Intergenerational Fairness in a Sequential Dictator Game With Social Interaction

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We modify the traditional dictator game by introducing 3 generations A, B and C. A takes an arbitrary share of a pie and passes the rest to B. B divides the rest of the pie between her and C. We find that this sequential dictator game increases generosity with respect to comparable traditional dictator games. Introducing a treatment with a social interaction between A and B on the one hand and B and C on the other hand leads to a higher share of passed money for both A and B. Introducing another treatment where it is unclear to B if a subject passed the share or if the passed share was generated by a random process, we show that B becomes more parsimonious. For all treatments, B reciprocates A's behavior in her decision upon the share which C receives.

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1 Introduction

Several experimental studies have shown, that the classical economic assumption of an agent who is solely motivated by monetary incentives is a scientific artefact. People frequently exhibit behavior in different circumstances where other motivations must have driven their decisions. The dictator game has been one of the most famous experimental setups to prove that there are non-monetary considerations inherent in human nature. In this game, two anonymous subjects are matched with each other, one being the allocator the other being the recipient. The allocator receives a certain amount of money which she can split up between her and the recipient in a completely arbitrary way. The recipients role is completely passive, no matter how the allocator decides, the split is made according to her decision.

Forsythe *et al.* (1994) where the first to gather empirical data on the dictator game. Recipients obtained 21% of the pie on average. Since there are no strategic considerations in the classical economic sense in the dictator game, there must have something else at play. Hoffman *et al.* (1994) ensure not only in-between subject anonymity in their experimental study but also subject-experimenter anonymity. Here, subjects generosity is almost reduced to zero. Bolton *et al.*(1998) conduct a study where they use menu-based games where the allocator has to choose between two or more divisions of the pie. They could not sustain the effect that subject-experimenter anonymity reduces subjects generosity. Andreoni and Miller (2002) use menu based dictator games with tokens which have different hold and pass values. They develop three categories of preferences, the perfectly selfish type whose utility depends only on his own pay off, the Rawlsian type with a Leontief utility function with his and the recipients payoff as arguments and finally the utilitarian type where the payoffs for the allocator and the recipient are perfect substitutes.

The point of departure of our experimental study is the dictator game. We enhance this game by a third generation, giving the setup a sequential character. Hence, we name this game sequential dictator game. This game could be perceived as an ideal type in the sense of Max Weber in order to capture problems with intertemporal externalities like environmental and resource problems. These problems have a particular feature in common: There is an intertemporal negative externality. There is a present generation which if it would be egoistic has an incentive to exploit resources in a way that there is not much left for the future generations or to pollute the environment where the impact takes place when the generation is not present any longer. The problem

with intergenerational externalities is the dynamic aspect of the externality: The benefits of the detrimental behavior accrue to the present generation while the future generations have to bear the burden of the costs. Since there is at the moment no one who has to pay the burden, there is no one with a interest in the classical economics sense who could vote for the introduction of instruments which would control the externality. Monetary concerns cannot not be used to induce someone's willingness to sacrifice resources for the sake of future generations, these instruments can only be used once people have agreed on helping the future generations. Consequently, if you want to induce sustainable development you will have to address other motivations but financial ones. At that point, the experimental evidence comes into play. In static setups people exhibit a certain propensity to give even if they have no monetary incentive to do so. Our experimental setup goes one step further, by trying to directly model the intergenerational framework. Of course our setup is still static but we capture a situation which could be interpreted as a multi-generation model if it is simply about the incentives. In addition to the introduction of the third generation, we run treatments with social interaction and a treatment where we introduce a random element. Due to the introduction of random element, the following two generations will not be aware if the situation they find themselves in is a results of a deliberate choice of the first generation or if the situation is created by chance. The paper is organized as follows: In section 2 we explain the experimental setup. In section 3 and 4 we analyze the allocation choices for the first generation, using non-parametric methods in the first section and a regression analysis in the latter. In section 4 and 5 we use the same instruments as in section 2 and 3 to examine the second generation's behavior. We summarize our results in section 7.
We find that the intergenerational setup increases generosity compared to the two-person dictator game. Social interaction also increases the willingness to help for the first generation. Income and gender do matter for the first generation and are positively linked. For the second generation, the dominant factor determining their allocation choice is the first generation's choice.

2 Experimental Design

The experiments were conducted from october 2000 to january 2001 in Heidelberg with 117 participants in 9 sessions and from mai 2002 to december 2006 in Kiel with 492 participants in 45 sessions. Participation was restricted to one session. The average amount of money which could be earned varied from 13 Euros to 15.5 Euros depending on the treatment. This amount included a show-up fee of 3 euros. Duration of the experiments was between 50 to 90 minutes depending on the treatment. The instructions for the experiments(which are translated from German into English) are attached in the appendix. We did not conduct any pre-test. All observations were used for the analysis. The subjects for the experiment were recruited by posting notices in on the campus. Hence, there was a wide range of study subjects among the subjects. Participants were gathered in one room where they had to read the instructions. After 5 to 10 minutes (depending on the treatment) questions with the respect to the experimental procedure were answered. Subjects were randomly assigned to groups. Usually, there were 3 to 5 groups in one session. One group consisted of 3 members: A, B and C. The position of being A, B or C was again assigned randomly.

