Supplementary material accompanying “Choosing the carrot or the stick? – Endogenous institutional choice in social dilemma situations” by Matthias Sutter, Stefan Haigner and Martin Kocher

Appendix A: Instructions for the endogenous choice with |*L*| = 3

(Originally in German –instructions for other treatments are available upon request)

Welcome to the experiment. Please refrain from talking to other participants from now on.

Groups of 4 persons and 10 periods

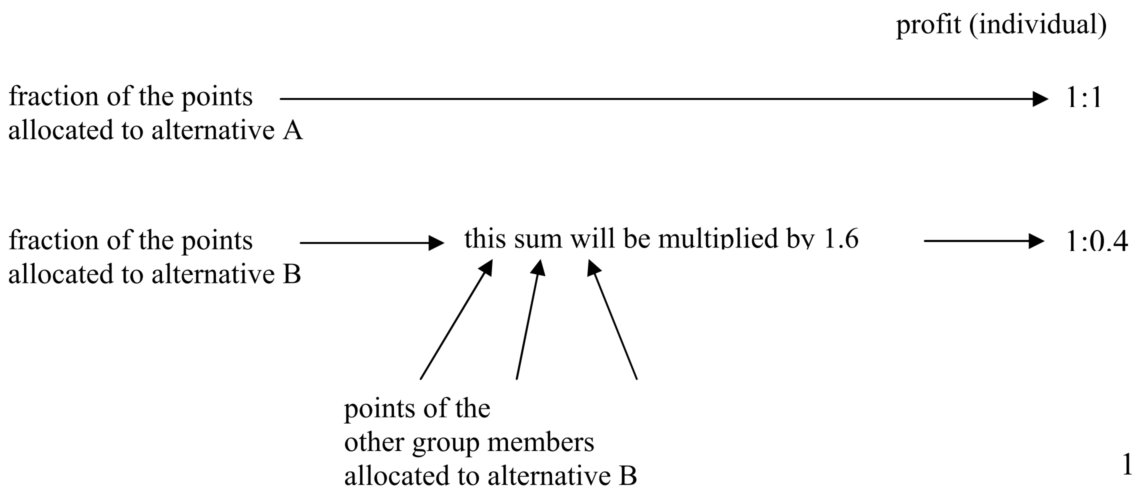
At the beginning of the experiment you are randomly assigned to a group of 4 subjects that will remain the same throughout the whole experiment. The whole experiment lasts 10 periods.

Basic decision

At the beginning of each period you will receive an endowment of 20 tokens. These tokens can be allocated into two alternatives, denoted A and B. The sum of the tokens allocated to A and B must equal 20. You cannot save any tokens or transfer them to a later period.

Profits from both alternatives

You will receive the tokens allocated to alternative A back one-to-one as one part of your profit.
The tokens allocated to alternative B are summed up with the contributions of the other group members to alternative B. The sum of all tokens allocated to alternative B in your group is multiplied by 1.6 and will be equally distributed– independent of one’s particular contribution – among all group members. This means that you – and every other group member – will receive 0.4 tokens in return (=1.6/4) for every token allocated to alternative B.
The following figure summarizes the profits from both alternatives. The sum of profits from both alternatives gives your total earnings in this period.



Three possible institutions

Institution number one

Under this institution you have to make your basic decision only. Your profit per period is as described above, depending on how much you have allocated to alternative A and how much the group altogether has allocated to alternative B. After the basic decision has been entered by all subjects, you will be informed on the next screen about the decisions of all other group members.

Institution number two

This is the same as institution number one, with the following additional feature: After having observed the other members' contributions you have the option to assign points to other members. You can assign points to as many other members as you wish, but you can only assign one point per member. Assigning a point has the following consequences: The person assigning a point bears the cost of one token (this cost will be subtracted from the period payoff). The person receiving a point bears the cost of three tokens (also to be subtracted from her period payoff).

Institution number three

This is also the same as institution number one, with the following additional feature: After having observed the other members' contributions you have the option to assign points to other members. You can assign points to as many other members as you wish, but you can only assign one point per member. Assigning a point has the following consequences: The person assigning a point bears the cost of one token (this cost will be subtracted from the period payoff). The person receiving a point receives three tokens (to be added to her period payoff).

