Tangible temptation in the social dilemma:

Cash, cooperation and self-control

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Abstract

The social dilemma may involve a within-person conflict, between urges to act selfishly and better judgment to cooperate. Examining the proposition from the perspective of temptation, we pair the public good game with treatments that vary the degree to which money is abstract (numbers on-screen) or tangible (tokens or cash). We also include psychometric measures of self-control and impulsivity. Consistent with our hypothesis, we find in the treatments that render money more tangible a stronger positive association between cooperation and self-control—and a stronger negative association between cooperation and impulsivity. Our results show that the representation of the endowment in the public good game matters for the role of self-control—and hence cooperation.

Keywords: Self-control, Cooperation, Public good experiment, Temptation.

JEL Classification: D01, D03, D64, D70.

1. Introduction

The social dilemma represents not only conflict between individual rationality and the collective good, but also a struggle within the individual—between conflicting preferences. More specifically, in contexts resembling that of the standard public good game (for surveys on public goods experiments, see, e.g., Ledyard, 1995; Zelmer, 2003; Gächter, 2007; Chaudhuri, 2011)—where the group is both abstract and anonymous—individuals may experience a self-control conflict between the temptation to act 'selfishly' and the 'better judgment' to act in the interest of others (Kocher *et al.*, 2013; Martinsson *et al.*, 2014). Expanding this conceptual framework, we explore here whether the representation of the endowment in a public good game matters for the applicability of self-control —and hence for cooperation.

We adapt from Reinstein and Riener (2011) a procedure for influencing the degree to which the endowment is represented as tangible (physical) vs. abstract (numerical), to test the hypothesis that a stronger positive correlation will emerge between cooperation and self-control in the treatment that renders money more tangible, and hence more viscerally tempting (Loewenstein, 1996). We also test the converse hypothesis—that a stronger negative correlation will arise between cooperation and impulsivity in the treatment that renders money more tangible. Our results confirm both predictions.

Our empirical strategy relies on a psychometric measure of individuals' trait capacity to exercise self-control (Rosenbaum, 1980a), also used in two recent papers that focused on the question of self-control conflict recognition in the public good game. Kocher *et al.* (2013) theorized about, and found evidence of, a positive association between cooperation and trait self-control among participants who reported feeling conflicted during the contribution decision—but not among participants who reported no conflict. Turning to the causality of conflict identification, Martinsson *et al.* (2014) fitted a subtle framing procedure to the public good game. They found that trait self-control was more strongly correlated with cooperation in the treatment that raised the relative likelihood of conflict identification than in the treatment that reduced the likelihood. The current paper extends the others by showing that the representation of the endowment in the public good game determines how self-control is related to cooperation.

The remainder of the paper is organized as follows. Section 2 briefly reviews the literature on the relation between pro-social behavior and self-control. Section 3 presents our model, and Section 4 outlines our experimental design. Section 5 presents the experimental results, and Section 6 discusses our findings and concludes the paper.

2. Self-control and pro-social behavior

2.1 *Conceptualizing self-control*

There are different ways of conceptualizing self-control. A common one, on which we rely here, is to understand self-control as a "cold" executive function that guides behavior in response to "hot" impulses to act against 'better judgment' (see e.g., Loewenstein, 1996; 2000; Metcalfe & Mischel, 1999; O'Donoghue & Loewenstein, 2007; Hofmann *et al.*, 2009). The executive function relies on limited resources, which we may think of as 'willpower' (see e.g., Baumeister *et al.*, 1998). In turn, the resources may include cognitive strategies to divert attention away from temptation (e.g., Mischel *et al.*, 1989), strategies of pre-commitment (e.g., Thaler & Shefrin, 1981; Schelling, 1984), or, simply, the strength of mind to resist (e.g., Myrseth & Wollbrant, 2013).

Perhaps not inconsistent with lay intuition, but noteworthy in light of the debate in social psychology about 'disposition versus the situation,' there is reason to think that the capacity to exert self-control constitutes a relatively stable personality trait. To this point, Mischel and colleagues found that a child's performance at age 4 on an instant gratification task (e.g., one marshmallow now, or two marshmallows later) predicted later in life their cognitive control (Eigsti *et al.*, 2006); ability to concentrate, self-control, interpersonal competence, SAT scores, and drug use (Mischel *et al.*, 1988; Mischel *et al.*, 1989; Shoda *et al.*, 1990; Ayduk *et al.*, 2000). Moreover, for the purpose of capturing trait self-control, a number of psychometric measures have emerged, including the Self-Control Schedule by Rosenbaum (1980a) and the Self-Control Scale by Tangney *et al.* (2004).

The visceral nature—or 'hotness'—of the temptation is central to most conceptualizations of self-control, both lay and scientific. It is thought that the immediate presence of a tempting object—say a newly baked cookie—triggers a stronger urge than does a more abstract and distant

representation of the object (Metcalfe & Mischel, 1999). In other words, the mere verbal description of a cookie would represent a lesser temptation than would a steaming, fresh one, standing in full purview of the hungry shopper. It is for this reason that numerous self-control strategies involve "cooling" the temptation, for example, by directing attention away from it (Mischel *et al.*, 1989), rendering it more abstract and less tangible (for a review, see Metcalfe & Mischel, 1999), or undermining its perceived value (Myrseth *et al.*, 2009). And it is for this reason that psychometric scales of trait self-control ask individuals about their tendencies (among other things) to engage in such behaviors (e.g., Rosenbaum, 1980a).

2.2 Self-control and social dilemmas

Loewenstein (1996; 2000), followed by O'Donoghue and Loewenstein (2007), suggest that visceral urges or drive-states may motivate 'selfish' behavior, and a growing body of empirical work indicates that this could be the case. Most pertinent to our present purposes is the work on cooperation in social dilemmas (for a review of social dilemmas, see van Lange *et al.*, 2013).

Several studies have examined the relationship between time preferences and cooperation. Curry *et al.* (2008) found in a standard public good game that discount rates were negatively associated with contributions to the public good. Fehr and Leibbrandt (2011) elicited time preferences of fishermen in the lab; they found that patient (vs. impatient) fishermen exhibited more cooperative behavior in the field, but they found no relationship in the lab. Jones and Rachlin (2009), however, find no correlation between temporal discounting and cooperation in a 100-person public good game—but it involved a purely hypothetical scenario, with no monetary incentives. Furthermore, Burks *et al.* (2009) report that "short-term" patience—the β in the β-δ model—is positively associated with cooperative behavior in a sequential prisoner's dilemma.[1,] Overall, then, preferences for the present over the future seem to be associated with more selfish as opposed to cooperative behavior.

[1] There is an extensive literature on self-control and time inconsistency in economics; see e.g. hyperbolic and quasi-hyperbolic discounting models by Strotz (1955) and Laibson (1997), the "planner-doer" model by Thaler

The literature on response times and cooperation, however, paints a conflicting picture. In several studies, shorter decision times are associated with more cooperative behavior (Rand *et al*., 2012; Lotito *et al.,* 2013; Rand *et al*. 2014)—even when such cooperation is conditional on that of the other players (Nielsen *et al*., 2013)—and treatments intended to reduce decision times boost cooperation (Rand *et al*., 2012; Rand *et al*. 2014).[2] Tinghög *et al*. (2013), however, fail to observe an effect of time pressure on cooperation, as do Verkoeijen and Bouwmeester (2014). Moreover, Lohse *et al.* (2014) report the opposite pattern—that longer decision times are associated with more cooperative behavior.[3] Further, if we were to view the time pressure treatment as one that influences cognitive resources, it would be relevant to note that Duffy and Smith (2014) report no consistent effect of cognitive load—meant to impair self-control by depleting cognitive resources—on outcomes across treatments, in a repeated multi-player prisoner's dilemma. We thus conclude that the precise role of cognitive resources in determining selfish versus cooperative behavior remains unclear.

