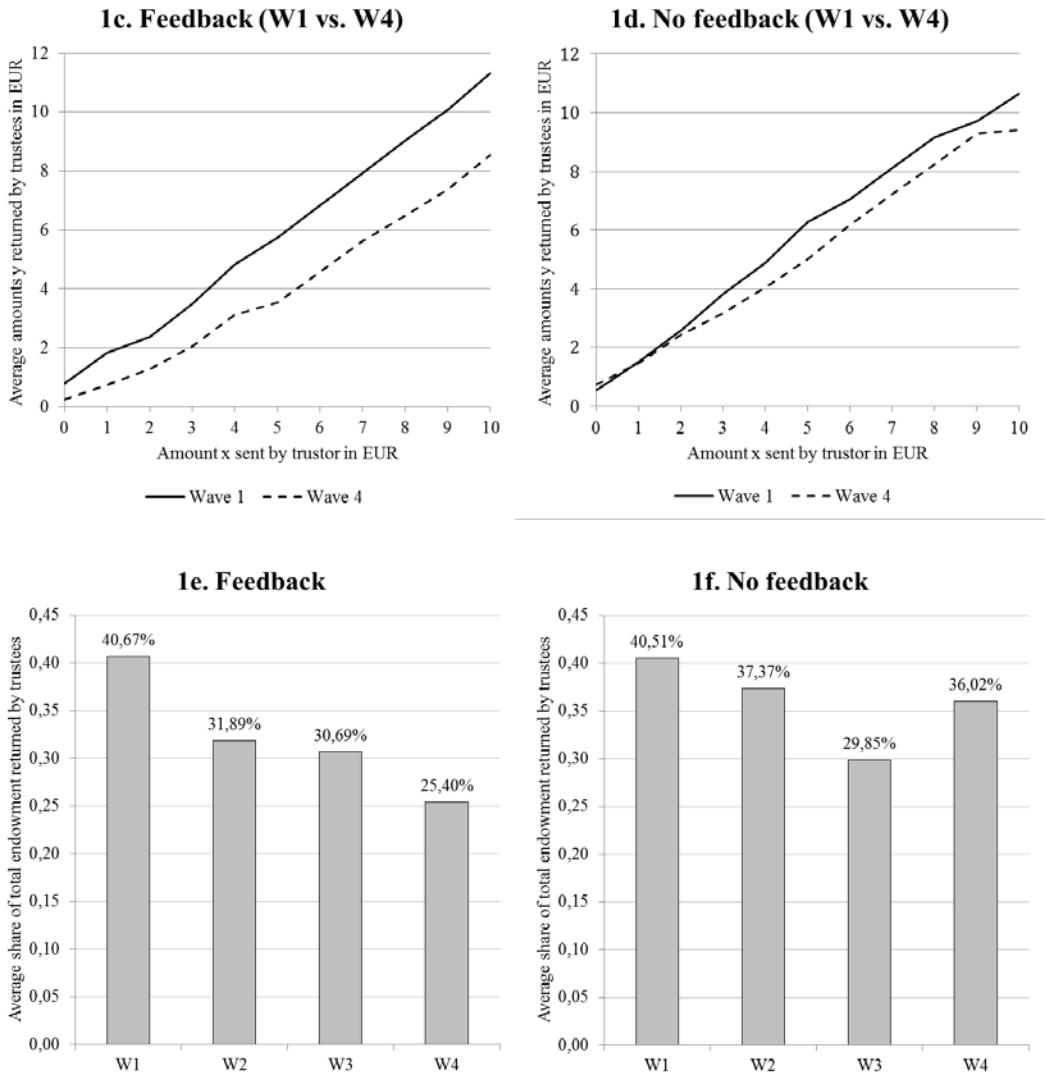


Figure 1: Results trust game

While we also observe a slight tendency towards more selfish behavior in the no-feedback treatment (1b, 1d) there is no monotonic development (1e) and there are no statistically significant differences in behavior between the first and the fourth wave (except for a=5, table 2).

	x=0	x=1	x=2	x=3	x=4	x=5	x=6	x=7	x=8	x=9	x=10
Feedback	.085	.001	.005	.005	.011	.007	.008	.006	.003	.002	.020
No feedback	.763	.387	.843	.149	.198	.033	.574	.803	.764	.937	.875

Table 2: Significance levels W1 vs. W4 trust game experiments (Wilcoxon signed-rank test)

We now check for systematic interrelations between the content of the feedback information given to the subjects in $t-1$ and their behavior in the subsequent wave t on the individual level. In the feedback treatment, the subjects receive three pieces of information:

1) The amount of money sent by the trustor (x_{t-1})

2) Own earnings ($EURself_{t-1}$)

3) Earnings of the trustor ($EURother_{t-1}$)

$EURself_{t-1}$ and $EURother_{t-1}$ are perfectly correlated in a trust game for a given x. Therefore, $EURother_{t-1}$ is omitted from the following fixed effects OLS regression model:

$$SumX_t = \alpha + \beta_1 x_{t-1} + \beta_2 EURself_{t-1} + \sum_i \gamma D_i + u_t,$$

where $SumX_t$ is the sum of all the amounts of money sent back to the trustor as elicited by the strategy method in wave t and D_i is a dummy variable for subject i to control for unobserved heterogeneity amongst the trustees.