Which institution is valid for your group?

Before the experiment starts, you have the option to participate in a vote on the institution that will be valid in your group for all 10 periods. You are not required to participate in the vote, but even in that case the voting outcome in your group will be binding for you as well. Participation in the vote has a one-time cost of 10 tokens (which will be subtracted from your first period's earnings).

If you participate in the vote you have to indicate for each of the three institutions introduced above whether you support this institution (click on "Yes") or not (click on "No"). You can support as many institutions as you want. Before the vote starts, you will see the number of voters in your group. When all group members that participate in the vote have made their decisions, you will see on a succeeding screen how many group members supported any of the three institutions.

1. If one and only one institution is unanimously supported by all voters in your group, then this institution will be applied for the 10 periods.

2. If two or three institutions are unanimously supported, then the institution will be chosen randomly from those institutions unanimously supported by all voters in your group.
3. If no institution has unanimous support, then the voting procedure will be repeated.

The voting procedure is repeated until the unanimous support of at least one institution is reached.

If no group member participates in the vote, the institution is chosen randomly with equal probabilities for each institution.

[In order to speed up the voting procedure, we ask you to pay close attention to the status bar where you will see either the message “waiting for others” or “please vote”.]

Screen sequences

In the upper part of the screen you will see your group and subject number. On all screens you will also be able to see the prevalent institution in your group.

Independent of the institution used, you always have to make the basic allocation decision. Then, you will be shown the basic decisions of all group members on the next screen. Under institution one you will also see the profits. Under institutions two and three you can then enter the points if you wish to assign some. As the final screen in institutions two and three of each period, you will see again the basic decisions of all group members (linked to their ID) and the sum of points you have assigned and received. You are not able to see how many points other group members have assigned or received or who has assigned points to you. The profits are calculated as described above.

Exchange rate. At the end of the experiment all tokens you have earned are summed up and converted in real money at a rate of **10 tokens = 0.40 EURO**.

Appendix B: Predictions and propositions

B1. Theoretic predictions when agents are purely selfish

B1.1 Standard voluntary contribution mechanism

The payoff for member i in period t is given by $\pi_{i,t} = E - c_{i,t} + \gamma C_t$, where $C_t = \sum_{j=1}^{n} c_{j,t}$ denotes the sum of contributions within a group. Given that $0 < \gamma < 1 < n\gamma$, it follows that the marginal return for member i from investing into the public good is negative (since $\partial \pi_{i,t} / \partial c_{i,t} = -1 + \gamma < 0$). Under the assumptions of selfishness and common knowledge of rationality, the only subgame-perfect equilibrium is to contribute zero in each single period (i.e. $c_{i,t} = 0 \; \forall t$).

B1.2 VCM with punishment or reward

Since punishment (reward) is costly (both with $|L| = 1$ and $|L| = 3$), no member will ever punish (reward) another member in the second stage of the final period. Hence, contributions in the first stage of the final period cannot be affected by the availability of punishment (reward). Unraveling the same logic back to the first period yields zero contributions as the only subgame-perfect equilibrium. Given that equilibrium contributions are identical under all available institutions, it follows that in the endogenous treatments all members should abstain from voting in order to save the voting costs.

B2. Theoretic predictions based on the Fehr and Schmidt (1999)-model

B2.1 Standard voluntary contribution mechanism

Proposition 1*: Consider the standard linear VCM. If at least one member in a four-person group cares relatively little about advantageous inequality (i.e., $\beta_i < 0.6$), the only equilibrium is complete free-riding ($c_{i,t} = 0$) of all members. Otherwise, there is a multiplicity of equilibria with all members contributing $c_{i,t} = c \in [0, E]$.*

This proposition is based on Proposition 4 in Fehr and Schmidt (1999, see p. 839). It follows from this proposition that in our case with $\gamma = 0.4$ and $n = 4$, there is no equilibrium with positive contributions in the repeated standard VCM if the fraction of members with a $\beta_i < 0.6$ is larger than 20%. This means that one member with $\gamma + \beta_i < 1$ suffices to wipe out cooperation in the whole group.