Setting out to explore self-control in cooperation, Kocher *et al.* (2013) formulate and test a model in a one-shot, linear public good game; they examine the association between cooperation, self-control, risk-preferences, and the contributions of other players. Consistent with their predictions, cooperation is positively associated with a psychometric measure of trait self-control (Rosenbaum, 1980a), and this association is moderated by an interaction with risk-preferences; higher risk aversion implied a weaker association. Moreover, they find that this interaction is moderated by the degree of cooperation of other players, captured by the conditional cooperation schedule from the strategy method; individuals feel obliged to contribute, and to expend costly effort in this pursuit, to the extent that others are also contributing to the public good. Finally, and also consistent with their model, the

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and Shefrin (1981), and the dual-self model by Fudenberg and Levine (2006). For work on procrastination, see e.g. O'Donoghue and Rabin, (1999) and Burger *et al.* (2011).

[2] For a general discussion on the merit of response times in economics, see Rubinstein (2007; 2013).

[3] Recent work by Recalde *et al.* (2014) argues that the negative correlation observed between decision times and contribution reflects confused participants, who quickly select contributions that on average lie in the middle of strategy space.

aforementioned patterns were obtained for individuals who reported feeling conflicted during the decision to cooperate—not for those who reported no conflict whatsoever. Notably, their study did not feature any experimental treatments, and so it left empirical questions of causality unanswered.

Martinsson *et al.* (2014) explore one of these questions, namely that of identification of self-control conflict. Borrowing an experimental framing procedure from Myrseth and Fishbach (2010), also recently adapted by Martinsson *et al.* (2012) to a dictator game, they attempted to influence identification of self-control conflict in a one-shot, linear public good game.[4] Consistent with their predictions, the frame hypothesized to promote identification of self-control conflict—relative to that hypothesized not to—yielded a stronger positive correlation between cooperation and trait self-control. This effect was obtained both for unconditional and conditional cooperation, and, in the latter case, it was stronger for higher levels of others' contributions.

The present paper presents a modified version of the self-control model from Kocher *et al*. (2013), by explicitly incorporating temptation strength, and it examines empirically in a one-shot public good game a new question of causality—that concerning the strength of temptation.

2.3 *Self-control and dictator games*

Most studies on dictator games that speak to the role of self-control have done so by measuring or manipulating cognitive resources, broadly conceived. Piovesan and Wengström (2009) find that lower response times of participants in a repeated dictator game, which lasts 24 periods, are correlated with more selfish choices, both across and within participants. These results permit the interpretation that individuals' default behavior is to act in self-interest, and that pro-social behavior necessitates the successful resolution of a self-control conflict, which is time-consuming and requires cognitive resources. Consistent with this idea, Achtziger *et al.* (2015) find in a repeated dictator game that

[4] The hypothesized mechanism behind their procedure is consistent with the "logic of appropriateness" framework, which assumes that individuals ask themselves, "What does a person *like me* do in a situation *like this* (e.g., March, 1994; Messick, 1999; Weber *et al*., 2004)?" It can then be viewed as specifying when a particular logic of appropriateness is activated, thereby activating a self-control conflict.

cognitive depletion reduced giving. Moreover, giving declined with rounds, consistent with the notion that cognitive resources were depleted as individuals progressed through the game. However, Hauge *et al.* (2009) report no effect of cognitive load on players in one-shot dictator games, and Cornellisen *et al.* (2011), find no main effect of cognitive load across three low-stake, one-shot dictator games. Breaking down the data, however, Cornellisen *et al.* (2011) report that cognitive load increased giving among individuals classified as "pro-socials" according to Liebrand's (1984) measure of *social value orientation* (social preferences), but that there was no effect among the majority of participants, classified as "pro-selves." Schulz *et al.* (2014) report that cognitive load raised the proportion of altruistic choices in a repeated "mini-dictator game," where participants faced dichotomous choices, between "fair" and "unfair" allocations.

Taking a different approach, Martinsson *et al*. (2012) show that donations to the Red Cross in a one-shot dictator game are positively correlated with participants' scores on the Rosenbaum (1980a) measure of trait self-control. Notably, the correlation was obtained in the treatment that was expected to raise the relative likelihood of identification of self-control conflict, but not in that which was expected to reduce the likelihood. Aguilar-Pardo *et al.* (2013) obtain consistent results; young children who engaged in altruistic sharing in a dictator game exhibited later higher scores on an inhibitory control task, a measure of executive functioning. While studies of dictator games have produced mixed results, the emerging picture is that self-control facilitates giving.

3. Predictions

3.1 *Utility*

We assume an agent whose preferences are described by the utility function U_i, which consists of three components:

$$U_i = u_i(\pi_i) - s_i(c_i) + f_i(c_i) \quad (1)$$

The first component, $u_i(\pi_i)$, is the utility from monetary payoffs. For simplicity, we assume that utility is linear in payoffs, and that the utility from monetary payoffs is equivalent to the payoff itself, $u_i(\pi_i) = \pi_i$. Our empirical setting is a one-shot linear public goods game, where π_i is the payoff, e_i the endowment, c_i the contribution level, and m the marginal return from the public good:

$$\pi_i = e_i - c_i + m \cdot \sum_{j=1}^{n} \frac{c_j}{n}. \quad (2)$$

If $0 < m/n < 1$ and $m > 1$, this payoff function satisfies the requirements of a public good.

The second component, $s_i(c_i)$, specifies the cost of exercising self-control. This cost is "opportunity-based," following Fudenberg and Levine (2006). The underlying idea is that temptation strength is proportional to the appeal of available alternatives and that cost of self-control is monotonically and positively related to temptation strength. In our case, greed grows stronger with a greater difference between the highest possible available monetary payoff. Since $c_i = 0$ maximizes monetary payoff, any positive contribution level c_i' reduces the monetary payoff, and hence $\pi(0) > \pi(c_i')$, for $c_i' > 0$. We may write the difference between the two payoffs as the difference between the payoff function evaluated at zero and the payoff function itself. This quantity then becomes $\pi(0) - \pi(c_i') = c_i - mc_i/n = (1 - m/n)c_i$. The term $(1 - m/n)c_i$ therefore denotes greed and is the argument of the self-control cost function. Assuming a standard quadratic functional form, we may write the cost of self-control as

$$s_i(c_i) = \frac{(t(1-m/n)c_i)^2}{2\omega_i} \quad (3)$$

where the self-control cost is moderated by a will-power parameter $\omega_i > 0$. The parameter $t > 0$ measures the tangibility of monetary rewards, capturing the idea that more tangible objects are also more viscerally tempting (see e.g., Lowenstein, 1996; Metcalfe & Mischel, 1999).

The third and final component in (1), $f_i(c_i)$ specifies an intrinsic benefit from contributing, similar to impure altruism models (e.g., Andreoni, 1990).

$$f_i(c_i) = \alpha_i c_i, \quad (4)$$

where $\alpha_i > 0$ is a utility weight capturing the importance of contributing.

