ARE GROUPS BETTER PLANNERS THAN INDIVIDUALS? AN EXPERIMENTAL ANALYSIS[☆]

Enrica Carbone[a,*], Gerardo Infante[b]

[a] *Seconda Università di Napoli, Corso Gran Priorato di Malta n.1, 81043 Capua (CE), ITALY*

[b] *University of East Anglia, Norwich Research Park, Norwich, NR4 7TJ, UK*

Abstract

We present the results of an experiment comparing group and individual planning in the domain of lifecycle consumption/saving decisions. Individual decision making is compared to two group treatments, which differ based on the presence of a rematching rule. We find that individuals and groups differ in how they solve the intertemporal consumption problem, but not in how they improve their consumption planning within a sequence. Individuals' performance improves across sequences, groups without rematching perform approximately the same, while groups with rematching do significantly worse. Our main finding is that while groups perform better than individuals in the first sequence, this difference seems to disappear in the second lifecycle. Results show that in the second sequence groups in the rematching treatment deviate substantially more from optimum than groups that are left stable

[☆] We are grateful to the Associate Editor, C. Bram Cadsby, and two anonymous referees for their comments and insights. We thank John Hey for his useful suggestions. We acknowledge the support of MIUR in funding this study that is part of the PRIN project 2007, titled "Consumption, saving and financial market: non conventional theories, test and applications."

[*] Corresponding Author

Email addresses: enrica.CARBONE@unina2.it (Enrica Carbone), g.infante@uea.ac.uk (Gerardo Infante)

across sequences.

Keywords: Collective Decision Making, Intertemporal Consumer Choice, Life Cycle, Risk, Laboratory Experiments

1. Introduction

Models of intertemporal consumption are typically presented as an exercise of maximization of lifetime utility, subject to a budget constraint. Traditionally these models assume that intertemporal planning is carried out by individuals. However, everyday, decisions that have consequences over time, particularly those that involve devising intertemporal consumption plans, are made by groups of different forms and nature (e.g. committees, households, boards of directors, groups of advisors and so on). Many experiments, particularly in game theory, report evidence of the difference between groups and individuals. Groups can coordinate more efficiently (Feri et al., 2010) and play some games in a significantly different way (stag-hunt game, (Charness and Jackson, 2007)). Also, they are able to develop strategic thinking faster than individuals, outperforming them especially in cases where learning is difficult (Cooper and Kagel, 2005). Groups are strategically more rational in ultimatum games (Bornstein and Yaniv, 1998), normal-form games (Sutter et al., 2010), and in cognitively demanding tasks (such as beauty-contest games, (Kocher and Sutter, 2005)). They learn faster (see also (Maciejovsky et al., 2010)), outperforming individuals when interacting directly with them (although the experience acquired through repetition allows individuals to partly compensate this difference, Kocher and Sutter (2005, p. 220)). As summarized by Charness and Sutter (2012), groups are more likely to make choices compatible with game-theoretic rationality, while individuals are more prone to biases and may seek group participation as a way of protecting themselves from the consequences of irrationality[1]. However, groups are not always clearly better than individuals. There are environments (games with unique equilibria) in which individual decision making is more efficient and others (games with multiple equilibria) where groups are able to achieve better welfare results[2]. In the domain of static choices, Bone et al. (1999) and Bateman and Munro (2005) report that there is no significant difference between groups and individuals with respect to their consistency with Expected Utility. In lottery-choice experiments Baker et al. (2008), Shupp and Williams (2008), and Masclet et al. (2009) find that groups are more risk averse than individuals, while results reported by Zhang and Casari (2012) show that group choices are closer to risk neutrality and more coherent than individual choices. An overall review of the existing literature shows that groups do not appear to be unequivocally better than individuals. Instead, it seems that the specific context and nature of the task may play an important role in the performance of both type of agents.

This paper contributes to the literature on this topic by gathering evidence that compares groups and individuals, in the domain of lifecycle consumption/saving decisions. In particular, we compare individual decisions with those of groups, whose members are either rematched with other people in the second lifecycle or remain stable for both sequences. Our findings

[1]Charness and Sutter (2012, p. 158)
[2]Charness and Sutter (2012, p. 158, 173)

are as follows: 1) individuals and groups differ in how they solve the intertemporal consumption problem, however, there is no difference in how they improve their planning within a sequence; 2) in the first lifecycle groups deviate significantly less from optimum, compared to individuals; 3) while individuals improve their performance across sequences, groups are unable to do so; 4) in the second sequence, the difference between individuals and groups is not significant. Groups in the rematching treatment deviate from optimum more than groups without rematching.

2. Related Literature

Empirical evidence has shown how dynamic optimization problems involve computational difficulties that agents are not always equipped to solve optimally. For example, analyses on household and aggregate data demonstrate that people do not save enough (Browning and Lusardi, 1996). Similarly, experimental results suggest that people are very different in how they solve this class of problems and in how they react to changes in the decision making environment. Carbone and Hey (2004) present an experiment on intertemporal planning in a lifecycle context with risky income. They find that their participants do not optimize and tend to overreact to changes in employment/unemployment status, also showing that subjects differ substantially in their actual planning horizon. Ballinger et al. (2003) and Brown et al. (2009) look at intertemporal consumption experiments focussed on "intergenerational" social learning. Both studies find that although subjects do not optimize, social learning seems to constitute an important force, driving planning closer to optimization. Carbone and Duffy (2014) have recently examined social learning in a lifecycle consumption/savings task as "contemporaneous imitation" rather than intergenerational imitation, they find that when social information on average consumption choices is provided, subject consumption and saving plans depart further from the optimal path relative to an environment without social information.

To date few studies have been done that compare the behaviour of individuals and groups in intertemporal contexts. Gillet et al. (2009) study an intertemporal choice problem of exploiting a common pool. They find that 1) groups make qualitatively better decisions than individuals when there is no competition with other players in an intertemporal common pool environment; 2) in an environment with multiple players, groups deciding by majority rule act more competitively than individuals, while unanimous groups become more competitive with repetition. In a more recent study on dynamic choices Denant-Boemont et al. (2013) present a laboratory experiment on collective time preferences based on elicitation of indifference values. The experiment tests impatience, stationarity, age independence and dynamic consistency in individual and group treatments. Their main finding is that individuals are impatient and deviate more from consistent behaviour while groups are more patient and make more consistent decisions.

To our knowledge there have not been any attempts made to compare the behaviour of individuals and groups in an intertemporal consumption context specifically. In our experiment we use three treatments, one for individual planning and the other two for groups. The critical difference between the two group treatments is the presence of the rematching feature. The creation of new groups in the second sequence, provides a way of additionally testing the extent to which subsequent performance is affected by the stability of the decision maker.

3. Theory

This study considers an agent living for a discrete number of periods (T) and having intertemporal preferences represented by the Discounted Utility model with a discount rate equal to zero. In each period, she receives utility from consumption; utility is assumed to have a functional form of the CARA type:

$$U(c) = \left(k - \frac{e^{-\rho c}}{\rho}\right)\alpha,$$

where c is consumption, α and k are scaling factors. The objective is then to maximize the expected lifetime utility, that is[3]

$$\max E_t \left[\sum_{t=1}^{T} \beta U(c_t)\right] \tag{1}$$

subject to

$$w_{t+1} = a_{t+1} + y = (1 + r)(w_t - c_t) + y$$

where w is available wealth, a represents available assets or savings at the beginning of period $t+1$ and y is income. In each period of her lifecycle, the agent receives either a high or a low income, with probabilities $p = q = 0.5$.