B2.2 Low leverage (|*L*| = 1)

B2.2.1 Punishment

Proposition 2*: Consider the VCM with punishment and $|L| = 1$. Complete free-riding is the only equilibrium when at least one group member satisfies $\beta_i < 0.6$ (which yields the same prediction as in the VCM). Only if all members satisfy $\beta_i \geq 0.6$, any positive contribution can be sustained as an equilibrium.*[1]

Let us denote the number of cooperators (defined as subjects who satisfy $\gamma + \beta_i \geq 1$) in a group by *n'*. For reasons of generality, let us define *k* as the costs of punishing or rewarding another subject. Note that *k* is normalized to unity ($k = 1$) in our experiment. Consider a strategy where all members contribute $c > 0$ and where all cooperators punish any member who contributes $c_{i,t} < c$. For this strategy to be an equilibrium we must show that (*i*) it does not pay for any member to free-ride and contribute less than *c* and that (*ii*) cooperators have an incentive to punish those who contribute $c_{i,t} < c$, i.e. that the punishment threat is credible.

(*i*) Free-riding on the other members' contributions *c* by choosing $c_{i,t} < c$ generates a monetary gain of $(c - c_{i,t})(1-\gamma)$ for the free-rider (relative to those contributing *c*). If the *n'* cooperators punish the free-rider, the latter suffers a monetary loss of $n'L$. The maximum gain from a deviation from *c* is given for $c_{i,t} = 0$. The resulting gain is smaller than the loss from being punished as long as the following condition is satisfied.

$$c \leq \bar{c} = \frac{n'L}{(1-\gamma)}. \tag{B1}$$

Hence, no member has an incentive to deviate from contributing *c* as long as the latter condition is fulfilled. What remains to be shown is whether the threat of punishing those members who would consider contributing $c_{i,t} < c$ is credible.

[1] This latter case is rather unlikely. See Table 2 for details.

(*ii*) For the threat to be credible, a cooperator's utility from punishing must be larger than her utility from not punishing, under the assumption that the other $(n'-1)$ cooperators stick to their punishment strategy. Hence, we have to check the following inequality for member *i*.

$$-k-\frac{\alpha_i}{n-1}(n-n'-1)k-\frac{\alpha_i}{n-1}(\bar{c}-c+k-n'L)\geq -\frac{\alpha_i}{n-1}(\bar{c}-c-(n'-1)L)-\frac{\beta_i}{n-1}(n'-1)k \quad \text{(B2)}$$

The first term on the left-hand side denotes the costs of punishing a deviating member. The second term indicates the disadvantageous inequality towards those members who contribute *c*, but who do not punish deviating members. The third term captures the remaining disadvantageous inequality towards the deviating member who gets punished by all *n'* cooperators. The first term on the right-hand side denotes the disadvantageous inequality towards the deviating member if member *i* does not punish, but the other *n'* – 1 cooperators punish. The second term is due to the advantageous inequality of member *i* towards the *n'* – 1 cooperators who punish. Rearranging and simplifying yields the following condition to be satisfied in order to make punishment a credible threat.

$$\frac{L}{k}\geq (n-n')+\frac{1}{\alpha_i}[(n-1)-\beta_i(n'-1)] \quad \text{(B3)}$$

Note that the left-hand side of equation (B3) yields $L/k = 1$ in our experiment in the low-leverage treatment ($|L| = 1$). From that it follows that condition (B3) cannot be satisfied as long as $n' < n$. Hence, the threat of punishment is not credible under $|L| = 1$ if $n' < n$. As a consequence, the same predictions as in the standard VCM apply. Only if $n' = n$, i.e. if all group members are cooperators (with $\gamma + \beta_i \geq 1$), the threat of punishment is credible and any contribution level $c \leq \bar{c}$ can be enforced.

