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Grandparents Matter: Perspectives on Intergenerational Altruism. An Experiment on Family Dynamic Spillovers in Public Goods Games.

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Grandparents Matter: Perspectives on Intergenerational Altruism

An Experiment on Family Dynamic Spillovers in Public Goods Games.

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ABSTRACT

The development and use of long-lived public goods involves more than one demographic generation, leaving the classic literature on voluntary provisions partially unfit to explain complex phenomena such as welfare systems, climate policies and major infrastructure projects.

This paper proposes a model that explains how equilibrium is reached in a context where a public good is produced by one generation of individuals and the following generation reaps the benefits of it. Within this model the case of intergenerational public goods production is explained using a spillover rule, where a percentage of the public good produced in time *t* by experimental parents will integrate the endowment of their artifactual children in *t+1*. A cascade mechanism allows also for the rebirth of three generations of players, mimicking the biological and anthropological mechanisms of gene transmission and intergenerational altruism.

Experimental evidence shows that subjects who are reminded of their lineage membership tend to contribute more compared to those who are not included in a dynastic model. More importantly, results show that the real dynastic background of individuals is a prominent influence in the levels of investment in public goods.

KEY WORDS: public goods, generations, intergenerational spillovers, intergenerational altruism, OLG.

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1 – Introduction

Public goods are both characterized and defined by a very simple, yet difficult to fully unravel and explain, social dilemma: individuals are conflicted between maximizing personal gain and cooperate for the collective interest. They are called to choose if and how much to invest between a private good and a common project that, although more fruitful, benefits both contributors and non-contributors. At the end of the choice spectrum two options are available: the Nash Equilibrium of free riding and the social optimum of full cooperation. In between rests a continuum of possibilities.

Also issues around public goods are further complicated when time and space are included into the picture. Focusing on the time dimension for the purpose of this chapter, it is clear that each generation inherits from the previous one many things, including public goods and their externalities (think, for example, of infrastructures, health care or education systems, etcetera). This also means that generations invest into public goods that will benefit future generations, which indicates the existence of a kind of intergenerational altruism and cooperation. The results of the experiment carried out by Fischer et al. (2004) suggest that intergenerational responsibility is actually recognized, leading individuals to consider the additional externalities of their actions and consequently moving closer to the social optimum.

Intergenerational altruism and cooperation, and per contra account intergenerational free-riding, could be also viewed from a biological point of view, since future generations are the offspring of current ones. Tension between individual and group success is universal at all levels of biological organization, from bacteria to institutions. However altruistic behavior is more common in species with complex social structures[1]. Making matters slightly more complex is the exact notion of

[1] For example, in a numerous bird species, a breeding pair receives help in raising its young with others protecting the nest from predators or helping to feed the newborns. In most of the social insect colonies

altruism in evolutionary biology: an organism is said to behave altruistically when its behavior benefits other organisms, at a cost to itself. Costs and benefits are measured in terms of reproductive fitness (expected number of offspring). So by behaving altruistically, an organism reduces the number of offspring it is likely to produce itself, but increases the expected number of offspring for other organisms. The presence of altruism in natures is therefore puzzling from a strictly Darwinian point of view.

However natural selection does not simply occur at an individual level, but also at a group level: altruism might detrimental for the individual but it is beneficial for the group, and since groups composed only (or mainly) of selfish organisms go extinct, groups containing altruists will prosper. Hamilton (1964) proposed a refinement of this explanation of altruism in nature, using the concepts of "*kind selection*" predicting that organisms are more likely to behave altruistically towards their relatives than towards unconnected members of their own species. Likewise, Hamilton's Rule predicts that the closer the relationship the greater the extent of altruism. In the years since Hamilton's theory was devised, these predictions have been amply confirmed by empirical work.

Together with altruism, cooperation is a key aspect of social evolution, since evolutionary processes are all based on it to some extend. Novak (2006) summarized the five rules for the evolution of cooperation as follows: direct reciprocity, indirect reciprocity, spatial selection, multi-level selection and kin selection.

The far-reaching research question of this chapter focuses on the possibility of contaminating experimental economics with biology in order to explain intergenerational public good provision. The topic implies the need to mimic into the

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(such as ants, wasps, bees and termites), sterile workers are devoted to caring for the queen, constructing and protecting the nest, searching for food, and looking after eggs or larvae.

laboratory many overlapping generations, joined by some common resource and characterized by some form of kin detection and selection, plus a proxy for genes transmission.

2 – Method

Again, we use the Public Goods Game (PGG) to study the evolution and maintenance of cooperation in a setting where each of the groups can be thought of as a generation within a dynasty. Additionally a proxy for genes transmission is introduced: individuals can experience rebirth for a set, but unknown, number of rounds.

We model the dynastic PGG as a variation of a standard PGG where there are two goods – one private and one public – and N individuals. Each individual $i = 1, .., N$ is endowed with an amount of the private good, z_i. The private good contributed (t) by the i^{-th} individual is used to produce the public good following a production function $Y = f(\Sigma t_i)$ where t_i is the amount of private good contributed by each individual in order to produce Y. The production function $f(\Sigma t_i)$ represents the benefits from cooperation before being equally divided among all N group members. The outcome of a public good experiment consists of two items: a level of public good Y and a reallocation of the private good for each agent $x_1, ..., x_N$. Player's i's individual payoff, π_i, equals: $\pi_i = z_i - t_i + (a+b\delta_i)\ \Sigma t_i$, where $(a+b\delta_i)$ is the decomposition of the MPCR with δ_i being an individual productivity factor. If $1/N < (a+b\delta_i) < 1$ the game is a social dilemma since individually, each player is best off giving nothing to the public good, but collectively the players are best off donating their entire endowments.

The spillover is modeled, simplified to only two ensuing players (i.e. Parent and Child), as follows:

Parent Public Good (PPG)

i = 1, .., N

z_{pi}: private good of parent

t_{pi}*:* private good contributed by the parent

$Y = f(\Sigma t_i)$*:* production function

Outcome of PPG:

p_i's individual payoff, π_i, equals:

$\pi_{pi} = z_{pi} - t_{pi} + \beta(\alpha\ \Sigma t_{pi})$

Where β is the share of subject PPG payoff kept by the parent and (1-β) is the share transferred the child.

Therefore the new condition for the game in order to be an intergenerational social dilemma is $1/\beta N < \alpha < 1$, where $0<\beta<1$.

Child Public Good (CPG):

i = 1, .., N

z_{ci}: private good of child

Z'_{ci}: private good of child+transfer

t_{ci}: private good contributed by the child

Outcome of CPG:

c_i's individual payoff, π_i, equals:

$\pi_{ci} = z'_{ci} - t_{ci} + \beta(\alpha\ \Sigma t_{ci})$

with $z'_{cj} = z_{cj} + (1-\beta)(\alpha\Sigma t_{pi})$ and where β is the share of subject PPG payoff kept by the child and (1-β) is the share transferred to the grandchild. Again the new condition for the game in order to be an intergenerational social dilemma is $1/\beta N < \alpha < 1$, and $0<\beta<1$.