[3]Having set the discount rate equal to zero, β equals 1, so the same can be expressed by: $E(U(c_t) + U(c_{t+1}) + \cdots + U(T))$.

The rate of return is known and held fixed during the lifecycle. Also, borrowing is not allowed, that is, wealth must always be greater or at most equal to zero. Finally, the agent has no bequest motives, that is, any savings are lost after the last period (T). The problem is then to choose the sequence of consumption (from period 1 to period T) that maximizes (1).

The standard procedure to solve this kind of problems is to use Dynamic Programming, through Backward Induction. The Bellman Equation of the problem has been determined as

$$V_t(w_t) = U(c_t^*) + E\left[V_{t+1}(w_{t+1}^*)\right] \tag{2}$$

where V_t is the value function, w_t represents available wealth and E is the expectation operator[4]. Equation (2) may also be expressed as

$$V_t(w_t) = U(c_t^*) + \left[\frac{1}{2}V_{t+1}(w_{t+1}^{*L}) + \frac{1}{2}V_{t+1}(w_{t+1}^{*H})\right] \tag{3}$$

where

$$w_{t+1}^{*L} = (1+r)(w_t - c_t^*) + y^L$$

$$w_{t+1}^{*H} = (1+r)(w_t - c_t^*) + y^H.$$

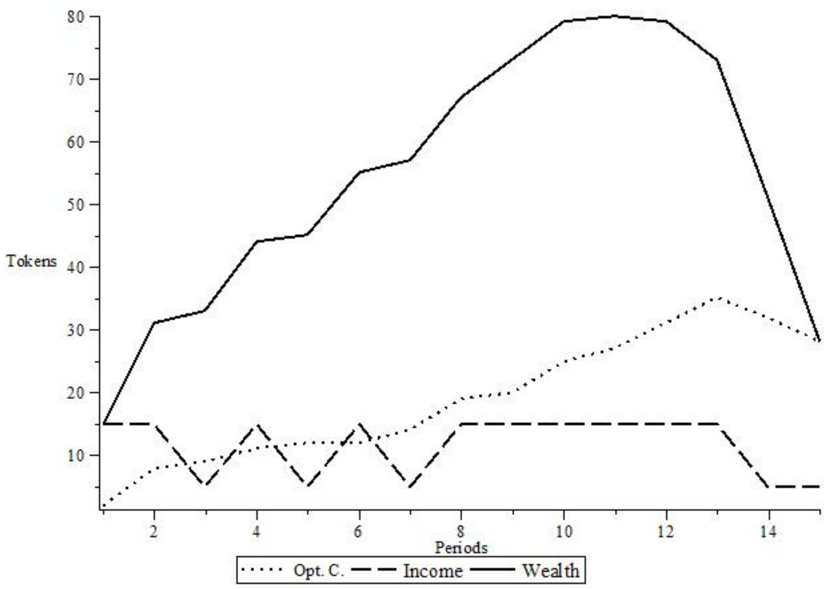
In other terms, the expectation is resolved by considering the two possible events: low income, y^L, and high income, y^H. Wealth in period t+1 is optimal because it is determined by the (optimal) consumption choice in t. The value

[4]Starred variables indicate optimal choices

function establishes a recursive relation between current and future decisions.

In the specific case of this study, some restrictions have been imposed on variables. In particular, as anticipated, borrowing is not allowed ($w_t \geq 0$) and all variables are rounded to the nearest integer. For this reason a numerical solution of the problem had to be computed. The figure below shows an example of an optimal solution determined by the Maple optimization program.

Figure 1 An example of optimal solution



4. Experimental Design

In order to investigate the difference between individual and group planning within the intertemporal consumption framework, an experiment composed of three treatments has been designed.

In each session participants played two independent sequences of fifteen periods each. The final payoff was calculated on the results of *one* sequence. At the end of the experiment there was a public procedure devised to randomly determine the paying sequence. Instructions provided definition for sequences and periods and also clarified what was meant by "independence" of sequences. In each period of a sequence, participants would receive income, denominated in "tokens", that, together with previous savings would determine available wealth[5]. Instructions asked participants to decide how many of their available tokens they would like to convert into "points", knowing that, at the end of the experiment, the total points accumulated would be converted into money at a fixed rate (two Euros per 100 points). Instructions also explained how to use the utility function (called "conversion function"), briefly pointing out some important features, such as the property of decreasing marginal utility[6].

The probability of receiving a high or low income was set to 0.5. This probability was made public knowledge. In each period of a sequence, income was determined by a random draw from an opaque bag and was the same for all participants in a session. The two events were colour coded such that the bag contained an equal number of balls in both colours. At the beginning of the experiment, one participant was asked to publicly open the bag and count the balls. When drawing a ball, participants were asked to shuffle the

[5]During the experiment expressions like "income", "wealth", "consumption" or "utility" were carefully avoided.

[6]Again, there was no explicit reference to decreasing marginal utility but to "increments at a decreasing rate".

contents of the bag and then pick one ball to show to everyone. The ball was then placed back into the bag so as not to alter the probability of future draws.

When making a decision, participants were made aware that tokens saved would produce interest (at a fixed rate of 0.2) which, in the next period, would be summed to savings and income to give the total of tokens available for conversion. Instructions also explained that all variables were integers. Participants were advised that interest would be rounded to the nearest integer, and examples were given to clarify this procedure. Finally, participants were told at different points of instructions that any savings left over at the end of the last period would be worthless.

4.1. Individual decision making

In the case of individual planning (IND), participants were randomly assigned to computers. Any contact with others, apart from the experimenters, was forbidden. For each decision participants had *one* minute where they could try different conversions (using a calculator), however they were not permitted to confirm their decision before the end of the minute. This procedure was implemented to induce participants to think about their strategy. The software included a calculator to allow participants to view the consequences of their decisions (in terms of future interest, savings and utility) and to compare alternative strategies.