B2.2.2 Reward

Proposition 3*: Consider the VCM with reward and $|L| = 1$. If at least one group member satisfies $\beta_i < 0.6$, zero contributions are the only equilibrium. Only when all members are rather averse to advantageous inequality ($\beta_i \geq 0.6$ for all i), positive contributions $c_{i,t} = c \in [0, E]$ are feasible in equilibrium. Using the reward option can only be part of an equilibrium strategy if all members satisfy $\beta_i \geq 0.75$.*

Suppose all members contribute $c \in [0, E]$. Note that the *n* – *n'* members with $\gamma + \beta_i < 1$ will never reward other members. A cooperator, then, has to consider the following inequality in order to decide whether to reward (left-hand side) or not (right-hand side).

$$(n'-1)L - (n-1)k - \frac{\alpha_i}{n-1}[L + (n-1)k](n - n') \geq (n'-1)L - (n'-1)\frac{\beta_i}{n-1}[L - (n'-1)k] \quad \text{(B4)}$$

The first term on the left-hand side captures the gains from being rewarded by the other *n'* – 1 cooperators. The second term shows the costs from rewarding all other members. The third term denotes the disadvantageous inequality towards the *n* – *n'* members with $\gamma + \beta_i < 1$ who do not reward others. The first term on the right-hand side shows again the gains from being rewarded by the other cooperators. The second term indicates the advantageous inequality towards those *n'* – 1 cooperators. Rearranging terms yields the following condition that has to be satisfied in order to make cooperators reward the other members.

$$(n-1)k + \frac{1}{n-1}[L + (n-1)k][\alpha_i(n - n') - \beta_i(n'-1)] \leq 0 \quad \text{(B5)}$$

This condition is never satisfied for *n'* < *n*. Therefore, there are no equilibria in which reward is part of the equilibrium strategy. Thus, for *n'* < *n* we have the same set of equilibria as in the standard VCM.

For $n' = n$ we find that mutual rewarding can be part of an equilibrium strategy. To show this, we examine a situation where all members contribute *c* and reward each other. If member *i* deviates and does not reward the other $(n-1)$ members, she saves rewarding costs of $(n-1)k$. But at the same time member *i* suffers from advantageous inequality, expressed by $\frac{\beta_i}{n-1}[L + (n-1)k](n-1)$. Sticking to reward is thus optimal if

$$(n-1)k \leq \frac{\beta_i}{n-1}[L + (n-1)k](n-1) \quad \text{(B6)}$$

For |*L*| = 1 and *k* = 1 we must have $\beta_i \geq 0.75$ for condition (B6) to hold. If all group members satisfy $0.6 < \beta_i < 0.75$, any positive contribution $c_{i,t} = c \in [0, E]$ can still be sustained as an equilibrium, but mutual reward is not part of an equilibrium.

B2.2.3 Voting under the low leverage (|*L*| = 1)

Proposition 4: *Suppose group members can vote between the standard VCM, the VCM with punishment, and the VCM with reward under |L| = 1. If voting is costly, subjects do not participate in the vote because contributions are expected to be the same for the standard VCM and reward or punishment with |L| = 1.*

Given the positive costs of voting, Propositions 2 and 3 imply Proposition 4.

B2.3 High leverage (|*L*| = 3)

B2.3.1 Punishment

Proposition 5: *Consider the VCM with punishment and |L| = 3. There exists a continuum of equilibria in the game where* $c \leq \bar{c} = Ln'/(1-\gamma)$ *can be enforced, but where no punishment actually occurs. Consequently, contributions are expected to be higher with punishment under |L| = 3 than under |L| = 1 and higher than in the standard VCM.*

Under the high-leverage |*L*| = 3 condition (B3) from Section B2.2.1 can be satisfied even if $n' < n$ (depending on a member's α_i and β_i). Hence, punishment can be a credible threat even if not all group members are cooperators. Therefore, it is possible to enforce $\bar{c}$. All other equilibria discussed for the case of punishment with |*L*| = 1 remain also valid for |*L*| = 3.

