Title
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Abstract

We test the effect of players' moods on their behavior in a gift-exchange game. In the first stage of the game, player 1 chooses a transfer to player 2. In the second stage, player 2 chooses an effort level. Higher effort is more costly for player 2, but it increases player 1's payoff. We say that player 2 reciprocates if effort is increasing in the transfer received. Player 2 is generous if an effort is incurred even when no transfer is received. Subjects play this game in two different moods. To induce a 'bad mood', subjects in the role of player 2 watched a sad movie before playing the game; to induce a 'good mood', they watched a funny movie.

Mood induction was effective: subjects who saw the funny movie reported a significantly better mood than those who saw the sad movie. These two moods lead to significant differences in player 2's behavior. We find that a bad mood implies more reciprocity while a good mood implies more generosity. Since high transfers are relatively more common, player 1 make more money when second movers are in a bad mood.

Keywords: Emotions, motivation, rationality, reciprocity, fairness.
JEL codes: C73, C93, L83

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1 Introduction

Although many economists may agree that mood and emotions have a significant influence on behavior, most of them may feel they have nothing to do with rational decision making and should be left out of the realm of economics. A milder position is that mood and emotions produce noise around some average behavior which is the one predicted by rational decision making, but are useless in trying to provide more accurate predictions.

Indeed, while the relationship between affect and behavior is a central theme of modern psychology (see Zajonc [38] and Lewis and Haviland-Jones [31]), as Elster [14] notes, emotions have been generally neglected by the economics profession.[1] One reason for this is probably the lack of evidence on the role emotions play in influencing behavior.[2] Our objective is to take a first step toward filling this void. Our claim here is that mood produces a shift in the mean behavior, and therefore it is useful in predicting actions of economic agents.

Clearly, evidence of a systematic shift is necessary to justify the introduction of emotions into economic theory. This is not, however, the only scope of our research. Even if one is convinced emotions should be considered by economists, there is no evidence to suggest what the actual effects are. For example, arguing that emotions are relevant for decision-making, Lowenstein [32] suggests they can be incorporated using a "state-dependent" utility function. In order to do this appropriately, though, one needs to know how this state dependency works in detail. For example, the marginal utility of consumption can be positively or negatively affected by a bad mood; and no model with emotions can be operationalized until we know which of these alternatives to use. Therefore, by measuring accurately how different moods change the way subjects behave in an experiment, we provide a necessary step towards the adoption of theoretical models.

We study the interaction of moods and behavior using a methodological approach common in experimental psychology; some external stimuli are employed to make the subjects feel in a particular way. In other words, we perturb individuals' emotional states through a method commonly known as

[1] There are a few notable exceptions, like Lowenstein [32], Hirschleifer [29] and Frank [22].

[2] In fact, Elster argues that "The more urgent task is to understand how emotions interact with other motivations to produce behavior."

mood induction. We adopt the mood induction procedure considered most successful in psychology since it employs audio-visual stimuli (see Westermann et al. [37] for a comprehensive comparison of mood induction procedures). Subjects watch a short excerpt from a movie that is meant to induce one of two moods. A funny movie induces a positive affect state that, for simplicity, we call "good mood". A depressive movie induces a negative affect state that, again for simplicity, we call "bad mood".[3] After mood induction has taken place, subjects take part in an economic experiment so that we can verify whether different induced moods are reflected by different behaviors.

The economic experiment is based on the gift-exchange game. This game is played by two individuals acting sequentially. The first mover has a sum of money and can transfer some of it to the second mover. The second mover receives the transfer and then chooses an effort level. Higher effort is more costly to the second mover, but it increases the first mover's payoff.[4] Using this game, generous behavior has been documented in a variety of different settings; second movers exert effort even when it implies a positive cost and no benefit.[5] These studies have also highlighted how reciprocal behavior emerges in this game; second movers effort is increasing in the transfer they receive.[6] These results have been rationalized using theories that highlight the interaction between purely 'selfish' and more 'moral' aspects of preferences.[7]

In our experiment, the mood of second movers in the gift-exchange game is manipulated. Before starting the game, we induce either a good mood or a bad mood. We then observe subjects' behavior. Players' choices differ across moods. In other words, if the mood is seen as a 'treatment' variable, behavior is significantly different across treatments. In a bad mood, effort depends positively on the transfer received. This behavior is consistent with the reciprocal behavior typically observed in the

[3] The literature reviewed in Westermann et al. [37] shows that similar movies produce similar moods, so the mood induction procedure is not too sensitive to the specific movie chosen. A similar point is also made by Gross and Levenson [25].

[4] This game is first studied by Fehr, Kirchsteiger and Riedl [18].

[5] For a recent survey of this evidence, see Fehr and Gächter [17].

[6] Reciprocal behavior in a different setting is studied in Berg et al. [3].

[7] Altruism and inequity aversion theories assume preferences depend on others' payoffs as well as one's own payoff. For example, Fehr and Schmidt [20] and Bolton and Ockenfels [5] assume that some players' utility function includes as argument some measure of the distribution of payoffs among players and they are averse to inequity. Reciprocity models use psychological games (introduced by Geanakoplos, Pearce and Stacchetti [23]) and assume preferences depend on one's own payoff and beliefs about others' play. For example, Rabin [34] and Dufwenberg and Kirchsteiger [13] assume individuals like to return intentionally kind or unkind actions with actions of the same type. Finally, Charness and Rabin [12] propose a model where both intentions and the actual distribution of payoffs matter.

gift-exchange literature. In a good mood, this dependence is much weaker. Surprisingly, players in a good mood reciprocate much less than players in a bad mood.

These results are interesting for a variety of reasons. First, we document a strong interaction between mood and behavior in an economic environment. Bosman and Winden [6] and Charness and Grosskopf [10] also attempt to analyze this interaction. The former, though, only looks at emotion produced as a consequence of the interaction among two players. Our study goes in a the opposite direction since we ask what are the behavioral consequences of specific moods. Charness and Grosskopf is similar in this respect, since they ask subjects about their mood before choices are made. However, they do not perturb the mood of subjects as we do. As a consequence, they find a very weak relationship between emotions and behavior. By adopting the mood induction technique developed in psychology, we instead find moods have a strong effect on behavior. This difference highlights the usefulness of experimental psychology techniques for economics when one wants to study psychological phenomena.

Second, we find that moral behavior changes in response to exogenously induced moods. This observation may be disturbing in itself. In addition, some assumptions underlying the theoretical research on reciprocity must now be reconsidered. Moral preferences are not stable with respect to a simple perturbation of the environment: they change with a player's mood.[8] In fact, we show that one's morals depend on one's moods. This effect is rather large and surprising, since the good mood treatment in our experiment is the only case we are aware of in which reciprocal behavior is almost absent in the gift-exchange game.