4.2. Group decision making

We use two treatments for group decision making: group baseline (GR-BSL) and group rematching (GR-R). Both treatments involve groups of two members. In GR-BSL groups were composed of the same members in the first and in the second sequence. In GR-R a random matching rule was enforced, so that groups were formed at the beginning of each sequence and the same participants could not be partners more than once. This was implemented in an attempt to isolate the performance of groups to the greatest extent possible. As in the treatment with individuals, a strict no talking rule was imposed (with the exception of members within the group). Groups had a total of three minutes to discuss and confirm a decision; however, a choice could only be confirmed after the first minute. In order to limit the length of sessions, after the three minutes time, if no decision was confirmed by members, the computer would randomly choose between the last two proposals[7]. To facilitate interactions between members and increase information about group strategies, an instant messaging system was made available to chat within the group. Participants were informed about the fact that the software was recording all of their messages and that the chat system was available from the beginning to the end of each period. Participants could freely exchange messages with their partner but they were not allowed to reveal their identity, encourage their partner to share identifying information or use inappropriate

[7]The software recorded all proposals. When members did not confirm a decision within three minutes, the computer would pick the last proposal of each member and then randomly choose one of those as representative of the group. This did not happen very frequently. We recorded 58 cases of "disagreement" out of 840 decisions (7%) in GR-R and 23 cases out of 900 decisions in GR-BSL (2.5%). Preliminary regressions suggested that disagreement was not a significant regressor.

language[8]. Instructions provided a detailed explanation of how to interact with one's partner and how to confirm a decision. Partners had to take turns in making proposals as well as take turns as "first proposers", that is, who initiated the exchanges of proposals in a period[9]. The person whose turn it was to make a proposal, selected the available button labeled "Propose" which submitted it to their partner. After sending a proposal the turn then passed to the other group member, who had to make a counter-proposal. During this process, both partners had a calculator available to try different conversions and check the consequences of each of them. As mentioned above, partners could not confirm a group decision before one minute. For that reason, they could only use the "Propose" button; a "Confirm" button was only available after the one minute time limit. To confirm a proposal, a group member had to press the "Confirm" button; otherwise she could still make a counter-proposal and pass the turn to her partner.

After instructions were provided in both individual and group planning sessions, a quiz was distributed to test participants' understanding of the experiment. Participants were then given some time to practice with the software, in particular with the calculator and the system for group interaction. All sets of instructions included a graph of the utility function and two tables with examples of conversions and of the interest mechanism[10].

[8]After analyzing all messages exchanged, findings suggest that participants generally complied with these rules.

[9]In the first period of a sequence, the computer would randomly determine the "first proposer"; after that, partners would take turns exchanging proposals.

[10]This material is available on request.

4.3. Payment

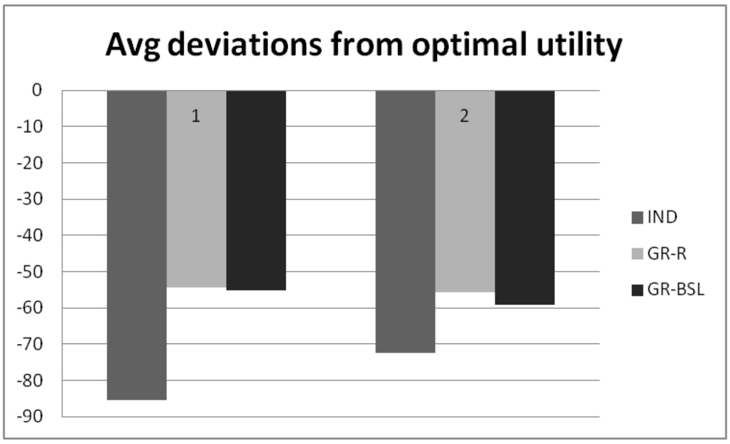
The final payoff was the conversion into money of the total of points accumulated in one sequence. The computer randomly determined which sequence would be used for payment. Instructions explained that points would be converted into money at a fixed rate of two Euros per 100 points. In the group treatments, both partners would receive the payoff calculated as described above. This design choice was made so as to not alter the framing of incentives between treatments. Also, the choice of not imposing a sharing rule or allowing participants to enter into bargaining on how to share the payoff, was motivated by considerations on how this might have altered the behaviour of participants during the experiment.

Experimental sessions were run at both the Università degli Studi di Salerno and LabSi at Università degli Studi di Siena (four sessions for GR-R, five for GR-BSL, three for IND). Participants were undergraduate students of different disciplines. Overall, 28 participants took part in the sessions for individual decision making, 56 participants took part in the group sessions with rematching (28 groups of two), and 60 participants took part in the group baseline treatment (30 groups of two). The experiment was programmed and conducted with the software z-Tree (Fischbacher, 2007).

5. Findings

A first approach in analyzing individual and group planning is to see how much, on average, participants deviated from optimal utility. This is reported in Figure 2, where bars represent average deviations for each treatment. Deviations from optimal utility are all statistically significant and typically larger for individuals. While the performance of groups (with and without re-matching, "GR-R" and "GR-BSL") remain approximately the same from sequence 1 to sequence 2, individuals appear to increase their utility.

Figure 2 Average deviations from total optimal utility for individuals (IND), groups with rematching (GR-R), and groups baseline (GR-BSL). The numbers 1 and 2 indicate the two sequences.



In the following analysis intertemporal planning will be studied by considering the deviations from unconditional and conditional optimum. While the first measure of optimum is calculated on optimal wealth, assuming optimal behaviour throughout the lifecycle, the notion of conditional optimum is based on *actual* wealth. For this reason, while in the first case deviations from the optimal strategy build up during the lifecycle, the second case incorporates a measure of improvement in behaviour[11].

[11]For discussions of these definitions of optimum, see Ballinger et al. 2003; Carbone and

Figure 3 Average deviations from optimum for individuals (IND), groups with rematching (GR-R), and groups baseline (GR-BSL)

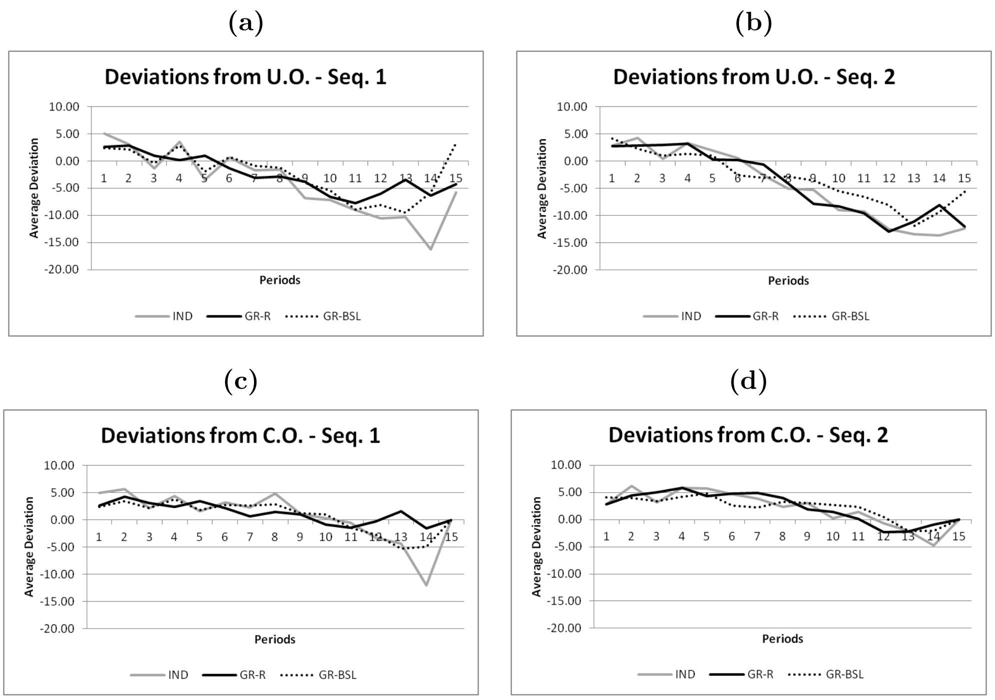


Figure 3 shows the comparison between group and individual planning, in each of the two lifecycles, in terms of the average deviation from *unconditional* ("U.O.") and *conditional* ("C.O.") optimum. Points on the x-axis represent optimal behaviour. In general deviations seem to have very similar patterns, although in Figure 3a (unconditional deviations, sequence 1), the line representing individuals appears to be definitely below those of groups in the second half of the horizon, both with and without rematching.

