Patience predicts cooperative synergy: the roles of ingroup bias and reciprocity

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Abstract

Patience—low delay discounting—has been shown to predict cooperative behavior in environments where cooperation conflicts with competitive aspirations. Indeed, impatience seems to be associated to a greater concern for the latter (i.e., for the individual's relative standing). But what about intergroup-competition situations, where competitive sentiments against outgroups can trigger ingroup cooperation? We analyze the connection between delay discounting and performance in two problem-solving tasks with either individual or intergroup-competition incentives. We find a positive relationship between the mean patience of the members of a group (both when using long-term discounting and short-term discounting, also known as present bias) and the within-group cooperative synergy during intergroup competition. Further exploratory analyses based on a follow-up social preferences task suggest that, for long-term discounting, this result may be explained by patient (vs. impatient) individuals' propensity to be initially cooperative and to subsequently treat group members based on reciprocal fairness instead of strict equality. For short-term discounting, or present bias, our exploratory analyses do not yield any significant result, meaning that we are unable to provide a social-preferences-based explanation to the higher synergy observed in groups with less present biased individuals.

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Short title: Patience and intergroup competition

1. INTRODUCTION

Teamwork is a central pillar of the functioning of modern organizations, whose performance largely depends on the ability of group members to cooperate for the common good. In the last years, the psychological and behavioral underpinnings of group performance have been increasingly studied (e.g., De Dreu & Weingart, 2003; Kozlowski & Ilgen, 2006). However, while it is recognized that people differ in their level of contribution to the group's goals, the sources of these individual differences require further exploration. Recent experimental research has shown that *delay discounting* is correlated with the extent to which people engage in group-beneficial behaviors, and thus is a likely determinant of group performance (Curry, Price, & Price, 2008; Espín et al., 2012).

Delay discounting, which refers to the subjective devaluation of a reinforcer as a function of its delay, is a temporally stable characteristic (Kirby, 2009) that displays great inter-individual variability (Frederick, Loewenstein, & O´Donoghue, 2002). In this paper, we use the adjective "patient" to characterize individuals with low delay discounting.[1] A large share of its scientific interest relies on the fact that delay discounting is decisive to explain individual behavioral differences in many areas. In the non-social domain, patience has been related, for instance, to better academic outcomes (Duckworth, Tsukayama, & May, 2010; Kirby, Winston, & Santiesteban, 2005; Mischel, Shoda, & Rodriguez, 1989; Shoda, Mischel & Peake, 1990) and to a lower propensity for drug abuse (Bickel, Odum, & Madden, 1999; Kirby, Petri & Bickel, 1999) and other unhealthy behaviors (Chabris et al., 2008; Weller et al., 2008).[2]

An important strand of research has highlighted the relevance of delay discounting for understanding social behavior both theoretically and empirically. According to the most widely accepted theories, long-run collective interest—and the future personal benefits it might bring to

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[1] Although delay discounting is often included within the broader class of "self-control" (Rachlin, 2000), temporal preferences are not based on the trade-off between automatic/intuitive and controlled/reflective processes but on that between short-run and long-run incentives (pecuniary or not). Therefore, it is important to note that self-control or dual-process theory, and its relationship with social behavior (Capraro et al., 2017; Corgnet et al., 2015; Rand et al., 2012), is not the main focus of this article.

[2] Note that if discounting predicts a particular choice (in the absence of confounding third variables), its decision process must involve some form of intertemporal trade-off, that is, the incentives associated with the available options should differ, at least subjectively, in their time of realization (e.g., Ainslie, 2001; Espín et al., 2015).

the individuals involved, through reciprocity or other mechanisms—is considered to be opposed to short-run self-interest (Dewitte & De Cremer, 2001; Messick & McClelland, 1983; Platt, 1973; Rachlin, 2002; Van Lange et al., 2013). Consequently, cooperative, group-beneficial acts are more likely to be carried out by patient individuals than by impatient individuals (Balliet & Joireman, 2010; Curry et al., 2008; Stevens, Cushman & Hauser, 2005).

Yet recent evidence from economic experiments indicates that such an association is more complex than previously thought (Al-Ubaydli, Jones, & Weel, 2013; Crockett et al., 2010; Espín et al., 2012, 2015). Indeed, the short-run goal during social interaction, at least in some environments, seems to be to outperform others in a competitive fashion rather than selfish payoff maximization (Espín et al., 2012, 2015). These results are consistent with the hypothesis that cooperation and competition are associated, respectively, with long-run and short-run (non-pecuniary) emotional satisfaction (Espín et al., 2015). In other words, individuals derive satisfaction from both outcompeting others and increasing the group payoff, but the latter emotion is more delayed or more lasting than the former. A recent theoretical model combining social preferences and delay discounting develops this hypothesis formally and shows that such an account may explain a variety of empirical results from both repeated and one-shot experiments (Espín, Sánchez, & Herrmann, 2017).

It follows that when successful group cooperation requires the suppression of competitive aspirations, as in typical social dilemmas for instance, patience should predict group-beneficial behavior. This seems indeed to be the case. In social dilemma experiments, patience has been positively associated with cooperative behavior that increases social efficiency (Al-Ubaydli et al., 2013; Curry et al., 2008; Davis et al., 2016; Harris & Madden, 2002; Yi, Johnson & Bickel, 2005; Yi et al., 2007).[3] Relatedly, in introducing punishment in a social dilemma game, Espín et al. (2012) found that patience was characteristic of cooperators who "altruistically" punished free-riders, which may be a group-beneficial behavior in the long run (Gächter, Renner, & Sefton, 2008), but that impatience was characteristic of free-riders who used punishment in a

[3] Note that there are also null results regarding the relationship between patience and cooperation. Fehr and Leibbrandt (2011) find a non-significant relation between patience (as measured by a single choice between receiving two chocolate praline "now" or three after two hours) and contributions in a one-shot public goods game among fishermen in Brazil. Also, Espín et al. (2012) find a non-significant relation between patience (as measured in a standard DD task similar to ours; see Methods section) and contributions in a one-shot public goods game with punishment. However, please note that the two studies find a positive relationship although it does not reach statistical significance. The reasons for such lack of significance might have to do with the particular way of measuring DD in Fehr & Leibbrandt (2011) and with the fact that the possibility of punishment introduces (selfish) incentives to cooperate, so that contributions might not reflect pure group-beneficial behavior, in Espín et al. (2012). To our best knowledge, there are no studies finding a negative connection between cooperation and patience. In sum, the existing evidence points to a rather robust positive effect of patience on cooperation.

competitive manner. Finally, in the ultimatum game, socially-inefficient competitive behaviors by both responders (i.e., the rejection of disadvantageous offers, Crockett et al., 2010; Espín et al., 2015; LeVeck et al., 2014) and proposers (i.e., the proposal of advantageous offers, Espín et al., 2015) have been found to be associated with impatience. In sum, previous evidence suggests that patience should correlate positively with group-beneficial (social-efficiency maximizing) behaviors and negatively with competitive (relative-standing maximizing) behaviors, regardless of whether self-interest prescribes the former or the latter, or none in particular.

But what if group performance is also fueled by competitive sentiments as happens during intergroup conflict? When competition is set at the group level, negative feelings toward the members of other groups ("outgroup hate") can serve as an important catalyst for within-group cooperation (e.g., Brewer, 1999; De Cremer & Van Vugt, 1999). The effects of individuals' delay discounting on the outcomes of intergroup conflict are therefore uncertain because competitive feelings (towards outgroups) that can spur within-group cooperation are likely to be related to impatience rather than to patience.

While intergroup competition relies on *positive interdependence* between the members of a group, its structure imposes *negative interdependence* between the members of competing groups (e.g., Deutsch, 1949; Tajfel & Turner, 1979). In this vein, the final effects on collective welfare are controversial because group identity may generate negative externalities that eventually overcome the collective benefits of within-group cooperation (Abbink et al., 2010; Bornstein, 2003; Gould, 1999). Indeed, how societies and organizations can alleviate the negative collateral effects that intergroup competition often imposes on social efficiency while keeping its benefits for within-group cooperation constitutes an enduring research question across disciplines (Ashforth & Mael, 1989; Böhm & Rockenbach, 2013; Dawes, 1980; Johnson et al., 1981).

This study employs the "beta-delta" model of intertemporal preferences (Laibson, 1997; Phelps & Pollack, 1968) to explore the relationship of 96 undergraduate business students' discounting with (i) their performance in a classroom experiment on problem-solving intergroup competition and (ii) their decisions in a follow-up social preferences elicitation task.

The beta component of the beta-delta model refers to the individual's short-term discounting (or "present bias", which involves trading-off immediate vs. delayed rewards) whereas the delta component focuses on long-term discounting (i.e., delayed vs. more delayed rewards). Previous research suggests that the beta component, due to the role of immediate rewards, might be more related with impulse and self-control (although it is a different construct, see footnote 1), whereas the delta component is more evaluative because it does not involve immediate rewards (Figner et al., 2010; McClure et al., 2004).

Microeconomics problem-solving tasks were performed first under individual competition and, subsequently in the same session, under intergroup competition (in three-person groups) schemes. In both conditions, real incentives were introduced in the form of bonus points for the final course grade in a rank-based way. To assess the extent to which within-group cooperation vs. competition plays a role in this setting, we define a group's cooperative synergy as the group's problem-solving performance under the intergroup competition scheme relative to its members' average performance in the individual condition. Our main empirical strategy will therefore be to study the correlation between the average patience in a group and the group's cooperative synergy.

