Competition and the role of group identity

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April 2019

Abstract:

The emergence of competition is a defining aspect of human nature and characterizes many important social environments. However, its relationship with how social groups are formed has received little attention. We design an experiment to analyze how individuals' willingness to compete is affected by group identity. We find that individuals display substantially stronger competitiveness in within group (ingroup) matchings than in between group (outgroup) matchings or in a control setting where no group identity is induced. We also find that the effect of group identity is stronger for subjects who participated more actively in the team-building task.

Keywords: competition; social distance; group identity; laboratory experiment.

JEL: C92, D03.

Acknowledgments: We thank Steffen Altmann, Gary Charness, Nick Vriend and Philipp Zahn for useful comments and Graeme Pearce for programming assistance. Financial support from the Queen Mary University of London is gratefully acknowledged.

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1. Introduction

Competitiveness is a pervasive trait of human nature and arguably one of the most important factors influencing social environments. An emerging body of experimental literature (following Niederle and Vesterlund, 2007) shows that an individual's propensity to compete depends on various factors. Over the past decade, numerous lab and field studies have discussed the role of demographic factors (most prominently, gender – a large literature indicates that women are less willing to compete than men) as well as socio-economic factors and environmental factors (mostly cultural factors that may also be determined by particular geographic characteristics of the location of residence – see Leibbrandt et al. (2013)). More recently, it has also been shown that the effect of individual traits may be mediated by cultural/environmental factors. Indeed Gneezy et al. (2009) provide evidence that the direction of gender gaps in the willingness to compete crucially depends on local culture. While in patriarchal societies a lower willingness to compete among women is observed, this is not the case in matrilineal societies.

In this paper, we discuss the impact of another crucial environmental factor on willingness to compete: the existence of group divisions within a community. Societies are often organized into multiple groups (such as religious, ethnic and political groups) that, as documented by the literature, are often the basis for ingroup favoritism and outgroup discrimination (see Hewstone et al., 2002, for a recent review). We design an experiment that manipulates the saliency of group membership and investigates whether and how social distance among subjects influences their propensity to compete.

Most of the extant literature on group identity analyses its impact on prosocial behavior (e.g., Chen and Li, 2009; Bernhard et al., 2006; Falk and Zehnder, 2007). In our study, we deviate from this literature by focusing on the effects of group identity on another major aspect of economics decision-making: individuals' willingness to compete. Group membership might affect the propensity to compete (namely, choice of the remuneration scheme) through "interpersonal comparison" channels, for instance, by affecting the perceived social image/social status of an individual within a group. Competition choices might be affected by group salience if the taste for competition is directly linked to the group membership of the competitors. A priori, it is an open empirical question whether social distance affects tastes for competition positively or negatively. On the one hand, a competitive choice of an individual against a member of her own group might represent a boost in her perceived status within her own group. In this case, we would expect a negative relationship between social distance and taste for competition, implying that competition is higher in within group (ingroup) matchings than in between group (outgroup) matchings. On the other hand, a competitive choice of an individual against a member of a different group might push the perceived status of the entire group. In this case, we would expect a positive relationship between social distance and taste for competition, implying competition is lower in within group (ingroup) matchings than in between group (outgroup) matchings.

In a competitive environment, however, individual actions might carry negative externalities on other individuals. Altruistic considerations might then affect competition choices and, as a result, group membership is likely to play a role, for instance, by boosting

altruism towards in-group members and decreasing altruism towards outgroup members (see Chen and Li, 2009). As in Niederle and Vesterlund (2007) we shut down this potential channel by making sure the individual decision to compete does not carry externalities on others and thus our focus is on how group identity interacts with the "interpersonal comparison" channels mentioned above.

To test whether group identity influences the willingness to compete and to understand the relationship between social distance and taste for competition, we employ common techniques from social psychology, such as the minimal group paradigm, as a means of manipulating the structure of social groups. In particular, we create artificial groups in the lab, which allow us to achieve the highest degree of control over the formation of social groups, thus facilitating the identification of the causal effect of social distance on competition. Following the group identity manipulation, we measure the willingness to compete by asking participants to indicate how they would like to get paid by selecting either a non-competitive (piece rate) or a competitive (winner-take-all tournament) incentive scheme after they have obtained relevant experience pertaining to each scheme. As a result, we are able to compare the competitive choices of subjects under three different conditions: (i) a setting without group identity where subjects choose between a piece rate scheme or a tournament to be played against another subject; (ii) a setting with group identity where subjects choose between a piece rate scheme or a tournament to be played against a member of their own group (ingroup); (iii) a setting with group identity where subjects choose between a piece rate scheme or a tournament to be played against a member of a different group (outgroup).

Our results are striking. We find that group identity matters: subjects are more likely to make competitive choices when group identity is artificially introduced. Interestingly, we find that the willingness to compete is higher when social distance among subjects is low: subjects are between 67% and 80% more likely to choose the tournament option when they compete against a member of their own group (controlling for factors that are likely to affect competition choices) compared to the setting without group identity. This is not attributed to differences in performance. We also determine that the observed effect is stronger on subjects who participate more in the team-building activity (and therefore who may be more likely to be concerned about their status within the group).

We broaden the existing literature in various respects. First, we contribute to the literature examining the determinants of the willingness to compete. A variety of studies have shown substantial gender differences in their willingness to compete (e.g., Apicella & Dreber, 2015; Buser et al., 2012; Charness & Gneezy, 2012; Dargnies, 2012; Dreber et al., 2014; Flory et al., 2014; Gneezy et al., 2009; Gneezy et al., 2003; Gneezy & Pietrasz, 2013; Gneezy & Rustichini, 2004; Healy & Pate, 2011; Niederle & Vesterlund, 2007, 2010, 2011; Price, 2008; Sutter & Rützler, 2015; Wozniak et al., 2014). These differences also seem to depend on age (e.g., Charness and Villeval, 2009) and the family background (e.g., Almas et al., 2016). Moreover, Leibbrandt et al., (2013) discuss how geographical characteristics (in particular, proximity either to a lake or the sea) might generate very different work environments, slowly instilling different types of cultures (e.g., more individualistic cultures

close to the lake because the lake's ecology leads fishermen to work and fish in isolation) and therefore generating very different preferences for competition. We contribute to the competition literature by exploring the relationship between group identity and individuals' willingness to compete.

We also add to the literature that focuses on the effects of group identity on individual behavior. An extensive literature in social psychology documents that group membership is likely to affect behavior (Tajfel and Turner, 1979). In the economic literature, Akerlof and Kranton (2000) have highlighted that identification with social groups is an important dimension to consider when analyzing economic decisions that have consequences in social life. This has also been recognized by recent experimental economic evidence; in particular, numerous studies have shown that individuals tend to favor those who belong to their own social group and discriminate towards out-groups in various strategic contexts (e.g.,; Charness et al., 2007; Chen and Li, 2009; Chen and Chen, 2011). We contribute to this literature by examining the impact of group membership on a crucial characteristic of human economic behavior: competitiveness. Our findings suggest that group membership might not only stimulate pro-social attitudes towards other members of the group as shown by a large literature but also amplify competitive behavior within the same group.