OLS using robust standard errors				
	Coefficient	Std. Error	T	P>|t|
x_{t-1}	.6369446	1.643872	.39	.700
$EURself_{t-1}$	-.2684996	.7045575	-.38	.705
N = 72	R^2 = .9366	F = 2358.13***		
*** p < 0.01				

Table 3: Regression results for the effect of feedback in the trust game

We do not observe any systematic feedback effects on prosocial behavior as both explanatory variables are economically and statistically insignificant (see Table 3). For the trust game, then, the hypothesis that feedback does not change the extent of prosocial behavior must be rejected even though the content of the feedback information is irrelevant for the decision in the next wave. Indeed, the very fact that feedback was given led to the observed change in behavior. Together with the significant decrease of the amount given back to the trustor, this is in line with the hypothesis that the moral self-licensing effect and the direct touch effect are at work.

4.2 Mutual gift-giving game results

Similar to the results of the trust game, the results of the feedback treatment of the mutual gift-giving game show that prosocial behavior decreases over time. Figure 2a shows the average conditional responses to the amount given by the other subject as measured by the strategy elicitation method. The monotonic drop in the share of the endowment given to the other subject over the four waves is demonstrated in figure 2e.

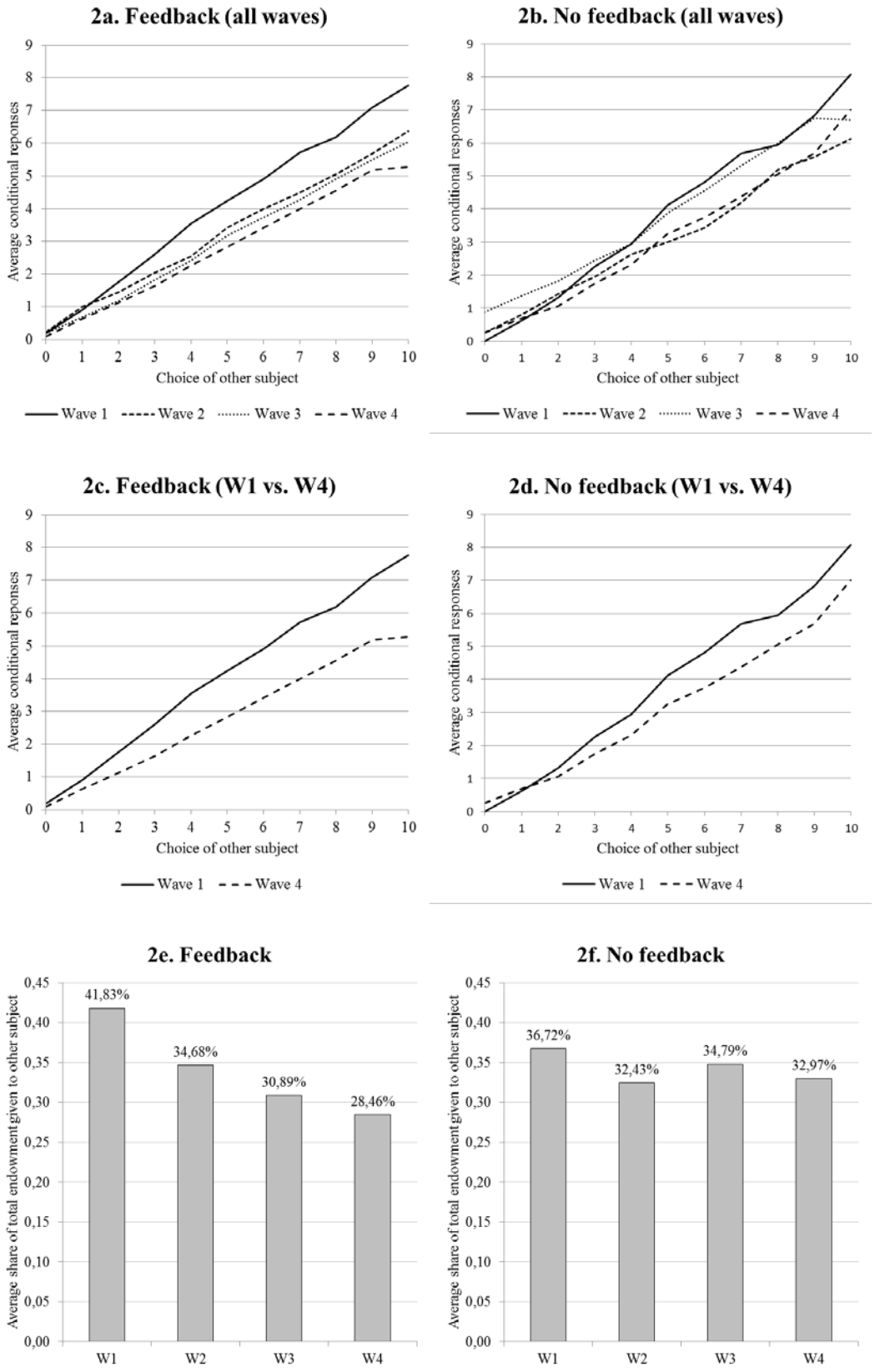


Figure 2: Results mutual gift-giving game

In the no-feedback treatment here though, as in the no-feedback treatment of the trust game, behavior does not change monotonically over the four waves (2f). Initially prosocial behavior

diminishes from wave one to wave two, increases from wave two to wave three and then again decreases from wave three to wave four (2b). Overall, the extent of prosocial behavior diminishes in both treatments, although significance levels illustrate that the decline is once again sharper in the feedback treatment (see Table 4).

	0	1	2	3	4	5	6	7	8	9	10
Feedback	.546	.020	.018	.010	.020	.032	.057	.116	.072	.072	.036
No feedback	.158	.941	.318	.046	.092	.015	.015	.015	.145	.145	.081

Table 4: Significance levels W1 vs. W4 trust game experiments (Wilcoxon signed-rank test)

Once again, we check for systematic interrelations between the content of feedback given and subsequent behavior. In the mutual gift-giving experiment, feedback consists of four pieces of information. We again denote the sum of amounts of money sent by the other subject as elicited by the strategy method by $SumY_{t-1}$, own earnings by $EURself_{t-1}$ and earnings of the other subject by $EURother_{t-1}$. Y_{t-1} is the amount of money sent by the other subject in the direct response task. Again, $EURother_{t-1}$ is omitted from the fixed effects OLS regression model:

$$SumX_t = \alpha + \beta_1 Y_{t-1} + \beta_2 SumY_{t-1} + \beta_3 EURself_{t-1} + \sum_i \gamma D_i + u_t,$$

where $SumX_t$ again is the sum of all the amounts of money given to the other subject as measured by the strategy elicitation method in wave *t* and D_i is a dummy variable for subject *i*.

OLS using robust standard errors				
	Coefficient	Std. Error	t	P>|t|
Y_{t-1}	-.5448794	.6723609	-.81	.422
$SumY_{t-1}$	.1931291*	.1085775	1.78	.083
$EURself_{t-1}$	-.036443	.2521188	-.14	.886
N = 66	R^2 = .8697	F = 82.56***		
*** p < 0.01				

Table 5: Regression results for the effect of feedback in the mutual gift-giving game

While feedback on one's own earnings and the decision of the other subject in the direct response task do not have significant effects on behavior, the information on the total amount of money sent in the strategy elicitation task yields a positive and statistically significant change in prosocial behavior at the ten percent level (see Table 5). This effect, however, cannot ex-

plain the overall monotonically diminishing prosocial behavior because the average total amount of money given by the other subjects in the strategy elicitation method is actually *increasing* monotonically in our experiment (see Table 6) by chance. Given the positive correlation between $SumY_{t-1}$ and $SumX_t$, the behavior of the other subjects would have increased prosocial behavior over time if the aforementioned effect was the sole source of changes in behavior.

Mean of *SumY* in wave 1	Mean of *SumY* in wave 2	Mean of *SumY* in wave 3
38.73	39.46	46.5

Table 6: Aggregate behavior of other subjects over the course of the experiment

Therefore, two effects must be at work in the feedback treatment of the MGG experiment. First, subjects react positively to the prosocial behavior of their counterparts in the previous wave. This could be interpreted as learning and an adaption to the social norm, which is revealed through the feedback. Second, giving feedback once again activates or at least amplifies moral self-licensing via the direct touch effect. The second effect overcompensates the positive norm adaptation effect, causing diminishing prosocial behavior over time.

We find weak statistical evidence for the learning effect by running OLS regressions on waves 2-4 separately. For waves 2 and 3, we find an almost identical positive but non-significant correlation between $SumX_t$ and $SumY_{t-1}$ (p-values slightly above 0.1), indicating learning and adaptation to the norm. For wave 4, the p-value for a rather small positive correlation between $SumX_t$ and $SumY_{t-1}$is very large (p=.814), which might indicate that the learning and adaptation process has been completed at this late stage of the experiment.