Hey 2004

5.1. Regression Analysis

In order to get a better understanding of how groups performed, compared to individuals, we have run a first set of regressions to compare our treatments (Table 1). We then proceeded to analyze each treatment in isolation with the objective of detecting how individuals and groups performed across sequences (Table 2). All estimations use the deviation from optimum as the dependent variable, defined as the logarithm of the absolute value of the deviation from optimum (both unconditional and conditional)[12]. This way estimated coefficients are interpreted in terms of percentage of variation, with positive (negative) signs representing increasing (decreasing) deviations. Also, the observations of participants who did not consume all of their wealth in the last period have been dropped[13]. All estimations discussed below include individual random effects and heteroskedasticity-robust standard errors.

Table 1 offers an overview of the comparisons between the treatments of our experiment. For each of them, two regressions are presented, one for each of the two sequences played by participants[14]. In Table 1 the variable we are most interested in is "Treatment", a dummy variable used to identify the treatment effect. These regressions all refer to deviations from unconditional optimum. In the case of conditional deviations, the crucial variable

[12]For a similar approach see Brown et al. (2009)

[13]This is because instructions clearly stated that the best strategy in the last period was to consume all the available wealth. Failure to do so is therefore interpreted as a mistake, rather than part of one's strategy. This occurred six times in the case of individual decision making, five times in the case of groups with rematching and only once in the case of groups without.

[14]The column "(1)" always corresponds to Sequence 1, and Column "(2)" to Sequence 2.

Table 1 Comparison of treatments - Dev. from uncond. optimum

	IND vs GR-R		IND vs GR-BSL		GR-R vs GR-BSL	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment	-0.267***	0.0289	-0.265*	-0.163	-0.0445	0.251**
	(-4.11)	(0.37)	(-2.41)	(-1.64)	(-0.49)	(2.81)
Period	0.109***	0.125***	0.115***	0.109***	0.110***	0.105***
	(17.20)	(24.05)	(18.88)	(19.07)	(17.57)	(19.16)
Income	-0.0121	0.00709	-0.0542	0.0283	0.000820	-0.00674
	(-0.22)	(0.14)	(-1.03)	(0.53)	(0.02)	(-0.12)
Wealth	0.00185	0.000738	0.00304*	-0.00306	0.00179	0.000554
	(1.46)	(0.42)	(2.51)	(-1.86)	(1.04)	(0.25)
Male	-0.0979	-0.244**	-0.170	-0.101	-0.0825	-0.105
	(-1.45)	(-3.21)	(-1.58)	(-1.07)	(-0.67)	(-0.88)
Mixed	-0.182*	-0.0875	-0.122	-0.111	-0.109	-0.0621
	(-2.03)	(-0.88)	(-0.87)	(-0.84)	(-0.95)	(-0.57)
Constant	1.010***	0.861***	0.988***	0.982***	0.742***	0.756***
	(12.36)	(11.10)	(9.20)	(10.84)	(6.27)	(6.63)
Observations	797	795	823	822	826	823
R^2	0.321	0.424	0.326	0.299	0.297	0.298

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

IND vs GR-R. “Treatment”=1 is for GR-R

IND vs GR-BSL. “Treatment”=1 is for GR-BSL

GR-R vs GR-BSL. “Treatment”=1 is for GR-R

(1) and (2) indicate sequence 1 and sequence 2

Table 2 Regressions by treatment

	IND		GR-R		GR-BSL	
	U.O.	C.O.	U.O.	C.O.	U.O.	C.O.
Sequence	-0.119*	-0.0210	0.243***	0.0710	-0.0358	0.0305
	(-2.36)	(-0.39)	(3.47)	(1.14)	(-0.70)	(0.61)
Period	0.119***	-0.0237***	0.113***	-0.0286***	0.102***	-0.0152*
	(20.31)	(-3.48)	(20.19)	(-4.35)	(17.39)	(-2.35)
Income	-0.0517	0.442***	0.00750	0.348***	-0.0251	0.273***
	(-1.01)	(7.92)	(0.15)	(6.73)	(-0.47)	(5.41)
Wealth	0.00230	0.0164***	0.00113	0.0146***	0.00252	0.0139***
	(1.82)	(15.55)	(0.61)	(13.00)	(1.56)	(11.70)
Male	-0.199*	-0.215**	-0.137	-0.191*	-0.0422	0.0805
	(-2.57)	(-3.08)	(-1.47)	(-2.41)	(-0.27)	(0.48)
Mixed			-0.111	-0.197*	-0.0613	0.0782
			(-1.25)	(-2.56)	(-0.44)	(0.51)
Constant	0.996***	1.072***	0.708***	1.130***	0.762***	0.867***
	(11.82)	(12.72)	(7.58)	(12.70)	(5.80)	(6.35)
Observations	794	712	798	696	851	739
R^2	0.362	0.351	0.361	0.306	0.244	0.203

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

IND:Individual Planning

GR-R: Groups WITH Rematching

GR-BSL: Groups WITHOUT Rematching

"Male" and "Mixed" refer to the base case "Female"

"Treatment" was always not significant. These estimations are reported in the Appendix (Table 5).

Finding 1. *Individuals and groups (in both group treatments) do not differ significantly in the way they improve their planning within a sequence (deviations from conditional optimum).*

Regressions show that there is a clear difference in how they solve the intertemporal problem (deviations from unconditional optimum). When comparing individuals and groups with rematching (column "IND vs GR-R"), results suggest that while in the first sequence groups deviate significantly less (about 27%) than individuals (column (1)), this difference seems to disappear in the second lifecycle (column (2)). This result may suggest that in the second lifecycle either individuals improved or that groups did worse. Another possibility is that *both* of these statements are true. Regressions in Table 2 help shed light on this conjecture. When looking at the effect of playing the second sequence (the variable "Sequence"), results show that while individuals were able to improve their planning (deviating about 12% less in sequence 2, column "IND"), groups did significantly worse (about 24%, column "GR-R"). When looking at the performance of groups without rematching, we find three interesting results. First, similarly to GR-R these groups are better than individuals in sequence 1, but this difference becomes not significant in sequence 2 (Table 1, column "IND vs GR-BSL"). Second, when directly comparing the two types of group (Table 1, column "GR-R vs GR-BSL") results show that groups with rematching perform worse than those without in sequence 2 (while in the first sequence the difference is not significant). Finally, regressions in Table 2 show that the performance of groups without rematching has not significantly changed across sequences.