Third, the lack of reciprocal behavior in a good mood implies that when the transfer received is high, subjects in a bad mood choose higher effort. Since high transfers are relatively more common, this difference in effort yields the surprising conclusion that first movers who face subjects in a bad mood do better than first movers who face subjects in a good mood. The effect is significant and large: the payoff of the first mover may change by roughly 30 per cent according to mood of the opponent. This result seems to contradict the findings in Bewley [4]; there, employers say they

[8]Some scholars argue forcefully that stability is necessary for a theory of behavior based on preferences to be interesting. For instance, see Becker [2] and Stigler and Becker [36].

do not lower wages fearing the impact of employers' bad mood on productivity. A comparison is difficult, however, because in our case the bad mood is exogenous to the relationship between the players; in the case Bewley describes, it is caused by one of them.

Although our results may seem unsettling to economists, psychology offers a setting to put them into context. A large literature studying mood and behavior finds, with few exceptions, a positive correlation between good moods and helping (see for example Carlson et al. [7], Morris [33], and Isen [30]). Individuals in a good mood appear more generous. The negative relationship we find between good mood and reciprocity is not inconsistent with these findings. In fact, our study emphasizes the importance of the difference between reciprocity and generosity. In the gift-exchange game, the former is measured by the slope of the effort-transfer relationship, while the latter is measured by the intercept of this relationship. Generosity corresponds to effort incurred even when no transfer is received, while reciprocity corresponds to higher effort that rewards a larger transfer. Since helping behavior is distinct from reciprocal behavior, we present a novel extension of the implications of mood on behavior. An economic experiment can thus extend and clarify some standard finding in psychology, highlighting the usefulness of using an experimental economics framework for psychology.

The remainder of the paper is divided as follows. Section 2 presents the experimental design in detail, including the mood induction procedure. Section 3 presents the empirical results and measures the effect of mood on behavior. Section 4 concludes.

2 Experimental Design

Each experimental session consisted of several rounds of the gift-exchange game. These were preceded by a mood-induction phase involving a subset of the subjects. All sessions took place at Tilburg University, The Netherlands, in June 1999 and May 2000. The experiment uses only pen and paper, and all materials related to it were in English.[9]

The game is played sequentially by two players. In the first stage, player 1 (the first mover) receives a fixed sum of money and transfers some of it to player 2 (the second mover). In the second

[9]The materials, including instructions and various questionnaires, are reported in the Appendix.

stage, the second move learns the transfer and then decides an effort level. Effort is costly to player 2 but beneficial to player 1.[10] In particular, for any given transfer, higher effort reduces player 2's payoff but increases player 1's payoff.

Let t denote the transfer chosen by player 1 and e denote the effort chosen by player 2. t can be any integer between 0 and 15, while e is a fraction between 0.1 and 1. The monetary payoffs are as follows:[11] player 1 makes

$$P_1(t,e) = (15 - t)\, e,$$

while player 2 makes

$$P_2(t,e) = t - c(e).$$

The cost function $c(e)$ is increasing and convex; its values for each possible effort are:

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$c(e)$	0.0	0.2	0.4	0.8	1.2	1.6	2.0	2.4	3.0	3.6

In a session, subjects play this game for a fixed number of rounds. During all rounds, each subject maintains the role of player 1 or player 2. Players are always matched anonymously. The matching follows a round robin procedure, so that a subject plays exactly once with each possible partner. Therefore, the number of rounds depends on the number of subjects in a session. We had sessions with 16, 14, 12, and 10 players, corresponding to 8, 7, 6, and 5 rounds respectively. The only information players receive is the play of their counterpart in a round. In particular, players cannot observe the action of other pairs, or the actions of their partner in previous rounds.

At the beginning of a session, subjects are randomly assigned the role of player 1 or 2 and then provided with the instructions for the gift-exchange game. These are read aloud by an experimenter in front of all participants. Afterwards, subjects answer a control questionnaire to check their understanding of game and the way payoffs are determined.

[10] In the instructions, we use the term "conversion rate" to avoid negative perceptions. Here, we revert to the more intuitive name "effort".

[11] The unit of account is the Dutch Guilder; it was worth approximately half a US dollar when the experiment took place.

At this point, the mood induction phase begins. Subjects are told that players 2 will watch a short sequence from a movie. Therefore, players 1 leave the room to make this possible. At this point, two different treatments are possible. In the bad mood treatment subjects watch a sequence from *Schindler's List*, directed by Steven Spielberg, lasting approximately five minutes.[12] In the good mood treatment subjects watch a sequence from *City Lights*, directed and interpreted by Charles Chaplin, lasting approximately five minutes.[13] The content of each sequence is meant to induce a negative or positive affect state respectively.[14] The use of sequences from commercial movies and their choice is entirely consistent with common practice in experimental psychology; for example, see Gross and Levenson [25].

At the end of the five minutes movie sequence, subjects answer a brief questionnaire related to the movie and their mood. Players 1 then come back into the room and the gift exchange game starts.[15] After the game is played, all subjects answer another brief questionnaire aimed at collecting information about their mood. At this point all subjects are paid, privately and in cash, the amount won in each round they played.

2.1 Analysis of the game

Assuming players only care about their own earnings, the gift exchange game has a unique sub-game perfect equilibrium. In the second stage, player 2 chooses the lowest feasible effort level. Anticipating this strategy, player 1 chooses the lowest feasible transfer. Hence, the only sub-game perfect equilibrium is composed of a transfer $t = 0$, and an effort $e = 0.1$ independent of the transfer of the other player.[16] However, abundant experimental evidence shows that many subjects do not

[12] The sequence is known as "liquidation of Krakow ghetto": it shows the Nazi troops ejecting families from their homes, making prisoners, and killing people. A more detailed description is in the Appendix.

[13] The sequence is known as the "boxing fight": an hilarious episode with Charlie Chaplin dancing around the ring to avoid to punches of his opponent. A more detailed description is in the Appendix.

[14] Before the projection players were only informed that they were going to watch a five minutes sequence from a movie, but they were not told which movie they were about to see.

[15] First movers waited in another room while the movie was shown. No communication among them took place during this time, and they were not told which movie second movers were watching.

[16] This outcome yields the lowest sum of payoffs for the players. Since this sum is equal to

$$15e + t(1 - e) - c(e),$$

the pair that maximizes it is minimum effort and maximum transfer, that is $e = 0.1$ and $t = 15$.

play this way: player 2 chooses on average $e > 0.1$ and there is a positive relationship between e and t. A variety of different theoretical approaches have been developed to capture these additional motives.

These theories can be divided into three rough categories. In models of *altruism* the income of another person enters positively into the player's utility function (see for example Andreoni [1]). In models of *fairness* the agent's preferences depend positively on her earnings as well as on the fairness of the whole income distribution across players (see for example Fehr et al. [19] Fehr and Schmidt [20], and [5]). In models of *reciprocity* individuals want to return positive and negative favors (see Rabin [34] and Dufwenberg and Kirchsteiger [13]). More recently, Charness and Rabin [12] have constructed a theory that encompasses both distributional concerns and reciprocity motives.