4.3 Solidarity game results

The concluding solidarity game experiments show that, in all cases, no statistically significant differences in behavior occur (see Table 7). Freshly recruited new subjects do not behave differently to those subjects who took part in the feedback treatments of the repeated trust game or the MGG experiments. The subjects who became more selfish in the trust game experiments, as measured by comparing $SumX_1$ and $SumX_4$, even give more on average to the losing player of the solidarity game than the fresh subjects. The diminishing prosocial behavior shown in the repeated experiments thus does not persist into the new context of the solidarity game.

	Trust game Feedback treatment only[1]		Mutual gift-giving game Feedback treatment only[1]		Freshly recruited new subjects
	All (N=20)	More selfish* (N=14)	All (N=17)	More selfish* (N=10)	N=99**
Mean of gift to losing player	2.25	2.07	1.59	1.40	1.90
Significance levels Mann-Whitney U test versus freshly recruited new subjects	p = .2455	p = .4942	p = .8576	p = .6442	

1 Data from the no-feedback treatments also revealed no significant differences between treatments or between experienced and freshly recruited new subjects.
* A subject is classified as 'more selfish' if $SumX_1 > SumX_4$
** All freshly recruited new subjects from no-feedback treatments included

Table 7: Results solidarity game experiments

5 Discussion

Our experiments were deliberately designed in a way that facilitated stable behavior. The payment mechanism, for example, was chosen such that it created a stabilizing effect (see footnote 3). Furthermore, the equidistant intervals between every two waves meant that each experiment was conducted on the same day of the week and the same time of the day. In Sass et al. (2014), it is demonstrated that this regular rhythm enhances the stability of behavior, because it promotes the creation of behavioral routines.

Nevertheless, we observe for both games that the direct perception of having behaved prosocially causes subjects to feel less obliged to act prosocially again a week later. We call this the direct touch effect. In the no-feedback treatments the decay is not as strong. Our observations suggest that moral self-licensing could be responsible for diminishing prosocial behavior in both games. The strong feedback effect in our data indicates that moral self-licensing is triggered by directly perceiving that prosocial behavior has indeed led to a socially desirable outcome. If this perception is missing, that is, if one's own prosocial behavior only hypothetically benefited another subject, no such inner license to behave more self-servingly is issued.

Our results suggest, furthermore, that the occurrence of moral self-licensing is subject to compliance with a concrete and context-sensitive social norm. The observations from our solidarity game experiments illustrate that the willingness to behave prosocially is reactivated when the context of the decision situation has changed. Apparently there is a different relevant social norm present in the solidarity game than in the trust game and the MGG. In the solidarity game, subjects are asked to decide upon a monetary transfer to the other player that

is subject to the influence of good fortune and bad luck. On the other hand, in both the trust game and the MGG, additional efficiency concerns might be important determinants of behavior. Presumably, then, different social norms are present in each game.

Our results suggest that prosocial behavior that comes with strong feedback effects might likewise lead to strong moral self-licensing. It is conceivable that taking up the sponsorship of a foster child thus might reduce philanthropic behavior in other similar charity-related contexts where the same social norm applies. Therefore, the willingness to aid a foster child financially obviously benefits the child in question but it might also give rise to a negative side effect which reduces the willingness to behave prosocially in related social contexts.

Our results show further that the direct touch effect seems to be an important general element of individual decision making. The hot versus cold effect reported by Brosig et al. (2003) and the realization effect described by Imas (2014) are variations of the general fact that directly perceiving the consequences of one's own past behavior or the impact of decisions of others may influence current behavior, even though the direct touch does not lead to additional information about the decision task. The direct touch effect has important implications for a great variety of economically relevant situations in various fields. It may play a role in marketing decisions, human resource management, the determinants of philanthropic behavior or the willingness to punish people for social norm violations – just to mention a few possible fields.

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Appendix A: Instructions and data sheet trust game

The following instructions are the English translation of the original German instructions.

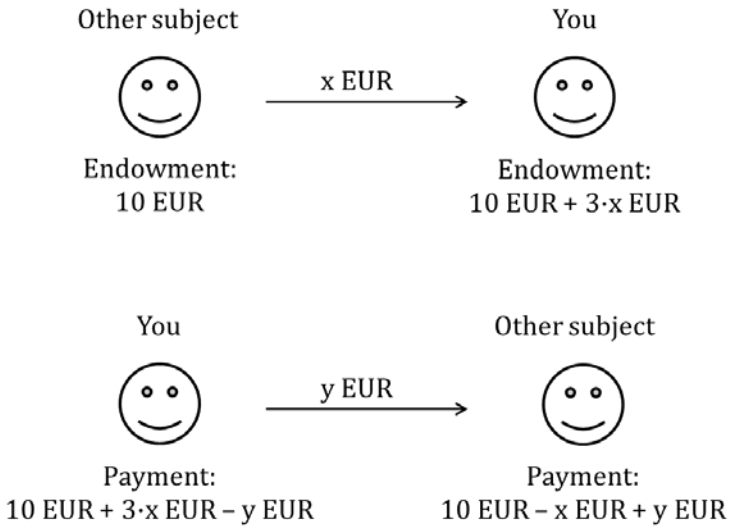
The original instructions are available from the corresponding author.