The basic game was what we call a sequential dictator game. A received an amount of 30 Euros (there was no experimental currency). From this pie A kept an arbitrary share while passing the rest to B and C. Afterwards, B divided the rest between B and C. Also B had complete discretion over the choice.

Treatment 1 used the basic game while ensuring anonymity among players. After the instructions have been read, subjects first had to draw from a lottery whether they were A, B or C. Then each candidate A were lead into a room where she had to fill out a form 1 (see appendix). A had to divide the pie between A and B and in addition personal data (gender, study subject, income and age) was asked. During that time, A was alone in the room. Then, A had to fill out form 2 (see appendix) where she was asked about her motivation concerning the division of the pie and about her knowledge about sustainability. That time, candidates A were together in a room with the other A candidates and the experimenter. Then, each candidates B were lead into a room where she was told by the experimenter how much money was passed on by A. Then, B was left alone to fill out the same form 1 as A. Afterwards, B had to fill out form 2. In form 2, B had to answer the same questions as A but in addition, B was asked about her expectation with respect to the amount which A passed on. Finally, C was told the amount of money which was left and had to fill out form 2 which was identical with form 2 for B. Hence, anonymity was ensured in the sense that A never had to meet B and C and vice versa.

Treatment 2 resembled treatment 1 except that A and B interacted socially *after* A had divided the pie. A made his allocation choice (alone in the room). When A had made his choice, B entered the room and was informed about A's choice. Then, A and B had to play a simple form of scrabble where they could

earn up to 3 Euros depending on their success. The resulting payoff from the scrabble game is split equally between A and B. The same holds for B and C who also played the scrabble game *after* B had chosen an allocation.
Treatment 3 was similar to treatment 2 except that the choice on the allocation of the pie was made *before* the scrabble game.
Treatment 4 was the same as treatment 1 except that B and C did not know if the initial allocation decision was made by A or a random process. By tossing a coin it was decided if the initial allocation was made by A or by the random process. If A was to make the choice, the experiment continued as in treatment 1. If the random process allocated the money, we used a 20-sided dice (in the presence of A) to determine the amount of money. A could receive between 10 and 30 Euros. Since the random process yielded only integer allocations, A was only allowed to choose allocations in Euros. That means that A was not allowed to pass e.g. 0.5 Euros but only 0 or 1 euro.

3 Analysis of A's Allocation Choice

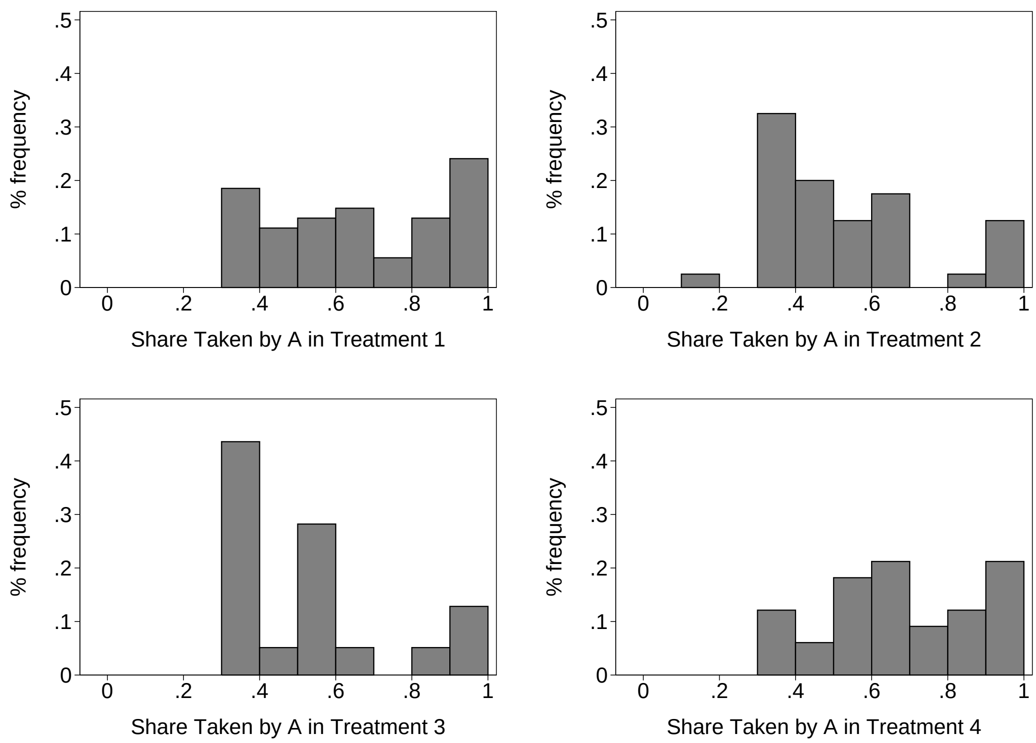

Figure 1: Comparison A's Shares Treatment 1-4

In this section we will analyze the allocation choice of A and compare the impact of the different treatments. You can see the results from the four treatments in Figure 1. Table 1 lists the means and variances of the allocation choices of A. In treatment 1 and 4, A passes an average of roughly 2/3s of