More specifically, we contribute to the existing literature exploring the relationship between group identity and pro-social behavior. Results from this literature typically suggest that high-identity groups are more cooperative compared to those with weaker identities. This has been documented both in the laboratory (e.g., Eckel and Grossman, 2005; Drouvelis and Nosenzo, 2013) as well as in the field (e.g., Solow and Kirkwood, 2002; Bernhard et al., 2006; Falk and Zehnder, 2007).[1] In contrast, competitiveness is considered to be an aspect of human behavior at the other end of the spectrum with respect to cooperative behavior (see the Social Value Orientation measure; e.g., Murphy et al., 2011). The negative relationship between co-operation and social distance documented by the literature does not however have to imply a positive relationship between competition choice and social distance, as we provide strong evidence that competition is higher in within group (ingroup) matchings than in between group (outgroup) matchings.

The rest of the paper is organized as follows. Section 2 outlines the experimental design and procedures. Section 3 presents our main findings. Section 4 concludes.

2. Experimental design

To analyze the impact of social distance on competition choices, we design an experiment that consists of two parts. In Part 1, we manipulate group identity by asking subjects to perform a problem-solving task either in groups or individually (depending on the treatment). In Part 2, subjects participate in a four-stage experiment in which they are given the opportunity to make decisions about how they would like to get paid for their performance. We discuss the two parts of the experiment in turn.

[1] There is also related literature finding empirical evidence for the presence of parochial altruism (that is, the combination of in-group altruism and out-group hostility) in experimental contest and conflict games (see Abbink et al., 2010, 2012).

Part 1. Group identity manipulation

We manipulate group identity following the procedures used by Chen and Li (2009).[2] At the beginning of Part 1, subjects are shown five pairs of paintings made by two artists (Paul Klee and Wassily Kandinsky). For each pair, subjects had to choose which of the two paintings they preferred. Subjects were then ranked according to their own choices and assigned to either the "Kandinsky" group or the "Klee" group. After subjects had made their choices, they were informed of the group to which they belonged. Following their assignment to one of the two groups and in order to strengthen identities, subjects participated in a problem-solving team building task and were given five minutes to communicate with members of their own group via a computer chat program before submitting their answers.[3] We refer to the resulting treatment as the "Identity" treatment. For control purposes, we also conducted a treatment where no group identity was manipulated. In this treatment, subjects also participated in the problem-solving task, but they were not asked about their preferences regarding the paintings. As a result, subjects were not divided into groups and could not communicate with any other participant before submitting their answers. We refer to this treatment as the "No-Identity" treatment.

Part 2. Competition choice

After the group manipulation phase had finished, subjects proceeded to the next part of the experiment, which allows us to measure how social distance impacts competition choices. At the beginning of Part 2, subjects were randomly matched into pairs. Within the "Identity" treatment, we distinguish between i) the "ingroup" treatment, where subjects in a pair belongs to the same group (so either both subjects belong to the "Kandinsky" group or they both belong to the "Klee" group) and ii) the "outgroup" treatment, where subjects in a pair belong to different groups (one of two subjects belongs to the "Kandinsky" group and the other one belongs to the "Klee" group). For simplicity, we will refer to subjects in the "ingroup" and "outgroup" treatment as "ingroups" and "outgroups", respectively. Subjects were then informed of whether their counterparts belonged to the same group or to a different group from Part 1. Within the "No-Identity" treatment, subjects were paired randomly with another participant and there was no reference to the "Kandinsky" and "Klee" groups from Part 1.

Subjects then participated in four different tasks and the pairings remained the same throughout the experiment. We used a similar design to the one introduced by Niederle and Vesterlund (2007). In all four tasks, subjects had to perform an addition task. Specifically, subjects were asked to add four randomized two-digit numbers and to complete as many of these summations as possible in three minutes. Equations were presented to participants on a computer screen, where subjects typed in their answer and clicked a "Submit" button once

[2] These are inspired by the social psychology literature (for a review of methodologies, see Tajfel and Turner, 1986).

[3] In the problem-solving task, subjects reviewed four paintings (two by Paul Klee and two by Wassily Kandinsky), and were asked to guess the artist who made each painting. Communication via the chat program was unrestricted, except that subjects were forbidden to reveal their identity and to use obscene language. Subjects submitted their answers individually and received £0.50 per correct guess. Subjects did not learn whether their guesses were correct until the end of the experiment.

they were ready. After each submission, subjects were shown the next equation to solve. Subjects were provided with a sheet of paper and a pen, but no other form of help was available to them. The difference in the structure of the four tasks hinged on how subjects were getting paid in each task. Below, a description of each of the tasks is provided.

Task 1 (Piece rate): Subjects are given three minutes to solve as many addition problems as they can. They receive £0.50 for each correct answer they provide. Note that in this task a subject's performance does not affect the earnings of the other subject in the pair, as each subject is compensated based on her or his own individual performance.

Task 2 (Tournament): Subjects are given three minutes to solve as many addition problems as they can. The participant who solves the largest number of correct problems in her or his pair receives £1 for each correctly solved problem; the other subject in the group receives no payment. In the case of ties between the two subjects in the pair, the winner of the tournament is randomly chosen. Note that in this task a subject's performance affects the earnings of the other subject in the pair, as each subject is compensated in relation to the performance of the other member of the pair.

Task 3: Before performing the three-minute addition task, subjects are asked to decide whether they want to get paid according to a piece rate (as in Task 1) or a tournament (as in Task 2) compensation scheme. Each subject has to make a compensation choice. When subjects select the piece rate, they then get paid based on their own performance in Task 3 and receive £0.50 for each correctly answered addition problem. On the other hand, when subjects select the tournament, they receive £1 per correct answer if they correctly answer more questions than their partner did in Task 2. If they correctly answer fewer questions than their partner in Task 2, they receive no payment. In the case of ties, the subjects who selected the tournament in Task 3 will receive the tournament winnings with a 50% chance and they will receive no payment with a 50% chance. Note that a subject's compensation choice (either piece rate or tournament) and performance during Task 3 will not affect the earnings of the other person in the pair. As a result, the compensation choice in Task 3 represents subjects' willingness to compete.

Task 4: Before performing the three-minute addition task, one of the subjects in the pair is selected at random and is given the opportunity to decide how she or he and their paired participant would like to be paid for their performance. When the randomly selected subject chooses the piece rate, each subject in the pair gets paid £0.50 for each correctly answered addition problem according to her or his own performance. When the randomly selected subject chooses the tournament, both subjects in the pair will be placed in a tournament and their performance in this task will be compared with the other subject's performance in their pair from Task 2. Subjects who take part in the tournament are compensated at a rate of £1 per correct answer if they obtain more correct answers that the other subject in their pair did in Task 2; if they do not, they receive £0. In Task 4, we use the same tie-breaking rule as in Task 3. Note that in this task the randomly selected participant's compensation choice (either piece rate or tournament) may affect the earnings of the other person in the pair (in the case

that the person who does not get to select the compensation choice has different tastes over competition).[4]

Belief-Assessment Questions: At the end of each task, subjects were asked to indicate how many correct additions they thought they had provided and how many correct additions they thought the other person in their pair had provided. Subjects received feedback about their own performance (and only about their own performance) at the end of each task and after they had indicated their beliefs about own and others' performance. The elicitation of beliefs was incentivized: for each of these two correct guesses, they received an additional £1. This means that a subject could earn up to £2 from the belief elicitation task.