Summarizing, experiments show that frequently players do not maximize their monetary payoffs. Many theoretical models interpret this evidence assuming that players' behavior is motivated by a desire for fairness, altruism, and reciprocity. In other words, these theories suggest that individuals do not only care about narrow self-interest: moral norms shape their behavior. In some sense, our experiment presents a simple stability test of the preferences proposed by these theories. We modify players' moods, a characteristic of the environment that should have no effect on individuals' choices, and see whether this is indeed the case. As it turns out, moods change moral behavior and hence all the theories fail this stability test.

3 The Evidence

130 undergraduate students (46 of whom female) from Tilburg University participated in the experiment. There were 10 sessions, 5 for each mood, with a number of subjects per session varying between 10 and 16. Overall, the data consist of 437 observations of the gift-exchange game presented in the previous section.[17]

Since the aggregate results do not differ substantially from those in the gift-exchange literature, we discuss them only in Section A.1 in the Appendix.[18] Here, we focus on mood and behavior.

[17]For a table reporting the entire data, see Section A.2 in the Appendix.

[18]For the evidence on gift-exchange experiments, see Fehr at al. [18] and [19], Charness [9], and Charness and Haruvy [11].

We start from the mood induction procedure and then look at players' choices. The main result is that different moods induce significantly different behavior. This difference is first assessed in non-parametric terms, and then measured more precisely using regression analysis. Throughout, we concentrate on the behavior of the players who participated in the mood induction phase; that is, we analyze the behavior of the second movers. Clearly, given our set up, first movers are influenced by the mood induction procedure only through the choices of the second movers.

3.1 Mood induction

In this section, we show that the mood of subjects is affected by the movie. This step is important to establish that a difference in behavior among the two treatments is a consequence of the subjects' mood, as manipulated by the experimenters. The simplest measure of this phenomenon is given by the subjects description of their own mood. After seeing the movie, but before playing the game, second movers compile a questionnaire containing the question "How do you feel?".[19] Subjects can choose along an 8-point scale ranging from "1: extremely happy, in a really good mood" to "8: extremely unhappy, in a really bad mood". The average answer in the good mood treatment is 5.6 (with a standard deviation 1.6), while it is 3.1 (standard deviation 1.3) in the bad mood treatment. Figure 1 shows the answer of each of the 65 individuals who participated in the experiment as second movers. On the left side are the individuals in the good mood treatment; on the right side are the individuals in the bad mood treatment. Along the vertical axes, higher points correspond to worse self-reported mood. Visually, the distribution of answers appears higher in the right side of the graph, suggesting that subjects in the bad mood treatment are in a worse mood.

This impression is strengthened by a non-parametric test. Using the Mann-Whitney procedure, we can test the null hypothesis that self-reported moods are drawn from the same distribution in the two treatments. The Mann-Whitney statistic equals 5.403, and it implies a p-value smaller than 0.0001. Therefore, subjects who participated in the bad mood treatment felt differently than subjects who participated in the good mood treatment. In fact, as hoped, they felt worse. We also measured self-reported mood at the end of the gift-exchange game, but the effect of mood induction

[19] The entire questionnaire is found in Section A.3.

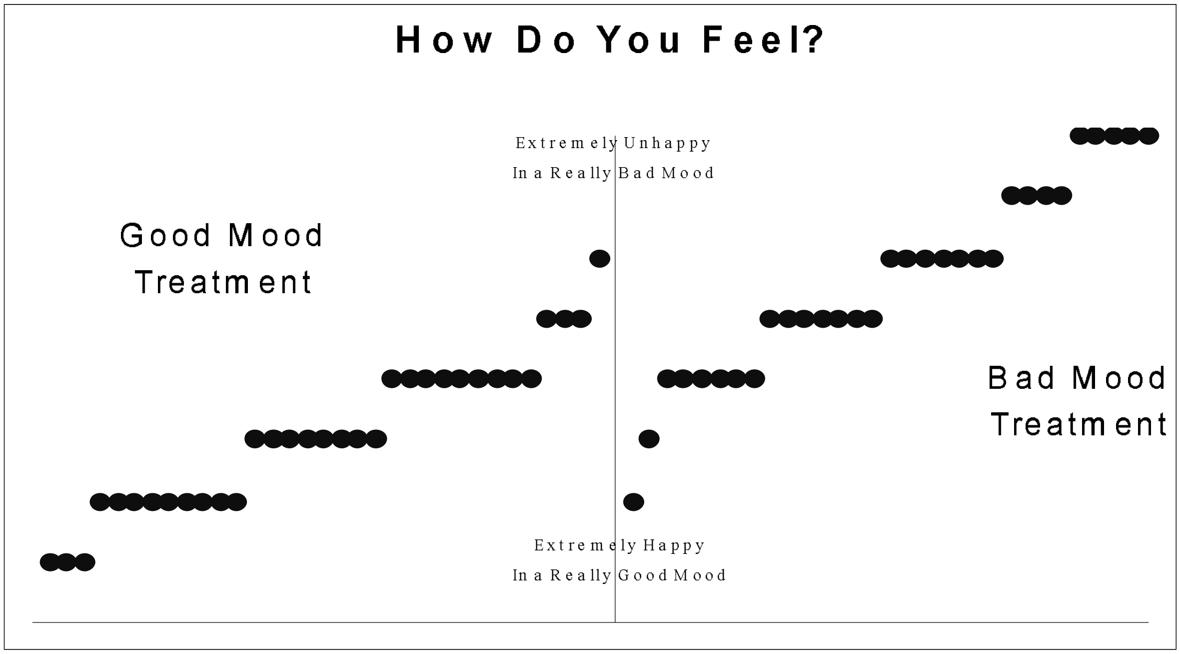

Figure 1: self-reported mood of second movers

is weakened by then.[20]

3.2 Mood and behavior: summary statistics and nonparametric tests.

Having verified subjects feel, or at least say they feel, differently as a consequence of the mood induction procedure, we now study their choices. First, we consider some summary statistics for the game. Although important, these statistics hide the effect that different transfer levels have on the choice of effort. Loosely speaking, differences in behavior corresponding to the two treatments must be very strong to turn out significant at this stage. In the next section, we use regression analysis to gauge these effects more precisely. Since actions taken in successive rounds may depend on previous play, we also report the statistics for the first round of play separately. However, there seems to be no significant difference between these observations and the entire data set.

The average values presented in Table 1 show that transfer and effort are slightly larger in the

[20]We asked same "how do you feel?" question, and the Mann-Whitney statistic corresponding to equality of distributions across moods has p-value of 0.7675.

Table 1: summary statistics by mood.