The motivation behind our modeling approach is to describe an agent with altruistic motivations, but who nevertheless feels tempted to be selfish. That is, the agent experiences a self-control conflict between her better judgment to act pro-socially and the temptation to act selfishly. To resolve this self-control conflict, the agent must expend costly effort. This effort is modeled with the approach by Fudenberg and Levine (2006), and implemented into the utility function accordingly.[5]

We state the utility function in full as

$$U_i = e_i - c_i + m \cdot \sum_{j=1}^{n} \frac{c_j}{n} - \frac{(t(1-m/n)c_i)^2}{2\omega_i} + \alpha_i c_i \qquad (5)$$

3.2 *Predictions*

We present here the main behavioral predictions for the public goods game. Maximization of the utility function in (5), with respect to c_i and solving for c_i^*, leads to our main prediction.

PREDICTION 1. *Given that the individual is sufficiently prosocial, such that* $\alpha_i > 1 - \frac{m}{n}$ *, raising tangibility of the allocation reduces optimal contributions in the public goods game more for lower than for higher levels of self-control.*

Proof. in Appendix A.

Impulsivity refers to the tendency to act spontaneously according to impulse, without carefully considering whether the act is in line with long-term goals or better judgment (e.g., Baumeister, 2002).

[5]The model presented in Kocher *et al*. (2013) also includes risk preferences specified over monetary payoffs, but does not account for temptation strength. Also, the pro-social component is modelled as depending on mean contributions of others' while here it is a constant. Hauge (2010) employs a similar modeling approach for the dictator game.

While impulsive behavior does not necessarily run counter to better judgment, it often does. Because impulsivity, therefore, ought to be negatively correlated with self-control, we predict the following:

PREDICTION 2. *Given that the individual is sufficiently prosocial, such that* $\alpha_i > 1 - \frac{m}{n}$*, raising tangibility of the allocation reduces optimal contributions in the public goods game more for higher than for lower levels of impulsivity.*

We illustrate our predictions graphically in Figure 1. Prediction 1 implies that the two lines converge with higher levels of self-control. Prediction 2, however, implies that the two lines diverge with higher levels of impulsivity.

Insert Figure 1 about here

4. Experimental design and procedure

4.1 *The public goods game*

Our experiment features a one-shot public good game, with the following linear payoff function for individual *i*

$$\pi_i = 10 - c_i + 0.4 \sum_j^4 c_j, \quad (6)$$

where c_i denotes the contribution of individual *i* to the public good. Each individual is assigned to a group of four randomly matched individuals, and each individual receives an endowment of 10 experimental points (the experimental currency unit). The marginal per capita return (MPCR) from investing in the public good is 0.4, which satisfies the requirements of a social dilemma. Assuming that participants are rational and self-interested, any MPCR < 1 implies a dominant strategy to free-ride. Because MPCR·*n* > 1, it is from the perspective of social welfare optimal to contribute the entire endowment.

Our experiment incorporates the preference elicitation and incentive mechanism from Fischbacher *et al.* (2001), which includes a version of the strategy vector method (Selten, 1967). Participants make two sets of decisions—first, an unconditional contribution to the public good and, second, a conditional contribution schedule. The unconditional contribution is given as a single integer, satisfying $0 \leq c_i \leq 10$. For the conditional contribution, participants indicate how much they would contribute to the public good for any possible average contribution (rounded to integers) of the other three players within their group. For each of the 11 possible averages from 0 to 10, participants decide on a contribution between (and including) 0 and 10.

Both the unconditional and the conditional contributions are potentially payoff-relevant, ensuring incentive-compatibility The conditional contribution schedule determines the payoff for one group member, randomly selected by the toss of a four-sided die.[6] Unconditional contributions determine the payoffs for the other three group members. Together, the three unconditional contributions within a group, and the corresponding conditional contribution, constitute total contributions to the public good.

4.2 *Treatments*

Our experiment features three between-subject treatments—the cash, token, and standard treatments. The purpose of the treatments was to influence the degree to which the endowment and the allocation, the sources of temptation, were tangible. Each of the nine sessions was assigned to one of the three treatments, and participants were randomly assigned to one of the nine sessions.

The treatments were implemented with a procedure adopted from Reinstein and Riener (2011). In the cash treatment, participants received their endowment in the form of one-euro coins, packaged in envelopes, one for each participant. Participants were instructed to indicate their allocation decision on the computer screen *and* by allocating the coins to two new envelopes, one marked for *self* and the other for the *public good*. Participants' payments at the end of the experiment were determined by the

[6] Each group member is assigned a number from one to four. The die is rolled by a randomly selected participant in the session, and the roll of the die is monitored by the experimenter.

on-screen decision. Similarly, participants in the token treatment received their endowment in the form of ten tokens, packaged in one envelope for each participant. Otherwise, the procedure in the token treatment resembled that in the cash treatment. In contrast, participants in the standard treatment completed the entire decision process on-screen, using z-Tree, without receiving any envelopes or any forms of physical representation of their endowments. As such, the baseline treatment followed the procedure typically used in linear public good games (e.g., Fischbacher *et al*., 2001; Zelmer, 2003).

The crucial distinction between the three conditions is the physical—and hence tangible—representation of the endowment and the allocation. We assumed that a more tangible representation of the source of temptation would more likely stoke stronger feelings of greed. This assumption is consistent with work on visceral influences (Loewenstein, 1996; O'Donoghue & Loewenstein, 2007); studies showing that those paying by credit card spend more than those paying cash (Hirschman, 1979); and that consumers who pay be credit card tip more than those who pay by cash (for a review, see Lynn & McCall, 2000). As the cash condition represents the most tangible representation of the endowment and the allocation, we expected this condition to ignite the strongest visceral influences, or temptation. In contrast, the standard treatment provides merely an abstract representation of the endowment and the allocation. We thus expected this treatment to elicit the weakest temptation. Consistent with our interpretation, Reinstein and Riener (2011) found that charitable donations were lower in the cash than in the standard treatment. Finally, while the token treatment provides a physical representation of the endowment and the allocation, the representation is more abstract than is that of the cash treatment. We thus expected the token treatment to fall somewhere between the cash and the standard treatments.

Insert Figure 2 about here

4.3 *Measurement of trait self-control and impulsivity*

To measure self-control, we implemented the Rosenbaum Self-Control Schedule (Rosenbaum, 1980a), henceforth abbreviated Rosenbaum.[7] This is a standard psychometric measure of trait self-control in the psychology literature. It has been validated against a number of relevant personality measures; and against behavioral tasks related to self-control, such as resisting pain (Rosenbaum, 1980b); coping with seasickness (Rosenbaum & Rolnick, 1983); mental disability (Rosenbaum & Palmon, 1984); stress (Rosenbaum & Smira, 1986; Rosenbaum, 1989); quitting smoking (Katz & Singh, 1986); saving over spending (Romal & Kaplan, 1995); and curtailing procrastination (Milgram *et al.*, 1988). More recently, the Rosenbaum has been found under certain conditions to correlate positively with donations in a dictator game (Martinsson *et al.*, 2012) and cooperation in a one-shot public good game (Kocher *et al.*, 2013; Martinsson *et al.*, 2014).