At the end of all four tasks, one of the four tasks was selected at random, and subjects were paid according to their earnings in that task. Subjects were paid according to the sum of their earnings from the two parts of the experiment, but they knew that any information about earnings in Part 1 would only be given at the end of Part 2.

Procedures: In total, 15 sessions were conducted and 240 subjects participated in our experiment (each session consisted of 16 subjects). 12 sessions (for a total of 192 subjects) were assigned to the "Identity" treatment and 3 (for a total of 48 subjects) were assigned to the "No-Identity" treatment. Subjects within the same "Identity" session were randomly allocated in the ingroup and outgroup condition: of the 192 subjects in the "Identity" treatment 110 were randomly allocated to the ingroup condition and 82 to the outgroup. In Table 1 we show a breakdown of our observations across sessions and treatments. All subjects were recruited at the University of Birmingham, using the ORSEE software (Greiner, 2015). The vast majority of participants were undergraduate students from various academic fields. Across all treatments, 49% of our subjects were males and 51% of our subjects were females. The experiment was conducted in the Birmingham Experimental Economics Laboratory (BEEL), and all treatments were computerized and programmed with the z-Tree software (Fischbacher, 2007). The full set of instructions used in the experiment is provided in Appendix B. Some of the instructions were also presented on the computer screen. At the end of a session, subjects were paid in private according to their total earnings from both Part 1 and Part 2. Average earnings (including a show-up fee of £2.50) were as follows: £8.99 for the ingroup condition of the "Identity" treatment, £8.79 for the outgroup condition of the "Identity" treatment, and £7.82 for the "No-Identity" treatment. Sessions lasted, on average, for 70 minutes.

[4] We focus our analysis on subjects' behavior across our treatments in Tasks 1-3 throughout the results section and devote less attention to Task 4 behavior because of the more limited number of observations. However, for completeness, we refer the readers to the Appendix where we present an analysis for Task 4 behavior.

Table 1. Overview of experimental design

Treatments	Conditions	Number of subjects per session			Number of observations
Control	Control	S1: 16 S2: 16 S3: 16			48
Identity	Ingroup	S1: 10 S2: 6 S3: 6 S4: 8	S5: 12 S6: 12 S7: 10 S8: 8	S9: 12 S10: 8 S11: 8 S12:10	110
	Outgroup	S1: 6 S2: 10 S3: 10 S4: 8	S5: 4 S6: 4 S7: 6 S8: 8	S9: 4 S10: 8 S11: 8 S12: 6	82

Note: All sessions consist of 16 subjects.

3. Results

3.1. Group identity and tournament entry

Our main research question pertained to analyzing how group identity affects subjects' willingness to compete. We therefore started our analysis by discussing whether and, if so, how the tournament entry in Task 3 is a function of group membership. Having experienced a piece rate and a tournament payment scheme (Task 1 and Task 2, respectively), the subjects were asked to select which of the two they wanted to apply to their Task 3 performance. If we look at the fraction of subjects who in Task 3 selected the tournament as their preferred compensation choice, we notice that while the majority of ingroups prefer the tournament, the majority of outgroups prefer the piece rate. Specifically, 60% of ingroups chose to enter the tournament, whereas the corresponding percentage for outgroups is 40%. We find that the observed gap between ingroups and outgroups in tournament entry is both substantial and statistically significant (a Fisher's exact test yields p=0.009).[5] The average percentage of subjects in the "No Identity" treatment who selected the tournament option is 33.3%.

Table 2 reports the results of two OLS regression models where the dependent variable is a binary variable equal to 1 if a subject selected to enter the tournament and 0 if a

[5] The average frequencies of subjects choosing the tournament are not significantly different between the outgroup and control conditions (Fisher's exact test yields p=0.459). By contrast, the corresponding average frequencies for the comparison between the ingroup and control conditions yield statistically significant differences (Fisher's exact test; p=0.003).

subject selected to be compensated with a piece rate payment scheme.[6] In Column (1), our independent variables comprise two treatment dummies (referred to as the "Ingroup" and the "Outgroup"; therefore, subjects in the control group represent the omitted category). Column (2) is augmented by including a dummy variable (called "Female") as a separate regressor, allowing for gender effects, which is equal to 1 if a subject is female and 0 otherwise. We then split the sample between men and women in Columns (3) and (4), respectively.

Table 2. Piece rate and tournament entry – Regression results

	Dependent variable: Choice of the tournament			
	(1)	(2)	(3)	(4)
	All sample	All sample	Men	Women
Ingroup	0.267***	0.247***	0.122	0.341***
	(0.083)	(0.081)	(0.129)	(0.101)
Outgroup	0.069	0.057	-0.100	0.179*
	(0.087)	(0.085)	(0.138)	(0.105)
Female		-0.175***		
		(0.063)		
Constant	0.333***	0.436***	0.550***	0.179**
	(0.068)	(0.078)	(0.113)	(0.073)
Obs.	240	240	118	122

*Notes: OLS estimates. Robust standard errors are presented in parentheses. Columns (1) and (2) consider the whole sample; whereas, Columns (3) and (4) consider only the sample for men and women, separately and respectively. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

The regression results from Table 2 corroborate our main observation from the statistical analysis. Specifically, we find that ingroups are more likely to enter the tournament compared to subjects in the control condition. The coefficient of the variable "Ingroup" is in fact statistically significant in both models. The size of the effect is 56% of the mean of the dependent variable and half of its standard deviation in Column (1) and 52% of the mean of the dependent variable and half of its standard deviation in Column (2). Yet, this is not the case for outgroups, who are equally likely to choose the tournament compared to subjects in the control condition. In Table A.1 in the Appendix we also show that ingroups are more likely to enter the tournament than outgroups by performing a similar analysis on a sample that only consists of ingroups and outgroups (using outgroups as reference category).

As a complementary remark, we also find that females are less competitive compared to males as has been documented by previous relevant experimental literature (e.g., Niederle and Vesterlund, 2007).[7]

Finally, we discuss how the group membership effect depends on gender. In particular, in Columns (3) and (4) of Table 2 we perform separate regressions by gender. We find that the group membership effect seems to be present only among women. In particular,

[6] In Appendix A, we provide additional regression analyses where we cluster standard errors at the session level (see Tables A.3-A.7). We obtain similar results to the ones reported in the main tables of the paper.