For a group to be successful during intergroup competition, cooperation between group members is warranted and, consequently, within-group competition must be suppressed. Note that when we refer to within-group cooperation and competition we are relaxing the definition of such concepts. In this setting, cooperation and competition with other members of the group do not need to be individually costly behaviors; for instance, they could come in the form of being flexible in accepting others' opinions vs. trying to impose one's own response to the problem (in line with Espín et al.'s (2015) results that more patient individuals are more "flexible" bargainers) or, more generally, in the form of being able vs. unable to coordinate with others (in line with Al-Ubaydli et al.'s (2013) findings that more patient pairs coordinate more often on the socially-efficient outcome). This is why we refer to cooperation vs. competition in a group as "group cooperative synergy" (see Discussion section). Therefore, in terms of our experimental design, if patient individuals are more cooperative and less competitive than impatient individuals *toward their interaction partners* (Curry et al., 2008; Espín et al., 2012, 2015, 2017; Yi et al., 2005) during intergroup conflict as well, this may be reflected in the level of cooperative synergy generated in the group condition. That is, the relative increase of group members' performance from the individual competition to the intergroup competition condition, as a proxy of within-group cooperative synergy, should be predicted by the group members' intertemporal preferences:

H1. Groups of patient individuals must perform relatively better than groups with impatient members, *ceteris paribus*.

However, if it is indeed the case that patience is positively associated with within-group cooperation, it might be that patience also goes along with a higher propensity to identify with the group and thus develop an ingroup bias (i.e., discrimination in favor of one's own group; Brewer, 1999). Such ingroup bias may trigger patient individuals' competitive sentiments ("hate") toward the outgroup, eventually leading to socially-inefficient destructive behaviors (e.g., Abbink et al., 2010; Benard & Doan, 2011; Goette et al., 2012; Hogg, 2000; Tajfel & Turner, 1986).

On the other hand, if more patient individuals are more cooperative and less competitive *toward the members of other groups*,

H2. Groups with patient members may perform relatively worse than groups with impatient members.

This might happen if the latter are more likely to seek to enhance within-group cooperation for the sake of outcompeting other groups, assuming that outcompeting others triggers short-run satisfaction (Espín et al. 2012, 2015, 2017).

In order to investigate whether patience is related to ingroup bias, we analyzed the subjects' choices in the follow-up social preferences task in addition to the outcomes of intergroup competition. In the social preferences task, subjects had to choose between different hypothetical distributions of bonus points between themselves and (i) an unknown, randomly chosen classmate (which we will refer to as "the collective") and (ii) each of the other two members of the group during the intergroup competition condition ("the ingroup"). This task allows to infer selfish, competitive/spiteful, egalitarian, efficiency, and altruistic preferences from the subjects (Bartling et al., 2009; Corgnet, Espín, & Hernán-González, 2015; see Fehr & Schmidt, 2006, for an overview of social preferences models) and to explore the dependence of these outcome-based social preferences on group identity (Chen & Li, 2009; De Cremer & Van Vugt, 1999). These measures will help us to look into the channels that may be linking patience and group performance, in particular, to explore whether more patient individuals are more, or less, likely to develop an ingroup bias which favors members of one's own group in detriment of members of other groups, and also whether they are more/less reciprocal.

2. METHODS

A total of 96 first-year, business administration students (65% females, mean age 19.69±0.26 [SEM]) at the University of Granada, Spain, participated in the study, which was presented as an activity for the introductory microeconomics course. Among these, 50 attended morning classes and 46 attended evening classes. The experimental sessions were conducted during a standard two-hour microeconomics class, either in the morning or in the evening.

2.1. General protocol and problem-solving tasks

At the beginning of a problem-solving session, students were informed that they would have to solve two problem sets, each containing three microeconomics problems based on the concepts they had been taught during the previous lectures. The maximum time allowed to solve each problem set was 40 min. Scores ranged from 0 to 10 and all three problems of each set carried the same weight in the overall score of the task. Written instructions for the first task were then distributed individually among the students.[4]

The first problem set was to be solved under rank-based individual incentives. Incentives were introduced in the form of bonus points to be counted toward the final course grade (which also ranged from 0 to 10) in such a way that only those students who obtained the 15 top scores (among 50 students in the morning session and 46 students in the evening session) would receive a bonus. The bonus points were distributed as follows:

- 1 point for each of the three students obtaining the three top scores;
- 0.75 points for the six students obtaining the 4^{th}-9^{th} scores;
- 0.5 points for the six students obtaining the 10^{th}-15^{th} scores.

In the event of a tie, the first student(s) to submit the assignment would prevail (the course instructor kept track of the order in which the assignments were submitted). This incentive scheme generates *negative interdependence* among participants, as required for a competitive goal structure (Deutsch, 1949; Johnson & Johnson, 2009). Communication among participants was not allowed.

After the individual competition condition had finished (with no feedback), students were randomly arranged into three-person groups (morning session: 17 groups, evening session: 15 groups; due to the number of students participating in the experiments, one group in the morning session was composed of only two students whereas one four-person group was formed in the

[4] An English translation of the instructions of each task can be found in Appendix A1 in the Supplementary materials.

evening session). The instructions for the intergroup competition condition and its corresponding problem set were then distributed individually to the participants. Again, assignments were to be submitted individually to the course instructor and 15 students would receive bonus points, but in this case the incentive scheme was based on groups' mean performance:

- 1 point for the three members of the group whose members obtained the highest mean score;
- 0.75 points for the six members of the two groups with the 2nd and 3rd highest mean score;
- 0.5 points for the six members of the groups ranking 4th and 5th.

Students were allowed to communicate only with the members of their group. This incentive scheme creates the *positive interdependence* between group members required for a cooperative goal structure, while keeping *negative interdependence* between members of different groups typical of intergroup competition schemes (Deutsch, 1949).

2.2. *The post-experimental questionnaire*

One week after the problem-solving sessions, the same 96 students were invited to the school's experimental economics lab (GLoBE – EGEO) to fill out a computerized questionnaire during the microeconomics class. All but one student (from the evening session) showed up. Upon arrival to the lab, they were given a list containing the scores obtained by 48 randomly selected students (25 and 23 in the morning and evening session, respectively) in both the individual and the group problem-solving tasks. This feedback manipulation was introduced to make the students' group identity (from the problem-solving session) more salient. Although the effects of the manipulation on decisions are not explored in this paper, nonetheless, we will statistically control for the specific feedback received by the individual when we analyze the questionnaire responses which might be influenced by the manipulation (i.e., the social preferences decisions).

The first screen informed the participants that (a) the data would be used for scientific purposes only; (b) anonymity would be preserved by randomly assigning a numerical code to identify the participants in the final dataset so that no link between participants' real identities and questionnaire responses could be made (in agreement with Spanish Law 15/1999 on Personal Data Protection); (c) the instructor of the course would not be allowed to access the data until the final course grades had been officially published; (d) unless otherwise stated, there were no correct or incorrect responses to the questionnaire (highlighting this point was important in order to minimize any potential demand effects that could arise due to the fact that the experiment was conducted by the course instructor); (e) the maximum time to complete the questionnaire was 20 min.

The questionnaire started with several questions on socio-demographics and on the students' perception about some features of the course and the problem-solving sessions. Among the latter we are particularly interested in the participants' responses to the question "*On a 5-point scale, where 1 is 'very uncooperative' and 5 is 'very cooperative', how would you rate the level of cooperation of the other members of your group during the group task?*" This question will provide insight into the participants' *perception* about their partners' cooperativeness and will therefore help explore whether others' behavior during the problem-solving task shape social preferences toward them, for instance, in a reciprocal manner. After answering these questions, participants were asked to complete the social preferences task and, finally, the delay discounting task. Communication was not allowed.

2.2.1. The social preferences task

In the social preferences task, participants had to make 12 decisions, divided into three four-decision blocks, on how to allocate hypothetical bonus points between themselves and another participant. A different person received the (hypothetical) bonus points in each block.[5] Although the participants' choices would have no real consequences, participants were asked to choose the option they preferred in each decision, regardless of their choices in the other decisions, as if the bonus points were going to be truly distributed in the way they had decided and one of the 12 trials was going to be randomly selected for "payment". We discarded the use of real bonus points in this task in order not to alter the incentives of the problem-solving tasks. That is, if the social preferences task involved real incentives, the participants should have been informed prior to performing the problem-solving tasks so that they could adjust their behavior accordingly. Otherwise, we would have deceived them because their behavior during the group task potentially determines how many points other group members would assign to them in the social preferences task (see, for example, Hertwig & Ortmann 2001). The implementation of real rewards (without deception) would have therefore distorted the incentives of the intergroup competition task, from which we get our main dependent variable, and would probably also

[5] An English translation of the instructions of the task can be found in Appendix A2 in the Supplementary materials.

have confounded the true motivations driving the participants' choices in the social preferences task (e.g., they could have colluded to assign the maximum number of points to each other). In any case, although hypothetical "payoffs" have been used extensively in social preferences tasks, for instance, within the literature on social value orientation (e.g., Van Lange, 1999), the results from this exercise are exploratory and need to be taken with caution.

The four decisions in each block were identical and presented in the same order. The decisions were adapted for this specific experiment from the social preferences task used in Bartling et al. (2009), where, instead of bonus points, options involved money—as is the common procedure in the economics literature on social preferences (e.g., Bolton & Ockenfels, 2006; Charness & Rabin, 2002). In the first block, participants had to choose among different distributions of points between themselves and another randomly selected student from the same class (either morning or evening), that is, the *collective*. In the second and third blocks, they were asked to write the first name of each of their group partners in a blank cell (or leave the cell empty if they did not remember the name) and then proceed to make the same four decisions for each partner, that is, the *ingroup*.

From the comparison between the participants' choices in the "collective" and "ingroup" blocks we can infer the strength of their ingroup bias (note that the probability of a group partner being the recipient of the points assigned in the "collective" block was less than 5% in each session).

Table 1 displays the distributions of bonus points to choose from in the social preferences task. In each decision, participants had to choose between the distribution shown on the left-hand and right-hand side of the table. Note that the left-hand option is kept constant across decisions. To characterize subjects' social preferences, we will use the number of choices consistent with each type of preference across decisions since different motivations might lead participants to choose the same option in one specific decision (for instance, egalitarian, efficiency and altruistic preferences would lead to prefer (0.5, 0.5) over (0.5, 0) in decision 1; see Corgnet et al., 2015).

Table 1

Decisions in the social preferences task (identical across blocks).