B2.3.2 Reward

Proposition 6: *Consider the VCM with reward and |L| = 3. Equilibrium predictions in this institution are identical to those with reward under |L| = 1. Yet, equilibria where all members reward each other are easier to achieve than under |L| = 1 because they require* $\beta_i \geq 0.6$ *instead of* $\beta_i \geq 0.75$ *for all members.*

From condition (B5) in Section B2.2.2 it can be seen that even under the high leverage treatment it is not possible to enforce any $c \in [0, E]$ through the use of rewards, since it is better even for cooperators to abstain from rewarding as long as $n' < n$. Only if $n' = n$, mutual rewarding can be part of an equilibrium strategy. From condition (B6) and the assumption that $n' = n$ it follows that mutual rewarding is part of an equilibrium strategy already if $\beta_i \geq 0.6$ for all members (which is a less restrictive condition than under $|L| = 1$, where it was necessary to satisfy $\beta_i \geq 0.75$ for all members).

B2.3.3 Voting under the high leverage (|*L*| = 3)

Proposition 7*: Suppose group members can vote between the standard VCM, the VCM with punishment, and the VCM with reward under $|L| = 3$. Assume that the distribution of social preferences follows the note in Table 2 as described above. Then, subjects are expected to support only the punishment institution, and voter turnout will be higher under $|L| = 3$ than under $|L| = 1$.*

Concerning voting behavior in our endogenous treatment under $|L| = 3$, it is important to note first that the punishment institution is the only one in which a contribution level $\bar{c} > 0$ can actually be enforced (with the magnitude of $\bar{c}$ depending on the number of cooperators in the group). In the standard VCM or with reward, positive contributions may be sustained in equilibrium, but only if none of the group members satisfies $\beta_i < 0.6$. Taking the distribution of social preferences from Fehr and Schmidt (1999), 97.4% of four person-groups would have at least one member with $\beta_i < 0.6$, and therefore the only equilibrium would be zero contributions. In the punishment institution, though, it suffices to have one subject with $\beta_i \geq 0.6$ to be able to enforce a contribution of $\bar{c} = 5$. Given the distributional assumptions from Fehr and Schmidt (1999), about 87% of groups should have at least one subject with $\beta_i \geq 0.6$. It can be easily verified that for almost any meaningful assumption about the distribution of social preferences among subjects, it is optimal (in expected terms) to participate in the vote (incur the one-time cost of 10 ECU) and support only the punishment institution.

Finally, we note that the voting stage entails a coordination problem. Given our approval voting procedure, in equilibrium only one subject per group should go to the ballot and vote for the punishment mechanism in $|L| = 3$ in order to save on voting costs.

B3. Theoretic predictions based on the Charness and Rabin (2002)-model

The subsequent analysis assumes (i) that *n''* subjects (henceforth called cooperators) out of *n* group members have social preferences of the Charness-Rabin type (see equation (4) in Section 5), (ii) $(n - n'')$ subjects care only for their own monetary payoff, and (iii) common knowledge of rationality applies.

B3.1 Standard voluntary contribution mechanism

Proposition 8*: Purely selfish players will never contribute positive amounts in the standard VCM. Cooperators will contribute their entire endowment to the public good if* $\lambda_i \geq 0.5$ and $\delta_i \leq 1 - \frac{1}{2\lambda}$.

For a purely selfish players it is a dominant strategy to contribute $c = 0$. A cooperator has to determine whether contributing a positive amount increases his utility (see equation (4) in Section 5) or not. Positive contributions decrease the cooperator's monetary payoff (by $1-\gamma$), increase the total payoff in the group (by $n\gamma - 1$), and decrease the minimum payoff in the group (which is by necessity the cooperator's payoff, since selfish subjects will never contribute more than the cooperator) by $1-\gamma$. Taking the derivative of equation (4) with respect to *c* yields the following inequality $(1-\lambda)(-1+\gamma) + \lambda[\delta(-1+\gamma) + (1-\delta)(-1+n\gamma)] \geq 0$. After some rearrangement this simplifies to

$$\delta \leq \frac{1.2\lambda - 0.6}{1.2\lambda} = 1 - \frac{1}{2\lambda} \tag{B7}$$

From (B7) it follows that the cooperator's concern for social welfare must satisfy $\lambda_i \geq 0.5$, and that δ_i must satisfy particular conditions (in relation to λ_i) such that a cooperator has a positive incentive to contribute. If so, cooperators contribute their full endowment *E*. If (B7) is not satisfied, all group members contribute zero.