		Round	Transfer All	Transfer 1^{st}	Effort All	Effort 1^{st}	Cost to transfer ratio All	Cost to transfer ratio 1^{st}
Good Mood	Mean		5.068	5.382	0.283	0.282	0.110	0.116
	std.dev.		3.32	2.55	0.24	0.22	0.19	0.20
Bad Mood	Mean		5.372	5.387	0.322	0.329	0.105	0.108
	std.dev.		2.76	2.17	0.22	0.18	0.10	0.08

		Round	Payoff 1 All	Payoff 1 1^{st}	Payoff 2 All	Payoff 2 1^{st}	N All	N 1^{st}
Good Mood	Mean		2.498	2.503	4.508	4.865	238	34
	std.dev.		2.08	1.84	3.12	2.36		
Bad Mood	Mean		2.747	2.977	4.720	4.761	199	31
	std.dev.		1.54	1.31	2.43	1.96		

Table 2: effort by transfer and mood: mean, standard deviation, and median.

	Transfer	0	1	2	3	4	5	6	7	8	9
Good Mood	N	31	22	12	11	13	33	28	33	22	17
	Mean	0.168	0.177	0.15	0.145	0.238	0.279	0.314	0.300	0.364	0.494
	std.dev.	0.22	0.15	0.17	0.07	0.13	0.20	0.20	0.26	0.29	0.26
	Median	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.2	0.2	0.5
Bad Mood	N	15	18	7	9	12	21	26	49	23	16
	Mean	0.107	0.106	0.114	0.211	0.2	0.29	0.381	0.408	0.474	0.469
	std.dev.	0.03	0.02	0.04	0.16	0.11	0.13	0.16	0.19	0.22	0.36
	Median	0.1	0.1	0.1	0.2	0.15	0.3	0.4	0.4	0.5	0.45

	Transfer	10	11	12	13	14	15
Good Mood	N	8	1	3	2	1	1
	Mean	0.475	0.300	0.800	0.250	0.100	0.300
	std.dev.	0.33		0.17	0.21		
	Median	0.35	0.3	0.7	0.25	0.1	0.3
Bad Mood	N	3	0	0	0	0	0
	Mean	0.333					
	std.dev.	0.21					
	Median	0.4					

Table 3: Wilcoxon-Mann-Whitney tests; H^0 is equal distributions between good and bad mood data.

	Effort		Cost to transfer ratio		Transfer	
	All rounds	First round	All rounds	First round	All rounds	First round
z	2.576	1.681	2.317	1.897	1.387	0.354
p-value	0.0100	0.0927	0.0205	0.0578	0.1654	0.7232

	Payoff 1		Payoff 2	
	All rounds	First round	All rounds	First round
z	2.921	1.920	.893	-0.112
p-value	0.0035	0.0548	0.3717	0.9110

bad mood treatment.[21] The difference between the two moods becomes clearer once we look at effort choices by transfer in Table 2. At low transfers, effort is higher when players are in a good mood; at large transfers, effort is higher when players are in a bad mood. Very large transfers, larger than 10, are extremely unlikely and happen only in the good mood treatment. These first rough observations highlight different behavior between the two moods. At this point, however, we do not know whether the difference is significant. More refined tests are necessary, beginning with non-parametric tests of equality of distributions, and are presented next.

Unless otherwise noted, all the nonparametric tests use the Wilcoxon-Mann-Whitney statistic which is approximately normally distributed. Table 3 reports zs and p-values for these test. They correspond to two-samples tests which all have the same null hypothesis H^0: the distribution function that generates data in the good mood treatment is the same distribution function that generates the data in the bad mood treatment.

Consider the first movers. In the first period of play, their behavior is not significantly different across moods. This is exactly what we expected since they were not subject to the mood conditioning procedure. The behavior of second movers, on the other hand, is significantly different across moods. The test for equality of distributions in the first round of play yields a p-value around 0.093 for the effort variable and 0.058 for the cost to transfer ratio. Equality appears unlikely in both cases. The effect of mood becomes even more significant when we consider the whole sample. The hypothesis

[21] The cost to transfer ratio is defined as $CT = \frac{c(e)}{t}$ and measures how much the second mover sacrifices own earnings to reward the first mover.

that the observed sample of efforts comes from the same distribution under good and bad mood can be rejected strongly (p-value 0.01). The same conclusion applies to the cost to transfer ratio (p-value 0.02). Interestingly, the behavior of first movers is weakly affected by the second movers mood (p-value 0.165). This is not unexpected. If one considers roles instead of individuals the game is played repeatedly. Therefore, if the mood of the second movers influences their choices, it can eventually influences the behavior of first movers.

Table 4: average payoffs by transfer and mood.

		Transfer										
		0	1	2	3	4	5	6	7	8	9	10
Good	Payoff 1	2.52	2.43	1.95	1.74	2.62	2.79	2.83	2.40	2.54	2.96	2.37
Mood	Payoff 2	-0.24	0.78	1.83	2.91	3.68	4.50	5.40	6.37	7.14	7.73	8.75
Bad	Payoff 1	1.60	1.48	1.49	2.53	2.20	2.90	3.43	3.26	3.32	2.81	1.67
Mood	Payoff 2	-0.01	0.99	1.97	2.71	3.78	4.51	5.21	6.10	6.85	7.70	9.33

Since the relationship between effort and transfer appears different across the two moods, one wonders how big this effect is in terms of players' payoffs. This can be seen looking at players' payoffs by transfer and mood, as presented in Table 4. Transfers equal to 6, 7 or 8 are chosen in 50% of all negative mood observations and 35% and of all good observations; furthermore, a transfer equal to 7 constitutes the mode in both treatments. In these cases, effort has a sizeable impact on payoffs. Consider a first mover who has chosen a transfer equal to 7. If she faces a good mood opponent, her average payoff equals 2.4; if she faces a bad mood opponent, her average payoffs equals 3.26. This constitutes an increase in payoff of 36%. Differences of similar magnitude are obtained for transfers equal to 6 or 8 (21% and 31% respectively). Therefore, a difference in moods implies not only a statistically significant difference in effort, but also a large difference in opponents' payoff.

The histogram in Figure 2 reports the number of times each pair transfer-effort was observed in the two treatments. Behavior in the good mood treatment, however, appears more scattered around the diagram. In particular, in the bad mood part of the diagram is easier to observe the positive relationship between effort and transfer typical of reciprocal behavior. We perform a final non-parametric test on the difference between moods using the standard deviation of effort choices for