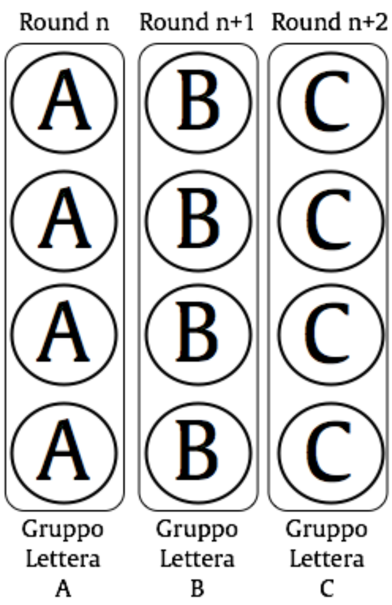
In our experiment we set β = 0.9 (therefore (1-β) = 0.1) and α =0.5 which satisfies the newly found condition for the intergenerational social dilemma $1/\beta N < \alpha < 1$. It is important to highlight that our new condition reduces the lower bound of the standard social dilemma condition of PGG.

2.1 – Experimental Design

The experiment consisted of two treatments: the baseline (BT) and the dynasties spillover (DT). We used a between subject design: each session was composed by 24 participants and consisted of 15 rounds. Participants were informed that several rounds composed the experimental session, but the exact number was not specified. However the set number of rounds was 15.

At the beginning of each session individuals were informed about their role during the experiment. In the BT they were presented with an envelope containing a card with a letter printed on it (either A, B or C). They were also presented with the following image, both in the instructions and in the first screen of the software programme, representing the structure of the game.

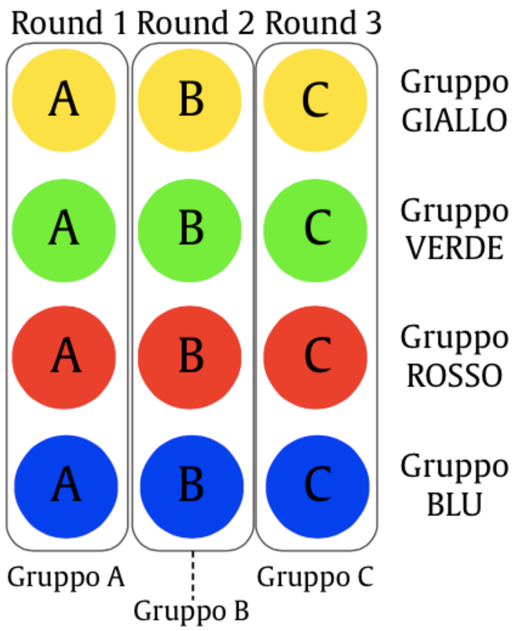
Figure 1 – BT Group Structure.



As shown, each individual belonged to a “Letter Group” and was called to make a decision in turns: first individuals belonging to the “Letter Group” A, then individuals belonging to the “Letter Group” B, then individuals belonging to the “Letter Group” C, then again individuals belonging to the “Letter Group” A, then individuals belonging to the “Letter Group” B, then individuals belonging to the “Letter Group” C, and so on until the experiment reached its ending.

In the DT they were presented with an envelope containing a colored card (either yellow, green, red or blue) with a letter printed on it (either A, B or C) plus a colored wristband (of the same color as the card) to be worn from the very beginning of the experiment. They were also presented with the following image, both in the instructions and in the first screen of the software programme, representing the structure of the game.

Figure 2 – DT Group Structure



As shown, each individual belonged both to a "Letter Group" and a "Color Group" and was called to make a decision in turns: first individuals belonging to the "Letter Group" A, then individuals belonging to the "Letter Group" B, then individuals belonging to the "Letter Group" C, then again individuals belonging to the "Letter Group" A, then individuals belonging to the "Letter Group" B, then individuals belonging to the "Letter Group" C, and so on until the experiment reached its ending.

In this treatment each "Letter Group" represented a generation, while each "Color Group" represented a dynasty. In order to induce and improve individual group identity and membership we introduced a preliminary task that each "Color Group" had to undertake. This consisted in submitting as many correct answers to a crossword as possible in 9 minutes time. The sum of the correct answers for each "Color Group" was multiplied by 5 ECU and paid at the end of the experiment, when also a feedback on the preliminary task was individually given. Both at the end of the preliminary task and at the end of the experiment, participants were asked to inform experimenters on how much they felt like they belonged to their "Color Group". We based our question on both Tropp and Wright (2001) and Sani et Al. (2007) and we developed a continuous Inclusion of the In-group in the Self (IIS) measure. To the contrary of what has been done previously (where the IIS was quantified by a single-item measure based on seven Venn-diagram figures) we proposed two circles – one representing the in-group and one representing the self – that could be overlapped to any measure that subjects deemed fit to represent their sense of psychological overlap with the group. Participants were asked to simply "drag and drop" with the mouse the self-circle within the boundaries of the software window.

In addition the structure of the "Color Group" – with different subjects taking turns playing for their color – allowed for the recreation a phenomena called "perceived collective continuity" or PCC (Sani et al., 2007). Individuals tend to see their in-groups (i.e. Nation, extended family, ethnic group etcetera) as having temporal continuity, as entities that are capable to move through time (Reicher & Hopkins, 2001). People therefore perceive themselves as part of the endless chain that goes beyond space and time.

Individuals in both treatments were also informed that the endowment at the beginning of each round would be different, either given by the experimenters (BT) or partially originated by the outcome of the PG game in the previous round (DT).

In particular individuals in the DT knew that the endowment was composed by the sum of 30 ECU plus a spillover of 10% of whatever the group in the previous round produced as the return from the public good, implying that only 90% was retained by the previous generation.

The endowments given by the experimenters in BT were generated by means of a backward design. The sessions of DT ran before those of BT, so we were able to mirror the endowments generated in DT for BT, as a set amount, so that we could compare the behavior in the two treatments controlling for a potential endowment effect.

In this way we recreated a simplified intergenerational setting where generations played a PG game at different stages, while each dynasty was affected by the actions of previous generations.

As usual in experiments on Public Goods, neutral terms have been used in both instructions and software, so there was no mention of any terminology linked to generations, dynasties or families.

Concluding the experiment was a structured questionnaire that, besides the standard socio-demographic questions, included a set of 15 questions aimed at investigating the generational and dynastic profile of participating subjects.

2.2 – Behavioral Predictions

As already discussed in section 2.2, standard game theory predicts that, using backward induction, the Nash Equilibrium for a repeated PG game should be free-riding. However countless experiments on PGG showed that such scenario is hardly ever achieved, even after 60 rounds. Furthermore previous literature shows that contributions to the PG tend to increase with higher marginal per capita returns (MPCR), chances of communication between subjects, homogeneity, and positive framing.

In addition, looking at previous experiments related to the dynastic lineage hypothesis, we can expect some form of increase in PG investments when the game is framed as an intergenerational setting. Peters et al. (2004) showed that parents and children contributed more to the PG when in the real family setting (compared to a strangers setting, as in Andreoni, 1998). Parents also contributed more compared to children and kept contributing more even in groups with children from other families.

This background allows the formulation of at least two testable predictions:

HP_1: Introducing a proxy for dynastic lineage increases the investment in the public good.

HP_2: The socio-demographic background of individuals, in particular their family composition and status, influences the levels of public good investment.