Finding 2. *Groups seem to do better than individuals when they first approach the problem (in the first sequence).*

Finding 3. *Individuals improve their planning across sequences; the performance of groups without rematching is not significantly different, while groups with rematching perform worse.*

Finding 4. *In the second sequence, the difference between the performance of individuals and groups is not significant. Groups in the rematching treatment (GR-R) deviate more from optimum than groups without rematching (GR-BSL).*

The fact that, in the second sequence, groups with rematching perform worse than individuals and groups without rematching, may have two possible explanations. On the one hand the rematching mechanism itself may have a detrimental effect on planning. On the other hand, differences in the actual distribution of income may have driven differences in performance across treatments, and across sequences. Table 2 shows that, in all treatments, wealth ("Wealth") and a high income ("Income") cause a significant increase in the deviation from optimum. In principle, this implies that the decline in performance of groups *with* rematching in sequence 2 may also be explained by a more favourable realization of the income distribution (i.e. they were luckier than participants in other treatments). A simple way to test this hypothesis is to compare all treatments with respect to the average total income earned in each sequence and the number of "bad" draws. As Table 3a shows, groups *with* rematching were indeed luckier in sequence 2, compared to participants in other treatments and to sequence 1. They moved from the lowest average income to the highest. Although this may help to explain why the performance of these groups is worse in the second sequence, this analysis alone does not clarify to what extent this result is driven by the effect of rematching and/or of income. In an attempt to further clarify this point, we have looked at the actual distributions of income within the first and last eight periods of each sequence (See Table 3b). We have also run regressions relative to these period-brackets. The models that have been estimated include an additional variable, the interaction between treatment and income, used to detect differences between treatments when earning a high income[15]. The following discussion is focussed on the analysis relevant to the Findings 3 and 4. Results show that learning across sequences is statistically significant for all treatments, but only with respect to the 8-to-15 period-bracket[16]. While the performances of individuals and groups *without* rematching improve across sequences[17], groups *with* rematching seem to do significantly worse. The effect of receiving a high income is always found to be not significant, in the two period-brackets of the second sequence, when comparing GR-R and IND. However, in those subsets of periods groups with rematching always earned more than individuals, receiving an above-average (90 tokens, periods 1 to 8) or exactly average (80 tokens periods 8 to 15) income, compared to individuals (76.67 and 70 tokens, respectively). If differences between treatments were caused by the actual distribution of income

[15]The following discussion refers to the deviation from unconditional optimum, as our main findings. These regressions are available on request from the authors.

[16]These regressions replicate those reported in Table 2, with the exception that they are restricted to periods 1 to 8 or 8 to 15.

[17]In GR-BSL the effect of the second sequence is only significant at 5%.

we would have expected groups in GR-R to deviate more. Instead, results show that the effect of the income distribution does not cause significant differences. In both period-brackets groups with rematching earned more than those without[18] and the interaction between treatment and income is always not significant.

Table 3 Distribution of Income (a) across Treatments and Sequences; (b) within periods 1-8 and 8-15

(a)

	IND	GR-R	GR-BSL
	Average total income		
Seq. 1	158.33	142.50	151.00
Seq. 2	138.33	160.00	133.00
	Average No. of low draws		
Seq. 1	6.67	8.25	7.40
Seq. 2	8.67	6.50	9.20

(b)

t	IND	GR-R	GR-BSL
	Sequence 1		
1–8	86.67	70.00	80.00
8–15	83.33	80.00	80.00
	Sequence 2		
1–8	76.67	90.00	68.00
8–15	70.00	80.00	74.00

5.1.1. Other regressors

Results in Table 2 show that wealth causes an increase of conditional deviations in all treatments (around 1.4% to 1.6%). Planning periods, as expected, have a positive coefficient in the case of unconditional deviation, and a negative one in the case of conditional deviations. Results also show that females deviate significantly more than males and mixed groups (in the individual and groups *with* rematching treatments).

[18]GR-R: 90 and 80 tokens; GR-BSL: 68 and 74 tokens.

5.2. Chat messages and heuristics

In order to gather more information on the relation between group planning and the deviation from optimum, a number of heuristics were extrapolated from the chat messages, representing the strategies discussed by participants during the experiment[19]. Given the nature of the task, the messages exchanged within each group in a sequence are a mix of proposals, counter-proposals, various planning considerations and comments that are not relevant for the problem. For this reason, any attempt to categorize each message within a heuristic is very difficult. Nevertheless, following Carbone (2005) we have summarized the strategies emerging from chat messages according to the following heuristics: (1) consume a fraction of savings (2) keep consumption constant (3) consume a fraction of wealth (C/W) (4) consume a fraction of income (C/Y) (5) consume all income in each period (6) consume all wealth in each period (7) unconditional optimum (8) conditional optimum. These heuristics can be rewritten as follows:

1. $C_t = \beta_1 * s_t + \varepsilon_1$
2. $C_t = \beta_2 * c_{t-1} + \varepsilon_2$
3. $C_t = \beta_3 * C/W + \varepsilon_3$
4. $C_t = \beta_4 * C/Y + \varepsilon_4$

For each group and individual we have estimated the parameters, β_i and ε_i, associated with the above heuristics[20], using their actual consumption

[19]We thankfully acknowledge the comments of the editor and two referees, which have helped sharpen the focus of this analysis.

[20]The heuristics from 5 to 8 do not need any parameter to be estimated.

choices. For each strategy we were then able to determine the fitted values of consumption[21] and compute their deviations from actual choices. This way, groups and individuals were attributed the heuristic for which the sum of squared deviations was *minimized*. Results are summarized in Table 4.

Table 4 Frequencies of estimated heuristics extrapolated from chat messages

GR-R	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Seq. 1	0	2	11	5	0	0	0	10
Seq. 2	0	1	18	2	1	0	0	6
IND	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Seq. 1	0	0	18	1	1	0	0	8
Seq. 2	0	0	16	4	2	0	0	6
GR-BSL	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Seq. 1	1	4	7	2	0	0	0	16
Seq. 2	0	2	15	1	1	0	0	11

Strategies

1 Consume a fraction of savings
2 Keep consumption constant
3 Consume a fraction of wealth (C/W)
4 Consume fraction of income (C/Y)
5 Consume all income in each period
6 Consume all wealth in each period
7 Unconditional optimum
8 Conditional optimum

It appears that for most participants the strategies that are closest to their actual choices are either strategy 3 (consume a fraction of wealth, C/W) or 8 (conditional optimum). Focussing more on the conditional optimum, we have calculated the average sum of squared deviations relative

[21] Obviously, this did not include heuristics from 5 to 8, whose values are exactly known.

to this strategy *only*. Results show that in sequence 1, not only do groups use it more frequently than individuals, but they do it with a significantly smaller degree of error (Average Sum of Squared Deviations: IND=2564.87; GR-R=1279.3; GR-BSL=749.56). In the second sequence, although the frequency of strategy 8 decreases in all treatments, individuals seem to use it more effectively, with a dramatic reduction of the average of the sum of squared deviations (Average Sum of Squared Deviations: IND=361.5; GR-R=3137.5; GR-BSL=477.45). On the other hand, groups *with* rematching on average do significantly worse than in sequence 1 and with respect to individuals and group *without* rematching.

6. Discussion

We have presented the results of an experiment comparing individual and group decision making in an intertemporal consumption/saving problem. In the experiment we have used two different types of groups, with (GR-R) and without (GR-BSL) rematching of their members across the two sequences they play. The main finding is that groups and individuals are indeed different in how they solve the lifecycle problem. When first approaching the problem, groups seem to be clearly better than individuals. However, by the second sequence this advantage disappears as individuals display a significant learning effect, which does not occur in group planning. In the GR-BSL treatment their performance remains approximately the same. However, in the GR-R treatment we observe a significant decline in group performance.

