CBESS Discussion Paper 15-09

Identity and Group Conflict*

by Subhasish M. Chowdhury*
Joo Young Jeon **
Abhijit Ramalingam***

*CBESS, CCP and School of Economics, University of East Anglia
** CBESS, CCP and School of Economics, University of East Anglia
*** CBESS and School of Economics, University of East Anglia

Abstract
We experimentally investigate the effects of real and minimal identities on group conflict. In turn we provide a direct test of the hypotheses coined by Amartya Sen that the salience of a real identity escalates conflict but that of a mere classification would not do so. In a baseline treatment two groups – one of East Asians, and the other of Caucasians – engage in a group contest, but the information on racial composition is not revealed. In the minimal identity treatment each group is arbitrarily given a different color code, whereas in the real identity treatment the race information is revealed. Supporting Sen's hypotheses, we find that compared to the baseline, free-riding declines and conflict effort increases in the real identity treatment but not in the minimal identity treatment. Moreover, this occurs due to an increase in efforts in the real identity treatment by females in both racial groups, but not by a particular racial group.

JEL classification codes
C91, C92, D03, D74, J15, J16.

Keywords
Conflict, Identity, Race, Gender.

Centre for Behavioural and Experimental Social Science
University of East Anglia
Norwich Research Park
Norwich NR4 7TJ
United Kingdom
www.uea.ac.uk/cbess

Identity and Group Conflict*

Subhasish M. Chowdhury [a], Joo Young Jeon [a] and Abhijit Ramalingam [b]

[a] School of Economics, Centre for Behavioural and Experimental Social Science, and Centre for Competition Policy, University of East Anglia, Norwich NR4 7TJ, UK.

[b] School of Economics, and Centre for Behavioural and Experimental Social Science, University of East Anglia, Norwich NR4 7TJ, UK.

This version: May 25, 2015

Abstract

We experimentally investigate the effects of real and minimal identities on group conflict. In turn we provide a direct test of the hypotheses coined by Amartya Sen that the salience of a real identity escalates conflict but that of a mere classification would not do so. In a baseline treatment two groups – one of East Asians, and the other of Caucasians – engage in a group contest, but the information on racial composition is not revealed. In the minimal identity treatment each group is arbitrarily given a different color code, whereas in the real identity treatment the race information is revealed. Supporting Sen's hypotheses, we find that compared to the baseline, free-riding declines and conflict effort increases in the real identity treatment but not in the minimal identity treatment. Moreover, this occurs due to an increase in efforts in the real identity treatment by females in both racial groups, but not by a particular racial group.

JEL Classifications: C91, C92, D03, D74, J15, J16
Keywords: Group Conflict, Identity, Race, Gender

* Corresponding author: Subhasish M. Chowdhury (s.modak-chowdhury@uea.ac.uk)

This research was partially supported by a grant from the Centre for Behavioral and Experimental Social Science at the University of East Anglia. We thank Carmen Bevia, Yan Chen, Werner Güth, Shaun Hargreaves-Heap, Dongryul Lee, Roman Sheremeta, the seminar participants at the University of East Anglia, Kyung Hee University, and the participants at the 1st London Experimental Workshop, 6th Indian Experimental Economics Conference in Kolkata, Korean Econometric Society Annual Conference in Yang Yang, ESA World Congress in Zurich, Stockholm School of Economics workshop on 'Conflict: Theory and Evidence', Young Researchers Workshop in Contests and Tournaments in Barcelona, the Autumn workshop at the Max Planck Institute - Jena for useful comments; and Zoe Bett, Emanuela Lezzi, Ailko van der Veen and Jiwei Zheng for research assistances. Any remaining errors are our own.

1. Introduction

Conflict between groups is omnipresent. Group members expend costly resources in such conflicts in order to gain material benefits, or to achieve social recognition, or to avoid a loss. Examples include racial conflict, conflict relating to language, religion or culture, political competition, collective rent-seeking, to name only a few. Such group conflicts are costly for the individual group members and often costly also for the society.[1] It is hence not surprising that researchers across disciplines continue to study the reasons leading to such a conflict, and possible ways to eradicate them. A component that is often seen to be common in initiation and escalation of various group conflict is group identity. In this paper we consider that specific aspect and investigate the effects that the salience of specific types of identities have in group conflict. We consider a real identity and a minimal identity in defining groups, and compare their effects on conflict relative to a situation in which no identity is made salient.