2.3 – Participants and Procedures

The Experiment was run in Trento (Italy) at the Cognitive and Experimental Economics Laboratory (CEEL) of the University of Trento. Participants were recruited through the CEEL online recruitment system. On their arrival at the laboratory, participants were seated in computer-equipped cubicles that did not allow communication or visual interaction among participants. In order to avoid the use of external aids during the experimental tasks, participants were asked to leave their personal belongings on the side of the room. The participants were mainly students of University of Trento.

A total of 96 participants (58 males and 38 females; mean age of 22.23 – min of 20, max of 33 – with SD of 2.52) took part in the experiment, divided into 4 sessions of 24 participants. Each treatment had two experimental sessions.

On the day of the experiment instructions (for each corresponding treatment) were distributed and participants were allowed to read them individually. To establish and ensure common knowledge instructions were also read aloud. Furthermore, before the beginning of the session a questionnaire was submitted to check the understanding of the experimental structure.

The experiment lasted approximately 60 minutes for BT and 90 for the DT. For their participation and punctuality subjects received, in addition to the result achieved in the experiment, a show-up fee of 3 Euro. The cumulative payoff of the active rounds was converted in Euro (1 ECU = 0.03 Euro) and privately paid to each subject. On average, participants in BT earned 9.70 Euro (SD 1.55) and in DT 9.81 Euro (SD 1.27) without the payment of the preliminary task and 12.47 (SD 1.62) including it.

3 – Results

3.1 – Descriptive Statistics

Table 1 summarizes the average, standard deviation, minimum and maximum of the contributions to the public good and the group contribution in BT, DT and overall respecti vely.

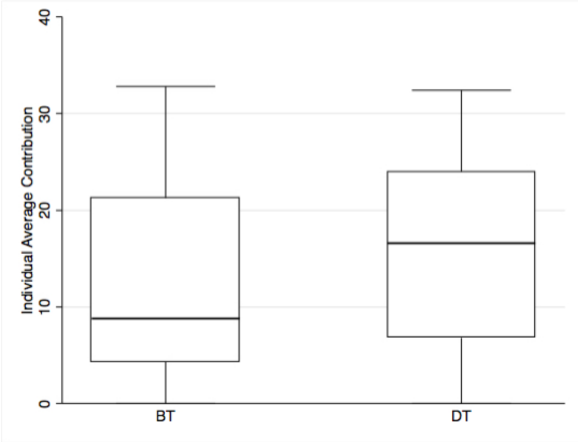
Table 1 – Average contribution to the public good.

Statistic	Individual Contribution			Group contribution		
	BT	DT	Overall	BT	DT	Overall
Mean	11.36	15.49	13.42	45.44	61.96	53.70
SD	12.80	11.89	12.51	39.49	31.06	36.44
Min	0	0	0	0	9	0
Max	35	35	35	128	110	128

RESULT 1 *– Giving in dynastic treatment is greater than in the baseline treatment.*

Looking at all the different aspects of subject and group contribution we can observe a clear difference between the two treatments. At a first glance, as depicted in both table 1 and figure 3, it is perceptible a difference between the two treatments, with higher average individual and group contribution for DT, and higher SD for BT.

Figure 3 - Box plot of average individual contribution in BT and DT.



In order to confirm such hypothesis we firstly ran two tests for normality. The Shapiro–Wilk test has p-value < 0.001 showing evidence that the data tested are not from a normally distributed population. This is confirmed by the skewness/kurtosis test of normality (p-value = 0.1381 and p-value = 0.0000 respectively).

As a consequence we choose a series of non-parametric tests between experimental treatments that are fit for the non-normal distribution at hand. We ran a two-sample Wilcoxon rank-sum test comparing the average individual contribution between the two treatments, confirming that there is a marginally significant difference between BT and DT (p-value = 0.0686). The existence of differences across the two experimental treatments is corroborated also by Kruskal-Wallis equality-of-populations rank test comparing average group contributions in BT and DT (p-value = 0.0147). From the output, we see that we can reject the hypothesis that the populations are the same at any level below 1.47%[2].

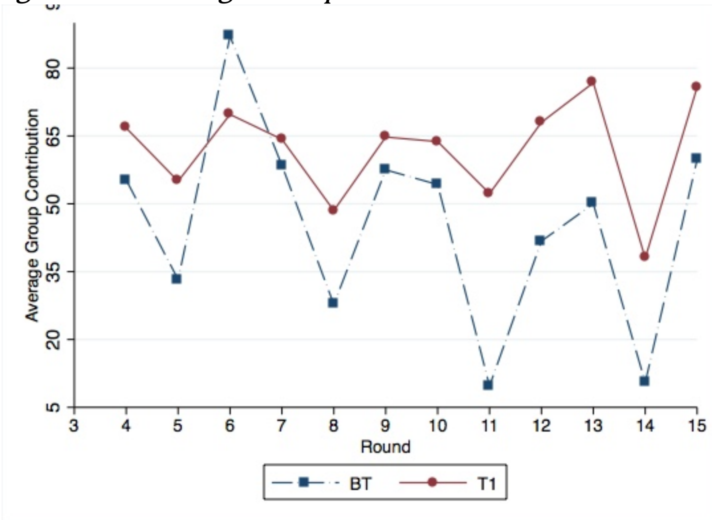
Figure 4 graphically depicts the trend of group average contributions for the rounds from 4 to 15, for BT and DT[3]. It is clear that the two treatments have different average group contributions (being those of DT higher than those of BT), but the trend

[2] For the purpose of calculating the Wilcoxon Rank Sum Test and the Kruskal-Wallis Test we calculated the average of contributions for each individual, agreegating therefore the observations into 48 for each treatment.

[3] From this point onwards and for all statistical information we do not consider rounds 1 to 3. These were dropped since they represented the first round for each “Letter Group” in both treatments and did not contain any “generation”effect.

of such data seems irregular. This is most probably due to the fact that groups were playing in turns and each had its very own trend of contributions, with possibly a restart effect playing its part into shaping group contributions. However, since our game is repeated, we should observe some degree of decay, even if subjects do not know the length of the game for sure.

Figure 4 – Average Group Contributions in BT and DT.



In order to isolate restart hypothesis we summarized the average investment in public good per group In table 2 the difference between the two treatments is highlighted. In addition we grouped the observations in turns rather than rounds, where a turn clusters together sets of three rounds. Each round therefore is representing from the first to the fifth choice of each "Letter Group".

Table 2 – Average investment in the public good per group, in turns.

	Turn 1	Turn 2	Turn 3	Turn 4	Turn 5	Overall
BT	63.58	58.50	47.92	35.25	40.08	49.07
DT	60.75	63.83	59.17	61.33	63.50	61.72
Difference	*2.83*	*-5.33*	*-11.25*	*-26.08*	*-23.42*	*-12.65*

RESULT 2 *– Being part of a dynasty matters. Not only the investment in the public good is higher, but also the levels of free riding are lower.*

Looking into table 3, it can be seen that in the first turn subjects in DT free ride more than subjects in BT. However the free riding percentage constantly increase for subjects in BT, reaching its maximum of 35.4% in the fifth turn, while it remains fairly constant for subjects in DT, except for a peak of 18.8% in turn 3. Not coincidentally, in the third turn of BT we can also see a drop in group contributions (Table 2).

Table 3 – Percent of subjects' free riding, in turns.