We also included a measure of impulsivity, adopted from the German Socio-Economic Panel (GSOEP; Wagner *et al.*, 2007). It consists of one question: "How do you assess yourself personally: Are you in general a person who thinks carefully before acting, so not impulsive at all? Or are you a person who acts without thinking long, so very impulsive?" The question was answered on an 11-point scale, ranging from "not impulsive at all" (0) to "very impulsive" (10).

4.4 *Overview of procedure*

We conducted the computer-based experiment in the experimental laboratory at Technische Universität Berlin, in December 2010, with the experimental software z-Tree (Fischbacher, 2007). In total, 180 students from all disciplines, except economics, participated in nine sessions—three sessions for each treatment—with 20 participants per session. Nobody participated in more than one experimental session, and they were randomly assigned to treatments. Approximately 66% of

[7] The Rosenbaum Self-Control Schedule (1980a) is included in Appendix B.

participants were male. Sessions lasted up to 1½ hours, and the average payoff was 12.9 euro, including a show-up fee of 4 euro.[8]

Experimental participants were arranged in separate cubicles upon arrival. Each session started with instructions for the public goods game. The instructions also indicated that there would be additional parts of the experiment, but that the instructions for these parts would only be provided after the completion of the current part. It was further stressed to participants that decisions in one part would be completely unrelated to those in the other parts. Participants received neutrally framed, written instructions (see Appendix B), on-screen and on paper. The instructions were read out loud by the experimenter, who was overseeing the execution of the experiment, but not otherwise involved with the research project. Everybody had the opportunity to ask questions in private. The experiment continued only after all participants had completed a series of computerized exercises (where they calculated profits for different contribution levels in the public goods game), and after all participants had correctly understood the procedures. Participants were informed that feedback and payment would only be provided at the very end of the experiment.

After finishing the public goods game, participants completed the Rosenbaum, the measure of impulsivity, and some demographic questions.

The final stage of the experiment included feedback on the decisions of group members in the public goods game and on the individual earnings. Payments were made privately and in cash.

5. Experimental results

Table 1 and 2 show that unconditional and conditional contributions, respectively, resemble those reported elsewhere (e.g., Fischbacher *et al.*, 2001; Fischbacher & Gächter, 2010), including studies that investigated the relationship between cooperation and self-control (Kocher *et al.*, 2013;

[8] Each experimental point earned in the public goods game was exchanged at the pre-announced rate of 1 point = 0.33 euro.

Martinsson *et al.*, 2014).[9] Also, the Rosenbaum scores correspond roughly to those found in other studies.[10] The age profile fits that of a typical student population (M = 23.3, SD = 4.1).

Insert Table 1 about here

Insert Table 2 about here

Table 3 indicates no differences in distributions of contributions, unconditional or conditional, between treatments. However, differences do arise in the distributions of age and gender, though these are only significant at the 0.1-level. It is worth noting the difference in Impulsivity scores between the cash and standard treatments, also significant only at the 0.1-level.

Insert Table 3 about here

We focus our analysis on unconditional contributions as our tangibility treatments were implemented only for this decision task; participants were given cash or tokens to represent the endowment and their unconditional contributions. Any treatment effect on conditional contributions would, therefore, amount to a priming or "carry-over" effect.

[9] In the cash and token treatments, participants were instructed to indicate their contributions in two ways, first by placing the cash or tokens in an envelope and second by indicating the same amount on a computer screen. The experimenter did not report any discrepancies between these sums, indicating that participants followed the instructions. .

[10] The mean of the pooled sample is below the corresponding range of means from the original samples studied by Rosenbaum (1980a, b)—M = 18.5 vs. M's ranging from 23 to 27. It is slightly above that obtained in Germany by Kocher *et al.* (2012) (M= 16.7), but below those obtained in Colombia by Martinsson *et al.* (2012; forthcoming, respectively) (M = 32.1 and M = 29.7).

Table 4 presents a regression analysis of the effect of treatments on unconditional contributions, taking the standard treatment as the baseline.[11] Specifications (3) and (4) include interaction terms for the treatments and the Rosenbaum measure, specification (4) adding controls for age and gender (significant at levels 0.05 and 0.1, respectively), specification (3) excluding these. Because of the imbalance of age and gender across treatments, we focus our discussion on specification (4). We test prediction 1—that raising the tangibility of the allocation will reduce optimal cooperation more for those with lower levels of self-control—by inspecting whether the coefficients on the two treatment dummies are negative, and whether interaction terms between treatments and Rosenbaum are positive. Negative coefficients on the treatment dummies would imply that the treatments reduce cooperation for individuals with little self-control, and positive interaction coefficients would imply that this reduction grows smaller for individuals with higher levels of self-control. Indeed, we find support for prediction 1. The coefficients on the token and cash treatments are negative and significant by one-tailed tests; and (t = 1.83, $p < 0.05$; t = 1.52, $p < 0.1$, respectively), and the coefficients on both interaction terms, for Rosenbaum and token and for Rosenbaum and cash, are positive and significant by one-tailed tests (t = 1.92, $p < 0.05$; t = 1.65, $p < 0.05$, respectively). We find no difference between the two interaction terms (($\chi^2(1) = 0.10$, $p > 0.1$). These results are of economic significance. In specification (4), a one standard deviation increase in the Rosenbaum is associated with an approximate 11% and 7% boost in contributions in the token and cash treatments, respectively.

In contrast, the main effect of the Rosenbaum in specification (4) is non-significant (t = 1.11, $p > 0.1$). This means that there is no discernable statistical association between Rosenbaum and contributions in the standard treatment. Moreover, when testing whether the association between the Rosenbaum and contributions in the cash treatment is greater than that in the standard treatment—by comparing the sum of the coefficient on the cash-Rosenbaum interaction and the coefficient on the

[11] We use a negative binomial regression model, as our data is over-dispersed; in each of the treatments, the variance of the raw data is much larger than the mean. This violates the assumption of equal variance, as confirmed by a Likelihood-ratio test, which rejects the null hypothesis that Poisson is the appropriate specification. OLS and Tobit regressions, available in Appendix B, yield very similar results.

Rosenbaum main effect to the coefficient on the Rosenbaum main effect alone—we obtain significance ($\chi^2(1) = 1.68$, $p < 0.1$). The corresponding test for the comparison of the association between Rosenbaum and contributions in the token treatment to that in the standard treatment is also significant ($\chi^2(1) = 2.56$, $p < 0.1$). A more tangible representation of the allocation appears to cause a stronger positive association between self-control and cooperation.

We summarize our findings in Result 1, according to Prediction 1:

RESULT 1: *The treatments that render the allocation 'tangible' reduce cooperation more for low than for high levels of self-control..*

Insert Table 4 about here

We plot in Figure 2 the predicted values of contributions based on specification (4) as a function of the Rosenbaum, and broken down by treatments. In line with our theoretical predictions, illustrated in Figure 1, we observe that the lines for the cash and standard treatments converge with higher levels of the Rosenbaum.

Insert Figure 2 about here

Before turning to Prediction 2, which concerns the relationship between cooperation and impulsivity, we test whether our measures of self-control and impulsivity are negatively correlated. Indeed they are ($R = -0.26$, $p < 0.01$), as expected.