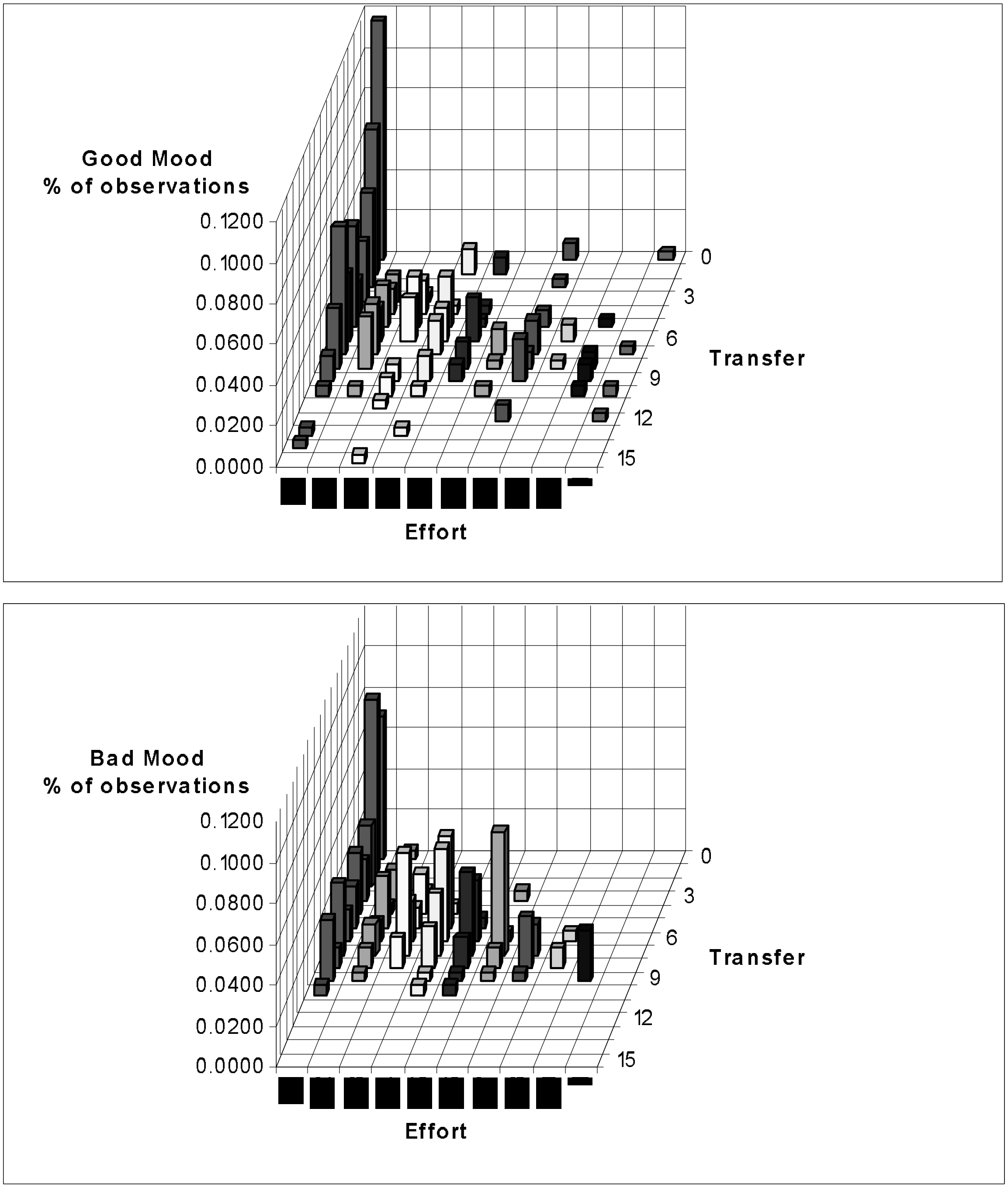

Figure 2: Comparison between good and bad mood

each transfer level.[22] The result is that effort levels are more unpredictable for individuals in a good mood. The usual Mann-Whitney test yields a p-value of 0.099, confirming a somewhat significant difference. Some psychologists have found a similar patterns: they suggest different moods influence the volatility of players' choices. For example, Hertel and Fiedler [27] and Hertel et al. [28] show that individuals in a good mood display more erratic behavior.

3.3 Regression analysis

In this section we measure more explicitly how the behavior of the second movers depends on mood. This can happen in two different ways. First, the behavior of second movers may differ in the two moods regardless of what first movers do. In addition, second movers may, depending on their mood, react differently to what first movers do. The analysis below shows these effects are both strong and significant.

The first step is to build a regression model to estimate these effects appropriately. Let e_{ir} be the effort chosen by the i^{th} subject in the role of player 2 after seeing transfer t_{ir} of the player 1, who was the partner of i in round r. We estimate the following model:

$$e_{ir} = \alpha + \beta X_{ir} + \nu_i + \varepsilon_{ir}, \tag{3.1}$$

where X_{ir} is a vector of independent variables, ν_i represents unobserved characteristics of individual i, and ε_{ir} is an error term with the usual properties. One can estimate equation (3.1) under two different sets of assumptions. If we assume the variables ν's are random, with mean zero, uncorrelated with X and ε, then we have the *random-effects model.* If we assume the ν's are constant parameters, we have the *fixed-effects model.* The choice between these models may depend on the actual right hand side variables employed.

Our regressors are the following. *Transfer*, a variable equal to the transfer t_{ir} player 2_i receives before choosing effort e_{ir}; *Good Mood*, a dummy variable equal to one if i was in the good mood treatment and zero otherwise; *Good Mood* multiplied by t_{ir}; *Female*, a dummy variable equal to one if i is female and zero otherwise; *Female* multiplied by t_{ir}; *Transfer* ≤ 2 and *Transfer* $= i$,

[22] They are presented in Table 2 above.

with $i = 10, 11, 12, 13, 14, 15$, dummy variables equal to one when t_{ir} has the appropriate value and zero otherwise. The non parametric tests of the previous section point to differences in behavior across moods which should be reflected in the coefficients of the variables *Good Mood* and *Good Mood* $\times$ *Transfer*. Players' gender is the only observed individual characteristic we can include in the estimation.[23] The transfer variables are included to account for possible non linearities in the data at low and high transfer levels.[24]

Modeling ν_i carefully is important for two reasons. First, individuals may have different preferences, and thus behave differently in the game. Second, individuals may react in different ways to the mood induction procedure. Introducing individual effects we measure systematic properties of behavior which may be induced by moods. The two estimation procedures are, in this respect, very different. The random effect estimator is appropriate only when there is no correlation between X and ε; otherwise the fixed effect model is necessary. The fixed effect estimator, however, cannot estimate some of the regressors we consider interesting.

This last point can be seen easily. For any variable z_{ir}, let individual and overall means be defined as

$$\overline{z}_i = \frac{\sum_{r=1}^{R} z_{ir}}{R} \text{ and } \overline{z} = \frac{\sum_{i=1}^{I} \overline{z}_i}{I}.$$

Equation (3.1) implies

$$\overline{e}_i = \alpha + \beta \overline{X}_i + \nu_i + \overline{\varepsilon}_i \tag{3.2}$$

and

$$\overline{e} = \alpha + \beta \overline{X} + \overline{\nu} + \overline{\varepsilon}. \tag{3.3}$$

If we subtract equation 3.2 from equation (3.1) and then add equation 3.3 we get

$$e_{ir} - \overline{e}_i + \overline{e} = \alpha + \beta \left(X_{ir} - \overline{X}_i + \overline{X} \right) + \overline{\nu} + \varepsilon_{ir} - \overline{\varepsilon}_i + \overline{\varepsilon}. \tag{3.4}$$

[23]There are 25 female Player 2, 11 in the good mood treatment and 14 in the bad mood. These numbers correspond to 32% and 45% of the respective populations. Therefore the distribution of genders was slightly different across moods.