	Turn 1	Turn 2	Turn 3	Turn 4	Turn 5	Overall
BT	6.3%	16.7%	25.0%	33.3%	35.4%	23.3%
DT	10.4%	10.4%	18.8%	12.5%	10.4%	12.5%
Difference	*-4.2%*	*6.3%*	*6.3%*	*20.8%*	*25.0%*	*10.8%*

To confirm the hypothesis of lower free riding in the presence of dynasties we ran a two-sample Wilcoxon rank-sum test comparing the number of free riders between the two treatments (in all rounds), confirming that there is a significant difference between BT and DT (p-value = 0.0549). At this point it is interesting to attest to the levels of full cooperation and compare it between the two treatments. As can be seen from Table 4 the results are reversed, with greater levels of full cooperation in the baseline treatment. However the trend for the two treatments shows a different story: while in BT the levels of full cooperation steadily decline with a downward peak in the fourth turn, in DT full cooperation progressively increases in each turn reaching its peak in the fifth turn. Coincidentally both treatments end at a 20.8% level of full cooperation.

Table 4 – Percent of subjects fully cooperating, in turns.

	Turn 1	Turn 2	Turn 3	Turn 4	Turn 5	Overall
BT	27.1%	22.9%	20.8%	16.7%	20.8%	27.1%
DT	6.3%	8.3%	10.4%	18.8%	20.8%	12.9%
Difference	*20.8%*	*14.6%*	*10.4%*	*-2.1%*	*0.0%*	*8.8%*

Again, in order to verify that the difference between the two treatments is significant we ran the Kruskal-Wallis equality-of-populations rank test comparing the number of occurrences of full cooperation in BT and DT, which returned a p value of 0.0845, showing only marginal significance, if any.

Falling in the “dynasty effect” are the results of the continuous Inclusion of the In-group in the Self (IIS) measure described in section 2.1. We checked for IIS in DT at the beginning of the experimental session as well as at the end of it. Briefly, the measure of membership is given by the distance in pixels between the center of the circle representing the self and the one representing the “Color Group”. When the two circles perfectly overlap the measurement is equal to 0, any other degree of overlapping is greater than 0 but smaller or equal than 100, and no overlapping is greater than 100 up to a maximum of 736 pixels.

Firstly a cluster analysis was run in an attempt to determine the natural clusters of the observed levels of membership (Tables 5 and 6). The two clusters show different ranges for the groups, with smaller lower and upper bounds for the measurement before the experimental session began. One hypothesis is that during the course of the experiment subjects could not reach their desired outcome for the self and/or the group and therefore felt less attached to their “Color Group”. To check if there is any relation between the measurement of the membership at the end of the experiment and the “Color Group” we ran a simple Pearson product-moment correlation coefficient. The Pearson’s r for the correlation between the average inheritance for each subject and the post-experiment measure of membership is equal to -0.4216, showing that there is only a very weak negative correlation. On the other hand one can speculate that the preliminary “Color Group” task had an effect on the levels of membership perceived. Again we ran the Pearson product-moment correlation coefficient, this time between the number of correct answers to the crossword and the pre-experiment IIS measurement. The result of -0.1844 clearly shows that the performance in the preliminary task did not affect the perceived IIS measure. However, seeing that 75% of subjects had some sort of overlapping between the self and the group circles, it is plausible to believe that the proxies (colored cards, wrist bands, software reminders) to induce group identity and membership worked at least to some extent.

Table 5 – Membership cluster analysis, beginning of experimental session.

Min	Mean	Max	Frequency
0	4.56	21	18
25	42.08	66	12
77	99.18	123	11
159	182.6	241	5
369	480.5	592	2
0	*74*	*592*	*48*

Table 6 – Membership cluster analysis, end of experimental session.

Min	Mean	Max	Frequency
0	30.85	55	20
67	89.63	108	11
125	155.75	201	8
275	351.67	422	3
592	616.17	736	6
0	*158.35*	*736*	*48*

3.2 – Regression Analysis

The dependent variable of the regression analysis performed is the level of individual investment (contribution) to the common project (public good). The following fixed explanatory factors were considered:

- *Inheritance*: 10% of the public good individual return that is transferred to the next player in DT, or the extra endowment that each player received in BT;
- Previous group contribution (*groupcprev*): how much the group has contributed as a whole in the previous turn of activity;
- Dynasty previous contribution (*dynstycprev*): how much the group (in lineage) playing in the previous round has contributed;
- *Turn*;
- *Generation*.

Furthermore, to illustrate the importance of the dynastic background of subjects, we included several control variables: the number of living-in family members (*family*), the number of grandparents (*gp*), and the frequency of the face-to-face interaction with grandparents (*freqgp*). In addition we controlled for the gender (*male*) and faculty (*eco*). Also the interactions between the number of grandparents, the inheritance and the gender with DT were included. Lastly we introduced a random explanatory factor in order to control for the potential bias in estimation due to the repetition of the choices and unobservable characteristics of participants into the experiment. Given the nature of the dependent variable and of the explanatory factors we chose to run random-effects GLS regression.

Table 7 – Random Effects GLS regression

Contribution	Coeff. (Std. Err)
DT	-1.559 (5.061)
Inheritance	-0.306 (0.665)
Group Previous Contribution	0.164 (0.026)***
Dynasty Previous Contribution	0.039 (0.030)
Turn	-0.028 (0.379)
Generation (Group B)	-7.399 (2.247)***
Generation (Group C)	0.032 (2.132)
Family	1.266 (0.909)
Grandparents	-3.474 (2.184)
Frequency Grandparents	0.584 (0.756)
DT X grandparents	7.768 (2.967)**
DT X frequency gp	-0.936 (1.088)
DT X inheritance	-2.989 (1.064)**
*DT X gender (male)**	6.602 (3.497)*
Male	-1.687 (2.489)
Economics	-1.616 (1.953)
Obs	384
Groups	96
Wald Chi-Square test (p-value)	< 0.0001

***p< 0.001 **p < 0.05, *p < 0.1

The results of the GLS regression show a significant positive impact of the group previous contribution (what the subject own "Letter Group" contributed in the previous active round). Greater positive and significant impacts are also registered in the interaction of DT with the number of grandparents and the gender. Significant negative influence on contribution is found for individuals belonging in the "Letter Group B and a marginal negative effect is found in the interaction between DT and the inheritance levels. Lastly, confirming the hypothesis of significant differences across individuals is the result of the Breusch and Pagan Lagrangian multiplier test for random effects (p-value of 0.0000).

Table 8 reports the results of a cluster estimator of the individual contribution on the same explanatory variables listed before. This allowed for intragroup correlation, specifying that the data has repeated observations on individuals. The results are similar to the random effects GLS regression, with an exception for the influence of grandparents, which have a significant negative impact on contribution.