Decision #	You	Other		You	Other
1	0.5	0.5	vs.	0.5	0
2	0.5	0.5	vs.	1	0
3	0.5	0.5	vs.	0.5	1
4	0.5	0.5	vs.	0.75	1

Selfish preferences consist in the maximization of the own payoff (i.e., bonus points); *competition/spitefulness* predicts choices that maximize the decision maker's relative payoff (competitive), which also minimize the counterpart's payoff (spiteful) in our task. *Egalitarian* preferences predict choices that minimize the difference between both players' payoffs; *efficiency* preferences would maximize the sum of both players' payoffs; and *altruism* entails maximizing the counterpart's payoff (i.e., the inverse of competitive/spiteful choices here).

For the statistical analyses we will run ordered Probit regressions with the number of choices consistent with each type of preference as dependent variables. *Selfish* preferences predict the choice of the right-hand option in decisions 2 and 4 but being indifferent between both options in decisions 1 and 3; hence there is a maximum of two selfish choices in each block. *Competitive/spiteful* preferences predict the right-hand option in decisions 1 and 2 but the left-hand option in decisions 3 and 4, so there is a maximum of four competitive/spiteful choices in each block. *Egalitarianism* would lead to choosing the left-hand option in every decision, with a maximum of four choices as well. *Efficiency* preferences predict choosing the left-hand option in decision 1 and the right-hand option in decisions 3 and 4 but being indifferent in decision 2, thus leading to a maximum of three choices. Finally, *altruism* predicts exactly the opposite choices than predicted by competitive/spiteful preferences.

2.2.2. The delay discounting task

The delay discounting task was adapted from Espín et al. (2015) for this experiment—similar tasks for eliciting intertemporal preferences have been used for instance in Bosch-Domènech, Brañas-garza and Espín (2014), Coller and Williams (1999), and Espín et al. (2012). Participants had to make a series of 20 intertemporal choices between hypothetical monetary rewards differing in amount and delay of receipt. Real monetary incentives were not used in this task since previous research indicates that the distribution of choices and even the associated neural activation during decision making in delay discounting tasks do not seem to be significantly altered by the presence of hypothetical versus real payoffs (e.g., Bickel et al., 2009; Johnson & Bickel, 2002; Lagorio & Madden, 2005; but see Coller & Williams, 1999). Participants were instructed to choose the option they preferred in each trial independently of their choices in other trials, as if the payoffs were real.

Following the standard procedure, in each trial participants had to choose between a sooner-smaller reward and a later-larger reward. The task comprised 20 questions (trials) of the form "*Do you prefer receiving €30 today or €36 in one month's time?*" divided into two blocks of 10 questions each: the first block involved choosing between a no-delay option ("today") and a one-month delay option, while the second block involved a one-month delay option and a seven-month delay option. In both blocks, the sooner-smaller reward was kept constant at €30 while the larger-later reward increased monotonically across trials from €30 to €48 in €2 increments.[6] With this protocol we will be able to calculate the parameters of a quasi-hyperbolic beta-delta discount function (Laibson, 1997; McClure et al., 2004; Phelps & Pollack, 1968) for each participant. The beta-delta model allows for a possible difference between short-term and long-term discounting and has been shown to display good predictive power for real-life outcomes (Burks et al., 2012).[7]

The beta-delta model formalizes the individual's discount function as $V_d = \beta\delta^t V_u$, where V_d is the discounted psychological value of a reward with (undiscounted) value V_u which will be received in t time units. β and $\delta \in (0, 1]$ are the "beta" and "delta" discount factors, respectively. The higher these discount factors, the more patient the individual is, as delayed rewards are valued more (i.e., they are discounted less). The beta discount factor refers to short-term discounting or "present bias", that is, the value of any non-immediate reward is discounted by a fixed proportion β. The delta discount factor captures long-term discounting in an exponential functional form, that is, for each unit of time that constitutes the delay to delivery, the value of a reward is discounted by δ.

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[6] An English translation of the instructions of the task can be found in Appendix A3 in the Supplementary materials.

[7] Other functional forms proposed in the delay discounting literature and a model-free parameterization are also explored for robustness (see below).

Typically, in each block, a participant begins by choosing the sooner option in the first trial (although this is not always the case) and at some point switches to the later option, which is increasing in amount across trials. We calculate beta and delta for each participant assuming indifference between both options in the switching trial.[8] Seven subjects made inconsistent choices (multiple switching or non-monotonic patterns) in either of the two blocks and will therefore be excluded from the discounting analyses since a discount function cannot be estimated for them. Thus, we obtained reliable discount factors for 88 individuals. Note that in the second block the beta discount factor does not influence choice since both options are delayed. Therefore, we computed a participant's delta from her choices in the second block and then beta from her choices in the first block, accounting for previously calculated delta. The time units were defined in months. We assume that utility is linear over the relevant range. Therefore, using the second-block choices we compute delta from $30 = \delta^6 X$, where X is the amount offered in the later option of the switching trial (from €30 to €50; see footnote 7). Using the first-block choices and the delta discount factor previously obtained, we compute beta from $30 = \beta\delta Y$, where Y is the amount offered in the later option of the switching trial. The mean (±SEM) beta discount factor in the sample was 0.888 (±0.010) whereas the mean delta discount factor was 0.936 (±0.002). See Figure 1 (right panel) for the distribution of beta and delta in the sample.

Ethics Statement

In accordance with Spanish applicable regulations contained in Law 14/2007, of July 3 on Biomedical Research, the current investigation does not constitute an experiment that is subject to this law, as there has been no intervention that could be classified as biomedical. We did not seek approval from the ethics committee since only adults were involved in the study and there was no risk for either emotional or physical health. All participants provided written consent prior to participation in the online survey. With regards to the classroom experiment consent was not required as it was part of the course's activities. This study was conducted in accordance with the Declaration of Helsinki for human research. All participants were treated anonymously by being assigned a numerical code in accordance with the Spanish Law 15/1999 on Personal Data Protection. No association was ever made between their real names and the results. As is

[8] As in Espín et al. (2012), the indifference point for a participant that never switched from the sooner to the later option is computed as if another €2 increment (i.e., a later reward of €50) would make her indifferent between both options. Different specifications do not qualitatively alter the results.

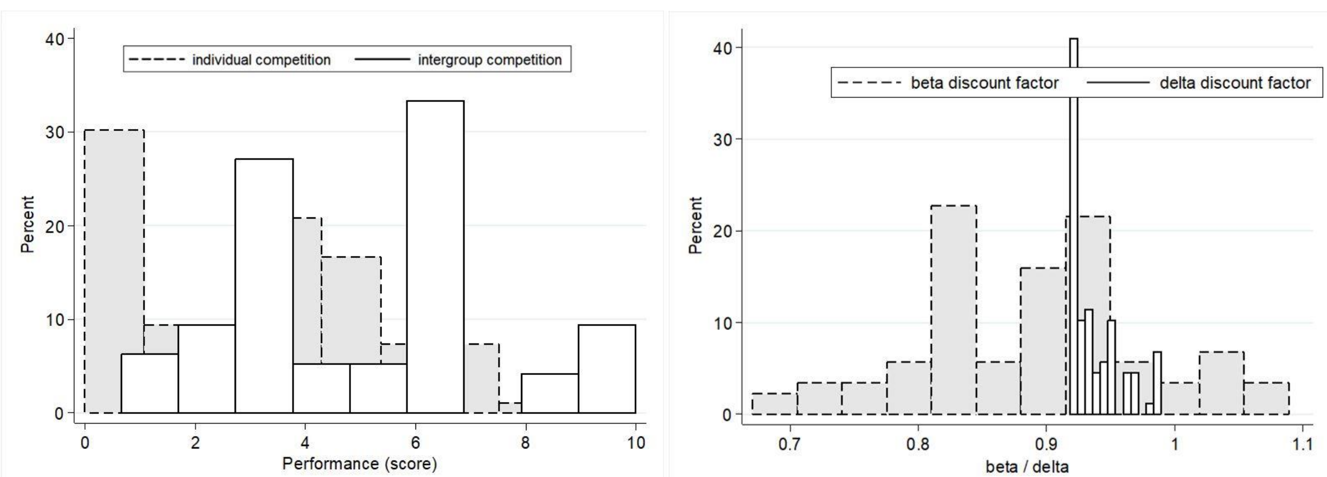
standard in socio-economic experiments, there are no ethical concerns other than preserving the anonymity of participants.

3. RESULTS

3.1. Patience and performance in the problem-solving tasks

Figure 1 (left panel) shows histograms for the participants' scores ($n = 96$) in the individual competition condition (dashed line; mean = 3.035±0.254 [SEM]) and the intergroup competition condition (solid line; mean = 5.191±0.252).[9] While performance was better in the group task—as it seems clear from the figure and is confirmed by a two-tailed paired-sample t-test ($p < 0.001$)—we cannot firmly conclude that social interaction generated positive synergies in our sample since the problem sets were different across conditions (although we tried to keep them equally difficult). Note that in a within-subject design it is not possible to use identical problem sets. However, it is not the aim of this study to validate the benefits of intergroup competition structures for group performance and cooperation but to study the relationship between individuals' patience and the level of synergy—whether positive or not—reached in the group task as a proxy for the level of within-group cooperation. These "cooperative synergies" are calculated at the group level and are therefore comparable across groups.

Figure 1. Histograms for (a) performance in each condition and (b) observed beta and delta discount factors ($n = 88$)



[9] Note that the within-group variability of the scores in the group task is nearly inexistent: within-group divergences are observed only in 4 (out of 32) groups. Moreover, these departures are very small and mostly due to typos. Indeed, the maximum distance between a group member's score and the group's mean score is 0.89 points (from a 0-10 scale).