B3.2 Punishment

Proposition 9: *Consider the VCM with punishment and |L| ≥ 1. The existence of the punishment option cannot induce any contributions in excess of those which would also be contributed without the availability of punishment.*

A selfish player will only cooperate if she is threatened by punishment in case of defection. In order to enforce contributions $c > 0$ from the selfish players, the gain from cooperation must exceed the gain from defection (i.e. contributing zero). That is $E - c + \gamma C \geq E + \gamma C - \gamma c - n'' L$, which yields $c \leq \bar{c} = n'' L / (1 - \gamma)$ after rearrangement. Thus, in general a selfish player has an incentive to contribute $0 < c \leq \bar{c}$ in case punishment by the cooperators is a credible threat. However, that is not the case, because if a cooperator decided in the second stage to punish the defector she would be worse off than under no punishment, because punishment reduces (i) her own payoff, (ii) the minimum payoff in the group, and (iii) the group's total payoff.

B3.3 Reward

Proposition 10: *Consider the VCM with reward and |L| ≥ 1. In the case of L = 3, subjects who satisfy* $\lambda_i \geq 0.5$ *(and thus contribute* c_i *= 20; their number is denoted by n'') can enforce a positive contribution of* $\bar{c} = n'' L / (1 - \gamma)$ *from subjects who care less for social welfare (with* $\lambda_i < 0.5$*). This enforcement rests on rewarding the selfish subjects for contributing* $\bar{c}$*. For the case of L = 1, the same argument applies, but reward can only be part of an equilibrium strategy (and thus* $\bar{c}$ *can only be enforced) if there are n′′ subjects who satisfy the more demanding condition* $\lambda_i \geq 0.75$.

Similar to the case of punishment, a selfish player compares the payoff from contributing and getting rewarded in the second stage with the payoff from defection in the first stage. Therefore, we have to assess the following inequality: $E - c + \gamma C + n'' L \geq E + \gamma C - \gamma c$. Again, after rearranging, we obtain the condition $c \leq \bar{c} = n'' L / (1 - \gamma)$. Thus, a selfish player cooperates if this condition is fulfilled.

It remains to be shown whether it constitutes an equilibrium for a cooperator to reward $(n - 1)$ group members in the second stage, even though she will, in turn, only be rewarded by the $(n''-1)$ other cooperators in the group. This is equivalent to check whether the inequality (B8) holds:[2]

$$
\begin{aligned}
&(1-\lambda)[(n'-1)L-(n-1)k]+\\
&\lambda[\delta((n'-1)L-(n-1)k)+(1-\delta)\{n'[(n'-1)L-(n-1)k]+(n-n')(n'L)\}]\geq\\
&(1-\lambda)(n'-1)L+\\
&\lambda[\delta((n'-1)L-L-(n-1)k)+(1-\delta)\{(n'-1)[(n'-1)L-L-(n-1)k]+(n-n'+1)(n'-1)L\}]
\end{aligned}
\tag{B8}
$$

After rearrangement and simplification we arrive at condition (B9):

$$
\frac{L}{k}\geq\frac{(1-\lambda)(n-1)+\lambda(1-\delta)}{\lambda}
\tag{B9}
$$

In the low-leverage treatment this is satisfied for $\delta=[0,1]$ and $\lambda=[3/4,1]$. Similarly, in the high-leverage treatment it is satisfied for $\delta=[0,1]$ and $\lambda=[0.5,1]$, provided that $5+\delta\geq 3/\lambda$. Hence, as long as λ and δ satisfy these conditions, reward constitutes a credible incentive to elicit contributions up to $\bar{c}$ from selfish players.

[2] As the payoff differences occur in the second stage, we omit for simplicity all the variables from the first stage that cancel out each other, i.e. $E, \gamma C, \gamma c$.

B3.4 Voting under the low leverage (|L| = 1)

Proposition 11*: Suppose group members can vote between the standard VCM, the VCM with punishment, and the VCM with reward under* $|L| = 1$*. If voting costs are sufficiently small, group members with* $\lambda_i \geq 0.75$ *participate in the vote and support reward*

Propositions 9 and 10 imply Proposition 11. Note again that subjects who care a lot for social welfare should participate in the vote in our endogenous treatments and support the reward option in order to be able to enforce positive contributions from subjects who care little for social welfare (and who do not participate in the vote). This latter group of subjects does only contribute in the VCM with reward but not in the standard VCM or the VCM with punishment.