Table 1
Allocation Choice A

Treatment	Mean Share A	Variance Share A
1	0.66	0.25
2	0.52	0.23
3	0.51	0.23
4	0.67	0.22
All	0.59	0.24

the initial pie to B and C. The introduction of social interaction enhances the passed share so that B and C receive on average almost half of the pie. A's choices (as usual in dictator games) have a rather high variance and are are obviously not normally distributed. Table 2 reports the results for the treatment comparison. We test each treatment against all other treatments using

Table 2
Treatment Comparison of A's Allocation Choice

Treatments Compared	MW Test Statistic (p-value)
1A vs 2A	0.01
1A vs 3A	0.01
1A vs 4A	0.77
2A vs 3A	0.70
2A vs 4A	0.00
3A vs 4A	0.00
1A vs Forsythe	0.01

a Mann-Whitney test (also called Wilcoxon rank sum test). We find that the differences between the treatments with social interaction (2 and 3)and the ones without social interaction (1 and 4) are significant at or below the 1%-level. Given that social interaction takes place, it does not seem to play a role if the interaction takes place before or after A's allocation choice since the MW-statistic cannot reject the hypothesis of different samples (p-value of 0.7). Given that there will be no social interaction, the introduction of the random element does not change A's allocation behavior (p-value of 0.77). Hence, social interaction (either before of after the allocation choice) seems to increase generosity.

In the case of treatment 2 where the allocation choice takes place before the scrabble game there should be two particular possible explanations why A might feel the desire to give more. On the one hand, A might like to give B an incentive to cooperate. If B has the impression that A was unfair B might want hurt A by refusing cooperation in the scrabble game. Even if this behavior would be at B's own expense (since B earns half of the payoff from the scrabble game), it would be consistent with results from previous experiments where some subjects showed such strong reciprocity that they would like to incur costs in order to punish someone they perceived as unfair(see Forsythe *et al.* (1994)). In this setup, the impact of this reasoning should not be too large since the possible loss for A (and thereby the punishment by B) is rather low. Playing scrabble together or alone will not dramatically reduce one's earning possibility. If you additionally consider the rather low maximum possible payoff of 3 Euros in the scrabble game in comparison to the pie of 30 Euros which are at stake, the influence of the willingness to maintain incentives to cooperate should not be too strong. Still, 11% of the subjects in treatment 2 justified their behavior using this explanation. The other effect which should also increase generosity is the fact that A had to play with B after allocation choice. Possibly, A would feel to be in a rather awkward situation if she had been greedy, since she would have to be in a room together with someone whom she treated at least not nicely for 10 minutes and even work/play together B. Actually, except for one subject no one explained her behavior in the line of that argument. Nonetheless, we believe that there is a considerate influence of that effect which could be proven indirectly: 20% in treatment 1 and 12% in treatment 2 justified their behavior with anonymity. In this case, anonymity should not only be interpreted in the sense that subjects do not get to know personal data of each other (which was ensured in all treatment) but it should be interpreted as not getting to know each other. That means, because subjects did not get to know each other they the propensity to be greedy was not reduced.

In treatment 3, there should also be two particular effects which would again increase generosity. The first effect may be that A feels the obligation to reward B for successful cooperation. 6% of the subjects from treatment 3 used this argument. From an incentive point of view there would be no reason for this behavior. But maybe this reasoning is part of our evolutionary heritage which still could manifest in our civilized times. Think of hunters which attack a big game which they could not take on alone but only by cooperation. After having killed the animal, they share the prey. (of course, here we have a repeated game, anyway, this rewarding after successful cooperation might have been evolved in this process). The second effect should be that subject got to know each other during the scrabble game leading to an increased affection of A towards B. Actually, only one subject mentions this justification. Still, the argument must be seen in the same way as for treatment 2: The high share of subject justifying their allocation in treatment 1 and 4 with anonymity allows us to reverse the argument that if subjects name anonymity to justify greediness, being generous implies that getting to know each other plays A significant role.

Another effect plays the same role in treatment 2 and 3: Since B plays twice while A and C only play 1 time, candidates A could feel the need to pass less to B because of concerns about equity. (see Forsythe *et al.* (1998)).