A *group's cooperative synergy* is defined as $\frac{M_G - M_I}{M_G}$, or, analogously, as $1 - M_I/M_G$, where M_G refers to the group members' mean score in the group condition and M_I refers to the mean of the group members' scores in the individual condition. This variable ranges from -0.820 to 0.833 with mean = 0.334±0.063 (SEM). The value is calculated in relative terms since we believe that an increase, for example, from $M_I = 1$ to $M_G = 5$ should reflect stronger synergies that an increase from $M_I = 5$ to $M_G = 9$. We, nevertheless, conservatively chose to normalize this variable by dividing over the mean score in the group task in order to avoid overweighting extremely high values that would arise if we normalized by the mean individual-task score (note that this is very close to zero in several groups; see Figure 1 [left panel]).[10]

Figure 1 (right panel) displays the distribution of beta and delta discount factors in the sample (only individuals with reliable values for both variables; $n = 88$). It can be seen that while beta is quite well distributed, delta is strongly left censored.[11]

Columns 1 and 2 of Table 2 display OLS regressions of individual performance estimated as a function of the beta discount factor, where the dependent variables are the individual's score in the individual and group conditions, respectively. In Table 3 we report the same regressions for the delta discount factor. For the analysis of performance in the individual condition, we use all the 88 observations with reliable discount factors. Robust standard errors clustered on individuals (column 1) or groups (column 2) are shown in parentheses. For the group condition, we also excluded the six observations corresponding to the members of the two groups formed by two/four instead of three students in order to avoid distortions. In both regressions we control for whether the individual belonged to the morning or evening session. As can be observed, we fail to find a direct significant relationship between patience and performance in either condition at the individual level (*ps* > 0.19).[12] The session dummy is not significant either (*ps* > 0.35).

[10] In fact, normalizing group synergy by individual scores would result in values ranging from -0.450 to 4.982.
[11] Note that about 40% of the participants never switched from the sooner to the later reward in the second block. This results in a left censoring of the delta discount factor at 0.918. This fact implies that the findings using delta might represent a lower bound of the true effect. Although obviously problematic, that a large percentage of subjects never switch in a multiple price list task, however, is rather common in the literature (Dohmen et al., 2010; Espín et al., 2012; Martín et al., 2019).
[12] If we keep the 6 students belonging to the groups with two/four members in the regressions that explain group condition performance, the results do not change. Similar conclusions can be drawn if we control for the individual's age and gender in each regression or if we use different delay discounting characterizations (available upon request from the authors).

Table 2

Problem-solving performance as a function of short-term patience (beta).

dependent vars.:	**indiv score** (1)	**group score** (2)	**group synergy** (3)	**group score** (4)
beta (group's mean in col. 3)	-2.805	3.208	2.603**	3.152**
	(3.108)	(2.360)	(1.172)	(1.474)
individual score				0.266***
				(0.076)
partners' mean beta				6.445*
				(3.194)
partners' mean indiv. score				0.593***
				(0.158)
R^2	0.020	0.020	0.228	0.301
F	0.79	0.99	4.65**	5.72***
observations	88	82	29	81

Notes: OLS estimates. Dependent variables are displayed at the top of the columns. Robust SE clustered on individuals (column 1) or groups (columns 2 to 4) are presented in parentheses. All regressions control for session (either morning or evening). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3

Problem-solving performance as a function of long-term patience (delta).

dependent vars.:	**indiv score** (1)	**group score** (2)	**group synergy** (3)	**group score** (4)
delta (group's mean in col. 3)	-7.108	1.613	9.335**	6.888
	(11.772)	(14.971)	(4.246)	(12.631)
individual score				0.262***
				(0.081)
partners' mean delta				10.564
				(25.115)

partners' mean indiv. score				0.562***
				(0.172)
R^2	0.013	0.003	0.129	0.237
F	0.59	0.08	5.98***	4.54***
observations	88	82	29	81

Notes: OLS estimates. Dependent variables are displayed at the top of the columns. Robust SE clustered on individuals (column 1) or groups (columns 2 to 4) are presented in parentheses. All regressions control for session (either morning or evening). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

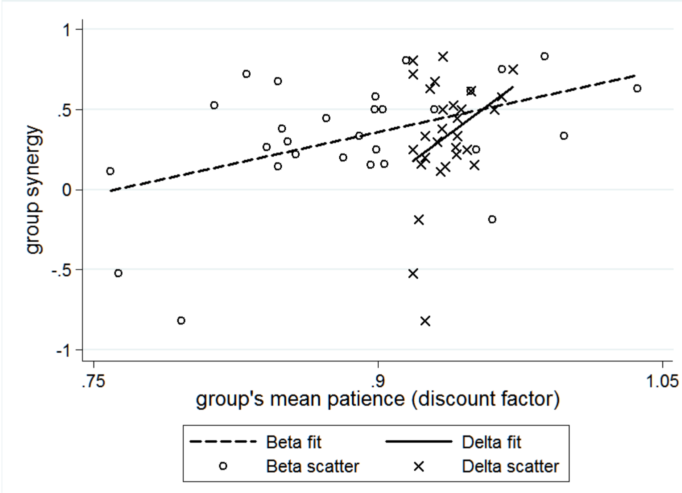
To explore the relationship between patience and group synergies in the intergroup competition context, we estimate the group's cooperative synergy as a function of the mean discount factor (separate regressions for beta and delta) of the group members while controlling for session (OLS regression with robust standard errors clustered on groups as independent observations). In order to avoid distortions in the estimations from the 32 initial groups, apart from the two groups with two/four members, we also excluded another group because the discount factors of two of its members could not be calculated (inconsistent choices in the discounting task) and thus the mean group patience equals the patience of only one member. The regressions were therefore performed with 29 final observations. Estimates are shown in column 3 of Tables 2 and 3. The effect of the (mean) beta discount factor is positive and significant ($p = 0.035$). A significantly positive effect on group synergy is found for the mean delta discount factor as well ($p = 0.036$), although the model's explanatory power is slightly diminished as indicated by the respective R^2 values.[13] This suggests that the effects of the two discount factors on group synergy are similar. Therefore, the more impulsivity-related beta and the more evaluative delta do not seem to exert different effects. The session dummy is not significant in any of the regressions (*ps* > 0.38).

Figure 2 displays scatter plots and linear fits corresponding to the relationship of group synergy with the mean beta (circle scatter, dashed line) and delta (cross scatter, solid line) discount factors. The graphical method largely corroborates the regression results. Therefore,

[13] The results are similar when including the three excluded groups (beta: $p = 0.026$; delta: $p = 0.033$). Using the number of patient responses in the first and second block as a model-free characterization of short- and long-term discounting, respectively (as in Espín et al., 2015), yields very similar results as well. Finally, combining responses in both tasks to obtain a single-parameter discounting characterization—either exponential, hyperbolic, or model-free—leads to identical conclusions. On the other hand, the results do not change much if we use the maximum individual score in the group instead of the average, which is a meaningful alternative, to compute group synergy (beta: $p = 0.071$; delta: $p = 0.030$). All these analyses are available upon request from the authors.

groups whose members are more patient achieve a higher level of cooperative synergy, that is, they reach a higher group welfare relative to the initial "endowments".

Figure 2. Group synergy as a function of group's mean patience (*n* = 29)



As a different approach to analyze the gains from group interactions, we estimate an individual's score *in the group condition* as a function of (i) her discount factor, (ii) her score in the individual condition, (iii) the mean discount factor of the other two group members, and (iv) the mean score of the other two group members in the individual condition (OLS regression; standard errors are clustered on groups in order to allow for error correlations across individuals belonging to the same group). As before, the regressions control for session. If patient individuals cooperate more with their peers, then the score of any group member is expected to be positively related to her partners' patience. Estimates are shown in column 4 of Tables 2 and 3 for models based on the beta and delta discount factors, respectively. In these analyses, the participant for whose two partners we cannot calculate a reliable discount factor is also excluded.

As can be observed, once we account for the subject's "capacity" (i.e., her score in the individual condition) and her partners' mean patience and capacity, patience is positively related to performance in the group task. However, this effect is significant only when patience is measured through the beta discount factor ($p = 0.041$) but not when using the delta discount factor ($p > 0.58$). Moreover, the mean patience of the other two group members also exerts a positive effect on an individual's performance in the group condition but, as before, this is only significant in the case of the beta discount factor (partners' mean beta: $p = 0.053$; delta: $p >$

0.67).[14] Finally, as expected, both her own and her partners' performance in the individual task are positive and significant predictors of an individual's performance in the group task (*ps* < 0.01). These findings are consistent with what we showed above at the group level, except for the fact that the effects of long-term discounting are now largely insignificant. Note, however, that the analyses in the latter statistical approach are not performed at the group but at the individual level. Therefore, patient individuals, although only as measured by the short-term discounting, perform *individually* better in the group condition once we account for the individual's capacity and the characteristics of the other group members. Nevertheless, we interpret this result with caution (especially the complete lack of explanatory power of the long-term discounting, which contrasts with the group-level results) since the incentives in the group task were related to the groups' mean scores, not to individual scores.

In sum, our data support H1 and, therefore, allow us to reject H2.

3.2. Patience and choices in the social preferences task: ingroup bias?

We have shown that groups of patient individuals performed relatively better than groups of impatient individuals, all else equal, as stated in H1. But does this higher group cooperative synergy associated with patience also imply that patient individuals are more susceptible to ingroup bias? In this subsection, we address this issue.

Tables 4 and 5 display the outcomes of a series of ordered Probit regressions (robust standard errors clustered on groups are presented in parentheses) estimating the number of choices consistent with each type of social preference mentioned earlier (i.e., selfish, competitive/spiteful, efficiency and egalitarian)[15] as a function of the decision maker's delay discounting. We start by analyzing the individuals' choices toward the *collective* in Table 4. In all regressions we control for session, as before, and for the subject's scores in both conditions. Since we find important effects of gender and age, we also include them as controls in the main regressions and report their coefficients. Finally, we also control for the feedback received by the individual regarding her own and her group partners' scores before completing the questionnaire (see Methods).[16] However, we do not report the coefficients of the feedback

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[14] If we control for the subject's age and gender, the results remain unchanged. The only noticeable variation is that the mean beta discount factor of the other two group members now turns significant at 5% ($p = 0.044$). Gender and age are not significant (*ps* > 0.20).
[15] Remember that, in this task, the choices predicted by spitefulness (and altruism, but inversely) coincide with those predicted by competitive preferences.
[16] Specifically, we included one dummy variable taking the value of 1 if neither the subject's own scores nor those of any of her partners were published (zero otherwise) and another dummy taking the value of 1 if her scores were not published but those of

variables because, as mentioned earlier, the analysis of their effects on decisions belongs to a different research project. In any case, although the models' power of fit generally increases with these control variables, their inclusion does not qualitatively affect the results on the relationship between patience and social preferences. Again, we excluded the two groups with two/four group members in order to keep decisions fully comparable across subjects; thus the regressions were performed with 82 observations.