Specifications (5) and (6) in Table 4 include interaction terms for the treatments and the Impulsivity measure, specification (6) including controls for age and gender (significant at levels 0.05 and 0.1, respectively), specification (5) excluding these. Because of the imbalance of age and gender across treatments, we focus our discussion on specification (6). We test prediction 2—that raising the tangibility of the allocation will reduce optimal cooperation more for those with higher levels of

impulsivity—by inspecting whether the coefficients on the two treatment dummies are significantly different from zero, and whether interaction terms between treatments and Impulsivity are negative. Should the coefficients on the treatment dummies not differ from zero, it would imply that the treatments fail to reduce cooperation for individuals with little impulsivity; negative interaction coefficients would imply that a reduction grows with higher levels of impulsivity. Indeed, we find support for prediction 2. The coefficients on the token and cash treatments are both non-significant (t = 0.12, $p > 0.1$; t = 1.44, $p > 0.1$, respectively), and, although the coefficient on the interaction between Impulsivity and token is non-significant (t = 0.33, $p > 0.1$), that on the interaction between Impulsivity and cash is negative and significant by a one-tailed test (t = 1.97, $p < 0.05$). The latter result is of economic significance. In specification (6), a one standard deviation increase in the impulsivity measure is associated with a 16% reduction in contributions.

In contrast, the main effect of Impulsivity in specification (6) is non-significant (t = 0.96, $p > 0.1$). This means that there is no discernable statistical association between Impulsivity and contributions in the standard treatment. Moreover, when testing whether the association between Impulsivity and contributions in the cash treatment is greater than that in the standard treatment—by comparing the sum of the coefficient on the cash-Impulsivity interaction and the coefficient on the Impulsivity main effect to the coefficient on the Impulsivity main effect alone—we obtain significance ($\chi^2(1)= 3.65$, $p < 0.05$). A more tangible representation of the allocation appears to cause a stronger negative association between impulsivity and cooperation.

We summarize our findings in Result 2, according to Prediction 2:

RESULT 2: *The cash treatment, which renders the allocation 'tangible', reduces cooperation more for high than for low levels of impulsivity. The token treatment, also thought to render the allocation tangible (but less so than cash), exhibits no effect.*

We plot in Figure 3 the predicted values of contributions based on specification (6) as a function of Impulsivity, and broken down by treatments. Consistent with our theoretical predictions, illustrated

in Figure 1, we observe that the lines for the cash and standard treatments diverge with higher levels of Impulsivity.

We fail to observe any carry-over effects to conditional contributions. While it is hard to know what this means, it would be consistent with the notion that our treatment effects act through the representation of the allocation more so than they do through representation of the endowment, per se.

6. Discussion

This paper has explored whether the representation of the endowment in a public good game influences cooperation. We find that it does—by influencing the applicability of self-control. Specifically, cooperation is more tightly associated with self-control when an individual's endowment is represented as tangible as opposed to abstract. The intuition behind this hypothesis is that a tangible representation of the endowment more likely stokes the temptation of greed, against which self-control would be exerted for the better judgment of acting in the interest of the common good. Consistent with our hypothesis, we find in a public good game that individuals' trait self-control is positively correlated with cooperation when the endowment is represented physically, in coins or tokens, but not when represented abstractly, i.e., numerically on the computer screen. Moreover, individuals' reported impulsivity is negatively correlated with contributions when the endowment is represented in coins, but not when represented on the computer screen or in tokens.

Our results add to an ongoing line of research that explores how individuals in social interaction act on the basis of ostensibly conflicting preferences. It follows Martinsson *et al.* (2012) in exploring the idea that the question of pro-social versus selfish behavior in general may represent one of self-control. And it follows Kocher *et al.* (2013) and Martinsson *et al.* (2014) in extending this conceptual framework to the social dilemma. While the aforementioned papers either measured experience of self-control conflict or experimentally manipulated it, this paper has focused on experimental variations of temptation. Moreover, while capturing self-control with the Rosenbaum (1980a) scale—

like the aforementioned papers—this paper, unlike the others, also provides converging evidence with a measure of impulsivity (GSOEP, Wagner *et al.,* 2007).

Conceptually speaking, our results are consistent with other findings in the literature on cooperation, most notably that contributions to the public good are negatively associated with discount rates (Curry *et al.*, 2008; Fehr & Leibbrandt, 2011). However, our results challenge the hypothesis recently advanced by Rand *et al.* (2012), that "our first impulse is to cooperate." Specifically, Rand *et al.* (2012) argue that cooperation represents the "default" behavioral response in social dilemmas—the option chosen in the absence of cognitive resources required for conscious ("System 2") processing. They find support for their hypothesis with a series of one-shot public good games in which lower reaction times are associated with higher levels of cooperation, and in which decision time manipulations influence cooperation. It is hard to reconcile our cash treatment effect—and its moderation by both self-control and impulsivity measures—with a story that posits cooperation as the generally spontaneous mode of behavior.

It may be worth noting the relation between the results obtained here and those found in studies on different types of payment modes. Set in consumer behavior contexts rather than stylized games of cooperation, these studies indicate that consumers spend more by abstract modes of payment—such as credit cards and "monopoly money"—than they do by cash (e.g., Hirschman, 1979; Soman, 2003; Raghubir & Srivasta, 2008). This pattern is consistent with the conceptual framework explored in our paper. What is more, several studies find that individuals in restaurants tip more when their payment mode is credit card than when it is cash (for a review, see Lynn & McCall, 2000). Our framework and empirical results invite a field study: self-control should be a stronger predictor of tipping behavior when the payment is made by cash than when made by more abstract representations of currency, such as credit cards, debit cards, or gift certificates.

This paper has relied on the strategy of influencing the degree to which the endowment and the allocation—the source of temptation—is tangible or abstract. As such, it has rendered individuals' aptitude at self-control more or less relevant to the decision context. Future work might consider pairing this treatment with one that influences the degree to which the object of altruism is concrete or

abstract. In our context, the object of altruism—the common good—is highly abstract; a more concrete representation, such as an image of the beneficiaries, might flip the psychological experience of the decision problem. It is quite possible that the concrete object of altruism would stoke feelings of empathy (e. g., Small & Loewenstein, 2003; Kogut & Ritov, 2005). The self-control conflict may then stand between the better judgment to act in self-interest and the temptation to act in the interest of others.

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Appendix A: Proof of Prediction 1.

Recall the agent's utility function:

$$U_i = e_i - c_i + m \cdot \sum_1^n \frac{c_j}{n} - \frac{(t(1-m/n)c_i)^2}{2\omega_i} + \alpha_i c_i$$

Maximization with respect to c_i yields the first order condition

$$-1 + \frac{m}{n} - \frac{\left(t(1-m/n)\right)^2 c_i}{\omega_i} + \alpha_i$$

and hence optimal contribution c_i^* is given by

$$c_i^* = \frac{\omega_i}{t^2}\frac{(\alpha_i - 1 + m/n)}{(1-m/n)^2}.$$

The derivative $\frac{\partial c_i^*}{\partial t}$ is then

$$\frac{\partial c_i^*}{\partial t} = -2\omega_i(\alpha_i - 1 + m/n)t^{-3}(1-m/n)^{-2}$$

Which is negative if $\alpha_i + \frac{m}{n} > 1.$

That is, the marginal benefit of contributing is larger than the marginal cost of contributing.

Furthermore, the derivative

$$\frac{\partial c_i^{*2}}{\partial t \partial \omega_i} = -2(\alpha_i - 1 + m/n)t^{-3}(1-m/n)^{-2}$$

is negative if $\alpha_i + \frac{m}{n} > 1.$

That is, if the marginal benefit of contributing is larger than the marginal cost of contributing. This demonstrates that the negative effect of increasing tangibility on optimal contributions is reduced as willpower increases. This proves the prediction.