We also gathered personal data on the subjects. Since in some experimental studies (see Eckel *et al.* (1998)) gender differences in behavior have a significant impact, we also compared male and female behavior within in samples. Using again the Mann-Whitney test we check, if there are significant difference between the subsamples. Results are reported in Table 3 Interestingly, we observe that only in treatment 2, there is a significant difference between male and female behavior (p-value of 0.02). There was one subject,justifying her generosity by avoiding the awkward situation of being together with someone whom she treated unfair. This subject was female. Thus, the reason for females to be more generous in treatment 2 could be that females feel more uncomfortable being in a room and cooperating with someone whom they treated unfairly (though inferring from one observation within a sample of forty might be a little optimistic). Due to the rather small sample size, this does not necessarily mean that there is no gender-effect in the other treatments. This evidence also shows an important shortcoming of the non-parametric sample comparison: To obtain useful results, samples must be weighted. Our recruiting method seems to be biased with regard to gender since in the social interaction treatment the share of females is lower than in the other treatments. Hence, as already mentioned by Eckel *et al.* (1998) future experiments should ensure that the drawn samples include an equal number of both genders.

Table 3
Testing for the Impact of Gender on A's Choice

Treatment	MW Test Statistic (p-value)
1A	0.25
2A	0.02
3A	0.26
4A	0.37

We also compare the results from our sequential dictator game (using the share A took for herself in treatment 1) to the results from the dictator game in the experiments by Forsythe *et al.* (1994) (again using the share of the pie the dictator took for herself). We choose this experimental study because its instructions and its experimental procedure are the ones most similar to our setup. Using again the Mann-Whitney test, we reject the hypothesis of equality of the two samples at the 1% level. Obviously it matters for people if they share a pie with one or with two people. It seems not to be the case that the allocator passes on a fixed absolute amount regardless how many recipient there are. Rather, the allocator takes the amount of recipients into account and chooses his allocation relative to the number of recipients. There cannot be made any claims on the relation between the number of recipients and the share of the pie which is passed if the number of recipients is larger than 3, research on this topic is to be made, yet.

4 Regression Analysis of A's Choice

We now link the gathered personal data of the A's with the sum of the passed money by A. We regress gender, income, age, study subject subject and knowledge of sustainability (SustA) on the share which A took for herself. Income was divided into seven classes starting from less than 350 Euros after having paid the rent and then adding 150 Euro each class, that means the second highest class ranged from 350 to 500 Euros and so on. For the sake of simplicity I coded the classes with 1,2,...,7 for the regression. We have four groups of study subjects: Economics (including business), science (including natural science, engineering, mathematics), humanities (including e.g. languages, arts, history) and other. The last group contained subjects which from our point of view did not really fit the three other categories like agricultural science, psychology or political science and the few participants which did not study. Sustainability was captured by a dummy variable which would be 1 if the subject gave a correct definition on sustainability and 0 otherwise. Treatments were also captured by a dummy variable for each treatment 2-4 leaving treatment 1 as benchmark setting. Hence, we had the following regression equation:

$$\begin{aligned} ShareA &= \beta_0 + \beta_1 \cdot GenderA + \beta_2 \cdot IncomeA + \beta_3 \cdot AgeA \\ &\quad + \beta_4 \cdot SubjectA + \beta_5 \cdot SustA + \beta_6 \cdot Treatment + \varepsilon \end{aligned}$$

Based on the results of redundant variable F-tests we eliminate Age, Subject, knowledge of sustainability and the regressor for treatment 4 as regressors. A Wald coefficient test shows that treatment dummy 2 and treatment dummy 3 are not significantly different, hence I replace both variable by a dummy for social interaction(SocInt). Hence, we have the following regression equation.

$$AmountA = \beta_0 + \beta_1 \cdot GenderA + \beta_2 \cdot IncomeA + \beta_3 \cdot SocInt + \varepsilon$$

The results of an OLS-regression are reported in table 4. Including personal

Table 4
OLS-Regression A

Variable	Coefficient	Std. Error	Prob.
Constant	0.695	0.047	0.000
Gender	0.117	0.037	0.002
IncomeA	-0.057	0.020	0.006
SocInt	-0.169	0.035	0.000

data in the analysis reveals that gender is significant at the 1%-level. Females keep almost 12 percentage points of the pie less than males. That explains the even stronger effect of the social interaction in the regression analysis, which increases to almost 17 percentage points (while comparing simple means yields only 14 percentage points). The intuition behind this is the non-weighted sample: There are only about 25% females in the social interaction treatments while there are 31% in treatment 1 and 48% in treatment 4. Since females tend to be more generous, the social interaction effect is underestimated by comparing mere sample means. Income plays also a role although the impact is considerably smaller than gender or social interaction. If income is increased by 150 Euros you take 5 percentage points less on average. Both income and social interaction are like gender significant at the 1% level.