Importantly, we do not find any significant effect when using the beta discount factor to characterize individuals' patience (*ps* > 0.10 in all regressions; see Tables A1 and A2 in the Supplementary materials). This means that the component of (quasi-hyperbolic) delay discounting which might be related to impulse and self-control, that is, short-term discounting or present bias (Figner et al., 2010; McClure et al., 2004), does not have an influence on social preferences decisions. Thus, in contrast to the previous section, here we do find clear differences in the predictive power of the two components of discounting. For reasons of space, we only show the results of the regressions based on the long-term, delta discount factor in the main text.[17]

It can be seen from Table 4 that patience correlates significantly with only two types of social preferences when assigning points to the *collective*. Specifically, delta predicts negatively the number of *competitive/spiteful* choices ($p = 0.002$, column 2) that maximize the decision maker's relative standing by minimizing the counterpart's payoff,[18] and positively the number of *efficiency* choices ($p = 0.018$, column 3) that maximize the joint surplus. On the other hand, neither *selfish* ($p > 0.69$, column 1) nor *egalitarian* ($p > 0.40$, column 4) choices are associated with patience. Since these are exploratory analyses and we perform multiple hypothesis testing, p-values should be corrected in some way. However, the dependent variables are related to each other by construction, which means that a Bonferroni-type correction (i.e., multiplying p-values by four here, as if the tests were independent) would be far too conservative and therefore we instead favor an analysis which controls for the other preferences as we do in the next paragraph. In any case, note that the above significant relationships would remain significant or

any of her partners were (zero otherwise). This was done in order to capture the effect of knowing, at least approximately, her score in the group condition. Thus, the comparison group was composed of those subjects whose own scores were published.

[17] When using either a model-free (given by the number of times the individual chose the larger-later reward in that block) or a hyperbolic characterization of long-term discounting, all the results reported below remain qualitatively similar. These analyses are available upon request.

[18] Analogously, patience is positively associated with the number of *altruistic* choices that maximize the counterpart's payoff.

marginally significant if such a conservative correction is applied (corrected $p = 0.008$ for *compet/spite* and $p = 0.072$ for *efficiency*).

Table 4

Patience (delta) and social preferences toward the collective.

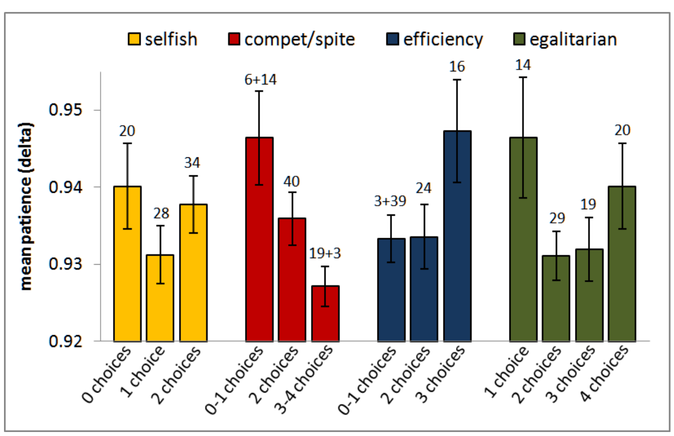
dependent vars.:	**selfish**	**compet/spite**	**efficiency**	**egalitarian**
	(1)	(2)	(3)	(4)
delta	2.522	-14.957***	15.045**	-5.829
	(6.415)	(4.771)	(6.339)	(6.999)
group score	-0.058	-0.125*	0.073	0.041
	(0.039)	(0.069)	(0.060)	(0.045)
individual score	0.067	0.088	-0.072	-0.055
	(0.059)	(0.070)	(0.071)	(0.059)
gender (male)	0.949***	-0.837***	1.324***	-0.784***
	(0.271)	(0.279)	(0.268)	(0.222)
age (yr)	-0.120**	0.025	-0.092**	0.102**
	(0.058)	(0.041)	(0.041)	(0.051)
pseudo R^2	0.132	0.126	0.171	0.109
chi^2	30.484***	29.531***	65.124***	49.277***
ll	-76.550	-93.407	-78.397	-98.814
observations	82	82	82	82

Notes: Ordered Probit estimates. Dependent variables are displayed at the top of the columns (number of choices consistent with each type of preference; *selfish*: up to two; *compet/spite* and *egalitarian*: up to four; *efficiency*: up to three). Robust SE clustered on groups are presented in parentheses. All regressions control for session (either morning or evening) and the feedback received regarding scores. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Given that some specific choices can be predicted by different types of preferences in our task, we checked the robustness of these results by controlling for other preferences in the regressions that explain a particular type of preference (the complete analyses are available upon request). When including the number of selfish and egalitarian choices as controls, the relationship of patience with both competitive/spiteful ($p = 0.003$) and efficiency ($p = 0.003$) choices remains significant. However, when controlling for efficiency (competitive/spiteful) choices, the relationship between patience and competitive/spiteful (efficiency) choices becomes insignificant (*ps* > 0.44). The latter result makes sense since in our task the choices predicted by these two types of preferences have considerable overlap (although in the opposite direction). Thus, we may conclude that patient individuals are both more cooperative and less competitive toward the collective than impatient individuals in the social preferences task.

A visual impression of the nature of these relationships is given in Figure 3, where subjects are categorized according to the number of choices consistent with each type of preference toward the collective. The figure displays the mean delta discount factor for each category (error bars represent robust SEM clustered on groups). For visual clarity, categories with low frequencies are combined with the adjacent categories. Specifically, those subjects who never chose as predicted by competitive/spiteful (six subjects) or efficiency (three subjects) preferences are included in one category with those who made only one choice consistent with that particular preference (14 and 39, respectively). In addition, the three subjects who chose four times (i.e., everywhere) according to the predictions of competitive/spiteful preferences are combined with those making three such choices (19 subjects). The number of observations within each category is shown on top of the bars (note that no individual chose the unequal distribution—option B—in the four decisions, so there are no observations with zero egalitarian choices). For the combined categories we show the number of observations in each subcategory. It can be seen that mean patience decreases with the number of competitive/spiteful choices (red bars) and increases with the number of efficiency choices (blue bars). No clear pattern is observed for either selfish (yellow bars) or egalitarian (green bars) choices.

Figure 3. Patience (delta) and social preferences toward the collective



Regarding the control variables, Table 4 shows that the individual's score in the group task is (marginally) significantly and negatively related with the number of competitive/spiteful choices, indicating that subjects who obtained higher scores treated the collective less negatively. In addition, gender and age are significant predictors in almost all regressions. Compared to females, males made more choices consistent with selfish and efficiency preferences and less choices consistent with competitive/spiteful and egalitarian preferences (this is in line with previous research; Andreoni & Vesterlund, 2001). However, when controlling for other preferences as a robustness check, only the effects of gender on competitive/spiteful and efficiency choices remain. Thus, we can conclude that, in our task, males are less competitive and more cooperative than females toward the collective. Age, on the other hand, is negatively related to the number of selfish and efficiency choices and positively related to the number of egalitarian choices. Interestingly, the effect of age on competitive/spiteful choices is not significant. This indicates that, although these considerably overlap with (non-) efficiency choices in our task, the variables that explain one type of preference do not necessarily explain the other type. Yet, none of these age effects are fully robust to controlling for other preferences.

Table 5 replicates the regressions of Table 4 except for three differences. First, the dependent variables refer now to the choices consistent with each type of preference when assigning points to the *ingroup*. Since group partners were the recipients of the bonus points in two blocks of the task, the maximum number of choices consistent with each preference are twice those in the previous regressions. Second, the decision maker's rating about the cooperativeness of her group partners (i.e., *partners' cooperation*, from 1 "very uncooperative" to 5 "very cooperative"; see Methods) is now added to the regressions as a potentially important variable that may capture the reciprocal nature of decisions, which will be analyzed in the next subsection. Third, we present three regressions for each type of preference. The first regression (columns "a") captures the main effect of patience once controlling for the above variables, the second one adds the *partners' cooperation* control (columns "b"), whereas we include the interaction between patience and (perceived) partners' cooperation in the third regression (columns "c").

Before analyzing the effects of individuals' discounting on their choices toward the ingroup, let us note that the impact of group identity is indeed noticeable in our sample. Subjects turned significantly less selfish (mean choices per recipient: 0.902±0.093 [SEM] vs.

1.171±0.088, SE of the difference [SED] = 0.074; *p* = 0.001, two-tailed signrank test), less competitive/spiteful (1.750±0.094 vs. 1.988±0.102, SED = 0.098; *p* = 0.007) and more egalitarian (2.787±0.124 vs. 2.549±0.115, SED = 0.085; *p* = 0.004) toward the ingroup compared to the collective. All these would remain significant if a Bonferroni-type conservative correction is applied (see above): the highest p-value would be that for competitive/spiteful (*p* = 0.028). Interestingly, the mean number of efficiency choices is identical for ingroup and collective recipients (1.646±0.092 in both cases, SED = 0.066; *p* = 1.000). Thus, subjects clearly adapted their decisions according to the identity of the recipient in the expected direction (see Chen and Li, 2009). Unexpectedly, however, this differential behavior toward their group partners does not directly translate into a larger number of efficiency choices that maximize the joint payoff.