Figures and Tables

Table 1. Summary statistics

Variable	Pooled sample	Standard treatment	Token treatment	Cash treatment	Kruskal-Wallis p^B
Unconditional contribution	4.69	4.77	4.58	4.73	0.9710
	(180, 3.27)	(60, 3.41)	(60, 3.34)	(60, 3.11)	
Conditional contribution[A]	3.05	2.92	3.09	3.14	0.3136
	(1980, 3.41)	(660, 3.33)	(660, 3.43)	(660, 3.46)	
Rosenbaum	18.46	19.55	19.15	16.68	0.8664
	(180, 21.69)	(60, 20.02)	(60, 20.56)	(60, 24.46)	
Impulsivity	4.37	4.17	4.80	4.92	0.1785
	(180, 2.23)	(60, 2.32)	(60, 2.23)	(60, 2.09)	
Male (1 if male)	0.66	0.72	0.68	0.57	0.1941
	(180, 0.47)	(60, 0.45)	(60, 0.47)	(60, 0.50)	
Age	23.27	22.7 0	23.70	23.42	0.1432
	(180, 4.08)	(60, 3.56)	(60, 3.92)	(60, 4.69)	

Note: Number of observations and standard deviations in parentheses (n, SD); A = created using the strategy method. B = H0: No difference in distributions across treatments;

Table 2. Fractions of contributor type by treatment.

Contributor type	Baseline treatment	Token treatment	Cash treatment
Conditional cooperator	46.67	55.00	46.67
Freerider	25.00	21.67	20.00
Humpshape contributor	8.33	6.67	15.00
Others	20.00	16.67	18.33

Note: Classifications follow those of Fischbacher *et al.* (2001). Individuals are also classified as conditional cooperators if the relationship between own and others' average contributions is positive and significant at the 1% significance level, based on the Spearman rank correlation coefficient (see e.g., Fischbacher *et al*., 2001; Fischbacher and Gächter, 2010).

Table 3. Pairwise Mann-Whitney U-tests

Variable	Mann-Whitney *p*-value		
	Standard vs. Token treatment	Standard vs. Cash treatment	Token vs. Cash treatment
Unconditional contribution	0.8280	0.9472	0.8470
Conditional contribution[A]	0.2392	0.1576	0.7369
Rosenbaum	0.8071	0.7889	0.5851
Impulsivity	0.1382	0.0871	0.8528
Male (1 if male)	0.6916	0.0880	0.1887
Age	0.0557	0.2434	0.3712

Note: H0: No difference in populations. A = created using the strategy method.

Table 4. Negative binomial regression results

Model	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.	Contrib.	Contrib.	Contrib.	Contrib.	Contrib.	Contrib.
Token treatment	-0.039	-0.087	-0.281	-0.344*	0.115	0.044
	(0.30)	(0.65)	(1.53)	(1.83)	(0.33)	(0.12)
Cash treatment	-0.007	-0.059	-0.255	-0.258	0.651**	0.477
	(0.06)	(0.47)	(1.46)	(1.52)	(2.05)	(1.44)
Rosenbaum			-0.007	-0.008		
			(1.35)	(1.11)		
Rosenbaum x token treatment			0.013*	0.013*		
			(1.88)	(1.90)		
Rosenbaum x cash treatment			0.014**	0.011*		
			(2.08)	(1.65)		
Impulsivity					0.065	0.047
					(1.40)	(0.96)
Impulsivity x token treatment					-0.025	-0.021
					(0.40)	(0.33)
Impulsivity x cash treatment					-0.150**	-0.123**
					(2.45)	(1.97)
Male		-0.219**		-0.187*		-0.196*
		(2.14)		(1.76)		(1.87)
Age		0.035**		0.036**		0.030**
		(2.44)		(2.38)		(2.10)
Constant	1.562***	0.916***	1.686***	0.963***	1.234***	0.788*
	(17.00)	(2.79)	(14.57)	(2.64)	(4.48)	(1.88)
lnalpha	-0.817***	-0.907***	-0.880***	-0.965***	-0.891***	-0.960***
	(3.65)	(3.91)	(-3.87)	(-4.09)	(-3.74)	(-3.93)
n	180	180	180	180	180	180
Pseudo r-squared	0.000	0.009	0.006	0.014	0.007	0.013

Note: absolute value of *t* statistics in parentheses; robust standard errors; * = $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$.