The finding that the performance of groups with rematching declines between sequences seems to be confirmed by the analysis of the estimated planning heuristics, which shows that in the GR-R treatment, groups tend to use the conditional optimum strategy with a higher degree of error (compared to the first sequence). In order to shed more light on this finding, we have also looked at the potential effects of the actual realizations of income across treatments, sequences, and subsets of periods of each sequence. Results suggest that although groups in the GR-R treatment earned more in the second sequence (compared to other treatments and to the first sequence), this does not seem to have caused the difference in performance we observed across treatments.

While the results of the individual treatment are in line with existing literature, the question remains, what happened in the second sequence of group treatments? Why are groups unable to improve their planning? In the case of GR-R, as discussed above, the answer seems to be connected to the role of rematching. However, the GR-BSL case is quite different. This treatment is most similar to the individual treatment, the critical difference being the nature of the agents. A review of chat messages reveals that groups tend to be inconsistent in how they follow a plan during a sequence. This seems to be related mainly to the process by which group members slowly try to find an agreement on group planning. It takes some time for them to agree on a strategy or find some understanding about how to solve the problem. Although we do not have specific information regarding the individual decision-making process, we conjecture this might be a key contributing factor in the difference in performance observed between groups and individuals.

While groups have an immediate advantage, individuals seem to be better equipped to reap the benefits of learning and experience.

7. References

Baker, R. J., Laury, S. K., and Williams, A. W. (2008). Comparing small-group and individual behavior in lottery-choice experiments. *Southern Economic Journal*, 75(2):367–382.

Ballinger, T. P., Palumbo, M. G., and Wilcox, N. T. (2003). Precautionary saving and social learning across generations: an experiment. *The Economic Journal*, 113(490):920–947.

Bateman, I. J. and Munro, A. (2005). An experiment on risky choice amongst households. *The Economic Journal*, 115(502):C176–C189.

Bone, J., Hey, J. D., and Suckling, J. (1999). Are groups more (or less) consistent than individuals? *Journal of Risk and Uncertainty*, 18(1):63–81.

Bornstein, G. and Yaniv, I. (1998). Individual and group behavior in the ultimatum game : Are groups more rational players ? *Experimental Economics*, 108(1):101–108.

Brown, A. L., Chua, Z. E., and Camerer, C. F. (2009). Learning and visceral temptation in dynamic saving experiments. *Quarterly Journal of Economics*, 124(1):197–231.

Browning, M. and Lusardi, A. (1996). Household saving: Micro theories and micro facts. *Journal of Economic Literature*, 34(4):1797–1855.

Carbone, E. (2005). Demographics and behaviour. *Experimental Economics*, 8:217–232.

Carbone, E. and Duffy, J. (2014). Lifecycle consumption plans, social learning, and external habit: Experimental evidence. *Journal of Economic Behavior and Organization*, 106:413–427.

Carbone, E. and Hey, J. D. (2004). The effect of unemployment on consumption: an experimental analysis. *The Economic Journal*, 114(497):660–683.

Charness, G. and Jackson, M. O. (2007). Group play in games and the role of consent in network formation. *Journal of Economic Theory*, 136(1):417–445.

Charness, G. and Sutter, M. (2012). Groups make better self-interested decisions. *Journal of Economic Perspectives*, 26(3):157–176.

Cooper, D. J. and Kagel, J. H. (2005). Are two heads better than one? team versus individual play in signaling games. *American Economic Review*, 95(3):477–509.

Denant-Boemont, L., Diecidue, E., and l'Haridon, O. (2013). Patience and time consistency in collective decisions. *INSEAD Working Paper*. 2013/109/DSC.

Feri, F., Irlenbusch, B., and Sutter, M. (2010). Efficiency gains from team-based coordinationlarge-scale experimental evidence. *The American Economic Review*, 100(4):1892–1912.

Fischbacher, U. (2007). z-tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2):171–178.

Gillet, J., Schram, A., and Sonnemans, J. (2009). The tragedy of the commons revisited: The importance of group decision-making. *Journal of Public Economics*, 93(56):785–797.

Kocher, M. G. and Sutter, M. (2005). The decision maker matters: Individual versus group behaviour in experimental beauty-contest games. *The Economic Journal*, 115:200–223.

Maciejovsky, B., Sutter, M., Budescu, D. V., and Bernau, P. (2010). Teams make you smarter: Learning and knowledge transfer in auctions and markets by teams and individuals. IZA Discussion Paper no. 5105.

Masclet, D., Loheac, Y., Denant-Boemont, L., and Colombier, N. (2009). Group and individual risk preferences : a lottery-choice experiment with self-employed and salaried workers. *Journal of Economic Behavior and Organization*, 70(3):470–484.

Shupp, R. and Williams, A. R. (2008). Risk preference differentials of small groups and individuals. *The Economic Journal*, 118(525):258–283.

Sutter, M., Czermak, S., and Feri, F. (2010). Strategic sophistication of individuals and teams in experimental normal-form games. IZA Discussion Paper no. 4732.

Zhang, J. and Casari, M. (2012). How groups reach agreement in risky choices: an experiment. *Economic Enquiry*, 50(2):502–515.

Appendices

A. Instructions - NOT FOR PUBLICATION

This Appendix contains the instructions of the individual (IND) and group with rematching (GR-R) treatments. The instructions of the group treatment without rematching (GR-BSL) are the same as the GR-R case, except for the part related to rematching.

A.1. Individual Decision Making

Welcome!

This is an experiment on decision making. The experiment will last about 1 hour and a half. Please read these instructions carefully as you have the chance to earn money depending on your decisions. If you have any questions please raise your hand. The experimenter will answer in private. You are not allowed to talk to other participants in the experiment.

The experiment consists of 2 independent "sequences", each one composed of 15 periods. Sequences are independent because there is no relation between them. This means that your choices in one sequence will not influence future sequences. However, please note that, within one sequence, your decision in each period will influence subsequent periods (for example, your decision in period 1 will have consequences for period 2 and so on).

At the beginning of each period you will receive an amount of tokens that will be available to you. You have to decide how many tokens you want to convert into points. You can convert a number of tokens between 0 and the amount available to you. The conversion function of tokens to points is reported in Figure 1 (Appendix). This figure shows graphically the conversion of tokens to points in a continuous interval. You may also look at Table 1 (Appendix) where some examples of conversions are provided. Please note that that the number of points obtained from the conversion increases as the number of tokens converted increases; however, increments are realized at a decreasing rate, that is, the difference in points obtained by converting 6 tokens rather than 5 is bigger than the difference between converting 16 tokens rather than 15. Finally, please note that the more tokens are converted in each period, the less tokens are saved for conversion in future periods. Please note that, before period 15 (the last period) is reached, tokens not converted will be saved for the next period. Savings will earn interest, thus increasing the amount of tokens available in the following period. When period 15 (the last period) is reached, any tokens left (that is, not converted) will be worthless.