Adjusted R-squared is rather low at 0.16. Thus, personal data does matter significantly but its predictive power is not overwhelming. Now, one has to be aware of the fact that regressions with data from dictator games could suffer from the fact that the error terms are non-normally distributed, which is also the case here (Jarque-Bera statistic rejects the non-normality hypothesis with 0.006). That means that the regression is still unbiased but that the t-statistic and hence the p-value could no longer be interpreted in the same way as with normally distributed error terms. Note, that with increasing sample size, this effect vanishes. According to Ratcliffe (1968) a number of 80 observations is sufficient to ensure proper interpretation of the t-statistic which is ensured in this study with 166 observations. A White test rejects heteroscedasticity at the 0.07 level, hence OLS would be suitable.

One feature of the dictator games is that subjects have, in a sense, to decide in two stages. First, the candidates have to make a discrete decision: Do I pass money on or not? Then, conditionally on passing on money, they have to decide how much money they pass on. Now, it could be that the factors determining if you pass money on or not are different from the factors which influence the amount or share of money which is passed. OLS fails to differentiate here and generates a biased estimate while a Tobit regression accounts for this problem.

Using this regression method we obtain the following results in table 5 The

Table 5
Tobit-Regression A

Variable	Coefficient	Std. Error	Prob.
Constant	0.715	0.047	0.000
Gender	0.141	0.037	0.001
IncomeA	-0.064	0.020	0.006
SocInt	-0.183	0.035	0.000

results are almost unchanged. Note, that here the regression coefficients cannot be interpreted as elasticities any longer.

5 Analysis of B's Allocation Choice

In this section we will analyze the allocation choice of A and compare the impact of the different treatments. You can see the results from the four treatments in Figure 2 Analyzing the allocation behavior of B is more complicated

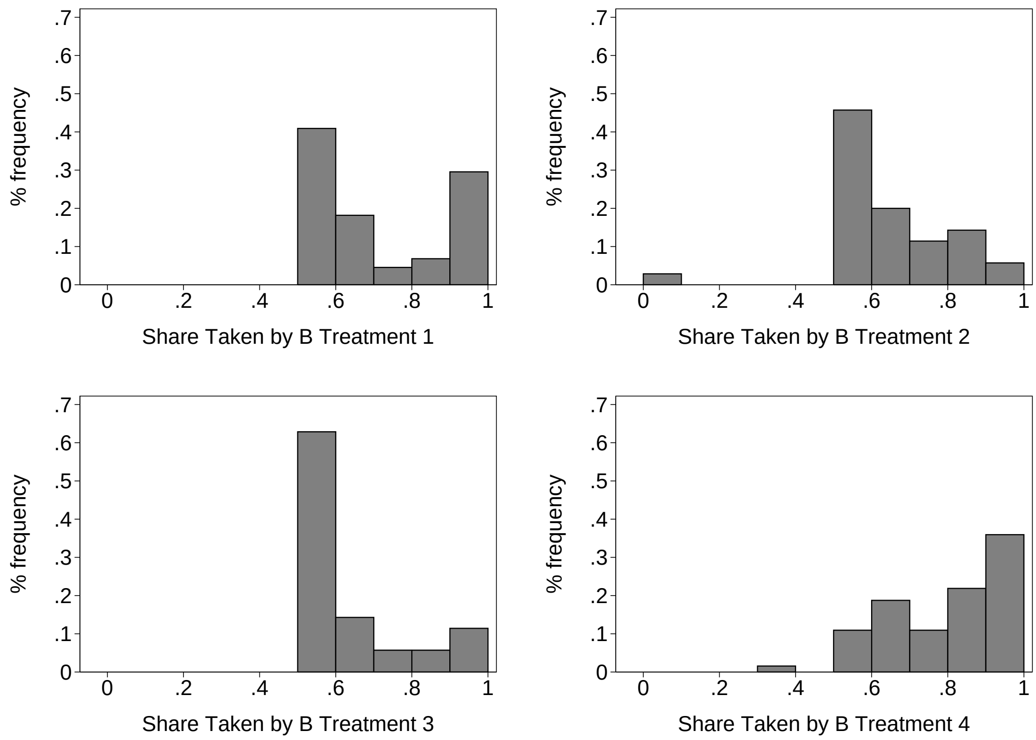

Figure 2: Comparison B's Shares Treatment 1-4

than analyzing A's allocation choice. Since the amount of money A passed to B is not constant among subjects we have an additional factor which potentially influences B's choice and consequently could render the conclusions from the sample comparison invalid. Table 6 reports the results for descriptive statistics on the different treatments. Comparing sample means for the dif-