- You will now take part in an experiment within the context of experimental economics. In this experiment, you can earn money that will be paid out to you in cash at the end of the experiment. The amount of money depends on your decisions and the decisions of other subjects.
- The experiment has a duration of four weeks. Thus, you might be invited to come to the MaXLab four times at intervals of one week. The peculiarities that result from this experimental setup are explained in detail in the following instructions. Please read them carefully. Thank you!

The decision situation of today's experiment

- You and another subject are part of the following decision situation. The other subject's identity will not be revealed to you at any point in time. Likewise, your identity will not revealed to the other subject. Thus, the interaction is completely anonymous. The other subject will take part in this experiment for the first and only time today.
- You and the other subject will receive an initial financial endowment of EUR 10.
- **First step**: The other subject makes a decision on an amount of money that will be subtracted from his or her initial endowment. The amount is then tripled and added to your initial endowment. Any integer value between EUR 0 and EUR 10 could be chosen.
- **Second step**: You make a decision on an amount of money you will send back to the other subject. Any integer value between EUR 0 and your total endowment (your intial endowment plus the amount sent by the other subject times three) could be chosen.
- **Note**: The other subject is fully informed about all these rules as well.

Graphical illustration:



Repeated invitation

- The experiment is conducted over a period of four weeks. Thus, you might be invited to come to the MaXLab up to four times at intervals of one week.
- However, there is positive probability that you will not participate in the next week:
    - Starting in the second week, you will draw a numbered ping pong ball just before the start of the actual experiment.
    - If the number you have drawn is one of the numbers written down on a list that is laid out openly for inspection before the draw, your participation in the experiment has ended. In this case, you will receive a show-up fee of EUR 5 as a thank you for coming to the MaXLab. Apart from this special case, no show-up fees will be paid to you or any other subjects in this experiment.

Payment mechanism

At this point, the instructions differ between the feedback and the no-feedback treatment. Both versions are shown below:

Feedback treatment:

- Immediately after each experiment you will receive information on what the other subject did and what your earnings from the experiment are. However, you will not be paid until after the end of your participation in this experiment. Only when the experiment has ended for you will you receive your payment according to the mechanism explained below.
    - Note: The other subject will take part in this experiment for the first and only time today und will receive a payment immediately after today's experiment.

No-feedback treatment:

- You will not receive any information on what the other subject did until after the end of your participation in this experiment.
- Likewise, you will not receive your payment until after the end of your participation in this experiment.
- Only when the experiment has ended for you will you receive all information and your payment.
    - Note: The other subject will take part in this experiment for the first and only time today und will receive a payment immediately after today's experiment.

- **At the end of your participation in this experiment, you will not receive the sum of the earnings from all the individual weeks. Instead, an individual week will be randomly drawn to be payoff relevant. The payment from that week will be multiplied by the number of times you have taken part and paid out to you in cash.**
- If you fail to show up for any of the experiments, you will forfeit all earnings.

- Example 1:
    - You took part in all four weeks of the experiment. Your earnings were EUR 10 in week 1, EUR 14 in week 2, EUR 18 in week 3 and EUR 22 in week 4. The draw determines that you will be paid the earnings from week 3 multiplied by four. Your total payment in this illustrative example is thus 4 * EUR 18 = EUR 72.
- Example 2:
    - You took part in the first two weeks of the experiment. Before the start of the third experiment, the draw determines that you will not take part in the experiment any further. Your earnings were EUR 10 in week 1, and EUR 14 in week 2. The draw determines that you will be paid the earnings from week 1 multiplied by two. In addition, you receive a show-up fee of EUR 5 for showing up in week 3. Your total payment in this illustrative example thus is 2 * EUR 10 + EUR 5 = EUR 25.
- Example 3:
    - You took part in the first three weeks of the experiment, but you failed to show up in week 4. In this case, you forfeit all earnings. Your total payment in this illustrative example is thus EUR 0.

The subjects filled out the following data sheet. Each data sheet contained a serial number, which made it possible to track individual behavior of each participant over the course of the experiment.