[24]The 'small transfer' dummy measures if second movers choose the lowest possible effort unless they receive a large enough transfer. The 'high transfer' dummies are included because large transfer are very infrequent, particularly in the bad mood treatment.

Estimation of equation (3.4) is equivalent to estimation of equation (3.1). The advantage is that the ν_is have dropped out and one need not worry about unobserved individual effects. This fixed effect estimator, however, cannot estimate variables in X that do not change with the round index r, *Good Mood* and *Female* in our case, since they are perfectly collinear with the constant in equation (3.4). It can only estimate their interactions with *Transfer*.

Summarizing, there is a trade-off between a more precise evaluation of the effect of the mood induction procedure and the risk of assuming incorrectly that ν_i, the X and ε are uncorrelated. If they were, on the other hand, the fixed effect estimator would still provide the right answer since it does not depend on the individual effects. Table 5 below reports the results for both procedures. They do not appear systematically different, which makes us favor the random effect specification since it includes all the regressors of interest.[25] The comments below, then, pertain to the random effects regression.[26]

The coefficient we are most interested are the ones representing the mood status: *Good Mood* and *Good Mood* $\times$ *Transfer*. Since they are both significant, the regression analysis confirms that mood affects behavior. Their estimates can then be used to gauge this relationship more precisely. The constant is not significantly different from zero. *Good Mood* is instead positive and significant. Therefore, second movers choose higher levels of effort when in a good mood, no matter what transfer they receive. *Transfer* is highly significant and has a positive sign. Second movers behavior is reciprocal : if the transfer received increases by one they will increase their effort by roughly 0.059. *Good Mood* $\times$ *Transfer* is negative and highly significant; the coefficient equals -0,022. Therefore, although we find evidence of reciprocal behavior consistent with previous studies on the gift-exchange game, good mood players appear very different. They respond **40 per cent less** to the transfer they receive if compared to players in a bad mood.

[25]The Hausman specification test for random effects, is equal to 2.71 which for a $\chi^2(10)$ distribution implies a p-value equal to 0.9874. It confirms that the difference between random and fixed effects estimates is not systematic.

[26]In the appendix, one can find the results for 'split sample' regressions, where the good and bad mood data are used separately. They are very similar to the one reported for the entire sample. We also tried other specifications, including ordered probit and tobit, to account for particular features of the data. Again, results are very similar to the ones described below, and are available upon request.

Table 5: Regressions with pooled data; N=437, I=65.

	Random Effects			Fixed Effects		
	R^2	χ^2	$p-value$	R^2	F	$p-value$
	0.269	255.27	0.000	0.239	24.33	0.000
	Coefficient	t	p-value	Coefficient	t	p-value
Constant	0.0144 0.0493	0.292	0.770	0.0687 0.0322	2.13	0.034
Transfer	0.0588 0.0059	9.939	0.000	0.0596 0.006	9.91	0.000
Good Mood	0.0837 0.0483	1.760	0.078	.	.	.
Good Mood × Transfer	-0.0219 0.0053	-4.157	0.000	-0.0231 0.0054	-4.28	0.000
Female	0.0159 0.0483	0.330	0.741	.	.	.
Female × Transfer	-0.0108 0.0053	-2.048	0.041	-0.0117 0.0054	-2.161	0.031
Transfer ≤ 2	0.0408 0.0323	1.264	0.206	0.0395 0.0328	1.203	0.23
Transfer=10	-0.0635 0.0487	-1.304	0.192	-0.0657 0.0494	-1.331	0.184
Transfer=11	-0.0845 0.1501	-0.563	0.573	-0.0678 0.152	-0.446	0.656
Transfer=12	0.2228 0.0921	2.42	0.016	0.2178 0.0935	2.330	0.02
Transfer=13	-0.1412 0.1153	-1.224	0.221	-0.1239 0.1168	-1.06	0.29
Transfer=14	-0.489 0.1565	-3.124	0.002	-0.4816 0.1591	-3.026	0.003
Transfer=15	-0.421 0.1607	-2.620	0.009	-0.4337 0.1644	-2.638	0.009

3.4 Summary of the empirical analysis: moods and morals

There are significant differences in the behavior that followed our mood induction experiment. Players in a good mood and players in a bad mood differ along two dimensions: generosity and reciprocity. Generosity is measured by the intercept of the regression in Table 5, reciprocity is measure by its slope. They are both different across players' moods. We conclude that moral dimensions of behavior can be significantly influenced by emotional aspects which are completely exogenous to the decision task at end.

When in a good mood, individuals are more generous. They give without necessarily having received. This higher generosity in a good mood is in line with a long-standing literature in psychology. The evidence extensively surveyed in Carlson et al. [7] and Isen [30] establishes a positive relationship between good mood and helping behavior.

When in a good mood, individuals are less reciprocal. They give much less as a function of what they received. This result is novel and surprising. Particularly since, based on the previous evidence of a positive relationship between good mood and generosity, one is tempted to imagine a more general positive relationship between good mood and cooperative behavior. Some psychologists, however, have found a positive relationship between negative affect and cooperation (see Hertel and Fiedler [27], and Hertel et al. [28]) which seems more consistent with our data. This seems more in line with what we find, even though the games in those experiments are much more complicated and difficult to interpret relative to the simple gift-exchange game we used. In this sense, our findings provide new insight into this topic also for psychologists.

4 Conclusions

We test the effect mood has on the behavior of players in a gift-exchange game. The main conclusion is that reciprocal behavior is much reduced in players who went through a good mood treatment. These results suggest the need for theory of behavior capable of accommodating the role of moods.

Psychologists' views of the evidence that moods affect behavior are based on cognitive interpretations of the role of moods and emotions. The idea of priming, for example, is used to explain why helping behavior is more frequent in subjects in a good mood. An individual in a good mood expects a more pleasant experience from social interaction, and is therefore more willing to help. A second, related, idea is mood maintenance. Current happiness depends on present actions and past happiness. Higher past happiness implies higher current happiness. In this setting, individuals in a good mood try to maintain their mood, while individuals in a bad mood try to change their mood. Under appropriate conditions, the optimal way to achieve this target when in a good mood turns out to be helping behavior.[27]

Economists may be tempted to incorporate moods and emotions into a theory of behavior in a way similar what has been done for altruism and reciprocity have been. In particular, an individual's utility function can depend on mood. In our view, this extension does not seem promising for two reasons. First, it leads research into a vicious circle with theory trying to catch up with experimental evidence, while instead there are good reasons to assume stable preferences.[28] Second, it increasingly leads into causal, immediate, explanations of behavior: we act in a certain way because we have preferences, or norms, or now moods that motivate these actions. A different type of explanation is a functional one, based on the advantage, in terms of fitness (defined by biological or cultural factors), of a behavior.