[7] Results are very similar if we use a Probit model instead of the linear probability model shown in Table 2. Similar considerations apply for all the main results reported in Tables 2, 3 and 4 where a Probit model can be an alternative specification. Results from Probit regressions are reported in Tables A.8-A.11 in the Appendix.

the coefficient of the "Ingroup" variable is positive and highly significantly different from zero only for the female sample, suggesting that females in ingroup matchings compete more than females in the control treatment. The difference between the ingroup effect on women and the ingroup effect on men is, however, not significantly different from zero.[8] The coefficient of the "Outgroup" variable reported in Column (4) is also significantly different from zero, although only marginally (p=0.091).

3.2 Group identity and tournament entry: the role of performance and confidence

We then explore whether any treatment differences exist in Task 1 and Task 2 performance using non-parametric analysis. Regarding performance in Task 1, we observe that subjects solve correctly 6.10 additions in the "ingroup" condition and 6.49 in the "outgroup" condition. This difference is not statistically significant (p=0.142). When we make statistical comparisons in relation to the control condition (where subjects solved, on average, 5.71 additions), we also find insignificant differences (p=0.481 for ingroup vs. control conditions; and p=0.101 for outgroup vs. control conditions).

We next turn to Task 2 performance. Again, we find that subjects perform equally well in the "ingroup" as well as in the "outgroup" condition. In particular, we find that subjects solve correctly 8.55 additions in the "ingroup" condition and 8.27 in the "outgroup" condition (p=0.685). When we consider Task 2 performance in the control condition (where subjects solved, on average, 7.69 additions), we find only weak evidence of significant difference at the 10% level with respect to the "ingroup" condition (p=0.076) and statistically insignificant evidence at conventional levels with respect to the "outgroup" condition (p=0.204).

We also perform an additional regression analysis to examine how the observed gap in willingness to compete between ingroups and outgroups changes if we include a performance measure in the regression analysis. Table 3 reports the results of two OLS regression models where the dependent variable is a binary variable equal to 1 if a subject has selected to enter the tournament and 0 if a subject has selected to be compensated with a piece rate payment scheme. In Column (1) our independent variables comprise three dummy variables ("Ingroup", "Outgroup", and "Female," as defined above) as well as the number of correct answers provided by a subject in Task 2, in Column (2) we also add the difference in correct responses given by a subject in Task 1 and in Task 2 among the control variables. We then split the sample between men and women in Columns (3) and (4), respectively.

[8] See Table A.2 in the Appendix.

Table 3. Piece rate and tournament entry when controlling for performance and confidence – Regression results

	Dependent variable: Choice of the tournament						
	(1) All sample	(2) All sample	(3) Men	(4) Women	(5) All sample	(6) Men	(7) Women
Ingroup	0.223***	0.220***	0.077	0.327***	0.180**	0.054	0.271***
	(0.080)	(0.080)	(0.123)	(0.101)	(0.080)	(0.122)	(0.101)
Outgroup	0.040	0.046	-0.136	0.187*	0.030	-0.150	0.170*
	(0.082)	(0.082)	(0.130)	(0.102)	(0.080)	(0.121)	(0.102)
Number of correct answers provided in Task 2	0.033***	0.028***	0.032**	0.025*	0.004	0.009	-0.000
	(0.009)	(0.010)	(0.013)	(0.015)	(0.011)	(0.014)	(0.016)
Difference in correct responses between Task 2 and Task 1		0.016	0.001	0.031	0.036**	0.024	0.048**
		(0.015)	(0.021)	(0.021)	(0.015)	(0.021)	(0.020)
Female	-0.139**	-0.141**			-0.134**		
	(0.063)	(0.063)			(0.060)		
Confidence					0.520***	0.532***	0.501***
					(0.105)	(0.133)	(0.173)
Constant	0.161	0.172*	0.297**	-0.074	-0.216	-0.130	-0.412**
	(0.104)	(0.104)	(0.144)	(0.123)	(0.132)	(0.166)	(0.191)
Obs.	240	240	118	122	239	117	122

*Notes: OLS estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Our earlier findings from Table 2 are robust to the inclusion of these two additional variables as separate regressors. In particular, ingroups are still more likely to choose to compete and enter the tournament than subjects in the control condition. The coefficient of the variable "Ingroup" is in fact significantly different from zero in both models. The size of the effect is 47% of the mean of the dependent variable and half of its standard deviation. The observed differences in competition between ingroups and subjects in the control group change therefore only minimally when we also include among the control variables the two performance measures discussed above.[9] Similar to what we find in Table 2, we also observe that the results seem to be driven by women (see Columns (3) and (4)).

Next, we examine whether our results are robust when we control for confidence. We define "confidence" as the ratio of a subject's beliefs about his own performance in Task 1 divided by his beliefs about the performance of the person he is paired with in the same task.[10] We thus ran an OLS regression where we augmented Column (2) of Table 3 by including "confidence" as an additional independent variable. Our regression results are reported in Table 3, Columns (5)-(7).[11] Column (5) refers to the whole sample, while Columns (6) and (7) refer to men and women, respectively.

Three are the main observations from Columns (5)-(7) of Table 3. First, the coefficient of the variable "confidence" is highly significant at the 1% level and is positive, implying that subjects with higher confidence levels are more likely to choose the tournament compensation scheme. This is the case for both men and women.

Second, we find that ingroups are more willing to compete than subjects in the control condition (as its coefficient is positive and statistically significant at the 5% level), even when we control for confidence.[12] The size of the ingroup treatment effect corresponds to 38% of the mean and of the standard deviation of the dependent variable. Comparing the coefficients of the variable "Ingroup" in Column (2) of Table 3 (coeff. = 0.220) with the corresponding coefficient of "Ingroup" in Column (5) (coeff. = 0.180), we could also observe that after controlling for confidence, however, the size of the coefficient drops substantially (approximately 20%).

Third, the ingroup treatment effect is mainly driven by women in the "Ingroup" treatment who appear to be more prone to compete than women in the control group, even after

[9] In Columns (3) and (4) of Table A.1 in the Appendix we also compare directly ingroups and outgroups and show that, even after controlling for performance in Task 2 and the difference between performance in Task 1 and in Task 2, ingroups are more likely to enter the tournament than outgroups by performing a similar analysis on a sample that only consists of ingroups and outgroups.

[10] This is similar to Wozniak et al. (2014), who instead use the beliefs about the average performance in Task 1 among the participants in the session as the denominator.

[11] Our results are not driven by outliers in the distribution of the confidence variable. Indeed the coefficients of the relevant variables are virtually the same if we eliminate subjects belonging to the top and bottom 5% of the distribution of the confidence level or if we eliminate subjects belonging to the top and bottom 10%. Results are available upon request.

[12] In Column (5) of Table A.1 we show also that ingroups compete more than outgroups even after controlling for confidence.

controlling for confidence. Women in the "Outgroup" treatment also appear to be more prone to compete, but this effect is weaker.