Figure 1. Prediction illustration

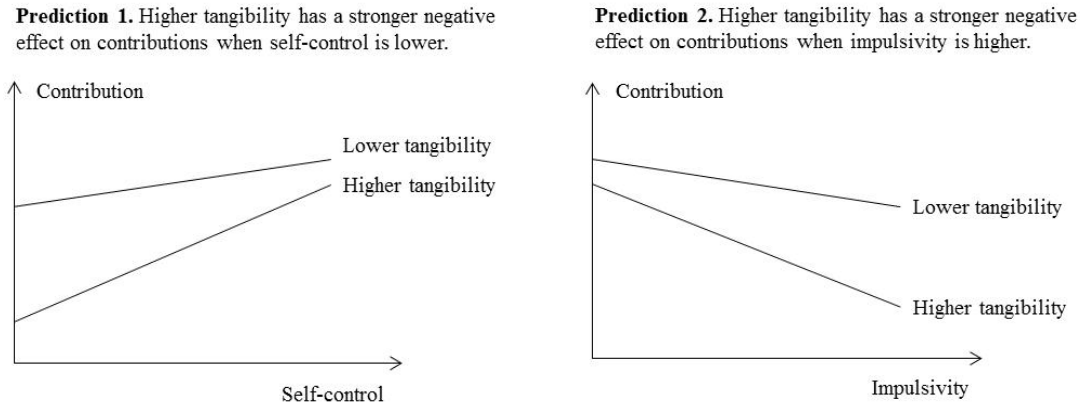
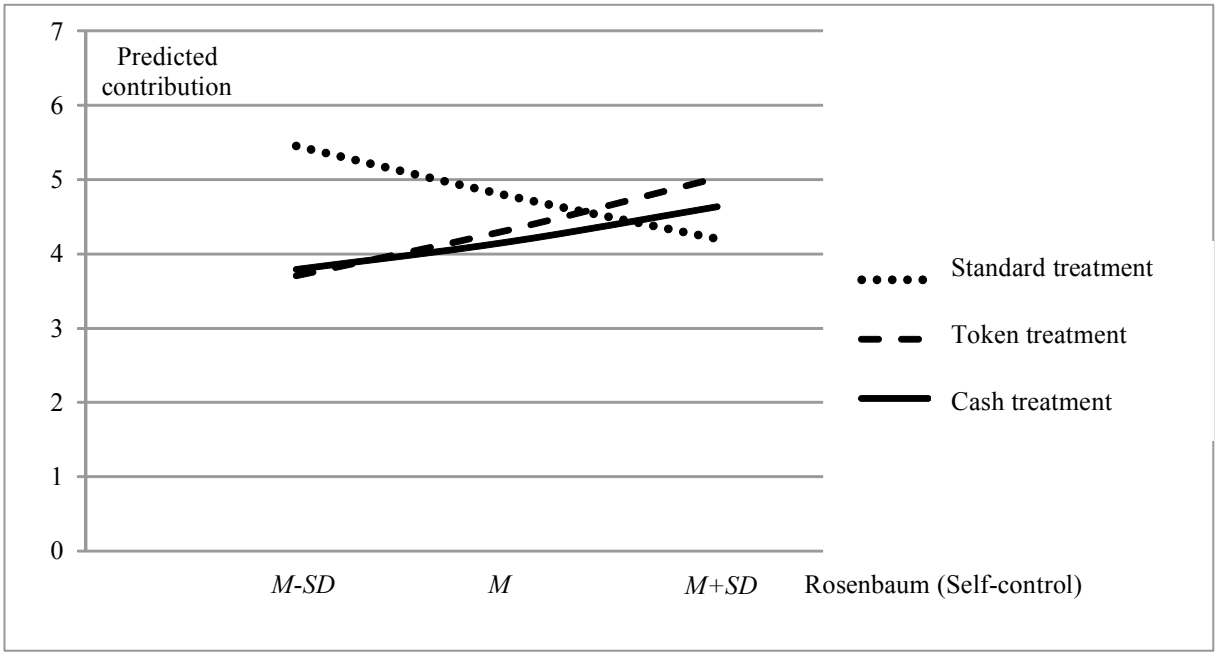
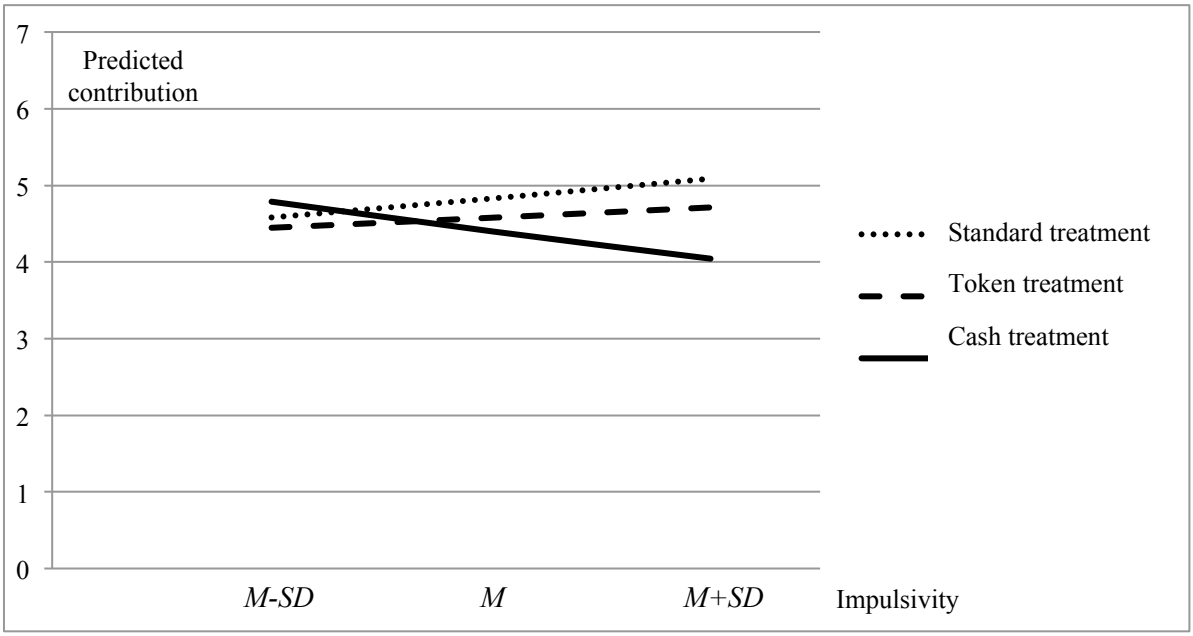


Figure 2. Predicted values of contribution as a function of self-control



Note: Predicted values are based on specification 4 in Table 4. The effect of male and age are evaluated at their means (Male = 0.66, Age = 23.27) and the Rosenbaum score equal to the sample mean (*M* = 18.46), the mean minus one standard deviation (*M-SD* = 18.46-21.70 = -3.24), and the mean plus one standard deviation (*M+SD* = 18.46+21.70 = 40.16).

Figure 3. Predicted values of contribution as a function of impulsivity



Note: Predicted values are based on specification 6 in Table 4. The effect of male and age are evaluated at their means (Male = 0.66, Age = 23.27) and we use values of the Impulsivity score equal to the sample mean (*M* = 4.63), the mean minus one standard deviation (*M-SD* = 4.63-2.23 = 2.40), and the mean plus one standard deviation (*M+SD* = 4.63+2.23 = 6.86).

Appendix B (for review only)

Instructions for the public goods game*

1. Baseline Treatment

Thank you for participating in the experiment. Please read the instructions carefully, as your payoff will depend on your decisions made in the experiment.

Please note that the instructions are your instructions; please do not communicate with other participants. If you have questions, please talk directly to the experimenter. If you do not adhere to this rule, you will have to be excluded from the experiment.

Your payoff in this experiment will be denoted in points. The exchange rate is:

1 Point = 1 Euro

The Decision Situation

Before you learn the full procedures of the experiment, we would like you to explain the decision situation that you are facing. At the end of the explanation you will have opportunity to answer some control questions to improve your understanding of the situation.

You will be member of a group of 4 people. Each member of this group is asked to divide 10 Tokens. You can pay these Tokens either into a private or into a public account.

Your Income from the private account

For each token in the private account you will earn exactly one point. Nobody else receives anything from your private account.

Your Income from the public account

For each token in the public account each group member will receive the same share. Each group member receives the following payoff from the public account

Income from the public account = Sum of all contributions into the public account X 0.4.

* Translated from German

If for example all members invest 10 tokens each in the public account, then you and the other group members receive 40 X 0.4 =16 points from the public account.

Total Income

Your total income is the sum of the points from the private and the public account

Total Income = Income from private account + Income from Public account

The Experiment

In the experiment you will face the aforementioned decision situation. You will do this experiment only once. You have ten tokes at your disposal. In this experiment you have to make two types of decisions: we will call them *conditional* and *unconditional* decisions.

- For the unconditional contribution, you just have to decide how much you would like to invest in the public project

- For the conditional contribution, you have to decide how much you would like to invest in the public project, given the average contribution of the other subjects (rounded to the next higher integer)

After all participants have made their decisions, a random process determines one member for each group, for whom the conditional contribution is relevant. For the other group members, only the unconditional contribution is relevant. When you make your decision, you do not know whether you will be chosen; you must therefore think about both of your decisions.

The random choice of one member will be determined as follows: Each group member receives a number between 1 and 4. One player will roll a 4 sided die. The number will then be entered into the computer. If the number drawn corresponds to you number within the group, then your conditional decision is relevant for your payoff. Otherwise, your unconditional decision is relevant.

2. Changes in the Instructions for the Token and Cash Treatments

In experimental instructions we added:

"Please open the envelope in front of you and take out the tokens (money) and two additional envelopes. Please put your unconditional contribution in the envelope labeled PUBLIC and the rest in the PRIVATE envelope. Please put the envelopes in the box at the entrance when leaving the lab."

The Rosenbaum Self-Control Schedule

Note: * = item is reverse scored. This is the original English version. The study used a German translation.