Table 8 – Linear Regression Cluster Id (individual contributions)

Contribution	Coeff. (Std. Err)
DT	2.970 (4.531)
Inheritance	-0.304 (0.563)
Group Previous Contribution	0.220 (0.026)***
Dynasty Previous Contribution	0.040 (0.028)
Turn	0.212 (0.414)
Generation (Group B)	-6.529 (2.131)***
Generation (Group C)	-0.420 (2.201)
Family	1.433 (0.912)
Grandparents	-4.092 (1.639)**
Frequency Grandparents	0.616 (0.656)
DT X grandparents	7.855 (2.923)**
DT X frequency gp	-0.872 (1.041)

DT X inheritance	-4.649 (1.077)***
DT X gender (male)	6.025 (3.376)*
Male	-1.503 (2.109)
Economics	-1.267 (1.850)
Obs	384
Groups	96
Wald Chi-Square test (p-value)	< 0.0001

***p< 0.001 **p < 0.05, *p < 0.1

Table 9 reports the results of a Tobit Regression. This specification has been chosen to account for the limits imposed in the experiment for the contribution choices. Also, since the initial endowment was varying in time depending on the inheritance received from the previous generation (or set by experimenters in BT), it was necessary to normalize the levels of contribution. Therefore the dependent variable is still the level of individual investment (contribution) to the common project (public good), but it is expressed as a value between 0 and 1. The contribution in percentage is regressed on the explanatory treatment variables previously specified for the GLS model.

Table 9 – Tobit Regression (individual contributions – values between 0 and 1)

Perc_Contribution	Coeff. (Std. Err)
DT	-0.052 (0.025)
Inheritance	0.012 (0.001)**
Group Previous Contribution	0.002 (0.001)***
Dynasty Previous Contribution	0.019 (0.022)**
Turn	-0.226 (0.069)
Generation (Group B)	-0.008 (0.064)***
Generation (Group C)	0.059 (0.027)
Family	-0.194 (0.067)**
Grandparents	0.041 (0.023)**
Frequency Grandparents	0.342 (0.089)*
DT X grandparents	-0.047 (0.032)***

DT X frequency gp	-0.227 (0.041)
DT X inheritance	0.297 (0.105)***
DT X gender (male)	-0.120 (0.077)**
Male	-0.053 (0.058)
Economics	-0.132 (0.177)
Obs	78 left-censored observations at perc_contr<=0 239 uncensored observations 67 right-censored observations at perc_contr>=1
Wald Chi-Square test (p-value)	< 0.0001

***p< 0.001 **p < 0.05, *p < 0.1

With the Tobit model the findings of the two previous models are confirmed. However the explainatory variables Inheritance, Dynasty Previous Contribution, Family, Grandparents, Frequency Grandparents became significant predictors of the Percentage Contribution.

3.2 – Socio-Demographic Profiling of Subjects

At the end of the experiment we administered an extended socio-demographic questionnaire aimed at profiling subjects from a dynastic point of view. In addition to the standard questions (age, gender, year of birth, academic background), questions regarding the family composition were asked. In particular the following information was elicited: number of cohabiting family members, number of brothers/sisters, number of grandparents, distance and frequency of face-to-face interactions with mother, father and each grandparent. Table 10 depicts the dynastic profiling of participating subjects.

Table 10 – Dynastic profiling of subjects, by treatment.

#	Cohabitating family members (including subject)				Number of brothers/sisters				Number of (living) grandparents			
	BT		DT		BT		DT		BT		DT	
	nr	*%*	*nr*	*%*	*nr*	*%*	*nr*	*%*	*nr*	*%*	*nr*	*%*
0	-	-	-	-	6	12.5%	9	18.8%	6	12.5%	11	22.9%
1	1	2.1%	-	-	32	66.7%	26	54.2%	13	27.1%	11	22.9%
2	2	4.2%	2	4.2%	8	16.7%	7	14.6%	18	37.5%	12	25.0%

3	9	18.8%	10	20.8%	2	4.2%	4	8.3%	6	12.5%	11	22.9%
4	26	54.2%	23	47.9%	-	-	2	4.2%	5	10.4%	3	6.3%
5	8	16.7%	7	14.6%	-	-	-	-	-	-	-	-
6	2	4.2%	4	8.3%	-	-	-	-	-	-	-	-
7	-	-	2	4.2%	-	-	-	-	-	-	-	-

The most common profile of a participating subject is an individual living with other 3 family members, namely the mother, the father and a brother/sister, and has two living grandparents. Although the sample of our subject is partially biases since we can expect students to be still dependent and cohabitating with their parents, the picture portrayed by our data fits into the one given by ISTAT (Italian National Institute of Statistics) in his 2014 Annual Report[4].

In Italy the numbers of couples with children are declining: currently there are about 8 million and 600,000 (about 320,000 less than in 2006-2007) and represent only 34.6 percent of all households (average 2012-2013). More specifically, following the decline in marriage and fertility (average of 1.29 children per female), married couples with children are declining more rapidly. In the same span of time families with children went from 37.3 to 32.6 percent. Nowadays only one in three families in Italy are of the more traditional form (parents plus child/children).

Grandparent's role also has drastically changed due to recent demographic shifts, such as the already mentioned fertility decline and longevity pattern. Demographic forecasts for Italy for the next 30 years show an escalation of the aging process, especially in the South, where in the period between 2011 and 2041 the proportion between individuals aged 60 to 100 and young people under the age of 15 will more than double (going from 123 to 278). During the same period in the Nothern and Central Italy, the aging index will increase by more than one and a half time, going

[4] Since the experiment was carried out only in Trento (Italy) we compared our data with the National Statistics. However it would be interesting to compare the results with other Countries where the socio-demographic framework is either very similar or somehow distinct.

from 159 to 242. This projection of an inverse pyramid society where more grandparents will have contact with fewer grandchildren has led researches to investigate their evolving relationship. Since such trends are common to most industrialized Countries the results of international papers on this subject can be extended to the Italian case[5].

Neugarten and Weinstein (1964) in their early anthropological investigation found that among 51 societies for which data were available, the roles of grandparents differed cross-culturally: if grandparents were removed from family authority their relationships with grandchildren were more kind and affectionate compared to societies where economic power and prestige rested with the elderly. Much later studies (Silverstein, 2001) have highlighted that factors such as family life stage, gender, marital status, geographical place, ethnicity and education were amongst the most recurrent variables influencing grandparents-grandchildren relationships.

Current socio-demographical shifts such as lower fertility rates and higher full-time employment for women also affect the importance of grandparents in the upbringing of children, and later in life as role models for the grandchildren they (helped) raising[6]. In particular this trend (of grandparents substituting parents in childcare duties) is the focus of contemporary studies and lobbying.

As a result of grandparents being the caretakers of their grandchildren at a sense of obligation towards each other has developed (Lumby, 2010). As grandchildren grow older, the relationships are more likely to evolve from care to giving advice and support. In addition grandparents provide a link to the past and act as sources of family history, heritage and traditions. Grandparents, being the link between many

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[5] For the purpose of this experiment the most relevant findings are those that look into the influence of grandparents over adult grandchildren.

[6] Kennedy (2009) explained that grandchildren tended to feel closer to their mother's parents than to their father's parents and that they perceived their grandparents as loving, helping and comforting and as role models who are important in their lives.

strands of the same lineage, also have an active role in keeping wider sets of relatives connected.

For what concerns Italy, Putnam et al. (1993) in their overview of 25 years of social trends concluded that low social capital reserves produced impoverished communities. Social capital is the results of social cohesion that starts from the very basic unit of the family. If and when families are capable of teaching and transmitting the values trust and respect, then they produce citizens who are engaged in rich social networks within communities.

It seems only plausible that, given the renewed importance of grandparents and their traditional role in families, individuals that have greater and better relationships with their grandparents are also more prone to cooperate, as a good member of a tight community would.