3.3 Heterogeneous Effects: Participation in the Team Building Task

Finally, we present complementary evidence showing that the role played by individuals in their group-building task is related to the treatment effects on their competition decisions.[13] We identify individuals who sent more messages during their group identity task as individuals who presumably have acquired a more active role within their group.

As mentioned, in the "Identity" treatments (i.e., the ingroup and outgroup conditions), subjects were assigned to either the "Klee" group or the "Kandinsky" group (based on their preferences). They were then given 5 minutes to discuss four paintings of the same artists with members of their own group in order to make guesses about which artist made each of the four paintings shown.

We first analyzed whether there were differences in the number of messages sent in Part 1 depending on the treatment assignment. Note that during this part, subjects did not know yet whether they would be assigned to the ingroup or outgroup treatment. We found that those subjects who belonged to the ingroup condition sent, on average, 4.78 messages; those subjects who belonged to the outgroup condition sent, on average, 5.14 messages.[14] A Mann-Whitney test shows that there is no significant difference in the average number of messages exchanged among subjects across the two conditions (p=0.8951) as it would be expected given their random assignment to conditions.

We next look separately at those subjects who sent more or fewer than the average number of messages across both conditions (4.98 messages). We did this by performing two separate regressions, as shown in Table 4. Column 1 (Column 2) reports the result of whether there are any significant differences between ingroups' and outgroups' willingness to compete when considering subjects who sent more (or fewer) messages than the average number of messages.[15]

[13] Note that the goal of this section is absolutely not to discuss any possible causal impact of communication on competition.

[14] We further explore whether the number of messages are gender specific. In particular, we find that, in the "ingroup" condition, women (men) sent 4.90 (5.34) messages; whereas, in the "outgroup" condition, women (men) sent 4.48 (5.10) messages. When we regress the number of messages on gender (controlling for treatment differences), we do not find evidence of significant gender effects (coeff. = -0.532; p=0.390).

[15] Note that from this analysis, we do not include the observations from the control condition, as each subject performed the problem-solving task individually without having the possibility to discuss it with other subjects. Therefore, the omitted category is now represented by the set of subjects in the outgroup treatment. The coefficient of the 'ingroup' variable can be interpreted as the percentage difference in the willingness to compete between ingroups and outgroups holding constant gender, performance in Tasks 1 and 2 and confidence.

Table 4. Tournament entry and participation in the team building – Regression results

	Dependent variable: Choice of the tournament	
	(1)	(2)
	Above-mean	Below-mean
Ingroup	0.272***	0.046
	(0.100)	(0.092)
Female	-0.113	-0.064
	(0.102)	(0.228)
Number of correct answers provided in Task 2	0.011	0.001
	(0.015)	(0.018)
Difference in correct answers between Task 2 and Task 1	0.033	0.032
	(0.024)	(0.023)
Confidence	0.459**	0.642***
	(0.210)	(0.123)
Constant	-0.275	-0.247
	(0.202)	(0.171)
Obs.	92	99

*Notes: OLS estimates. Robust standard errors are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

As shown in Table 4, for those subjects who sent more messages than the average (Column 1), the coefficient of the "Ingroup" variable is highly significant at the 1% level. By contrast, as reported in column 2, by looking at those who sent fewer messages than the average, we observe that the coefficient of the "Ingroup" variable becomes statistically insignificant at conventional levels. This suggests that group membership only has an effect on the willingness to compete of subjects who participate the most in the group activity. In particular, those subjects who in Part 1 sent more messages than the average number of messages sent in Part 2 are more prone to compete with members of their own group than with members of the other group.

3.4 Robustness

One potential concern is that the procedure used to induce group identities may have primed competition among subjects in the "Identity" treatments. Following Chen and Li (2009), our procedure to induce group identities consisted of two components: a process that randomly allocated subjects to groups, and an "identity strengthening" task where subjects could exchange advice and opinions with other group members while solving a problem task.

Although with our data we cannot disentangle a potential priming effect of the task from its group identity effect, we think that the following considerations provide some reassurance in this regard. Chen and Li (2009) did run a treatment where group identities were induced only via random group assignment and without having subjects participate in the "identity-strengthening" task. They find that the "identity-strengthening" treatment significantly increases self-reported group attachment, but has only small effects on behavior. This suggests that the "identity-strengthening'" task is unlikely to produce strong priming effects.

The fact that such task gave subjects the opportunity to communicate, however, may have had an impact on competitiveness not just through the induced group identity but also through the information revealed in the communication stage. Therefore we may still be worried that the positive (and significantly different from zero) coefficient of the variable "Ingroup" could be explained by the within group communication during the team building task: during the communication time subjects within the same group may learn about characteristics of the members of their own group and in particular, what matters for our purposes, they may have a better understanding of their possible performance in the addition task. In order to disregard such alternative mechanism (unrelated to group identity) in Table 5 we sequentially add as control variables in the main specification the beliefs of each subject about his own performance in Tasks 1 and 2 and the beliefs about the performance of his competitor in Tasks 1 and 2 in a non-linear fashion.[16] Across all models reported, we find that the coefficient of the variable "Ingroup" remains similar.

To further rule out an information mechanism, we present evidence that the information acquired during the "identity strengthening" task in Part 1 of the experiment is unrelated to subjects' performance in the addition task. We therefore look at correlations at the individual level between the number of correct answers in the "identity strengthening" task in Part 1 of the experiment and subjects' performance in the addition task in each of the three Tasks. When we perform Pearson's correlation tests for the whole sample we find that the level of the correlation is always fairly low and never significantly different from zero. Correlation coefficients (and p-values within parenthesis) are respectively 0.061 (p=0.399), -0.010 (p=0.889) and 0.033 (p=0.654) if we consider the addition task in Task 1, the addition task in Task 2 and the addition task in Task 3, respectively).[17] Similar results are obtained if we also perform separate Pearson's correlation tests for the samples of ingroup (correlation coefficients (p-values) are -0.018 (p=0.855), -0.017 (p=0.862) and -0.035 (p=0.716) in Task 1, Task 2 and Task 3, respectively) and outgroup (correlation coefficients (p-values) are 0.148 (p=0.184), 0.015 (p=0.895) and 0.127 (p=0.257) in Task 1, Task 2 and Task 3, respectively) matches.

Additionally, we show that the information collected by subjects during the "identity strengthening" task is unlikely to have changed subjects' beliefs about others' performance in the addition task. We start by calculating for each subject the average performance of his/her group members during the "identity strengthening" task. Then we consider only the sample of "Ingroup" matchings, that is the sample of individuals who during Part 1 of the experiment could have potentially collected useful information about their competitors and therefore could have updated their beliefs about their competitor's performance in Part 2. We provide evidence that for each of the three relevant Tasks in Part 2 of the experiment the beliefs about others' performance in the addition task are unrelated to the average performance of the subject's peers in the "identity strengthening" task: the size of the correlation coefficient from the Pearson's correlation test (and p-values within parenthesis) are -0.013 (p=0.896), 0.001

[16] If we include only a linear specification, we obtain similar results (available upon request).