The explanations of reciprocity provided in many of the papers quoted earlier are causal, not functional. These causal explanations (like the standard utility maximizing explanation in different settings) are not compatible with the environment's effect on behavior that we find here. We find that the intensity of reciprocity is smaller when subjects are in good mood. This result seems to require a new look at the cognitive theories explaining the connection between altruism and moods, or emotions. This should be the subject of further experimental and theoretical research.

[27]This is the point made in Hermalin and Isen [26].

[28]For instance, Gary Becker writes:

> "The assumption of stable preferences provides a stable foundation for generating predictions about responses to various changes, and prevents the analyst from succumbing to the temptation of simply postulating the required shift in preferences to "explain" all apparent contradictions to his predictions". Becker [2], Chapter 1.

A Appendix

A.1 Analysis of the Aggregate Data

Here we briefly describe the results as *average* over the two treatments. They do not differ substantially from those in the gift-exchange literature. Table 6 shows aggregate statistics for the experiment. The average transfer of player 1 is 5.2, while the average effort of player 2 is 0.3. The average payoffs for players 1 and 2 are equal to 2.6 and 4.6 respectively. Players 2 do not always maximize their monetary payoffs. They choose minimal effort 185 times, corresponding to 42% of the observations. In the remaining cases, they sacrifice some of their achievable payoffs to the advantage of players 1. The cost to transfer ratio, $CT = \frac{c(e)}{t}$, is a measure of this phenomenon. When the transfer is zero the ratio CT is not well defined since player 1 's transfer is zero. In the remaining observations, however, the cost-to-transfer ratio averages 0.1, so players 2 sacrifice about 10 per cent of their potential earnings.

Table 6: summary statistics for transfer, effort, and cost to transfer ratio.

	Transfer		Effort		CT ratio		Payoff 1		Payoff 2	
Round	All	1^{st}	All	1^{st}	All	1^{st}	All	1^{st}	All	1^{st}
Average	5.206	5.385	0.300	0.305	0.108	0.112	2.611	2.729	4.604	4.815
Std. Dev.	3.08	2.36	0.23	0.20	0.16	0.16	1.86	1.62	2.82	2.16
Minimum	0	0	0.1	0.1	0	0	0	0.6	-3.6	0
Maximum	15	12	1	0.8	1.2	0.8	15	7.2	14.6	10

Table 7: effort by transfer: average, standard deviation, and median.

		Transfer									
		0	1	2	3	4	5	6	7	8	9
	N	46	40	19	20	25	54	54	82	45	33
Effort	Mean	0.148	0.145	0.137	0.175	0.220	0.283	0.346	0.365	0.420	0.482
	std.dev.	0.18	0.12	0.14	0.12	0.12	0.18	0.18	0.22	0.26	0.32
	Median	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.35	0.4	0.5

		10	11	12	13	14	15
	N	11	1	3	2	1	1
Effort	Mean	0.436	0.300	0.800	0.250	0.100	0.300
	std.dev.	0.30		0.17	0.21		
	Median	0.4	0.3	0.7	0.25	0.1	0.3

Similarly to other gift exchange experiments, players do not play the sub-game perfect equilibrium, and are better off because of that. The data also display the typical positive relationship between effort and transfer. This is in Table 7 which presents, for each transfer received, the average and median effort choices of players 2.

A.2 Data and 'Split-Sample' Regression Results

Table 8: number of effort and transfer pairs by induced mood.

	Transfer	Effort	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	Total
Good Mood													
	0		28						2			1	31
	1		17			3	2						22
	2		11						1				12
	3		7	3	1								11
	4		4	3	4	1	1						13
	5		12	5	6	6	1		2		1		33
	6		8	4	5	4	5			2			28
	7		15	6		4		3	4			1	33
	8		7	6			3	1	2	1	2		22
	9		3		2	3	2		5		2		17
	10		1	1	2	1		1			1	1	8
	11				1								1
	12								2			1	3
	13		1			1							2
	14		1										1
	15				1								1
	Total		115	28	22	23	14	5	18	3	6	4	238
Bad Mood													
	0		14	1									15
	1		17	1									18
	2		6	1									7
	3		4	3	1			1					9
	4		6	1	4	1							12
	5		4	5	2	9	1						21
	6		3	2	4	9	6	1		1			26
	7		7	3	10	6	8	12	3				49
	8		2	2	3	4	3	2	5	2			23
	9		6	1		1	1	1	1		5		16
	10		1			1	1						3
	11												
	12												
	13												
	14												
	15												
	Total		70	20	24	31	20	17	9	3	5		199

Table 9: regressions using good mood data; N=238, I=34, min N_i=5, and max N_i=8.

	Good Mood					
	Random Effects			Fixed Effects		
R^2: within	0.282			0.283		
R^2: between	0.149			0.121		
R^2: overall	0.198			0.186		
	Wald test = 80.85	p-value	0.000	F test = 8.55	p-value	0.000
	Coefficient	t	p-value	Coefficient	t	p-value
Constant	0.1015 0.058	1.749	0.080	0.1198 0.0476	2.517	0.013
Transfer	0.0358 0.0076	4.714	0.000	0.0351 0.0076	4.639	0.000
Female	0.0208 0.0477	0.304	0.761			
Female × Transfer	-0.0095 0.0077	-1.235	0.217	-0.0118 0.0636	-1.511	0.132
Transfer≤2	0.0354 0.0477	0.741	0.459	0.0282 0.0479	0.588	0.557
Transfer=10	-0.0524 0.0637	-0.822	0.411	-0.0625 0.0636	-0.982	0.327
Transfer=11	-0.0803 0.1656	-0.485	0.628	-0.063 0.1652	-0.381	0.703
Transfer=12	0.2283 0.1034	2.207	0.027	0.2254 0.1035	2.178	0.031
Transfer=13	-0.1446 0.1329	-1.089	0.276	-0.1141 0.1327	-0.86	0.391
Transfer=14	-0.4796 0.1742	-2.753	0.006	-0.4736 0.1745	-2.713	0.007
Transfer=15	-0.406 0.1802	-2.253	0.024	-0.4217 0.182	-2.317	0.022

Table 10: regressions using bad mood data; N=199, I=31, min N_i=5, and max N_i=8.

			Bad Mood			
	Random Effects			Fixed Effects		
R^2: within	0.533			0.533		
R^2: between	0.124			0.122		
R^2: overall	0.37			0.368		
	Wald test = 190.15	p-value	0.000	46.88	p-value	0.000
	Coefficient	t	p-value	Coefficient	t	p-value
Constant	0.0103	0.188	0.851	0.0081	0.19	0.85
	0.0545			0.0429		
Transfer	0.0603	8.561	0	0.0612	8.623	0.000
	0.007			0.0071		
Female	0.0112	0.184	0.854			
	0.0439					
Female × Transfer	-0.0119	-1.644	0.100	-0.0115	-1.576	0.117
	0.0072			0.0835		
Transfer≤2	0.0479	1.092	0.275	0.0532	1.204	0.23
	0.0439			0.0442		
Transfer=10	-0.0881	-1.066	0.286	-0.0667	-0.798	0.426
	0.0827			0.0835		
Transfer=11	.			.		
Transfer=12	.			.		
Transfer=13	.			.		
Transfer=14	.			.		
Transfer=15	.			.		