Table 6
Allocation Choice B

Treatment	Mean Share B	Variance Share B
1	0.71	0.21
2	0.63	0.19
3	0.61	0.16
4	0.80	0.18
4self	0.81	0.17
4dice	0.80	0.19
All	0.71	0.20

ferent treatments within the candidates B reveals (analogously to the results from A) that candidates B take a larger share of the remaining pie than A took from the whole pie (depending on the treatment 5 to 13 percentage points). Interestingly, this effect of being more greedy is more pronounced in treatment 4 than in treatment 1. The results for testing on treatments differences are reported in table 7 Using the Mann-Whitney test, we find that similarly to

Table 7
Treatment Comparison of B's Allocation Choice

Treatments compared	significance level
1Bself vs 1Bdice	0.923
1B vs 2B	0.195
1B vs 3B	0.031
1B vs 4B	0.017
2B vs 3B	0.299
2B vs 4B	0.000
3B vs 4B	0.000
1Bself vs 1Bdice	0.923

the choice of A, the social interaction treatments differ from treatments 1 and 4. But comparing treatment 1 to treatment 4 reveals a significant difference between the two samples (p-value of 0.02). This is rather surprising since we thought, that for the B the decision setup is not much altered. Now, one could guess that subjects where somehow able to tell if a random process or a subject was at work allocating the pie. Since subjects have a slight tendency to pass even amounts like 25, 20, 15 and 10 Euros, B might anticipate this and infer from such allocations that a subject was responsible for the allocation. But comparing the subsamples of treatment 4 (the subsmaple where the dice allocated vs the subsample where subject as allocated) yields results very far from showing significant differences (p-value 0.92). Thus, there must be something different at play. Since the average amount passed by A is almost for treatment 1 and 4, the random element somehow seems to trigger different behavior. In treatment 1, 27% of the subjects justified their behavior with a sort of reciprocity. Normally, reciprocity takes place between the same subjects and follows a 'tit-for-tat' strategy. That means, once someone treated me nicely, I reciprocate by being nicely, too. In this case, B cannot apply this strategy to A since it has only influence on C's share. But obviously, even if C has not been involved in A's decision, B seems to reciprocate with respect to C. Thus, if A was generous towards B, B tends to be generous towards C. This undirected reciprocity which we call 'social history' effect seems to play an important role considering the number of subjects justifying their behavior according to this principle. Now, in treatment 4, only 6% of the subjects used this reasoning to justify their behavior. Obviously, reciprocity is directly linked to a subjects intention. Only if subject know that another subject deliberately made her choice they seem to reciprocate on that action. But this explanation would not be sufficient to explain the the difference between the two treatments because the reciprocity effect somehow should cancel out, since some of the candidates A were generous, some were greedy. So there must be another point. Maybe, subjects would only reciprocate on positive actions if it was intentional, while if there is a negative action they would reciprocate negatively no matter if this was a deliberate action by a subject or the result of a random process which is completely unintended. Testing for gender differences among treatments yields the following results reported in table 8. Testing for gender differences

Table 8
Testing for the Impact of Gender on A's Choice

Treatment(s)	significance level
1B	0.208
2B	0.836
3B	0.985
4B	0.668
4Bself	0.743
4Bdice	0.342

yields no significant differences between females and males in any treatment. The gender effect in treatment 2 vanished, hence there must be another effect which possibly dominates the gender effect.

6 Regression Analysis of B's Choice

At the beginning of the analysis of B's allocation behavior we already hinted at the fact that B's allocation behavior might be influenced by the varying amount, B received. Note, that we do not talk about a scaling problem. Forsythe *et al.* (1994) have already showed that the size of the pie should be of minor importance. But conditional on the knowledge of the initial overall size which was at A's disposal, the amount B received should matter (keeping in mind the reciprocity effect). Hence, a regression analysis constitutes the adequate analysis tool. We use the regression equation to explain the allocation behavior of B which we used for A but include some further regressors. In particular we add the share which A passed on to B, if B's expectation was disappointed meaning that B received less than expected (LessexpB) and if B's expectation was exceeded meaning that B received more than expected (MoreexpB).

$$\begin{aligned} ShareB &= \beta_0 + \beta_1 \cdot ShareA + \beta_2 \cdot LessexpB + \beta_3 \cdot MoreexpB \\ &\quad + \beta_4 \cdot GenderB + \beta_5 \cdot IncomeB + \beta_6 \cdot AgeB \\ &\quad + \beta_7 \cdot SubjectB + \beta_8 \cdot SustB + \beta_9 \cdot Treatment + \varepsilon \end{aligned}$$

Using the redundant variable F-tests we obtain the following regression equation:

$$ShareB = \beta_0 + \beta_1 \cdot ShareA + \beta_2 \cdot LessexpB + \beta_3 \cdot Treatment4 + \varepsilon$$

Using OLS yields the results from table 9 All left coefficients are significant at