Amount of money you want to sent back to the other subject

Amount of money the other subject sent you	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
0	**10** / 10	**9** / 11	**8** / 12	**7** / 13	**6** / 14	**5** / 15	**4** / 16	**3** / 17	**2** / 18	**1** / 19	**0** / 20										
1	**13** / 9	**12** / 10	**11** / 11	**10** / 12	**9** / 13	**8** / 14	**7** / 15	**6** / 16	**5** / 17	**4** / 18	**3** / 19	**2** / 20	**1** / 21	**0** / 22							
2	**16** / 8	**15** / 9	**14** / 10	**13** / 11	**12** / 12	**11** / 13	**10** / 14	**9** / 15	**8** / 16	**7** / 17	**6** / 18	**5** / 19	**4** / 20	**3** / 21	**2** / 22	**1** / 23	**0** / 24				
3	**19** / 7	**18** / 8	**17** / 9	**16** / 10	**15** / 11	**14** / 12	**13** / 13	**12** / 14	**11** / 15	**10** / 16	**9** / 17	**8** / 18	**7** / 19	**6** / 20	**5** / 21	**4** / 22	**3** / 23	**2** / 24	**1** / 25	**0** / 26	
4	**22** / 6	**21** / 7	**20** / 8	**19** / 9	**18** / 10	**17** / 11	**16** / 12	**15** / 13	**14** / 14	**13** / 15	**12** / 16	**11** / 17	**10** / 18	**9** / 19	**8** / 20	**7** / 21	**6** / 22	**5** / 23	**4** / 24	**3** / 25	**2** / 26
5	**25** / 5	**24** / 6	**23** / 7	**22** / 8	**21** / 9	**20** / 10	**19** / 11	**18** / 12	**17** / 13	**16** / 14	**15** / 15	**14** / 16	**13** / 17	**12** / 18	**11** / 19	**10** / 20	**9** / 21	**8** / 22	**7** / 23	**6** / 24	**5** / 25
6	**28** / 4	**27** / 5	**26** / 6	**25** / 7	**24** / 8	**23** / 9	**22** / 10	**21** / 11	**20** / 12	**19** / 13	**18** / 14	**17** / 15	**16** / 16	**15** / 17	**14** / 18	**13** / 19	**12** / 20	**11** / 21	**10** / 22	**9** / 23	**8** / 24
7	**31** / 3	**30** / 4	**29** / 5	**28** / 6	**27** / 7	**26** / 8	**25** / 9	**24** / 10	**23** / 11	**22** / 12	**21** / 13	**20** / 14	**19** / 15	**18** / 16	**17** / 17	**16** / 18	**15** / 19	**14** / 20	**13** / 21	**12** / 22	**11** / 23
8	**34** / 2	**33** / 3	**32** / 4	**31** / 5	**30** / 6	**29** / 7	**28** / 8	**27** / 9	**26** / 10	**25** / 11	**24** / 12	**23** / 13	**22** / 14	**21** / 15	**20** / 16	**19** / 17	**18** / 18	**17** / 19	**16** / 20	**15** / 21	**14** / 22
9	**37** / 1	**36** / 2	**35** / 3	**34** / 4	**33** / 5	**32** / 6	**31** / 7	**30** / 8	**29** / 9	**28** / 10	**27** / 11	**26** / 12	**25** / 13	**24** / 14	**23** / 15	**22** / 16	**21** / 17	**20** / 18	**19** / 19	**18** / 20	**17** / 21
10	**40** / 0	**39** / 1	**38** / 2	**37** / 3	**36** / 4	**35** / 5	**34** / 6	**33** / 7	**32** / 8	**31** / 9	**30** / 10	**29** / 11	**28** / 12	**27** / 13	**26** / 14	**25** / 15	**24** / 16	**23** / 17	**22** / 18	**21** / 19	**20** / 20

Amount of money the other subject sent you	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
0																				
1																				
2																				
3																				
4	**1** / 27	**0** / 28																		
5	**4** / 26	**3** / 27	**2** / 28	**1** / 29	**0** / 30															
6	**7** / 25	**6** / 26	**5** / 27	**4** / 28	**3** / 29	**2** / 30	**1** / 31	**0** / 32												
7	**10** / 24	**9** / 25	**8** / 26	**7** / 27	**6** / 28	**5** / 29	**4** / 30	**3** / 31	**2** / 32	**1** / 33	**0** / 34									
8	**13** / 23	**12** / 24	**11** / 25	**10** / 26	**9** / 27	**8** / 28	**7** / 29	**6** / 30	**5** / 31	**4** / 32	**3** / 33	**2** / 34	**1** / 35	**0** / 36						
9	**16** / 22	**15** / 23	**14** / 24	**13** / 25	**12** / 26	**11** / 27	**10** / 28	**9** / 29	**8** / 30	**7** / 31	**6** / 32	**5** / 33	**4** / 34	**3** / 35	**2** / 36	**1** / 37	**0** / 38			
10	**19** / 21	**18** / 22	**17** / 23	**16** / 24	**15** / 25	**14** / 26	**13** / 27	**12** / 28	**11** / 29	**10** / 30	**9** / 31	**8** / 32	**7** / 33	**6** / 34	**5** / 35	**4** / 36	**3** / 37	**2** / 38	**1** / 39	**0** / 40