A.3 Experiment Materials

Experiment Instructions

You are about to participate in an economic experiment that is part of a research project about decision-making. The instructions are simple, and if you read them carefully and make appropriate decisions, you might earn a considerable amount of money. All earnings resulting from your decisions in the experiment will be added up and paid privately to you in cash at the end of the experiment. The instructions are for private use only. Communication between the participants is strictly forbidden. If you have a question, please raise your hand. Attached to the instructions you will find a questionnaire that you should complete after we have gone through the instructions (and all remaining questions are answered). Together with these instructions you also have got a "documentation" that will be used to document your decisions.

The experiment consists of 8 rounds. At the beginning of each round pairs consisting of two persons each are formed. These two persons are called Person A and Person B. Each of you acts in all 8 rounds either as Person A or as Person B. Whether you are A or B is noted on the card you have drawn. After a round is finished, new pairs with different persons are formed, and the next round begins. You will never be matched twice with the same person, and you will not learn the identity of them.

In each round, Person A is endowed with 15 points. At the beginning of a round, A has to decide how many points she/he wants to transfer to the Person B she/he is matched with. This transfer t can be any integer between 0 and 15. Hence, transfers like 12 or 3 are allowed, but not transfers like 5.4 or 9.6. The points not transferred to B (i.e. $15 - t$) remain with A. When A has made a decision about the transfer, she/he has to record this transfer on her/his documentation in the line "transfer". It will then be transmitted to "her/his" Person B by the experimenter by recording it in B's documentation in the line "transfer".

After B is informed about the transfer, she/he has to decide about a conversion rate r. r can be 0.1, 0.2, 0.3, .1. (see the list of feasible values of r on page 2 of these instructions). When B has made a decision about the conversion rate, she/he has to record it in her/his documentation in the line "conversion rate". It will then be transmitted to Person A by the experimenter by recording it in A's documentation in the line "conversion rate". This finishes the round, and the next round with new partners start. Note, though, that your role (A or B) remains fixed.

The conversion rate r chosen by B is the rate that exchanges the points remaining with A into Dutch Guilders. Hence, A's earnings in a round in Dutch Guilders are given by:

$$\text{earnings of } A = (15 - \text{ transfer } t)(\text{ conversion rate } r)$$

B earns the points transferred to her/him. But the of the conversion rate is connected with costs $c(r)$, which depend the conversion rate B chooses. As you can see from the list of possible conversion rates r and conversion rate costs $c(r)$, these costs are increasing in r. Hence, B's earnings in a round in Dutch Guilders are given by:

$$\text{earnings of } B = \text{ transfer } t - \text{ conversion rate cost } c(r)$$

Do you have any questions?

Conversion rate costs:

e	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
$c(e)$	0.0	0.2	0.4	0.8	1.2	1.6	2.0	2.4	3.0	3.6

Questionnaire

We would like to test whether you have understood our instructions. Therefore we ask you to answer the following questions. Please try to answer each question. Wrong answers have no consequences for you.

1) Assume that A chooses a transfer of 4, and B a conversion rate of 0.9. How much do they earn?
Earnings of A......
Earnings of B......
(*Three more questions like the previous one followed at this point.*)

The Movies

In the bad mood treatment, the following sequence of approximately 6 minutes from Universal Pictures' Schindler's List, directed by Steven Spielberg, is shown.

> **Liquidation of the Ghetto, March 13, 1943.** The scene begins with trucks full of soldiers ready to move into the Ghetto. Then the Nazis troops, many of whom have leashes on muzzled dogs, set up for the extermination. Noises of the growling dogs, trucks, and orders shouted out are heard. The storm troopers surround the buildings and expel the families from their apartments. Fear appears on the faces of the children. In one of many vignettes, some of the refugees roll their valuable jewels into wads of bread to be swallowed. Any resistance or questioning is halted with a gun. Suitcases are dumped from upper balconies and abandoned as litter. A young male character tells her fiance that he is planning to escape through the sewer tunnel, but she refuses to join him. He opens a manhole cover and descends into the steamy depths. Frightened Jews are yelled at and herded into groups. One father is killed with machine-gun fire for deflecting a soldier's aim toward his son's back as he was attempting to run away. The boy is also arbitrarily shot as he is dragged back. To prevent even crueler deaths, a doctor in the hospital calmly measures out doses of poison that are soon administered by nurses to patients. The lifeless corpses are machine-gunned until the soldiers realize they're already dead. Without regard to family considerations, women are segregated from the men, splitting husbands and wives.

In the good mood treatment, the following sequence of approximately 6 minutes is shown from Charles Chaplin Productions' City Lights, directed by Charles Chaplin.

> **Boxing Fight.** The boxing fight sequence is a funny choreographed ballet between the Tramp (Chaplin) his opponent (a mean looking boxer) and their referee (a tall wide

man). The Tramp defensively dances around in the ring to avoid the punches of the big opponent, deftly hiding and ducking for safety behind the tall referee, and slipping away from his opponent at one point to leave his opponent facing the referee. Later in the fight, the bell rope gets wrapped around the Tramp's neck. When he is knocked down, the rope pulls on the bell and luckily, the round is declared over. But unfortunately, when he turns to go to his corner for a rest, the Tramp's movement rings the bell again, starting the next round.

Questionnaires

Questions before the game was played.
Answer by circling the appropriate number.

1. Rate the artistic content of the scene you just saw on the following scale:

1: extremely high / very good
2
3
4
5
6
7
8: extremely low / very bad

2. Rate the actors' performance in the scene you just saw on the following scale:

1: extremely good / very able
...
8: extremely bad / very unable

3. Rate how do you feel on the following scale:

1: extremely happy / in a very good mood
...
8: extremely unhappy / in a very bad mood

4. Rate a price of 5dfl to watch the entire movie on the following scale:

1: extremely cheap / a very good bargain
...
8: extremely expensive / a very bad bargain

Questions after the game was played.
Answer by circling the appropriate number.

1. Rate your performance in the economic experiment on the following scale:

1: extremely satisfactory / very good
...
8: extremely unsatisfactory / very bad

2. Rate how do you feel now on the following scale:

1: extremely happy / in a very good mood
...
8: extremely unhappy / in a very bad mood

3. Rate how happy you feel about your partners' decisions in the experiment on the following scale:
1: very happy / extremely satisfied
...
8: very unhappy / extremely unsatisfied

4. Have you ever participated in an economic experiment before:

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