Directions - Indicate how characteristic or descriptive each of the following statements is of you by using the code given below

+3 very characteristic of me, extremely descriptive
+2 rather characteristic of me, quite descriptive
+1 somewhat characteristic of me, slightly descriptive
-1 somewhat uncharacteristic of me, slightly undescriptive
-2 rather uncharacteristic of me, quite undescriptive
-3 very uncharacteristic of me, extremely nondescriptive

l. When I do a boring job, I think about the less boring parts of the job and the reward that I will receive once I am finished.

-3	-2	-1	1	2	3

2. When I have to do something that is anxiety arousing for me, I try to visualize how I will overcome my anxieties while doing it.

-3	-2	-1	1	2	3

3. Often by changing my way of thinking I am able to change my feelings about almost everything.

-3	-2	-1	1	2	3

4. I often find it difficult to overcome my feelings of nervousness and tension without any outside help.*

-3	-2	-1	1	2	3

5. When I am feeling depressed I try to think about pleasant events.

-3	-2	-1	1	2	3

6. I cannot avoid thinking about mistakes I have made in the past.*

-3	-2	-1	1	2	3

7. When I am faced with a difficult problem, I try to approach its solution in a systematic way.

-3	-2	-1	1	2	3

8. I usually do my duties quicker when somebody is pressuring me.*

-3	-2	-1	1	2	3

9. When I am faced with a difficult decision, I prefer to postpone making a decision even if all the facts are at my disposal.*

-3	-2	-1	1	2	3

10. When I find that I have difficulties in concentrating on my reading, I look for ways to increase my concentration.

-3	-2	-1	1	2	3

11. When I plan to work, I remove all the things that are not relevant to my work.

-3	-2	-1	1	2	3

12. When I try to get rid of a bad habit, I first try to find out all the factors that maintain this habit.

-3	-2	-1	1	2	3

13. When an unpleasant thought is bothering me, I try to think about something pleasant.

-3	-2	-1	1	2	3

14. If I would smoke two packages of cigarettes a day, I probably would need outside help to stop smoking.*

-3	-2	-1	1	2	3

15. When I am in a low mood, I try to act cheerful so my mood will change.

-3	-2	-1	1	2	3

16. If I had the pills with me, I would take a tranquilizer whenever I felt tense and nervous.*

-3	-2	-1	1	2	3

17. When I am depressed, I try to keep myself busy with things that I like.

-3	-2	-1	1	2	3

18. I tend to postpone unpleasant duties even if I could perform them immediately.*

-3	-2	-1	1	2	3

19. I need outside help to get rid of some of my bad habits.*

-3	-2	-1	1	2	3

20. When I find it difficult to settle down and do a certain job, I look for ways to help me settle down.

-3	-2	-1	1	2	3

21. Although it makes me feel bad, I cannot avoid thinking about all kinds of possible catastrophes in the future.*

-3	-2	-1	1	2	3

22. First of all I prefer to finish a job that I have to do and then start doing the things I really like.

-3	-2	-1	1	2	3

23. When I feel pain in a certain part of my body, I try not to think about it.

-3	-2	-1	1	2	3

24. My self-esteem increases once I am able to overcome a bad habit.

-3	-2	-1	1	2	3

25. In order to overcome bad feelings that accompany failure, I often tell myself that it is not so catastrophic and that I can do something about it.

-3	-2	-1	1	2	3

26. When I feel that I am too impulsive, I tell myself "stop and think before you do anything."

-3	-2	-1	1	2	3

27. Even when I am terribly angry at somebody, I consider my actions very carefully.

-3	-2	-1	1	2	3

28. Facing the need to make a decision, I usually find out all the possible alternatives instead of deciding quickly and spontaneously.

-3	-2	-1	1	2	3

29. Usually I do first the things I really like to do even if there are more urgent things to do.*

-3	-2	-1	1	2	3

30. When I realize that I cannot help but be late for an important meeting, I tell myself to keep calm.

-3	-2	-1	1	2	3

31. When I feel pain in my body, I try to divert my thoughts from it.

-3	-2	-1	1	2	3

32. I usually plan my work when faced with a number of things to do.

-3	-2	-1	1	2	3

33. When I am short of money, I decide to record all my expenses in order to plan more carefully for the future.

-3	-2	-1	1	2	3

34. If I find it difficult to concentrate on a certain job, I divide the job into smaller segments.

-3	-2	-1	1	2	3

35. Quite often I cannot overcome unpleasant thoughts that bother me.*

-3	-2	-1	1	2	3

36. Once I am hungry and unable to eat, I try to divert my thoughts away from my stomach or try to imagine that I am satisfied.

-3	-2	-1	1	2	3

Robustness checks

Table D.4.1. Tobit regression results.

Model:	(1)	(2)	(3)	(4)
Dep. Var.:	Contrib.	Contrib.	Contrib.	Contrib.
Token treatment	-2.123*	-2.424**	1.152	0.809
	(1.82)	(2.10)	(0.61)	(0.44)
Cash treatment	-1.770	-1.888*	4.291**	3.277*
	(1.60)	(1.75)	(2.24)	(1.73)
Rosenbaum	-0.044	-0.041		
	(1.45)	(1.37)		
Rosenbaum × token treatment	0.089**	0.091**		
	(2.14)	(2.22)		
Rosenbaum × cash treatment	0.084**	0.071*		
	(2.16)	(1.87)		
Impulsivity			0.503*	0.410
			(1.90)	(1.57)
Impulsivity × token treatment			-0.292	-0.279
			(0.78)	(0.76)
Impulsivity × cash treatment			-1.014***	-0.864**
			(2.61)	(2.26)
Male		-1.309*		-1.402*
		(1.84)		(1.95)
Age		0.205**		0.168**
		(2.50)		(2.04)
Constant	5.681***	1.895	2.399*	0.030
	(6.79)	(0.93)	(1.71)	(0.01)
N	180	180	180	180
pseudo R^2	0.009	0.020	0.009	0.018

Note: Absolute value of *t*-statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table D.4.1. OLS regression results.

Model:	(1)	(2)	(3)	(4)
Dep. Var.:	Contrib.	Contrib.	Contrib.	Contrib.
Token treatment	-1.331	-1.557*	0.678	0.432
	(1.55)	(1.92)	(0.45)	(0.28)
Cash treatment	-1.121	-1.228	3.300**	2.569*
	(1.43)	(1.62)	(2.21)	(1.66)
Rosenbaum × token treatment	0.059*	0.061**		
	(1.97)	(2.07)		
Rosenbaum × cash treatment	0.060**	0.052*		
	(2.23)	(1.88)		
Rosenbaum	-0.031	-0.029		
	(1.43)	(1.34)		
Impulsivity			0.335	0.271
			(1.48)	(1.18)
Impulsivity × token treatment			-0.155	-0.144
			(0.52)	(0.49)
Impulsivity × cash treatment			-0.755**	-0.645**
			(2.55)	(2.17)
Male		-0.857*		-0.933*
		(1.69)		(1.88)
Age		0.159***		0.132**
		(2.79)		(2.35)
Constant	5.365***	2.335*	3.147***	1.127
	(8.96)	(1.68)	(2.61)	(0.60)
n	180	180	180	180
R^2	0.039	0.092	0.048	0.091

Note: Absolute value of *t*-statistics in parentheses; *= $p < 0.1$, ** = $p < 0.05$, *** = $p < 0.01$; robust standard errors.