[17] We also perform the same test at the session level and obtain very similar results.

(p=0.989) and -0.012 (p=0.905) if we consider the addition task in Task 1, in Task 2 and in Task 3 respectively.[18]

Table 5. Robustness checks

	Dependent variable: Choice of tournament			
	(1)	(2)	(3)	(4)
Ingroup	0.226***	0.197**	0.198**	0.227***
	(0.080)	(0.080)	(0.080)	(0.078)
Outgroup	0.048	0.063	0.069	0.102
	(0.082)	(0.081)	(0.081)	(0.079)
Female	-0.136**	-0.125**	-0.125**	-0.102*
	(0.063)	(0.060)	(0.061)	(0.060)
Number of correct answers provided in Task 2	0.030	0.021	0.000	0.023
	(0.022)	(0.021)	(0.030)	(0.031)
Difference in correct responses between Task 2 and Task 1	0.015	0.018	0.026	0.011
	(0.024)	(0.023)	(0.023)	(0.024)
Task 1: Beliefs (own), and Beliefs (own) ^2	yes	yes	yes	yes
Task 1: Beliefs (other), and Beliefs (other) ^2	no	yes	yes	yes
Task 2: Beliefs (own), and Beliefs (own) ^2	no	no	yes	yes
Task 2: Beliefs (other), and Beliefs (other) ^2	no	no	no	yes
Constant	0.168	0.399***	0.134	0.089
	(0.107)	(0.124)	(0.184)	(0.183)
Obs.	240	240	240	240

*Notes: OLS estimates. Robust standard errors are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

4. Conclusions

Understanding the behavioral determinants and impact of social relationships on individuals' behavior has captured a lot of interest in the experimental economics literature. In this paper, we conduct an experimental study that analyzes the effects of social distance on a major aspect of individuals' decision making: whether or not to compete. By using established techniques from social psychology, we manipulate the degree of social distance among group members. We then examine whether and, if so, how this affects their willingness to compete by asking them to select between a non-competitive (i.e. piece rate) and a competitive (i.e. tournament) incentive scheme. The findings from our study provide robust evidence that social distance is indeed a significant factor affecting competition choices. More specifically, a lower social distance among individuals results in a higher willingness to compete with each other.

[18] Correlations are computed at the individual level. We also perform the same test at the session level and obtain very similar results.

We also find that a stronger taste for competition against ingroups is observed mostly among those individuals who are willing to send more messages in the team-based activities. We interpret these findings as evidence in favor of the hypothesis that individuals who actively participate in group activities are also more concerned about social comparisons within their group and thus are more likely to choose a competitive compensation scheme. Future research should analyze in more detail the complex relationship between social status within a group and competitive preferences.

Our findings also nicely complement existing experimental studies which show that group identity and pro-sociality are positively related. Individuals with strong group identities typically exhibit more altruistic (see Bernhard et al., 2006) and cooperative behavior (see Eckel and Grossman, 2005) within their own group. We focus on a different aspect of economic behavior: namely, competitiveness. Existing psychological analysis categorizes competition as being at the opposite end of the social value orientations' spectrum (see Murphy, 2011) compared to cooperative motivations. Our experiment provides new evidence showing that group identity generates a surprising effect as far as competition is concerned: individuals make more competitive choices in within group matchings.

In addition, our study gives rise to certain future research avenues. Other factors may play a decisive role in defining the level of competition, which may interact with the level of identification among individuals in a society. For instance, it is likely that the size of the group plays an important role in defining the preferences for competition. The larger the group, the more diluted the comparison effect may be but the larger the pool of individuals on which to establish the primate by choosing to compete. How social distance among group members interacts with the group size and competition choices is an open empirical question that warrants further systematic investigation.

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Online Supplementary Material

Appendix A. Additional analyses

Table A.1. Piece rate and tournament entry –

Additional regression results (outgroup omitted category)

	Dependent variable: Choice of the tournament				
	(1)	(2)	(3)	(4)	(5)
Ingroup	0.198***	0.193***	0.185***	0.179**	0.150**
	(0.072)	(0.072)	(0.070)	(0.071)	(0.067)
Female		-0.127*	-0.084	-0.086	-0.079
		(0.071)	(0.071)	(0.071)	(0.068)
Number of correct answers provided in Task 2			0.033***	0.029***	0.003
			(0.010)	(0.011)	(0.011)
Difference in correct answers between Task 2 and Task 1				0.011	0.034**
				(0.017)	(0.016)
Confidence					0.594***
					(0.101)
Constant	0.402***	0.468***	0.173*	0.186*	-0.289**
	(0.054)	(0.066)	(0.101)	(0.102)	(0.123)
Obs.	192	192	192	192	191

*Notes: OLS estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.2. Piece rate and tournament entry – Regression results (with interaction terms)

	Dependent variable: Choice of the tournament
Ingroup	0.122
	(0.129)
Outgroup	-0.100
	(0.138)
Female	-0.371***
	(0.134)
Female × Ingroup	0.218
	(0.164)
Female × Outgroup	0.279
	(0.173)
Constant	0.550***
	(0.113)
Obs.	240

*Notes: OLS estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.3. Piece rate and tournament entry – Regression results (clustered standard errors)

	Dependent variable: Choice of the tournament	
	(1)	(2)
Ingroup	0.267***	0.247***
	(0.053)	(0.050)
Outgroup	0.069	0.057
	(0.057)	(0.060)
Female		-0.175**
		(0.070)
Constant	0.333***	0.436***
	(0.018)	(0.049)
Obs.	240	240

*Notes: OLS estimates. Robust standard errors (clustered at the session level) are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.4. Piece rate and tournament entry when controlling for performance – Regression results (clustered standard errors)

	Dependent variable: Choice of the tournament	
	(1)	(2)
Ingroup	0.223***	0.220***
	(0.051)	(0.052)
Outgroup	0.040	0.046
	(0.055)	(0.056)
Female	-0.139*	-0.141*
	(0.078)	(0.077)
Number of correct answers provided in Task 2	0.033***	0.028**
	(0.009)	(0.011)
Difference in correct responses between Task 2 and Task 1		0.015
		(0.017)
Constant	0.161*	0.172*
	(0.090)	(0.094)
Obs.	240	240

*Notes: OLS estimates. Robust standard errors (clustered at the session level) are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.5. Confidence and group identity – Regression results (clustered standard errors)

	Dependent variable: Confidence = Beliefs about own performance in Task 1 / Beliefs about other's performance in Task 1
Ingroup	0.106**
	(0.033)
Outgroup	0.061
	(0.042)
Female	-0.068*
	(0.049)
Constant	1.056***
	(0.035)
Obs.	239

*Notes: OLS estimates. Robust standard errors (clustered at the session level) are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.6. The role of confidence in tournament entry – Regression results (clustered standard errors)