B3.5 Voting under the high leverage (|L| = 3)

Proposition 12*: Suppose group members can vote between the standard VCM, the VCM with punishment, and the VCM with reward under* $|L| = 3$*. If voting costs are sufficiently small, group members with* $\lambda_i \geq 0.5$ *participate in the vote and support reward*

Again, Propositions 9 and 10 imply Proposition 12. As a final remark, remember that given our approval voting procedure, in equilibrium only one subject per group should go to the ballot and vote for the reward mechanism in $|L| = 3$ in order to save on voting costs.

Appendix C: Social orientation questionnaire

The social orientation questionnaire consists of 24 choices (see Table C1) between two own-other payoff allocations (the "decomposed game") in constant, anonymous pairs. Each allocation assigns a given amount of experimental money to the subject herself, called own payoff *x*, and a certain amount of points to the matched player, called other payoff *y*. It was common knowledge that every subject received the same questionnaire. During the questionnaire players did not receive any feedback about the other player's choices in order to avoid strategic considerations. The payoff allocations are constructed such that $r^2 = 15^2 = x^2 + y^2$ holds. Hence, each allocation can be represented as a vector in a Cartesian plane which lies on a circle with radius *r* centered at the origin.

The payoff allocations are paired such that each choice consists of two adjacent vectors. If one assumes that a – yet unknown – motivational vector $\vec{M}$ exists, a subject will choose that allocation (vector) which is closer to $\vec{M}$. Based on a series of choices, therefore, it is possible to determine a subject's "social motivation" with respect to weighing own payoffs (*x*) versus others payoffs (*y*) by adding up *x* and *y* separately across all choices and calculating the angle θ_M of the resulting vector $\vec{M}$. By means of this angle, subjects' motivation can be classified as belonging to one of the following eight categories: individualism, altruism, cooperation, competition, martyrdom, masochism, sadomasochism, and aggression.

In addition, the length of the motivational vector serves as a measure of consistency, i.e., whether the choices are taken such that the subject has always chosen that vector which is closest to the motivational vector. If a subject chooses consistently throughout the 24 choices, the length of the resulting vector would be 30. Random choice would result in a vector of zero length.

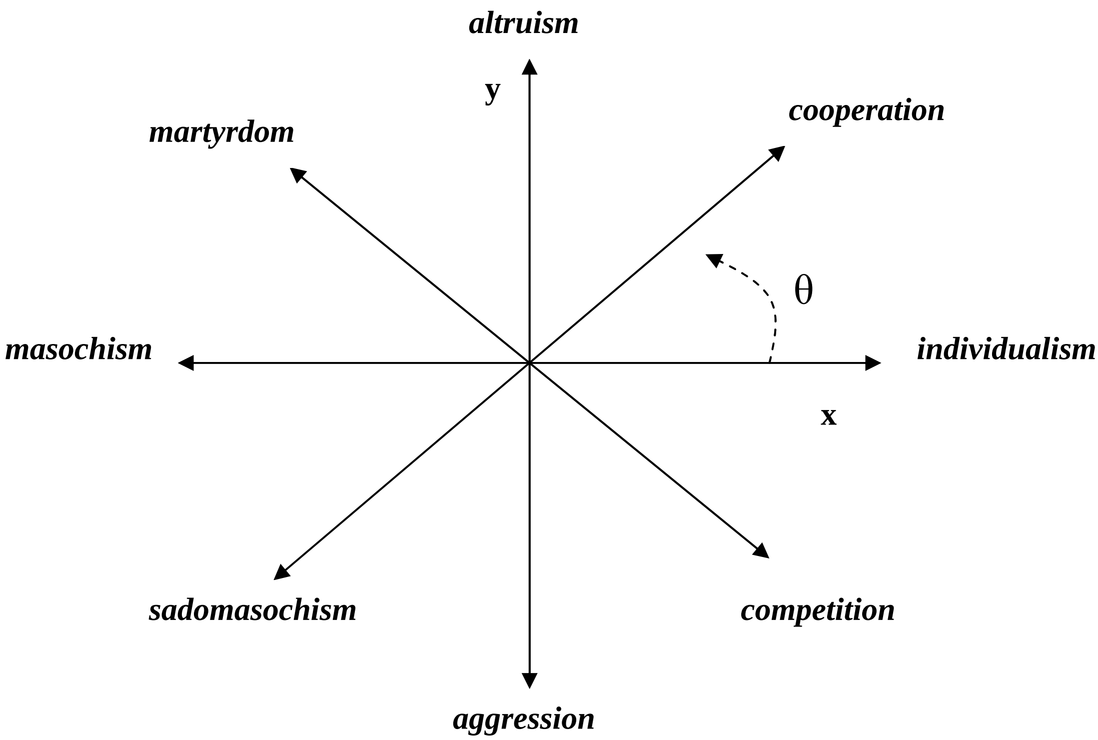
In order to incentivize the procedure, subjects' total payoffs from the series of choices were determined by the sum of choices made by the subject herself and by the choices of the paired player.