3.4 – Discussion

This study examined the influence of dynastic lineage over investments in public goods in an experimental setting. During the last two decades, laboratory experiments have become a recognized method for testing economic theories and paradigms. Experimental economics has the obvious advantage to generate empirical information in a controlled environment that is also replicable. However, amongst other limitations, a standard questionnaire for collecting socio-demographic and economic data to administer to participating subjects is not yet available. This type of standard instrument would not only improve the comparability of different datasets and analyze the selectivity of subject pools (Gächter, 2009) but also extend the understanding of the influence that socio-demographic characteristics of subjects have over economic decision-making processes.

As suggested by Gächter (2009), the integration of experiments into representative surveys would allow researchers to explore the impact of socio-demographics on experimentally observed behavior. Since it is already a standard practice amongst most researchers in the field of experimental economics to elicit socio-demographic information from subjects at the end of experimental sessions, it would be reasonable to coordinate such effort. Such surveys are relevant since they could provide explanatory variables for unclear decision-making processes. This consideration is particularly relevant for the purpose of explaining intergenerational public good investments: as shown in section 3.2 individuals with a greater number of (living) grandparents tend to contribute more to the common project. If an extended version of a standard socio-demographic questionnaire were not administered relevant information that explain such an important intergenerational dynamic would not be available.

The experiment presented in this paper is a first step towards the identification of potential intergenerational factors affecting public goods provision, and much remains to be understood. First and foremost future research should investigate whether dynastic lineage in real families is as strong as the results of this experiment suggested. Also future work should look into the possibility of investing in either a dynastic family good or a public good, similar to what has been done for local and global PG experiments. Another line of research could look at the same issue by means of a sequential dictator game, extending the work of Bahr and Requate (2007).

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Appendix: Original and Translated Instructions

Note: the label [Common] identifies instructions which are common to all treatments; the label [BT] identifies instructions which refer exclusively to the Base Line Treatment; the label [DT] identifies instructions which refer to the Dynasty Treatment.

General Instructions

ORIGINAL

[COMMON]Cari Partecipanti,

Vi ringraziamo per aver deciso di prendere parte a questo esperimento. Da questo momento in poi vi chiediamo di non comunicare con gli altri partecipanti. Se doveste avere delle domande, vi preghiamo di alzare la mano e attendere che uno degli sperimentatori venga a rispondervi privatamente.

L'ESPERIMENTO

Ruoli e Gruppi

[BT] Posto sul tavolo dinanzi ad ognuno di voi c'è una busta contenente un tagliando con una lettera stampata (A, B, C). Questo tagliando v'informa sul ruolo che dovrete ricoprire durante l'esperimento.

[Ad esempio se davanti a voi c'è un tagliando con la lettera B significa che siete un giocatore del tipo B.]

[DT] Posto sul tavolo dinanzi ad ognuno di voi c'è una busta contenente un tagliando colorato (giallo, verde, rosso o blu) con una lettera stampata (A, B, C). Questo tagliando v'informa sul vostro colore e sul ruolo che dovrete ricoprire durante l'esperimento.

[Ad esempio se davanti a voi c'è un tagliando rosso con la lettera B significa che appartenete al gruppo colore rosso e siete un giocatore del tipo B]. Inoltre nella stessa busta c'è anche un braccialetto con il colore che vi è stato assegnato: vi chiediamo d'indossarlo sin da questo momento.

L'esperimento di oggi è costituito da due parti.

La prima consiste in un compito preliminare (*vedi sezione 1.3 - Task del compito preliminare).*

[BT] L'esperimento è costituito da un certo numero di round, ognuno dei quali è indipendente dagli altri. Questo significa che le decisioni prese in un round influiscono solo sui guadagni di quel round che e non sui guadagni dei round successivi.

[DT] L'esperimento di oggi è costituito da due parti.

La prima consiste in un compito preliminare (*vedi sezione 1.3 - Task del compito preliminare).*

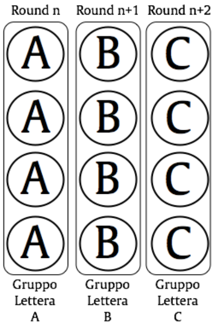
La seconda invece è costituita da un certo numero di round, ognuno dei quali è dipendente dagli altri. Questo significa che le decisioni prese in un round influiscono sia sui guadagni di quel round che sui guadagni di tutti i round successivi.

[COMMON] In ogni round parteciperanno tra loro solo gli individui di un certo tipo (A o B o C). Nel primo Round parteciperanno solo gli individui del tipo A (GRUPPO A), nel secondo solo gli individui del tipo B (GRUPPO B), nel terzo round solo gli individui del tipo C (GRUPPO C). Nel quarto round parteciperà nuovamente solo il GRUPPO A, nel quinto nuovamente solo il GRUPPO B, e nel sesto round nuovamente solo il GRUPPO C, e via dicendo fino alla fine dell'esperimento.

[DT] Anche la composizione del "GRUPPO COLORE" (un individuo del tipo A, uno del tipo B e uno del tipo C) sarà la medesima per tutti i round, cioè gli altri due membri del tuo "GRUPPO COLORE" rimarranno sempre gli stessi.

L'identità degli altri membri del tuo "GRUPPO COLORE" e del tuo "GRUPPO LETTERA" non sarà mai portata a tua conoscenza. Allo stesso modo la tua identità non sarà mai rivelata a loro.

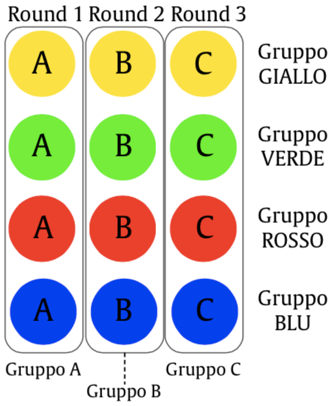
[BT] La composizione del "GRUPPO LETTERA" (giocatori del tipo A, B o C) sarà la medesima per tutti i round, cioè gli altri 3 membri del tuo "GRUPPO LETTERA" saranno sempre gli stessi. L'identità degli altri membri del tuo "GRUPPO LETTERA" non sarà mai portata a tua conoscenza. Allo stesso modo la tua identità non sarà mai rivelata a loro.



[BT] Figura 1 – Struttura dei Gruppi Lettera e Ruoli dei partecipanti.

La Figura 1 illustra la struttura dei "GRUPPI LETTERA" e dei Ruoli durante i round dell'esperimento. Vi chiediamo di osservarla attentamente per qualche secondo e d'identificare il vostro ruolo all'interno della struttura dei "GRUPPI LETTERA".

Ricapitolando: ogni giocatore appartiene a un GRUPPO LETTERA (GRUPPO A, GRUPPO B, GRUPPO C). L'esperimento è costituito da un certo numero di round e in ogni round giocano solamente gli individui di un certo GRUPPO LETTERA.



[DT] Figura 1 – Struttura dei Gruppi Colore, dei Gruppi Lettera e Ruoli dei partecipanti.