Table 9
OLS-Regression B

Variable	Coefficient	Std. Error	Prob.
Constant	0.408	0.044	0.000
ShareA	0.386	0.073	0.000
Lessexp	0.107	0.028	0.003
Treatment4	0.163	0.031	0.000

the 1%-level. As argued before when analyzing B's allocation behavior there is a reciprocity effect. This effect is very strong compared to the other effects we have found so far. If A takes 1 percentage point more, B reciprocates with regard to C by taking almost 0.4% more, too. People who had been positively surprised by A's choice reciprocate negatively, increasing their share with 16 percentage points. At first glance, this seems counterintuitive keeping in mind that we diagnosed a strong propensity to reciprocate. But if you approach the problem under a different angle, this is perfectly reasonable. In an environment, where subjects have not yet made any experiences, the adequate heuristic would be, to infer from yourself. If you are a greedy type, you would expect others to be greedy, too and vice versa. Thus, the expectation dummy could also be interpreted a person type dummy. This finding is consistent with results from Andreoni and Miller (2002) who derived preferences from menu based dictator games and found that there are basically three types. An interesting aspect is, that social interaction does not matter any longer. Dummies for treatment 2 and 3 are no longer significant. Hence, the findings from the treatment comparison must be interpreted in the following way: There is a treatment effect. But this treatment effect does not stem from the social interaction between B and C, but from the social interaction with A. This effect is transferred via the social history effect. One problem in the analysis could be possible multicollinearity between ShareA and Lessexp since both regressors have a certain relation. If Share A is low, B receives a large amount. Consequently, it is likely that B expected less. Adjusted R-squared is 0.29 which is higher than for A's allocation behavior, due to the strong influence of reciprocity. Now, error terms are normally distributed, which is also the case here (Jarque-Bera statistic cannot rejects the non-normality with a p-value of 0.07). A White test rejects heteroscedasticity at the 0.88 level, hence OLS would be suitable. Again, a Tobit regression might be more appropriate. The results are reported in table 10 Significance levels improve a little for the expectation

Table 10
Tobit-Regression B

Variable	Coefficient	Std. Error	Prob.
Constant	0.354	0.044	0.000
ShareA	0.501	0.073	0.000
Lessexp	0.117	0.028	0.001
Treatment4	0.192	0.031	0.000

term and the reciprocity effect becomes even relatively stronger with respect to the other factors. Note again, that the regression coefficients cannot be interpreted as elasticities. The results for B's expectation are reported in table 11 Subjects B were on average pretty reliable in there expectations on the amount of money which was allocated. But this result has to be treated carefully. Subjects B had to report their expectation after they have been informed about A's allocation. Hence, there is a possible adjustment of subjects in the right direction. The same holds for candidates C (see table 12). They were also very reliable in their predictions but also the C candidates were informed about the allocation before they had to report their expectations.

Table 11
Expectations B On A's Allocation Choice

Treatment	Mean Share Received by B	Mean Exp B	Variance Exp B
1	0.36	0.39	0.23
2	0.48	0.44	0.18
3	0.49	0.51	0.24
4	0.31	0.35	0.18
4self	0.33	0.38	0.17
4dice	0.30	0.32	0.19
All	0.41	0.41	0.21

Table 12
Expectations C On B's Allocation Choice

Treatment	Mean Share Received by C	Mean Exp C	Variance Exp C
1	0.11	0.09	0.10
2	0.18	0.12	0.11
3	0.20	0.18	0.12
4	0.07	0.12	0.12
4self	0.08	0.11	0.12
4dice	0.06	0.12	0.13
All	0.13	0.12	0.12

7 Conclusion

Our experimental evidence shows that people are willing to sacrifice resources in order to help others. There are numbers of reasons which subjects named for this, the most important one is fairness. Furthermore, people are aware of the intergenerational context of the setup. They deliberately sacrifice resources to trigger generosity in the next generation via the channel of reciprocity. They also pass on more resources than in the one-generation-model, the traditional dictator game, indicating that they take the upcoming generation into consideration. Social interaction enhances intergenerational generosity, either because people feel uncomfortably if they behave greedy without the veil of anonymity or because the social interaction leads to increased affection. Reciprocity plays a key role in sustainable development. If people see that a previous generation behaved sustainable, they, at least partly, take this generation as a role model and reciprocate by behaving sustainable, too. Thus, there is a process of norm building involved. That has important consequences for the political implementation: Once induced, sustainable development could be perpetuated, needing only small efforts to be maintained. On the other hand, if the present generation carries on with a laissez-faire policy not caring about sustainability, the next generation reciprocates negatively starting a vicious circle between generations. More income increases the willingness to sacrifice resources at the initial stage where sustainable development is implemented. This notion is in line with present perceptions that on average, higher income countries do spent more money on sustainable development. When implementing sustainable development, gender does matter: Females seem to feel more uncomfortable with behaving unsustainable if the rest gets to know about it and they have to be around with the rest for a while. Hence, if you try to implement sustainability with least costs, maybe you should address the female part of the population with more emphasis. Once induced, sustainable behavior should sustain itself regardless on factors like income or gender because the social history effect dominates the decision. Last, but not least: The introduction of a random element showed, that peoples willingness to reciprocate positively is only triggered if they know that this was a deliberate choice. Once they have the perception that it was an unintended byproduct, the cease to reciprocate positively. With respect to sustainable development that means that the notion of deliberate generosity must be conveyed: Behave sustainably and talk about it!