	Dependent variable: Choice of the tournament
Ingroup	0.180***
	(0.054)
Outgroup	0.030
	(0.050)
Female	-0.133**
	(0.080)
Number of correct answers provided in Task 2	0.004
	(0.011)
Difference in correct responses between Task 2 and Task 1	0.036**
	(0.016)
Confidence	0.520***
	(0.120)
Constant	-0.216
	(0.126)
Obs.	239

*Notes: OLS estimates. Robust standard errors (clustered at the session level) are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.7. Tournament entry and participation in the team building – Regression results (clustered standard errors)

	Dependent variable: Choice of the tournament	
	(1)	(2)
	Above-mean	Below-mean
Ingroup	0.272**	0.046
	(0.093)	(0.086)
Female	-0.113	-0.064
	(0.091)	(0.141)
Number of correct answers provided in Task 2	0.011	0.001
	(0.016)	(0.014)
Difference in correct answers between Task 2 and Task 1	0.033	0.032
	(0.020)	(0.028)
Confidence	0.459***	0.642***
	(0.127)	(0.120)
Constant	-0.275	-0.247
	(0.214)	(0.210)
Obs.	92	99

*Notes: OLS estimates. Robust standard errors (clustered at the session level) are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.8. Piece rate and tournament entry – Probit regression results

	Dependent variable: Choice of the tournament	
	(1)	(2)
Ingroup	0.261***	0.244***
	(0.080)	(0.078)
Outgroup	0.070	0.061
	(0.089)	(0.087)
Female		-0.172***
		(0.059)
Obs.	240	240

*Notes: Probit estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.9. Piece rate and tournament entry when controlling for performance – Probit regression results

	Dependent variable: Choice of the tournament	
	(1)	(2)
Ingroup	0.217***	0.213***
	(0.077)	(0.076)
Outgroup	0.038	0.044
	(0.084)	(0.083)
Female	-0.133**	-0.136**
	(0.059)	(0.058)
Number of correct answers provided in Task 2	0.036***	0.031***
	(0.010)	(0.011)
Difference in correct responses between Task 2 and Task 1		0.014
		(0.015)
Obs.	240	240

*Notes: Probit estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.10. The role of confidence in tournament entry – Probit regression results

	Dependent variable: Choice of the tournament
Ingroup	0.163**
	(0.075)
Outgroup	0.023
	(0.081)
Female	-0.128**
	(0.056)
Number of correct answers provided in Task 2	0.006
	(0.012)
Difference in correct responses between Task 2 and Task 1	0.036**
	(0.015)
Confidence	0.545***
	(0.118)
Obs.	239

*Notes: Probit estimates. Robust standard errors are presented in parentheses. ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Table A.11. Tournament entry and participation in the team building – Probit regression results

	Dependent variable: Choice of the tournament	
	(1)	(2)
	Above-mean	Below-mean
Ingroup	0.265***	0.011
	(0.085)	(0.086)
Female	-0.103	-0.069
	(0.092)	(0.088)
Number of correct answers provided in Task 2	0.018	0.001
	(0.021)	(0.017)
Difference in correct answers between Task 2 and Task 1	0.027	0.035
	(0.023)	(0.022)
Confidence	0.460**	0.814***
	(0.201)	(0.143)
Obs.	92	99

*Notes: Probit estimates. Robust standard errors are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Analysis of ingroup vs. outgroup differences in Task 4

While our main research questions are concerned with the role of group identity in affecting competition choices, for reasons of completeness, we present an analysis of subjects' behavior in Task 4. As explained in Section 2, in Task 4, one subject in each pair was selected at random and was given the opportunity to decide how he or she and the paired participant would like to be paid for their performance. Within the subsample of the randomly selected subjects, we observe substantially weaker willingness to compete in Task 4 (on average, 23% of them selected the tournament option) than in Task 3 (49% of subjects chose to compete): subjects tend to be less competitive when they know their decision is going to affect the payoffs of the subjects to whom they have been paired. However, we do not find any evidence that the group matching effects documented in the previous section varies between Task 3 and Task 4. In Columns (1) and (2) of Table A.12, we look more closely at whether the determinants of the likelihood of entering the tournament of randomly selected subjects are different across treatments in Task 3 and Task 4 of the experiment. Our findings provide no evidence that the coefficients of the variables "Ingroups" and "Outgroups" are significantly different between Task 3 and Task 4.

Table A.12. Likelihood of entering tournament – Regression results

	Dependent variable: Choice of the tournament in…	
	Task 3	Task 4
	(1)	(2)
Ingroup	0.204*	0.142
	(0.118)	(0.101)
Outgroup	0.131	0.051
	(0.110)	(0.084)
Female	-0.111	-0.111
	(0.087)	(0.079)
Difference in correct answers between Task 1 and Task 2	0.041**	0.005
	(0.017)	(0.015)
Confidence	0.554***	0.112
	(0.137)	(0.137)
Constant	-0.282	0.074
	(0.180)	(0.160)
Obs.	120	120

*Notes: OLS estimates. Robust standard errors are presented in parentheses. * denotes significance at the 10-percent level, ** denotes significance at the 5-percent level, and *** at the 1-percent level.*

Appendix B. Experimental instructions

[Note: These are the written instructions as presented to subjects facing the "Identity" treatments. Amendments to the "No Identity" treatment are given in square brackets.]

PRELIMINARY INSTRUCTIONS

Welcome! You are about to take part in a decision-making experiment. This experiment is run by the "Birmingham Experimental Economics Laboratory" and has been financed by various research institutions. Just for showing up you have already earned £2.50. You can earn additional money depending on the decisions made by you and other participants. It is therefore very important that you read these instructions with care.

It is important that you remain silent and do not look at other people's work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your following of these rules.

We will first jointly go over the instructions. We would like to stress that any choices you make in this experiment are entirely anonymous. Please do not touch the computer or its mouse until you are instructed to do so. If you have any questions at any point, please raise your hand and one of us will come to your desk to answer your question. Please do not ask any question out loud. Thank you.

This experiment consists of two different parts, PART 1 and PART 2. In each part you will be asked to make one or more decisions and will have a chance to earn money. The amount of money you will earn in each part of the experiment will depend on your decisions and may depend on other participants' decisions. The total amount you will earn from the experiment will be the sum of the earnings you make in the two parts of the experiment. Your cash earnings will be paid to you in private at the end of the experiment.

You will be informed about your earnings from the two parts of the experiment only at the end of the session. Therefore, in PART 2, everyone will make their decisions without knowing any outcome from PART 1. The instructions for PART 1 of the experiment are displayed directly on screen. **All participants in this session have identical instructions.** Once everyone in the room has completed PART 1, you will receive new instructions for PART 2.

PART 2

General Instructions

At the beginning of PART 2 the computer will pair you with one other participant in this room. Your pair will belong either to your own group or to the other group from PART 1. Each participant will privately be informed of the group membership of the participant s/he is paired with. **You will remain paired with the same person until the end of the experiment.** You will not learn the identity of the other participant you are paired with during or after today's session.

[NO IDENTITY: At the beginning of PART 2 the computer will pair you with one other participant in this room. **You will remain paired with the same person until the end of the experiment.** You will not learn the identity of the other participant you are paired with during or after today's session.]