Your payoff, at the end of the experiment, will be calculated on the decisions you have made in ONE of the above mentioned "sequences". This sequence will be randomly selected among the 2 played. This means that your payment will be calculated based on the decisions you made during the 15 periods composing the randomly selected sequence. In particular, your payment will be the conversion in Euros of the total amount of points earned in the selected sequence, using a conversion rate of 2 Euros each 100 points.

Periods and Decision Making

At the beginning of each period, you will be randomly assigned a number of tokens. This number may be "high" (15 tokens) or "low" (5 tokens). You have 50% chance of receiving one of the two. It is important to note that the amount of tokens received in one period does not affect the chances of getting the same or the other amount in any following period.

From period 1 to period 14, if you have any tokens saved, they will earn interest, at the rate of 20% ($r = 0.2$). Savings plus interest accumulated will increase the number of tokens available to you in the following period. Please remember that tokens not converted at the end of period 15 will be worthless. Table 2 (Appendix) is available to you, reporting some examples of calculation of interest.

At the beginning of each period you will be showed on the computer screen the total of tokens available, consisting in:

1. Tokens earned in the period: 15 or 5
2. Tokens saved in the previous period (S)
3. Interest earned on savings: S x 0.2 (not rounded)
4. Tokens available for conversion rounded to the nearest integer (for example, 3.4=3; 3.5=4 or 3.6=4): Tokens earned in the period (1.) + Tokens saved in the previous period (2) + Interest earned on savings

(3.)

5. Total of points earned: sum of the points earned starting from period 1

Of course, in period 1 there will be no savings and no interest received, so the number of tokens available to you will be equal to 15 or 5 tokens.

Within this screen you will be asked to enter the number of tokens you wish to convert into points. You may change your decision in any moment before pressing the “confirm” button. When this button is pressed your decision will become irrevocable. You cannot move to the next decision before one minute from the beginning of the current period. To make your decision you may use a calculator to observe the consequences of your choice. Depending on the number entered, it is possible to see the related savings, interest earned on savings in the next period and the number of points earned from conversion. The use of the calculator will not make your choice final.

Once the first 15-period sequence has been completed, the following sequence will start. As explained above, the experiment involves making decisions through 2 sequences.

At the end of each sequence a summary of the choices made during the 15 periods will be provided.

Earnings

When the 2 sequences have been completed, your payment will be determined. One sequence will be randomly selected and you will receive the conversion in Euros of the total amount to points earned in the selected sequence.

If you have any questions, please raise your hand and an experimenter will be happy to assist you.

Right after these instructions a short quiz testing your comprehension of the experiment will take place followed by 3 minutes practice with the conversion function.

Appendix

Figure 1 - Conversion function

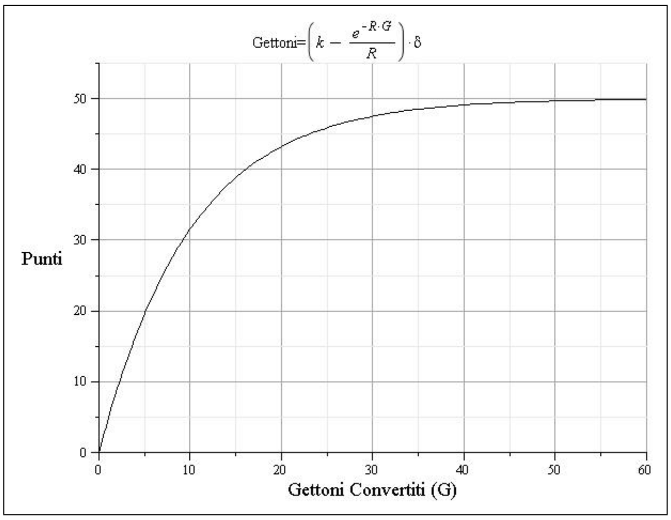


TABLE 1	
Tokens Converted (G)	Points Earned
0	0
1	4.758129098
2	9.063462346
3	12.95908897
4	16.4839977
5	19.67346701
6	22.5594182
7	25.17073481
8	27.53355179
9	29.67151701
10	31.60602794
11	33.35644582
12	34.9402894
13	36.37341035
14	37.6701518
15	38.84349199
16	39.9051741
17	40.8658238
18	41.73505559
19	42.52156904
20	43.23323584
⋮	⋮
50	49.66310265
⋮	⋮
100	49.99773
⋮	⋮
150	49.9999847
⋮	⋮
200	49.9999999

$Punti = 50 - 50 * e^{-0.1*G}$
G = Tokens Converted

TABLE 2		
Tokens Saved	**Interest on saved Tokens**	**Tokens Saved + Interest**
0	0	0
1	0.2	1.2
2	0.4	2.4
3	0.6	3.6
4	0.8	4.8
5	1	6
6	1.2	7.2
7	1.4	8.4
8	1.6	9.6
9	1.8	10.8
10	2	12
11	2.2	13.2
12	2.4	14.4
13	2.6	15.6
14	2.8	16.8
15	3	18
16	3.2	19.2
17	3.4	20.4
18	3.6	21.6
19	3.8	22.8
20	4	24
⋮	⋮	⋮
50	10	60
⋮	⋮	⋮
100	20	120
⋮	⋮	⋮
150	30	180
⋮	⋮	⋮
200	40	240

Interest = 0,2 * S
S = Tokens Saved

A.2. Group Decision Making[22]

Welcome!

This is an experiment on decision making. You will be making decisions in cooperation with another participant whose identity will be unknown to you. The experiment will last about 1 hour and a half. Please read these instructions carefully as you have the chance to earn money depending on your decisions. If you have any questions please raise your hand. The experimenter will answer in private. You are not allowed to talk to other participants in the experiment.

The experiment consists of 2 independent "sequences", each one composed of 15 periods. Sequences are independent because there is no relation between them. This means that your choices in one sequence will not influence future sequences. However, please note that, within one sequence, your decision in each period will influence subsequent periods (for example, your decision in period 1 will have consequences for period 2 and so on).

During this experiment you will be part of a group composed of two individuals. The section "Groups and Decisions" explains how groups will be formed, how to interact within a group and reach a decision.

At the beginning of each period your group will receive an amount of tokens

[22] The material referred to in the "Appendix" is the same for all sets of instructions and can be consulted in subsection 1 (Individual Decision Making).

that will be available to you. You have to decide how many tokens you want to convert into points. You can convert a number of tokens between 0 and the amount available to you. The conversion function of tokens to points is reported in Figure 1 (Appendix). This figure shows graphically the conversion of tokens to points in a continuous interval. You may also look at Table 1 (Appendix) where some examples of conversions are provided. Please note that that the number of points obtained from the conversion increases as the number of tokens converted increases; however, increments are realized at a decreasing rate, that is, the difference in points obtained by converting 6 tokens rather than 5 is bigger than the difference between converting 16 tokens rather than 15. Finally, please note that the more tokens are converted in each period, the less tokens are saved for conversion in future periods. Please note that, before period 15 (the last period) is reached, tokens not converted will be saved for the next period. Savings will earn interest, thus increasing the amount of tokens available in the following period. When period 15 (the last period) is reached, any tokens left (that is, not converted) will be worthless.