Turning to the main effects of patience on preferences toward the ingroup, it can be observed from Table 5 that, using the same set of controls as in Table 4, delta is a significant or marginally significant predictor in three out of four cases. Delta impacts positively on the number of *selfish* (*p* = 0.026, column 1a) and *efficiency* (*p* = 0.060, column 3a) choices and negatively on the number of *egalitarian* (*p* = 0.008, column 4a) choices. Interestingly, now patience does not significantly predict *competitive/spiteful* choices, although the sign is negative as before (*p* = 0.262, column 2a). Only the relationship with egalitarian choices would survive a Bonferroni-type correction (corrected *p* = 0.032), however. As mentioned above, we favor a less stringent analysis based on controlling for the other social preferences rather than such a conservative correction. When controlling for egalitarian choices, in fact, the significant relationships of patience with the number of both selfish and efficiency choices vanish (*ps* > 0.19). Additionally, when the number of selfish (efficiency) choices is included as a control, the relationship between patience and efficiency (selfish) choices turns insignificant (*ps* > 0.10). Indeed, the only main effect of patience that survives the robustness checks is that on the number of egalitarian choices: it remains significant when controlling for either selfish, competitive/spiteful or efficiency choices (*ps* < 0.04). We can therefore conclude that patient individuals showed less egalitarian behavior than impatient individuals when assigning points to their group partners. Using the same format of Figure 3, Figure 4 provides a graphical representation of the relationship between patience and preferences toward the ingroup. It can be observed that the most patient subjects are indeed concentrated in the category that reflects the weakest egalitarian concerns.

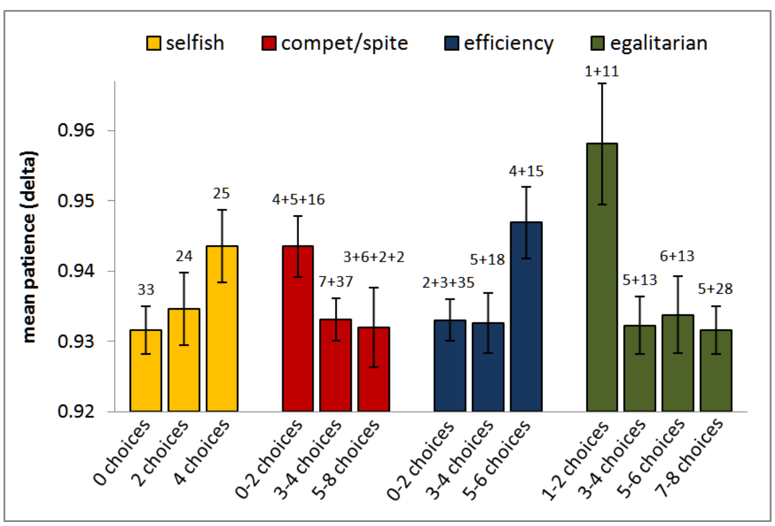
Table 5

Patience (delta) and social preferences toward the ingroup.

dependent vars.:	selfish			compet/spite			efficiency			egalitarian		
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)	(3a)	(3b)	(3c)	(4a)	(4b)	(4c)
delta	16.279**	16.111**	-11.930	-5.974	-7.793	37.943***	11.212*	12.440**	-31.608**	-19.625***	-19.323***	4.453
	(7.324)	(7.492)	(15.546)	(5.323)	(4.813)	(10.940)	(5.972)	(5.685)	(13.402)	(7.392)	(7.505)	(15.738)
partners' cooperation		-0.190*	-7.203*		-0.333***	11.355***		0.240**	-11.053***		0.279**	6.282*
		(0.113)	(3.952)		(0.127)	(3.176)		(0.117)	(3.943)		(0.113)	(3.645)
delta X part coop			7.476*			-12.479***			12.057***			-6.397*
			(4.168)			(3.400)			(4.204)			(3.844)
group score	-0.049	-0.025	-0.039	-0.007	0.028	0.049	-0.006	-0.029	-0.050	0.036	0.007	0.016
	(0.064)	(0.071)	(0.075)	(0.061)	(0.051)	(0.043)	(0.050)	(0.040)	(0.039)	(0.054)	(0.060)	(0.061)
individual score	-0.059	-0.071	-0.091	0.020	0.004	0.033	-0.041	-0.029	-0.058	0.051	0.066	0.082
	(0.071)	(0.070)	(0.074)	(0.040)	(0.042)	(0.047)	(0.050)	(0.053)	(0.056)	(0.066)	(0.064)	(0.069)
gender (male)	1.237***	1.372***	1.458***	-0.796***	-0.687**	-0.860***	1.205***	1.133***	1.319***	-1.216***	-1.388***	-1.468***
	(0.254)	(0.247)	(0.274)	(0.292)	(0.299)	(0.331)	(0.267)	(0.270)	(0.295)	(0.238)	(0.230)	(0.249)
age (yr)	-0.119**	-0.121***	-0.141**	0.042	0.049	0.081*	-0.089**	-0.094**	-0.126***	0.136***	0.135***	0.153***
	(0.046)	(0.046)	(0.055)	(0.041)	(0.045)	(0.048)	(0.037)	(0.039)	(0.043)	(0.043)	(0.042)	(0.049)
pseudo R^2	0.157	0.169	0.180	0.055	0.081	0.103	0.102	0.117	0.139	0.122	0.139	0.144
chi^2	35.833***	51.265***	41.772***	19.836**	29.529***	39.443***	51.358***	52.124***	47.644***	48.466***	86.537***	82.682***
ll	-75.190	-74.156	-73.193	-131.668	-128.004	-124.943	-113.134	-111.297	-108.518	-130.131	-127.537	-126.741
observations	82	82	82	82	82	82	82	82	82	82	82	82

Notes: Ordered Probit estimates. Dependent variables are displayed at the top of the columns (number of choices consistent with each type of preference; *selfish*: up to four; *compet/spite* and *egalitarian*: up to eight; *efficiency*: up to six). Robust SE clustered on groups are presented in parentheses. All regressions control for session (either morning or evening) and the feedback received regarding scores. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 4. Patience (delta) and social preferences toward the ingroup



Finally, to explore the link between patience and ingroup bias in more detail, we regress the (mean) number of egalitarian choices toward the ingroup *minus* those toward the collective as a function of delta. We observe a significant negative effect of delta on the difference variable (coeff. = -22.108, $p < 0.001$ [Bonferroni corrected $p < 0.001$]; same controls as in Table 5, column a), indicating that the more impatient individuals turn more egalitarian toward their group compared to the collective. This means that impatient individuals display a form of ingroup bias when it comes to egalitarian choices. The effect of delta on all other possible ingroup biases (i.e., in terms of selfish, competitive/spiteful and efficiency choices) is not significant when the "egalitarian ingroup bias" is accounted for (*ps* > 0.24), whereas its effect on egalitarian ingroup bias remains significant after controlling for all other possible ingroup biases (*ps* < 0.02).

3.2.1. Patience and reciprocity

Beyond the fact that more patient individuals seem to be in general more cooperative and less competitive (which was an expected result; Curry et al., 2008, Espín et al., 2015), we observe that more impatient individuals show a particular ingroup bias regarding egalitarian choices. These two results may partially explain why groups with patient members achieved higher levels of synergy than groups of impatient individuals. It might be, however, that patience also impacts group behavior through reciprocity. Indeed, we find several significant main effects of the variable capturing the decision maker's perception about the cooperativeness of her partners during the task (i.e., *partner's cooperation*), thus indicating that reciprocity is an important driving force behind subjects' choices toward their group partners. Specifically, the more cooperative the group partners, the fewer the selfish and competitive/spiteful choices (although only marginally significant in the former case; Table 5, columns 1b and 2b, respectively) and the more efficiency and egalitarian choices (columns 3b and 4b, respectively) toward them.

In order to explore whether patient individuals' choices are more or less based on reciprocal concerns than those of impatient individuals, we interacted delta with the (perceived) cooperativeness of the group partners. The interaction term yielded significant estimates in all four regressions. The interaction effect is highly significant in the regressions estimating the number of competitive/spiteful ($p < 0.001$, column 2c) and efficiency ($p = 0.004$, column 3c) choices, but it is only marginally significant in explaining selfish ($p = 0.073$, column 1c) and egalitarian choices ($p = 0.096$, column 4c).[19] Only the former two interaction effects would survive a Bonferroni-type correction. Indeed, the first two effects are robust to controlling for selfish and egalitarian choices (*ps* < 0.012) but, as before, not to controlling for each other (*ps* > 0.19). Once we control for either competitive/spiteful or efficiency choices, however, the interaction effect on selfish and egalitarian choices turns insignificant (*ps* > 0.19). So, from now on, we focus on the former significant interaction effects (on compet/spite and efficiency) since the latter (on selfish and egalitarian) are not robust.

Wald tests performed on the interaction coefficients of Table 5 reveal that the partners' cooperation does not significantly affect the number of either competitive/spiteful or efficiency choices made by the most impatient subjects (i.e., delta = 0.918; compet/spite: coeff. = -0.105, $p > 0.43$; efficiency: coeff. = 0.020, $p > 0.88$) but that it is a strong predictor of the number of such choices made by the most patient subjects (i.e., delta = 0.989; compet/spite: coeff. = -0.990, $p < 0.001$; efficiency: coeff. = 0.875, $p < 0.001$). Therefore, only sufficiently patient individuals are responsive to the cooperativeness of their partners when assigning points to them, thus apparently showing a reciprocal disposition. Moreover, when the partners had been very uncooperative (i.e., partners' cooperation takes the value of 1), delta predicts positively the number of competitive/spiteful choices (coeff. = 25.464, $p = 0.001$) and negatively the number of efficiency choices (coeff. = -19.550, $p = 0.040$). On the other hand, when the partners had been very cooperative (i.e., partners' cooperation takes the value of 5), delta is associated negatively with the number of competitive/spiteful choices (coeff. = -24.450, $p = 0.001$) and positively with the number of efficiency choices (coeff. = 28.679, $p = 0.002$). In sum, patient individuals seem to be more willing than impatient individuals to punish uncooperative partners (negative reciprocity) and reward cooperative partners (positive reciprocity).

Since both negative and positive reciprocity are considered to be important catalysts for the establishment of human cooperation (Fehr & Gächter, 2002; Rand et al., 2009; Rand & Nowak, 2013), we argue that such a reciprocal disposition by patient individuals might indeed constitute a key mechanism underlying the positive effect of patience on the synergies of group interactions.