- The 11 rows of the table above correspond to the 11 possible amounts of money (EUR 0-10) that the other subject could have sent you. You do not know at this point in time how much money the other subjects actually sent you.
- The 41 columns of the table above correspond to the 41 possible amounts of money (EUR 0-40) you coud give back to the other subjects. The maximum amount of money that you could return is obviously dependent on how much you were sent by the other subjects in the first step.
- The table contains all possible combinations of earnings of the experiment, dependent on the amount of money sent by the other subjects and the amount of money you give back to the other subject. **The bold number on top in each cell corresponds to the earnings you would receive**. The other number on the bottom of each cell corresponds to the amount of money the other subjects will be paid.
- Your task: Please indicate for every possible amount of money that you could have received from the other subject, how much money you want to give back to the other subject. Please do so by unambiguously marking one of the cells in each row. In the end you must have marked a total of 11 cells. Thank you!

Appendix B: Instructions and data sheet MGG game

The following instructions are the English translation of the original German instructions.

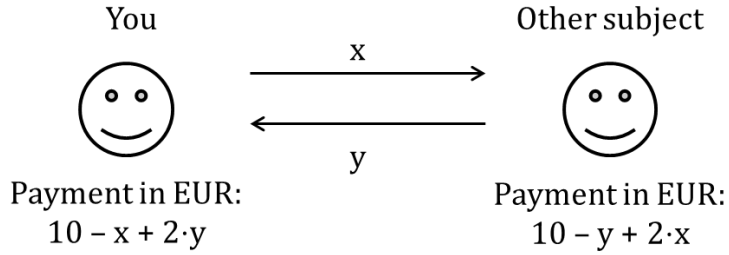
The original instructions are available from the corresponding author.

- You will now take part in an experiment within the context of experimental economics. In this experiment, you can earn money. The amount of money depends on your decisions and the decisions of other subjects.
- The experiment has a duration of four weeks. The peculiarities that result from this experimental setup are explained in detail in the following instructions. Please read them carefully. Thank you!
- In this experiment, every interaction is between two subjects. Each week you are matched with a freshly recruited new subject who, in each case, will take part for the first and only time in this experiment. Thus, you are matched with a different subject each week.
- The other subject's identity will not be revealed to you at any point in time. Likewise, your identity will not revealed to the other subject. Thus, the interaction is completely anonymous.

The decision situation of today's experiment

- The decision situation is perfectly symmetrical. You and the other subject are given the same information and choice options.
- You and the other subject receive an initial financial endowment of EUR 10.
- You decide on an amount of money x that will be subtracted from your endowment, doubled, and given to the other subject.
- The other subject simultaneously decides on an amount of money y that will be subtracted from his or her endowment, doubled, and given to you.

Graphical illustration:



- The following table consists of all possible payment combinations (in EUR) resulting from the choices of x and y. Your payment is the **bold number at the top of each cell**, the payment to the other subject is the number at the bottom of each cell.

y ► x▼	0	1	2	3	4	5	6	7	8	9	10
0	**10** 10	**12** 9	**14** 8	**16** 7	**18** 6	**20** 5	**22** 4	**24** 3	**26** 2	**28** 1	**30** 0
1	**9** 12	**11** 11	**13** 10	**15** 9	**17** 8	**19** 7	**21** 6	**23** 5	**25** 4	**27** 3	**29** 2
2	**8** 14	**10** 13	**12** 12	**14** 11	**16** 10	**18** 9	**20** 8	**22** 7	**24** 6	**26** 5	**28** 4
3	**7** 16	**9** 15	**11** 14	**13** 13	**15** 12	**17** 11	**19** 10	**21** 9	**23** 8	**25** 7	**27** 6
4	**6** 18	**8** 17	**10** 16	**12** 15	**14** 14	**16** 13	**18** 12	**20** 11	**22** 10	**24** 9	**26** 8
5	**5** 20	**7** 19	**9** 18	**11** 17	**13** 16	**15** 15	**17** 14	**19** 13	**21** 12	**23** 11	**25** 10
6	**4** 22	**6** 21	**8** 20	**10** 19	**12** 18	**14** 17	**16** 16	**18** 15	**20** 14	**22** 13	**24** 12
7	**3** 24	**5** 23	**7** 22	**9** 21	**11** 20	**13** 19	**15** 18	**17** 17	**19** 16	**21** 15	**23** 14
8	**2** 26	**4** 25	**6** 24	**8** 23	**10** 22	**12** 21	**14** 20	**16** 19	**18** 18	**20** 17	**22** 16
9	**1** 28	**3** 27	**5** 26	**7** 25	**9** 24	**11** 23	**13** 22	**15** 21	**17** 20	**19** 19	**21** 18
10	**0** 30	**2** 29	**4** 28	**6** 27	**8** 26	**10** 25	**12** 24	**14** 23	**16** 22	**18** 21	**20** 20