Your payoff, at the end of the experiment, will be calculated on the decisions you have made in ONE of the above mentioned "sequences". This sequence will be randomly selected among the 2 played. This means that your payment will be calculated based on the decisions you made during the 15 periods composing the randomly selected sequence. In particular, your payment will be the conversion in Euros of the total amount of points earned in the selected sequence, using a conversion rate of 2 Euros each 100 points.

Each member of the group will receive this payoff.

Periods

At the beginning of each period, you will be randomly assigned a number of tokens. This number may be “high” (15 tokens) or “low” (5 tokens). You have 50% chance of receiving one of the two. It is important to note that the amount of tokens received in one period does not affect the chances of getting the same or the other amount in any following period.

From period 1 to period 14, if you have any tokens saved, they will earn interest, at the rate of 20% ($r = 0.2$). Savings plus interest accumulated will increase the number of tokens available to the group in the following period. Please remember that tokens not converted at the end of period 15 will be worthless. Table 2 (Appendix) is available to you, reporting some examples of calculation of interest.

Groups and Decisions

During each sequence you will be paired with another participant but you will not know his/her identity. This matching will be random. At the end of the first sequence, of 15 periods, new groups will be composed for the second sequence, using again random matching.

Participants matched with you in a group will never have the opportunity to know your identity. During the experiment is absolutely forbidden to reveal your identity to the other group member (or try to know the identity of other participants).

At the beginning of each period you will be showed on the computer screen the total of tokens available, consisting in:

1. Tokens earned in the period: 15 or 5
2. Tokens saved in the previous period (S)
3. Interest earned on savings: S x 0.2 (not rounded)
4. Tokens available for conversion rounded to the nearest integer (for example, 3.4=3; 3.5=4 or 3.6=4): Tokens earned in the period (1.) + Tokens saved in the previous period (2) + Interest earned on savings (3.)
5. Total of points earned: sum of the points earned starting from period 1

Of course, in period 1 there will be no savings and no interest received, so the number of tokens available to you will be equal to 15 or 5 tokens.

In the same screen described above you will be asked to interact with the other member of your group in order to make a decision. To do this the following procedure will be employed:

1. You will have to take turns interacting with the other member

2. In the first period, one of the members of the group will be randomly selected to start the interaction. In the periods following the first, members will take turns initiating the interaction.

3. By pressing the button "PROPOSE", the member of the group who begins the interaction will send his/her proposal to the other member and conclude his/her turn. After this, he/she will have to wait the other member of the group to send his/her decision (accept the proposal or make a new one)

4. It will not be possible to make a group decision before 1 minute. However, during this time group members will be able to exchange proposals of conversion. At the end of the 1 minute time limit, each member of the group, during his/her turn, will also have the opportunity to confirm the proposal received, hence turning it into the group decision, which is irrevocable. The period is concluded when one of the group members confirms a proposal. Hence, the approval of the other member is not required.

5. Members will be able to keep interacting up to a time limit of 3 minutes. After this limit, if a group decision has not been made, the computer will randomly select one of the two members making his/her proposal the final decision of the group.

6. When the minimum time to make a group decision is over (1 minute), if the member whose turn it is to start interacting has not sent any

proposal to his partner, the turn will automatically pass to the other member of the group.

Rules of Group Interaction

1. A group decision cannot be made before 1 minute since the start of the current period. This means that even if an agreement is reached, this decision cannot be confirmed before the minimum time limit of 1 minute is over.

2. On the screen used for group interaction, a calculator will be available to you to verify the consequences of your choice. Depending on the number of tokens entered, it is possible to see the related savings, interest earned on savings in the next period and the number of points earned from conversion.

3. A table, denominated "Group decision: current proposals" will be shown on screen. This table is composed of two rows containing the conversion proposals of each member of the group together with the related consequences. Your row is indicated by blue coloured characters.

4. Below this table a box will be available to enter your proposal of conversion, which may be confirmed by pressing the button "PROPOSE".

5. After 1 minute, that is, the minimum time allowed to make a group decision, at each turn a button labeled "CONFIRM" will be available. By pressing this button the group decision will be recorded (becoming irrevocable)

6. An instant messaging (IM) system will also be available and operative from the beginning to the end of the period. To use the chat simply write your message and press enter on the keyboard. This way, your message will be sent to your partner. Each message will be recorded. While using the chat system it is absolutely forbidden to:

    (a) Communicate one's identity in any way (name, student number, nicknames, etc.)

    (b) Ask other participants questions that could lead to the disclosure of identifying information

    (c) Use inappropriate language (insults, etc.)

    The experimenter will make sure that all the rules of chat usage are respected. A violation of one of these rules will cause the cancellation of the final payoff of the participant who committed the violation.

When the group decision has been made, the current period ends and a new period begins.

Once the first 15-period sequence has been completed, the following sequence will start. As explained above, the experiment involves making decisions through 2 sequences.

At the end of each sequence a summary of the choices made during the 15 periods will be provided.

Earnings

When the 2 sequences have been completed, your payment will be determined. One sequence will be randomly selected and you will receive the conversion in Euros of the total amount to points earned in the selected sequence.

If you have any questions, please raise your hand and an experimenter will be happy to assist you.

Right after these instructions a short quiz testing your comprehension of the experiment will take place followed by 3 minutes practice with the conversion function and 3 minutes practice with the group-interaction system.

B. Comparison of Treatments - Conditional deviations

Table 5 Comparison of treatments - Dev. from cond. optimum

	IND vs GR-R		IND vs GR-BSL		GR-R vs GR-BSL	
	(1)	(2)	(1)	(2)	(1)	(2)
Treatment	-0.0890	0.0273	-0.166	-0.0684	0.0179	0.0699
	(-1.44)	(0.38)	(-1.62)	(-0.79)	(0.21)	(0.90)
Period	-0.00625	-0.0429***	-0.0102	-0.0291***	-0.00448	-0.0395***
	(-0.92)	(-6.40)	(-1.52)	(-4.40)	(-0.67)	(-6.08)
Income	0.381***	0.433***	0.369***	0.349***	0.326***	0.290***
	(6.94)	(8.13)	(6.75)	(6.33)	(6.34)	(5.62)
Wealth	0.0141***	0.0153***	0.0150***	0.0150***	0.0140***	0.0137***
	(16.04)	(11.92)	(14.16)	(7.41)	(12.34)	(10.11)
Male	-0.158**	-0.245***	-0.139	-0.0575	-0.0735	-0.0341
	(-2.58)	(-3.48)	(-1.40)	(-0.66)	(-0.66)	(-0.34)
Mixed	-0.174*	-0.234*	-0.0315	0.00111	-0.0600	-0.0426
	(-2.14)	(-2.52)	(-0.25)	(0.01)	(-0.57)	(-0.43)
Constant	1.033***	1.237***	1.018***	1.082***	0.864***	1.159***
	(12.94)	(16.16)	(9.99)	(12.85)	(8.08)	(11.24)
Observations	713	695	734	717	731	704
R^2	0.338	0.340	0.333	0.181	0.277	0.226

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

IND vs GR-R. "Treatment"=1 is for GR-R
IND vs GR-BSL. "Treatment"=1 is for GR-BSL
GR-R vs GR-BSL. "Treatment"=1 is for GR-R
(1) and (2) indicate sequence 1 and sequence 2