As a final exercise, the interaction effects that survived the above robustness checks on ingroup choices (i.e., on competitive/spiteful and efficiency choices) are checked again by

[19] Due to the complex interpretation of interaction effects in non-linear models (Ai & Norton, 2003), we replicated the interaction regressions with OLS: the significance levels remain nearly identical.

controlling for the number of choices the individual made toward the collective that are consistent with that specific type of preference. The interaction effects on both competitive/spiteful (p = 0.003) and efficiency (p = 0.011) choices remain significant.

Finally, regarding the control variables, Table 5 shows that the effects of gender and age are very similar to those found in Table 4. Hence, these variables do not seem to reflect the differences between subjects' choices toward the ingroup and those toward the collective. The subjects' scores in the individual or the group task do not yield significant estimates.

4. DISCUSSION

We find a positive relationship between the mean patience of the members of a group, either measured using short-term or long-term discounting, and the group's cooperative synergy. This finding indicates that patience works as a spur to the synergetic benefits of group interactions *also* during intergroup conflict.

Arguably, the incentive structure and the rules of the intergroup competition task may make the essence of group interactions more similar to a repeated social dilemma game, where repetition can coordinate individual and group interests in the long run (e.g., Axelrod, 1984; Fudenberg & Maskin, 1986) than to a one-shot game where individual and group interests are clearly confronted. Whether within-group cooperation in our task is really an individually costly behavior is therefore unclear but, in any case, sufficient patience seems to be required to suppress within-group competition in order to achieve such a long-run coordinated outcome. In this sense, our results may resemble Al-Ubaydli et al.'s (2013) observation that the mean patience of a playing pair positively covaries with the ability of its members to coordinate on the cooperative, socially-efficient outcome during a finitely *repeated* stag-hunt game. Similarly, Harris and Madden (2002), and Yi et al. (2005, 2007) found that patience predicts cooperation in a finitely *repeated* prisoner's dilemma versus a tit-for-tat strategy. Extending the present findings to the typical experimental design of social dilemma games with intergroup competition, where the players' individual contributions to the group can be scrutinized and the length of the interactions can be manipulated, is an interesting endeavor for future research.

We also show that patience, but only using long-term discounting, is positively associated with the number of efficiency and altruistic choices when assigning points to unknown classmates (the collective) in the social preferences task. This result suggests that the relationship between long-term patience and the collective interest (i.e., cooperation) is not merely related to the expectation of future personal returns linked, for instance, to others' reciprocal behavior. This is possibly in line with Curry et al.'s (2008) finding that patience correlates positively with contributions in a *one-shot* public goods game. Yet this does not imply that impatience predicts more selfish choices but rather more competitive/spiteful choices that reduce social welfare. Similar results have been found using non-student samples in a *one-shot* ultimatum game (Espín et al., 2015) and a *one-shot* public goods game with punishment (Espín et al., 2012), where impatience appears to be related to competitive, but not selfish behavior. Thus, our findings are consistent with the view that the intertemporal conflict underlying the connection between discounting and social behavior is not merely based on a trade-off between sooner and later material rewards: people may derive short- and long-run emotional satisfaction (which arguably functions as a motivational driver of social decision making; see Ruff and Fehr (2014) for a recent overview) from competitive and cooperative goals, respectively, and these non-material incentives could also play a crucial role (Espín et al., 2012, 2015, 2017).

Moreover, the positive effects of patience on within-group cooperation during intergroup conflict seem to be emanating from factors other than an enhanced ingroup bias. When assigning points to the ingroup, long-term patience is associated negatively with the number of egalitarian choices and, if the other group members had been uncooperative (cooperative) during the group task—as self-reported by the decision maker—associated positively with the number of competitive/spiteful (altruistic and efficiency) choices. The latter result is in line with Espín et al.'s (2012) finding that patient cooperators are more likely to engage in "altruistic" punishment of cheating group members in a *one-shot* public goods game. Cooperators' punishment of free-riders is considered to be a powerful instrument to enforce human cooperation and therefore a group-beneficial behavior (e.g., Fehr & Gächter, 2002; Gächter et al., 2008). Indeed, there is evidence that the effectiveness of peer punishment for benefiting the group may increase in environments of intergroup competition (Sääksvouri, Mappes, & Puurtinen, 2011). More patient individuals might thus be more willing to use reciprocal or "strongly reciprocal" (Gächter & Herrmann, 2009; Gintis, 2000) strategies to enforce within-group cooperation, even if this goes against strict within-group equality. To put it differently, the use of equity versus equality norms to allocate resources among group members might distinguish patient from impatient individuals.

The negative relationship between patience and egalitarian choices toward the ingroup, which to the best of our knowledge has not been documented before, is of great interest since it suggests that the short-run goals associated to social interaction (Espín et al., 2015, 2017) may dramatically change when group identity is made salient. We report in this way a particular form of egalitarian ingroup bias among impatient individuals. Future research is warranted to examine the possible mediating or interacting role of social identity on the relationship between delay discounting and social behavior in different scenarios, such as the ultimatum game or the public goods game with punishment. For instance, if these results can be extended to the one-shot ultimatum game, then the competitive/spiteful behavioral patterns observed among impatient subjects in both roles of the game (i.e., rejecting low offers as responder *and* proposing low offers as proposer) when playing against an unknown partner (Espín et al., 2015) might become equality-seeking patterns with an ingroup counterpart.

Importantly, however, subjects' behavior in the social preferences task is predicted by the long-term, delta discount factor but not by the short-term, beta discount factor. In other words, our further analyses based on social preferences do not allow us to infer an explanation for the positive effect of short-term patience (i.e., of a smaller average present bias in the group) on group synergy, as social preferences do not seem to be the reason. In fact, when we include *both* the mean beta and the mean delta of the group as predictors of group synergy both remain significant or marginally significant (beta: $p = 0.042$; delta: $p = 0.079$), the coefficients are reduced only by 12% (beta) and 25% (delta) and the two variables together explain 29% of the variance in group synergy. From these results, it can be argued that beta and delta discount factors may partially operate through different channels to increasing group performance. It would be interesting for future research to provide an in-depth analysis of such differential effects, which might have to do with the presence or absence of a prepotent response/impulse that has to be inhibited (behavioral inhibition guided by executive control appears to be related to short-term but not long-term discounting measures; see Figner et al., 2010).

Taken together, these results corroborate a general tendency of patient individuals to engage in cooperative/non-competitive acts but, at the same time, they also underscore the complexity of the relationship between intertemporal preferences and social behavior. While more impatient individuals seem to be more competitive towards the members of other groups (or at least toward the collective), they seem unable to coordinate with their partners in order to reap the benefits of group interaction. Instead, the results from the social preferences task suggest that they focus on strict within-group equality, in contrast to patient individuals who focus on within-group reciprocal fairness (or equity). The success of groups of patient (vs.

impatient) individuals, when long-term discounting is considered, may thus be related to their propensity to be initially cooperative and to subsequently treat group members based on reciprocal fairness instead of strict equality.

These findings can also be useful from the point of view of organizational design and applied educational research. Our results suggest that managers and educators may shape the outcomes of teamwork by allocating individuals into groups with optimal composition in terms of members' delay discounting (e.g., the predominance of impatient and patient individuals may encourage within-group equality and efficiency, respectively).

The scope of this study is, however, limited due to several factors. As mentioned, the social preferences measures were obtained in a non-incentivized way for the reasons outlined in the Methods section. Even though we acknowledge that hypothetical incentives probably make a difference in social preferences tasks by leading people to give the socially-desirable, prosocial response to a larger extent (see, e.g., Amir et al., 2012), we still observe much variability and many individuals chose options that can hardly be labeled as socially desirable (e.g., toward the collective, 34 out of 82 individuals [41%] chose always the selfish option and only 16 [20%] chose always the socially-efficient option; see Figure 3). Along these lines, note that we are not interested in measuring average social preferences in the population but in their relationship with patience. Thus, socially-desirable responding can bias our conclusions only if it is related to patience. Although rather speculative, it might be the case that more patient individuals are more likely to give the socially-desirable response because they are more likely to think about the experimenter's *future* perception. However, this might have only exacerbated an already existing positive relation between patience and group-beneficial (vs. competitive/spiteful) behavior, because many of the papers reviewed as evidence for this link actually use real monetary stakes (e.g. Al-Ubaydli et al., 2013; Curry et al., 2008; Crockett et al., 2011; Espín et al., 2012; 2015; LeVeck et al., 2014). Also as mentioned, the design of the intergroup competition task could have confounded purely cooperative behavior with, for example, an ability to coordinate with others or communication skills. Future research should try to replicate the current results using scenarios with cleaner and more ecologically-valid measures of behavior. In addition, it might be that more patient individuals value grade points more, since they are associated with long-run positive consequences. Yet, our findings can only be explained by differences in the valuation of points if this argument holds for group but not individual grades (as we look at their comparison), but we cannot find any reason why more patient individuals should value more the points obtained in the group task than those obtained in the individual task. Also, we lack a control for individual intelligence or cognitive abilities. It would be interesting for future research to perform a "horse-race" between patience and IQ as predictors of within-group cooperative synergy. Finally, there exist potential sources of reverse causality. For example, group synergies could influence choices in the social preferences task. While controlling for group and individual scores in the social preferences regressions should alleviate this concern (we also checked whether controlling for group synergy specifically affects the results and found qualitatively similar estimates), we cannot eliminate it completely. Another source of reverse causality might be that individual/group outcomes, or group synergy, affect time preferences rather than the other way around. However, we cannot think of a reason why time preferences should be affected by the outcome of a classroom experiment (perceived as a course task) conducted one week earlier. Longitudinal studies can help get rid of these potential limitations.