Table C1: Decomposed game – own-other payoff allocations

	Option A		Option B	
Question number	self (x)	other (y)	self (x)	other (y)
1	15	0	14.5	-3.9
2	13	7.5	14.5	3.9
3	7.5	-13	3.9	-14.5
4	-13	-7.5	-14.5	-3.9
5	-7.5	13	-3.9	14.5
6	-10.6	-10.6	-13	-7.5
7	3.9	14.5	7.5	13
8	-14.5	-3.9	-15	0
9	10.6	10.6	13	7.5
10	14.5	-3.9	13	-7.5
11	3.9	-14.5	0	-15
12	14.5	3.9	15	0
13	7.5	13	10.6	10.6
14	-14.5	3.9	-13	7.5
15	0	-15	-3.9	-14.5
16	-10.6	10.6	-7.5	13
17	-3.9	-14.5	-7.5	-13
18	13	-7.5	10.6	-10.6
19	0	15	3.9	14.5
20	-15	0	-14.5	3.9
21	-7.5	-13	-10.6	-10.6
22	-13	7.5	-10.6	10.6
23	-3.9	14.5	0	15
24	10.6	-10.6	7.5	-13

The classification of the subjects is accomplished by means of the angle of the motivational vector $\vec{M}$ (based on the vectors defining the basic social motivation; see Figure C1) Subjects with an angle θ_M between 0° and 22.5° or 337.5° and 0° are classified as individualistic, subjects with an angle between 22.5° and 67.5° as cooperative. Further angles are: altruist (between 67.5° and 112.5°), martyrdom (between 112.5° and 157.5°), masochism (between 157.5° and 202.5°), sadomasochism (between 202.5° and 247.5°), aggression (between 247.5° and 292.5°), and competitive (between 292.5° and 337.5°), but they are very rarely observed in practice. To avoid examining subjects who made relatively inconsistent choices, we included in the analysis only those subjects with a vector length of 15 (out of the maximal length of 30).

Figure C1: Vectors defining the basic social motivation



Experimental instructions for the ring test

You will have to make a series of choices between two options, called Option A and Option B. Every option allocates a positive or negative number of tokens to your account and a positive or negative amount of tokens to another person's account. This other person is also sitting in this room. You will remain anonymous to the other person and so will the other person to you. The person will not be someone who was in your group during the first part of the experiment.

Example:

CHOICE NUMBER 2	Option A	Option B
Your payoff	10.00	7.00
Other's payoff	-5.00	4.00

If you choose option A, you will receive 10 tokens and the other person will be deducted 5 tokens. In case you choose option B, you will receive 7 tokens and the other person will receive 4 tokens.

Your payoff is determined by summing up "your payoff" in the 24 decisions that you have to make. Note that you will also act as a recipient for the person you act with. Hence, you receive the sum of "other's payoff" from this other person. The sum of both accounts determines your earnings from this part. The exchange rate is

10 tokens = 1.5 Euro

Note that you will not be informed about the identity of the other person and about this person's decisions. You will only get to know the sum of money that has been allocated to you by the other person.