- **A few examples:**
  - You and the other subject both choose 0, so x=0, y=0
    - Your payment: **10**
    - Other subject's payment: 10

- You and the other subjects both choose 10, so x=10, y=10
  - Your payment: **20**
  - Other subject's payment: 20
- You choose x=5 and the other subject chooses y=3
  - Your payment: **11**
  - Other subject's payment: 17
- You choose x=3 and the other subject chooses y=5
  - Your payment: **17**
  - Other subject's payment: 11

Payment mechanism & feedback

At this point, the instructions differ between the feedback and the no-feedback treatment. Both versions are shown below:

Feedback treatment

- Immediately after each experiment you will receive information on what the other subject did and what your earnings from the experiment are. However, you will not be paid until after the end of your participation in this experiment. Only when the experiment has ended for you will you receive your payment according to the mechanism explained below.

No-feedback treatment

- You will not receive any information on what the other subject did until after the end of the four-week experiment.
- Likewise, you will not receive your payment until after the end of the four-week experiment. Only after the end of the experiment will you receive your payment.

- **At the end of the experiment, you will not receive the sum of the earnings from all the individual weeks. Instead, an individual week will randomly drawn to be payoff relevant. The payment from that week will be multiplied by four and paid out to you in cash.**
- It is very important to us that you show up each of the four weeks. If you fail to show up for any of the experiments, you will forfeit all earnings.

- Example 1:
    - You took part in all four weeks of the experiment. Your earnings were EUR 10 in week 1, EUR 14 in week 2, EUR 18 in week 3 and EUR 22 in week 4. The draw determines that you will be paid the earnings from week 3 multiplied by four. Your total payment in this illustrative example is thus 4 * EUR 18 = EUR 72.
- Example 2:
    - You took part in the first three weeks of the experiment, but you failed to show up in week 4. In this case, you forfeit all earnings. Your total payment in this illustrative example is thus EUR 0.

The subjects filled out the following data sheet. Each data sheet contained a serial number, which made it possible to track individual behavior of each participant over the course of the experiment.

Step 1

Please indicate the amount of money **x** that you want to give to the other subject in this first step:

x = _____ EUR.

Step 2

Please now indicate for every possible amount of money **y** that the other subject could have given you, how much you want to give back to the other subject.

1. If the other subject chooses **y = 0**, I choose **x** = _____ .
2. If the other subject chooses **y = 1**, I choose **x** = _____ .
3. If the other subject chooses **y = 2**, I choose **x** = _____ .
4. If the other subject chooses **y = 3**, I choose **x** = _____ .
5. If the other subject chooses **y = 4**, I choose **x** = _____ .
6. If the other subject chooses **y = 5**, I choose **x** = _____ .
7. If the other subject chooses **y = 6**, I choose **x** = _____ .
8. If the other subject chooses **y = 7**, I choose **x** = _____ .
9. If the other subject chooses **y = 8**, I choose **x** = _____ .
10. If the other subject chooses **y = 9**, I choose **x** = _____ .
11. If the other subject chooses **y = 10**, I choose **x** = _____ .

Information on payoff calculation

Payoffs are calculated by using the step 1 decision for one subject and the step 2 decisions for the other subject. It is randomly determined whether your decision from step 1 or step 2 becomes relevant for payoff calculation.

Please note: If we detect an inconsistency regarding your decisions in step 1 and step 2, you might be excluded from the experiment, in which case you also forfeit all earnings. Please make sure that your choices made in step 1 and step 2 do not contradict each other. Thank you!

Appendix C: Instructions solidarity game

The following instructions are the English translation of the original German instructions.

The original instructions are available from the corresponding author.

- You will now take part in an experiment within the context of experimental economics. In this experiment, you can earn money that will be paid out to you in cash at the end of the experiment. The amount of money depends on your decisions and the decisions of other subjects.

The decision situation of today's experiment

- You and another subject are part of the following decision situation. The other subject's identity will not be revealed to you at any point in time. Likewise, your identity will not revealed to the other subject. Thus, the interaction is completely anonymous. The other subject will take part in this experiment for the first and only time today.
- There is a chance of 2/3 (approx. 66.7%) that you will win EUR 10. Whether you win or not is determined randomly. You will draw one of three numbered ping pong balls. Balls numbered 1 and 2 win, ball 3 loses.
- The other subject also has the same chance of 2/3 (approx. 66.7%) to win EUR 10. Whether the other subject wins or not is determined randomly with the same procedure explained above.
- **The decision situation: You decide on an amount of money you want to give to the other subject if you win EUR 10, but the other subject does not. Any integer value between EUR 0 and EUR 10 is possible.**
- **The other subject will likewise decide on an amount of money he or she wants to give to you if you do not win but the other subject does.**
- Note: If you and the other subject win, you both will receive EUR 10. No show-up fee will be paid out if neither player wins.