The Task

In this experiment you will be performing a task four different times. The task will consist of having you solve 2-digit 4-number addition problems in a 3 minute period.

The addition problems will look similar to the following equation:

12 + 57 + 48 + 52 =

In some cases, you will be asked to make decisions about how you will potentially be paid for your performance.

Only one of the four tasks will determine your payout for the experiment and it will be randomly chosen at the end.

To answer a problem, you will simply type the numbers on the keyboard, then click the "Submit" button and another problem will appear. You can choose not to answer a question by clicking the "Submit" button. The answer will then be recorded as being incorrect and you will be moved to the next problem.

To help with time management, there will be a clock counting down the seconds for the 3 minute duration.

At the end of each task, you will receive new instructions.

Task 1

For Task 1, you will be paid £0.50 for each correctly answered addition problem during the 3 minute time limit. The person you are paired with will be paid £0.50 for each correctly answered addition problem as well.

Notice that your performance during Task 1 will not affect the earnings of the other person in your pair and the performance of the other person in your pair during Task 1 will not affect your earnings.

You will not know how many problems you answered correctly when the 3 minute period has elapsed. At the end of the 3 minutes you will see a screen asking about your performance and the other person's performance in your pair. You will receive extra money for correct estimates. If you estimate your exact performance correctly, you will receive £1. If you estimate the other person in your pair's exact performance correctly, you will receive an additional £1.

After you enter your decisions, please click the "Submit" button. You will then be taken to a screen showing how many problems you answered correctly.

Do not discuss your performance with anyone else at any time. The task will begin once everyone in this session is ready to begin. Once everyone has completed Task 1, you will receive new instructions for Task 2. Do you have any questions at this point?

Task 2

For Task 2, you will be placed in a tournament and compete in the number task against the other person in your pair. The tournament will always have a size of 2, including yourself.
If you win the tournament you will be paid £1 for each correctly answered problem and the person you are paired with will receive £0. If you do not win the tournament then you will receive £0 and the person you are paired with will be paid £1 for each correctly answered problem they provided.
In the event of a tie for first place, the winner of the tournament will be determined randomly. That is, with a 50% chance you will receive the tournament winnings and with a 50% chance the person you are paired with will receive the tournament winnings.
Notice that your performance during Task 2 will affect the earnings of the other person in your pair and the performance of the other person in your pair during Task 2 will affect your earnings.
You will not know how many problems you answered correctly when the 3 minute period has elapsed. At the end of the 3 minutes you will see a screen asking about your performance and the other person's performance in your pair. You will receive extra money for correct estimates. If you estimate your exact performance correctly, you will receive £1. If you estimate the other person in your pair's exact performance correctly, you will receive an additional £1.
After you enter your decisions, please click the "Submit" button. You will then be taken to a screen showing how many problems you answered correctly.
Do not discuss your performance with anyone else at any time. The task will begin once everyone in this session is ready to begin. Once everyone has completed Task 2, you will receive new instructions for Task 3. Do you have any questions at this point?

Task 3

For this Task, you will be given the opportunity to decide how you would like to be paid for your performance. You can either choose the individual piece rate pay or enter in a tournament. You will remain paired with the same person as in Task 2.

If you choose the piece rate pay, you will be paid £0.50 for each correctly answered addition problem during the 3 minute time limit. If you select tournament, you will compete against the Task 2 performance of the other person in your pair. You will be paid at a rate of £1 per correct answer, if you obtain more correct answers than the other person in your pair did in Task 2. If not, you will receive £0. In the event of a tie for first place, with a 50% chance you will receive the tournament winnings and with a 50% chance you will receive £0.

The other person in your pair will be given the opportunity to decide how they would like to be paid for their performance as well. If they choose the piece rate pay, they will be paid £0.50 for each correctly answered addition problem during the 3 minute time limit. If they select tournament, they will compete against your performance in Task 2. They will be paid at a rate of £1 per correct answer, if they obtain more correct answers than you did in Task 2. If not, they will receive £0. In the event of a tie for first place, with a 50% chance the other person in your pair will receive the tournament winnings and with a 50% chance they will receive £0.

Notice that your compensation choice (either piece rate or tournament) and your performance during Task 3 will not affect the earnings of the other person in your pair. The compensation choice (either piece rate or tournament) of the other person in your pair and their performance during Task 3 will not affect your earnings.

You will not know how many problems you answered correctly when the 3 minute period has elapsed. At the end of the 3 minutes you will see a screen asking about your performance and the other person's performance in your pair. You will receive extra money for correct estimates. If you estimate your exact performance correctly, you will receive £1. If you estimate the other person in your pair's exact performance correctly, you will receive an additional £1.

After you enter your decisions, please click the "Submit" button. You will then be taken to a screen showing how many problems you answered correctly.

Do not discuss your performance with anyone else at any time. The task will begin once everyone in this session is ready to begin. Once everyone has completed Task 3, you will receive new instructions for Task 4. Do you have any questions at this point?

Task 4

For this Task, one participant from each pair will be selected at random and will be given the opportunity to decide how they and their paired participant would like to be paid for their performance. The randomly selected participant can either choose the individual piece rate pay or enter in a tournament. You will remain paired with the same person as in Task 2.

If the randomly selected participant chooses the piece rate pay, each participant in a pair will be paid £0.50 for each correctly answered addition problem during the 3 minute time limit.

If the randomly selected participant chooses to enter a tournament, both participants will be placed in a tournament. Your performance in this task will be compared with the other person's performance in your pair from Task 2. The other person's performance in this task will be compared with your performance from Task 2.

You will be paid at a rate of £1 per correct answer, if you obtain more correct answers that the other person in your pair did in Task 2. If not, you will receive £0. In the event of a tie for first place, with a 50% chance you will receive the tournament winnings and with a 50% chance you will receive £0.

The other person in your pair will be paid at a rate of £1 per correct answer, if they obtain more correct answers than you did in Task 2. If not, they will receive £0. In the event of a tie for first place, with a 50% chance the other person in your pair will receive the tournament winnings and with a 50% chance they will receive £0.

Notice that your performance during Task 4 will not affect the earnings of the other person in your pair and the performance of the other person in your pair during Task 4 will not affect your earnings. The randomly selected participant's compensation choice (either piece rate or tournament) may affect the earnings of the other person in your pair.

You will not know how many problems you answered correctly when the 3 minute period has elapsed. At the end of the 3 minutes you will see a screen asking about your performance and the other person's performance in your pair. You will receive extra money for correct estimates. If you estimate your exact performance correctly, you will receive £1. If you estimate the other person in your pair's exact performance correctly, you will receive an additional £1.

After you enter your decisions, please click the "Submit" button. You will then be taken to a screen showing how many problems you answered correctly.

Do not discuss your performance with anyone else at any time. The task will begin once everyone in this session is ready to begin. Once everyone has completed Task 4, the experiment will be over. Do you have any questions at this point?