8 Appendix

Instructions for Experiment I

There are three candidates called A, B and C who are in a group. Candidates are randomly assigned to a group. The candidates do not get to know each other. The task is to divide 30 Euros.

Step 1: Candidate A chooses an amount between 0 and 30 Euros which she keeps for herself. The rest R will be divided by candidate B between B and C.

Step 2: Candidate B gets to know the amount R, which A passed to B and C. She chooses an amount between 0 and R which she keeps for herself. Candidate C receives the rest of the money.

Step 3: The entire amounts including the profit from playing the letter game will be paid to A, B and C.

The experiment is finished.

Instructions for Experiment II

There are three candidates called A, B and C who are in a group. Candidates are randomly assigned to a group. The task is to divide 30 Euros. A and B and respectively B and C meet, while A and C do not meet.

Step 1:	Candidate A und B play a kind of Scrabble (game with letters, instructions see below), where they can earn additional money. The better A and B cooperate the higher the amount which they earn. Each of them receives half of the amount earned. Time limit for the letter game is 15 minutes.
Step 2:	Candidate A chooses an amount between 0 and 30 Euros which she keeps for herself. The rest R will be divided by candidate B between B and C.
Step 3:	Candidate B gets to now the amount R, which A passed to B and C
Step 4:	Candidate B chooses an amount between 0 and R which she keeps for herself. C receives the rest of the money.
Step 5:	Candidate B and C play the letter game. See Step 2.
Step 6:	The entire amounts including the profit from playing the letter game will be paid to A, B and C.

The experiment is finished.

Instructions for the letter game:

There are 101 letters, which should be used to form words. The numbers on the letters indicate the value of each letter. Words may be formed crosswise. For each used letter you obtain points according to the value of the letter. Letters which appear in two words count twice.

One point is worth 2 cents.

The amount earned by player A and B (likewise B and C) is split equally between them.

Note, that you can earn a maximum amount of 6 Euros (that means 3 Euros for each of the players).

Instructions for Experiment III

There are three candidates called A, B and C who are in a group. Candidates are randomly assigned to a group. The task is to divide 30 Euros. A and B and respectively B and C meet, while A and C do not meet.

Step 1:	Candidate A und B play a kind of Scrabble (game with letters, instructions see below), where they can earn additional money. The better A and B cooperate the higher the amount which they earn. Each of them receives half of the amount earned. Time limit for the letter game is 15 minutes. B leaves the room.
Step 2:	Candidate A chooses an amount between 0 and 30 Euros which she keeps for herself. The rest R will be divided by candidate B between B and C.
Step 3:	Candidate B gets to know the amount R, which A passed to B and C
Step 4:	Candidate B and C play the letter game. See Step 2.
Step 5:	Candidate B chooses an amount between 0 and R which she keeps for herself. Candidate C receives the rest of the money.
Step 6:	The entire amounts including the profit from playing the letter game will be paid to A, B and C.

The experiment is finished.

Instructions for the letter game:

There are 101 letters, which should be used to form words. The numbers on the letters indicate the value of each letter. Words may be formed crosswise. For each used letter you obtain points according to the value of the letter. Letters which appear in two words count twice.

One point is worth 2 cents.

The amount earned by player A and B (likewise B and C) is split equally between them.

Note, that you can earn a maximum amount of 6 Euros (that means 3 Euros for each of the players).

Instructions for Experiment IV

There are three candidates called A, B and C who are in a group. Candidates are randomly assigned to a group. The candidates do not get to know each other. The task is to divide 30 Euros.

Step 1: It is decided by tossing a coin whether i) a 20-sided dice divides for candidate A or ii) candidate A divides herself.

i) In case the 20-sided dice divides for candidate A:

Step 2: The 20-sided dice determines an integer amount (in Euros, no Cents) between 10 and 30 Euros which A receives. The rest R will be divided by candidate B between B and C.

Step 3: Candidate B gets to know the amount R, which A passed to B and C. She chooses an amount between 0 and R which she keeps for herself. Candidate C receives the rest of the money.

Step 4: The entire amounts including the profit from playing the letter game will be paid to A, B and C.

The experiment is finished.

i) In case candidate A divides herself:

Step 2: Candidate A chooses an amount between 0 and 30 Euros which she keeps for herself. The rest R will be divided by candidate B between B and C.

Step 3: Candidate B gets to know the amount R, which A passed to B and C. She chooses an amount between 0 and R which she keeps for herself. Candidate C receives the rest of the money.

Step 4: The entire amounts including the profit from playing the letter game will be paid to A, B and C.

The experiment is finished.

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