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Supplementary materials for

Patience predicts cooperative synergy: the roles of ingroup bias and reciprocity

Appendix Tables

dependent vars.:	selfish	compet/spite	efficiency	egalitarian
	(1)	(2)	(3)	(4)
beta	-1.597	1.500	-2.284	0.770
	(1.384)	(1.302)	(1.408)	(1.128)
group score	-0.045	-0.138*	0.101	0.030
	(0.040)	(0.076)	(0.067)	(0.049)
individual score	0.062	0.092	-0.081	-0.050
	(0.059)	(0.071)	(0.073)	(0.061)
gender (male)	0.916***	-0.787***	1.252***	-0.763***
	(0.277)	(0.273)	(0.280)	(0.219)
age (yr)	-0.142**	0.050	-0.126***	0.118**
	(0.056)	(0.049)	(0.044)	(0.048)
pseudo R^2	0.138	0.098	0.151	0.106
chi^2	35.304***	24.311***	47.186***	50.122***
ll	-76.056	-96.339	-80.263	-99.177
observations	82	82	82	82

Table A1. Patience (beta) and social preferences toward the collective. Notes: Ordered Probit estimates. Dependent variables are displayed at the top of the columns (number of choices consistent with each type of preference; *selfish*: up to two; *compet/spite* and *egalitarian*: up to four; *efficiency*: up to three). Robust SE clustered on groups are presented in parentheses. All regressions control for session (either morning or evening) and the feedback received regarding scores. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

dependent vars.:		selfish			compet/spite			efficiency			egalitarian	
	(1a)	(1b)	(1c)	(2a)	(2b)	(2c)	(3a)	(3b)	(3c)	4(a)	(4b)	(4c)
beta	-0.454	-0.658	-11.836	0.009	-0.426	0.343	-0.303	-0.048	-4.623	0.362	0.691	10.722
	(1.515)	(1.528)	(8.414)	(1.017)	(1.110)	(6.193)	(0.899)	(1.012)	(5.921)	(1.313)	(1.302)	(9.101)
partners' cooperation		-0.204*	-2.569		-0.316**	-0.151		0.208*	-0.766		0.296***	2.434
		(0.111)	(1.740)		(0.125)	(1.336)		(0.116)	(1.274)		(0.111)	(1.889)
beta X part coop			2.613			-0.181			1.076			-2.361
			(1.868)			(1.428)			(1.359)			(2.044)
group score	-0.035	-0.009	-0.010	-0.009	0.026	0.026	0.002	-0.019	-0.020	0.021	-0.013	-0.013
	(0.066)	(0.073)	(0.070)	(0.067)	(0.061)	(0.061)	(0.055)	(0.048)	(0.047)	(0.056)	(0.063)	(0.060)
individual score	-0.064	-0.078	-0.086	0.020	0.002	0.003	-0.041	-0.028	-0.031	0.055	0.073	0.079
	(0.076)	(0.075)	(0.075)	(0.039)	(0.042)	(0.043)	(0.052)	(0.056)	(0.056)	(0.072)	(0.070)	(0.070)
gender (male)	1.134***	1.257***	1.279***	-0.788***	-0.691**	-0.692**	1.170***	1.113***	1.124***	-1.111***	-1.275***	-1.297***
	(0.255)	(0.253)	(0.262)	(0.289)	(0.294)	(0.299)	(0.269)	(0.270)	(0.278)	(0.248)	(0.261)	(0.270)
age (yr)	-0.139***	-0.141***	-0.151***	0.047	0.051	0.052	-0.100***	-0.104***	-0.108***	0.159***	0.159***	0.170***
	(0.047)	(0.048)	(0.056)	(0.040)	(0.043)	(0.044)	(0.033)	(0.034)	(0.037)	(0.043)	(0.042)	(0.050)
pseudo R^2	0.12	0.134	0.144	0.051	0.074	0.074	0.086	0.097	0.099	0.083	0.103	0.109
chi^2	41.150***	45.357***	48.687***	15.909**	29.614***	29.525***	57.804***	65.247***	64.199***	36.631***	46.784***	47.908***
ll	-78.53	-77.296	-76.400	-132.296	-128.997	-128.992	-115.123	-113.736	-113.561	-135.79	-132.826	-131.992
observations	82	82	82	82	82	82	82	82	82	82	82	82

Table A2. Patience (beta) and social preferences toward the ingroup. Notes: Ordered Probit estimates. Dependent variables are displayed at the top of the columns (number of choices consistent with each type of preference; *selfish*: up to four; *compet/spite* and *egalitarian*: up to eight; *efficiency*: up to six). Robust SE clustered on groups are presented in parentheses. All regressions control for session (either morning or evening) and the feedback received regarding scores. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix A1

Practical class session.
Units 5,6 and 7.

Degree in Business Administration

Today's class will be divided into two sessions. The instructions for session II will be provided later once session I has finished.

INSTRUCTIONS FOR SESSION I

On the back of this sheet you will find a list of 3 numerical exercises corresponding to units 5, 6 and 7 of the course syllabus. While performing this activity you must not communicate with any of your classmates. You have 40 minutes to provide your results.

You will be able to earn a bonus of up to 1 point toward your overall final grade in the course. Here are the rules:

Once the exercises have been scored, a ranking will be made. The **top 15 students with the best scores** will get a bonus. The distribution of bonus points will be as follows:

(*) 1 point for each of the three students obtaining the top three scores

(*) 0.75 points for the six students obtaining the 4th-9th scores

(*) 0.5 points for the six students obtaining the 10th-15th scores.

In the event of a tie, the order in which the assignments are submitted will be considered for the ranking.

Please do not turn over the page until instructed by your teacher.

Good luck!!

INSTRUCTIONS FOR SESSION II

On the back of this sheet you will find a list of 3 numerical exercises corresponding to units 5, 6 and 7 of the course syllabus. For this session, students will be randomly arranged into three-person groups. While performing this activity you can communicate only and exclusively with the members of your group. You have 40 minutes to provide your results.

You will be able to earn a bonus of up to 1 point toward your overall final grade in the course. Here are the rules:

(*) The three members of the group whose members' achieved the highest mean score will earn 1 bonus point.

(*) The six members of the two groups with the 2nd and 3rd highest mean score will earn 0.75 bonus points

(*) The six members of the groups ranking 4th and 5th will earn 0.5 bonus points.

In the event of a tie, the order in which the assignments are submitted will be considered for the ranking.

Please do not turn over the page until instructed by your teacher.

Good luck!!

Appendix A2
PART III – BONUS ASSIGNMENT

In the next part of the questionnaire, you must make a series of 12 decisions on how you would assign bonuses for you and other students to be counted toward the overall final grade.

The decisions are completely independent from each other and there are no right or wrong decisions. You must make the decisions that you really prefer in every situation, regardless of what you have decided or are going to decide in the others.

The decisions that you are going to make are fictitious: they have no real consequences. However, please respond as honestly as possible, as though the consequences of your decisions were real.

Your decisions, like the rest of the questionnaire, will be treated anonymously and will not be disclosed under any circumstances to other students.

This part consists of 3 blocks of questions. It is 3 groups of 4 identical decisions, in which only the recipient of the bonus points you assign varies.

Mark the option you prefer in each decision

BLOCK 1

In this block, another student chosen randomly from the class will receive the bonus points.

Decision 1

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 0 bonus points for the other student

Decision 2

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 1 bonus point for you and 0 bonus points for the other student

Decision 3

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 1 bonus point for the other student

Decision 4

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.75 bonus points for you and 1 bonus point for the other student

BLOCK 2

In this block and the following one, one out of the two students from your working group will receive the bonus points.

Please, type the name of the student who is going to receive the bonus points in the next four decisions:_______________________________ (leave the space blank if you do not remember the person's name)

Decision 1

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 0 bonus points for the other student

Decision 2

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 1 bonus point for you and 0 bonus points for the other student

Decision 3

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 1 bonus point for the other student

Decision 4

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.75 bonus points for you and 1 bonus point for the other student

BLOCK 3

In this block, the other member of your working group will receive the bonus points.

Please, type the name of the student who is going to receive the bonus points in the next four decisions:_______________________________ (leave the space blank if you do not remember the person's name)

Decision 1

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 0 bonus points for the other student

Decision 2

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 1 bonus point for you and 0 bonus points for the other student

Decision 3

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.5 bonus points for you and 1 bonus point for the other student

Decision 4

- 0.5 bonus points for you and 0.5 bonus points for the other student
- 0.75 bonus points for you and 1 bonus point for the other student

Appendix A3

PART IV – ADDITIONAL INFORMATION (1)

In the next part of the questionnaire, you must take a series of 20 decisions on whether you would prefer to receive an amount of money sooner as opposed to later.

The decisions are completely independent from each other and there are no right or wrong decisions. You must make the decisions that you really prefer in every situation, regardless of what you have decided or are going to decide in the others.

The decisions that you are going to make are fictitious: they have no real consequences. However, please respond as honestly as possible, as though the consequences of your decisions were real.

Your decisions, like the rest of the questionnaire, will be treated anonymously and will not be disclosed under any circumstances to other students.

Mark the option you prefer in each decision

BLOCK 1

Decision 1

Receive €30 today OR €30 in 1 month's time

Decision 2

Receive €30 today OR €32 in 1 month's time

Decision 3

Receive €30 today OR €34 in 1 month's time

Decision 4

Receive €30 today OR €36 in 1 month's time

Decision 5

Receive €30 today OR €38 in 1 month's time

Decision 6

Receive €30 today OR €40 in 1 month's time

Decision 7

Receive €30 today OR €42 in 1 month's time

Decision 8

Receive €30 today OR €44 in 1 month's time

Decision 9

Receive €30 today OR €46 in 1 month's time

Decision 10

Receive €30 today OR €48 in 1 month's time

BLOCK 2

Decision 1

Receive €30 in 1 month's time OR €30 in 7 months' time

Decision 2

Receive €30 in 1 month's time OR €32 in 7 months' time

Decision 3

Receive €30 in 1 month's time OR €34 in 7 months' time

Decision 4

Receive €30 in 1 month's time OR €36 in 7 months' time

Decision 5

Receive €30 in 1 month's time OR €38 in 7 months' time

Decision 6

Receive €30 in 1 month's time OR €40 in 7 months' time

Decision 7

Receive €30 in 1 month's time OR €42 in 7 months' time

Decision 8

Receive €30 in 1 month's time OR €44 in 7 months' time

Decision 9

Receive €30 in 1 month's time OR €46 in 7 months' time

Decision 10

Receive €30 in 1 month's time OR €48 in 7 months' time