La Figura 1 illustra la struttura dei "GRUPPI COLORE", dei "GRUPPI LETTERA" e dei Ruoli durante i round dell'esperimento. Vi chiediamo di osservarla attentamente per qualche secondo e d'indentificare il vostro ruolo all'interno della struttura dei "GRUPPI COLORE" e "GRUPPI LETTERA"

Ricapitolando: ogni giocatore appartiene a un GRUPPO COLORE (GRUPPO GIALLO, GRUPPO VERDE, GRUPPO ROSSO o GRUPPO BLU) e a un GRUPPO LETTERA (GRUPPO A, GRUPPO B, GRUPPO C). L'esperimento è costituito da un certo numero di round e in ogni round giocano solamente gli individui di un certo GRUPPO LETTERA.

Task del compito preliminare

Prima di cominciare con il task dell'esperimento a ogni GRUPPO COLORE è chiesto di completare un cruciverba.

A turno, ogni membro di un GRUPPO COLORE ha a disposizione tre minuti per completare quante più definizioni del cruciverba possibili.

Al termine dei tre minuti disponibili per ogni individuo uno sperimentatore passerà a raccogliere il cruciverba per passarlo all'individuo successivo del proprio GRUPPO COLORE.

L'ordine con cui è passato il cruciverba è il seguente:

individuo A → individuo B → individuo C

Ciascun membro del GRUPPO COLORE sarà retribuito con 5 UMS per ogni definizione corretta data dal GRUPPO COLORE nel suo insieme (quindi indipendentemente da chi ha dato la definizione corretta all'interno del GRUPPO COLORE). Il risultato del task preliminare di ogni GRUPPO COLORE sarà comunicato al momento del pagamento finale (alla fine della sessione odierna).

Task dell'esperimento

[DT] Prima di cominciare il task dell'esperimento e subito dopo aver terminato tutti i round vi sarà richiesto di esprimere quanto vi sentite parte del vostro "GRUPPO COLORE".

[COMMON] All'inizio di ogni round saranno assegnate un certo numero (almeno 30) di unità di moneta sperimentale (UMS) a ogni membro del "GRUPPO LETTERA" attivo durante quel round. L'ammontare di UMS può variare di round in round, quindi vi chiediamo di prestare attenzione al numero di UMS assegnate di volta in volta.
Di queste UMS ogni membro del gruppo attivo dovrà decidere, individualmente e autonomamente, se e quanto destinare a un progetto comune. Anche gli altri soggetti nel GRUPPO LETTERA attivo saranno chiamati a esprimere la stessa scelta.
Assumiamo, per comodità, che tu sia un membro attivo denominato X e gli altri 3 componenti del tuo gruppo siano denominati rispettivamente Y, Z e W. Definiamo la tua contribuzione al progetto come C_Xe le contribuzioni degli altri 3 componenti del tuo gruppo come C_Y , C_Z e C_w.
Gli utili totali derivanti dal progetto sono calcolati sommando alla tua contribuzione (C_X) le contribuzioni degli altri 3 componenti del tuo gruppo (C_Y C_Z C_w) e moltiplicandola per 2. Il risultato sarà poi diviso equamente tra tutti e 4 i componenti del gruppo.
In altre parole l'utile individuale lordo derivante dal progetto è calcolato sommando alla tua contribuzione (C_X) le contribuzioni degli altri 3 componenti del tuo gruppo (C_Y C_Z C_w) e moltiplicandola per alfa pari a 0.5 (=2 diviso 4).
Ciò che deciderai di non contribuire (cioè almeno 30 UMS – C_X) verrà messo sul tuo conto personale.

[DT] Dipendenza tra Round

Come già ricordato l'esperimento di oggi è costituito da un certo numero di round, ognuno dei quali è dipendente dagli altri. Questo significa che le decisioni prese in un round influiscono sia sui guadagni di quel round che sui guadagni di tutti i round successivi.
In ogni round in cui sei attivo i tuoi guadagni sono dati dalla somma delle due seguenti voci:

- gli UMS che hai messo sul tuo conto personale (almeno 30 UMS - C_X);
- gli utili derivanti dal progetto [alfa x (C_Y +C_Z+C_w+ C_x)].

Alla quale è sottratta la seguente voce:

- gli utili derivanti dal progetto [alfa x (C_Y +C_Z+C_w+ C_x)] moltiplicati per una percentuale pari al 10% , ovvero la quota trasmessa al membro del tuo GRUPPO COLORE nel round successivo.

[Ad esempio se siete un partecipante del tipo B e un membro del GRUPPO COLORE ROSSO lascerete il 10% del vostro guadagno derivante dal progetto comune al soggetto del tipo C della vostro stesso GRUPPO COLORE ROSSO.]
Questo significa che, escluso il primo round, a ogni round successivo l'effettivo ammontare di UMS disponibili per ciascun giocatore attivo è pari alle UMS assegnate dagli sperimentatori più la quota trasmessa dal membro del proprio "GRUPPO COLORE" che ha partecipato al round precedente.
Alla fine di ogni round in cui sei attivo ti sarà comunicato il valore delle singole contribuzioni degli altri membri del tuo "GRUPPO LETTERA" (C_Y C_Z C_w), il valore della contribuzione totale del "GRUPPO LETTERA" (C_Y +C_Z+C_w+ C_x), il valore trasmesso al membro del tuo "GRUPPO COLORE" che giocherà nel round successivo e il tuo guadagno netto finale.
Le informazioni comunicate ai membri inattivi di ogni "GRUPPO COLORE" saranno solo il valore della contribuzione del membro del proprio "GRUPPO COLORE" e il valore trasmesso al membro del proprio "GRUPPO COLORE" che giocherà nel round successivo.
Inoltre sarà fornito lo storico a scalare di questi risultati alla fine di ogni round.

[BT] In ogni round in cui sei attivo i tuoi guadagni sono dati dalla somma delle due seguenti voci:

- gli UMS che hai messo sul tuo conto personale (30 UMS - C_X);
- gli utili derivanti dal progetto [alfa x (C_Y +C_Z+C_w+ C_x)].

Alla fine di ogni round in cui sei attivo ti sarà comunicato il valore delle singole contribuzioni degli altri membri del tuo “GRUPPO LETTERA” (C_Y C_Z C_w), il valore della contribuzione totale del “GRUPPO LETTERA” ($C_Y + C_Z + C_w + C_x$), e il tuo guadagno netto finale.

I TUOI GUADAGNI

[COMMON] Nota bene: tutti gli importi durante tutto l’esperimento s’intendono arrotondati per difetto se il primo decimale è minore o uguale a 5, o per eccesso altrimenti.
Sarai pagato 3,00 EURO per aver partecipato ed esserti presentato in orario.
Inoltre alla fine dell’esperimento sarà calcolato il tuo guadagno cumulativo al tuo ultimo round attivo.
[DT] Sarai inoltre pagato per il task preliminare con 5 UMS per ogni definizione corretta del cruciverba data dal tuo “GRUPPO COLORE”.
[COMMON] Ogni UMS sarà convertita in 0,03 EURO.

TRANSLATED
[COMMON] Dear Participant,
Thank you for taking part in this experiment. From this moment on, we ask you not to communicate with other participants. Should you have any questions, please raise your hand and wait for one of the investigators to respond privately.

The Experiment
Roles and Groups
[BT] Placed on the table, right in front of each of you there is an envelope containing a coupon with a printed letter (A, B, C). This coupon informs you about the role that you will play during the experiment.
[For example, if in front of you there is a coupon with the letter B it means that you are a type B player].

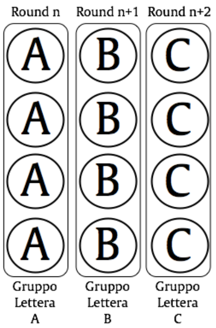
[DT] Placed on the table, right in front of each of you there is an envelope containing a colored coupon (yellow, green, red or blue) with a printed letter (A, B, C). This coupon informs you about your color and the role that you will play during the experiment.
[For example, if in front of you there is a red coupon with the letter B it means that you belong to the red group and a type B player]. In the same envelope you will also find a wristband of the same color that you have been assigned: we kindly ask you to wear it from now onwards.

[BT] The experiment consists of a given number of rounds, each of which is independent from the others. This means that decisions you make in one round only affect earnings of that very same round and not the earnings of later rounds.
[DT] Today’s experiment consists of two parts.
The first is a preliminary task (see section 1.3 - Task of the preliminary task).
The second one consists of a given number of rounds, each of which is dependent on others. This means that decisions made in one round affect both the gains of that round and the earnings of later rounds.

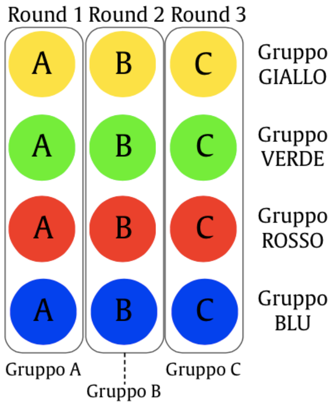
[COMMON] In each round individuals of a certain type (A or B or C) will be active and making decisions. In the first round only individuals of type A (GROUP A) will participate, in the second only individuals of type B (GROUP B), in the third round only individuals of the type C (GROUP C). In the fourth round again only GROUP A will participate, in the fifth again only to GROUP B, and in the sixth round again only GROUP C, and so on until the end of the experiment.

[DT] The composition of the "COLOR GROUP" (one individual of type A, one type B and one type C) will be the same for all rounds, meaning that the other two members of your "COLOUR GROUP" will always remain the same.
The identities of the other members of your "COLOUR GROUP" and your "LETTER GROUP" will never be brought to your knowledge. Similarly your identity will never be revealed to them.

[BT] The composition of the "LETTER GROUP" (players of type A, B or C) will be the same for all rounds, that is, the other three members of your "LETTER GROUP" will always be the same. The identities of the other members of your "LETTER GROUP" will never be brought to your knowledge. Similarly your identity will never be revealed to them.



[BT] Figure 1 - Structure of Letter Groups and Roles of the participants.
Figure 1 illustrates the structure of the "LETTER GROUP " and roles during the rounds of the experiment. We ask you to carefully observe it for a few seconds and identify your role within the structure of the "LETTER GROUP ".
In summary: each player belongs to a LETTER GROUP (GROUP A, GROUP B, GROUP C). The experiment consists of a given number of rounds and in every round only the individuals of a certain LETTER GROUP are playing.



[DT] Figure 1 - Structure of the Color Groups, Letter Groups and Roles of participants.
Figure 1 illustrates the structure of the "COLOR GROUP", the "LETTER GROUP" and roles during the rounds of the experiment. We kindly ask you to carefully observe it for a few seconds and indentify of your role within this structure.
In summary: each player belongs to a COLOR GROUP (YELLOW GROUP, GREEN GROUP, RED GROUP, or BLUE GROUP) and a LETTER GROUP (GROUP A, GROUP B, GROUP C). The experiment consists of a certain number of rounds and in every round only the individuals of a certain LETTER GROUP are going to play.
Preliminary task:
Before starting with the experiment each COLOR GROUP is asked to complete a crossword puzzle.
Taking turns, each member of a COLOR GROUP has three minutes to complete as many definitions of the crossword as possible.
At the end of the three minutes available for each individual an experimenter will collect the crossword and pass it next to the individual of the same COLOR GROUP.
The order in which the crossword is passed along is the following:
Individual A → Individual B → individual C
Each member of the COLOR GROUP will be paid with 5 UMS for each correct definition given by COLOR GROUP as a whole (so regardless of who gave the correct definition in the COLOR GROUP). The result of the preliminary task of each COLOR GROUP will be notified at the time of the final payment (at the end of today's session).

1.3 - Experiment

[DT] Before beginning the experiment and after finishing it you will be asked to express how much you feel part of your "COLOUR GROUP".

[COMMON] At the beginning of each round each member of the active “LETTER GROUP” will receive (at least 30) units of experimental currency (UMS). The amount of UMS may vary from round to round, so we ask you to pay attention to the number of UMS assigned from time to time.
Of these UMS every member of the active group will have to decide, individually and autonomously, whether and how much to allocate to a common project. The other active parties in the “LETTER GROUP” will be called to make the same choice.

[DT] 1.3 - Dependence between rounds
As already mentioned, the experiment consists of a set number of rounds, each of which is dependent on others. This means that decisions made in one round affect both the gains of that round and the earnings of later rounds.
In each round where you are active your earnings are the sum of the following two items:
- The UMS that you put on your personal account (30 UMS – C_x);
- Profits accruing from the project [alpha x (C_x + C_y + C_z+ C_W)].
Which is reduced by the following entry:
- Profits accruing from the project [alpha x (C_x + C_y + C_z+ C_W)] multiplied by a percentage equal to 10%, or the proportion sent to the member of your GROUP COLOR in the next round.
[For example, if you are a participant of type B and a member of the RED GROUP you will leave 10% of your gain from the common project to the type C individual of your own RED GROUP].
This means that, excluding the first round, in each subsequent round the actual amount of UMS available for each active player is equal to the UMS assigned by experimentes plus the portion transmitted by the member of its "COLOR GROUP" that was active in the previous round.
At the end of each round in which you are active you will get feedback on the value of the individual contributions of the other members of your "GROUP LETTER" (C_y C_z C_W), the value of the total contribution of the "GROUP LETTER" (C_x + C_y + C_z+ C_W) The value sent to the member of your "COLOUR GROUP" that will play in the next round and your net gain final.
The feedback provided for inactive members of each "COLOR GROUP" will only consist of the value of the contribution of the member of its "COLOR GROUP" and the value sent to the member of his own "COLOR GROUP" that will play in the next round.
Previous rounds results will be also reported at the end of each round.

[BT] In each round you are active your earnings consist of the sum of the following two items:
- The UMS that you put on your personal account (30 UMS – C_x);
- Profits accruing from the project [alpha x (C_x + C_y + C_z+ C_W)].
At the end of each round in which you are active you will get feedback on the value of the individual contributions of the other members of your "GROUP LETTER" (C_y C_z C_W), the value of the total contribution of the "GROUP LETTER" (C_x + C_y + C_z+ C_W), and your net final gain.

YOUR EARNINGS

[COMMON] Please note that all amounts throughout the experimentare rounded down when the first decimal is less than or equal to 5, or otherwise they are rounded up.
You will be paid 3.00 EURO for participating and being on time.
At the end of the experiment we will calculate your cumulative gain to your last active round.
[DT] You will also be paid for the preliminary task with 5 UMS for each correct definition of crossword given by your "COLOUR GROUP".
[COMMON] Each UMS will be converted into 0.03 EURO.

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