In his seminal work Sen (2007, Ch. 2) introduces the relationship between the salience of an identity and conflict. He hypothesizes that in certain situations when a particular identity (e.g., religion or race) becomes salient, it can then engender conflict and can even lead to its escalation. Further differentiating 'identity' from 'classification', Sen (2007, p. 26) argues that a classification is a mere categorization and that a person's race is his identity, but his shoe-size can only be a classification (often interpreted as a minimal identity). As a result, when an identity or a classification determines the concept of a group, the salience of the (real) identity increases conflict but that of a minimal identity (classification) does not. In this study we run a laboratory experiment to investigate the relationship between identities and conflict. We ask the following questions: Is there empirical support for Sen's hypotheses about the effects of identity on conflict? Does real identity initiate and instigate conflict more than a mere classification (minimal identity)? Is the effect of identity symmetric across agents?

We run a group contest experiment with a group specific public good prize. In this game group members expend individually costly effort for their group and the sum of all group members' efforts influences the probability of winning the prize. Irrespective of the outcome of the contest, all players lose their efforts – resembling conflict situations in the field. Furthermore, irrespective of the individual effort expended, every member of the winning

[1] The earliest documented group conflict resulting in fatalities was between 14,000 BC and 12,000 BC in Nubia (present-day Sudan) in which at least 59 people died (Kelly, 2005). Almost 15,000 years later, in the last century, the conflict between the Hutu and the Tutsi populations in Rwanda, Burundi and Uganda claimed more than a million lives. Even when fatalities are not involved, group conflicts often create costs such as long run tension and hatred, intentional destruction of properties, expense of resources on unproductive defense activities etc.

group wins the prize – again, replicating various field situations. We rely on the theory by Katz et al. (1990) and the experimental procedures as in Abbink et al. (2010) for the basic structure of the experiment, and introduce the concepts of identity and classification within this structure. We employ three treatments. In the baseline, two three-player groups – one consisting of East Asians, and the other consisting of Whites (Caucasians) – engage in the group contest, but no information about the group composition is revealed. In the treatment capturing classification or minimal identity the same experiment is run, but each group is arbitrarily given a different color code. In the real identity treatment the racial compositions of the groups are revealed.

The relationship between identity and several other behavioral outcomes is well examined in the literature. Sherif et al. (1961), Turner (1978), and Tajfel & Turner (1979) among others investigate this broad topic in Psychology. Sen (1985) himself studies the effects of identity on coordination, but exploring the effects on identity in economics literature starts with the seminal study by Akerlof & Kranton (2000). Since then, a series of follow-up studies have emerged.[2] Chen & Li (2009) stand out by employing a minimal identity paradigm similar to the idea of 'classification' as explained in Sen (2007).

Existing field studies or laboratory experiments in social psychology and in economics have shown that an introduction of an identity elicits in-group out-group discrimination.[3] It has further been shown that group identity can be formed in terms of inequality (Esteban et al., 2012a, b), or communication (Cason et al., 2012) and that such a group identity can be exploited to manage diversity (Eckel & Grossman, 2005) or to invoke stereotypes (Shih et al., 1999). To explore identity related conflicts, the existing experimental studies employ games such as prisoner's dilemma (Bornstein, 1992) or dictator games (Kranton et al., 2013) that examine conflict of interests in agents, but are not designed to replicate group conflict situations in which group members expend costly resources to gain something. Thus, although the hypotheses coined in Sen (2007) are often discussed in various studies, to our knowledge, there exists no research testing these issues. In this study we investigate, in a controlled setting, the effects of the salience of a particular identity on 'Conflict' and provide with direct empirical tests.

We find that in all the treatments subjects expend significantly more effort than what is predicted by Nash equilibrium. However, efforts are significantly higher in the real identity

[2] For example, Robinson (2001), Akerlof & Kranton (2002, 2005, 2008, 2010), and Basu (2005) analyze the theoretical background and Fershtman & Gneezy (2001), Goette et al. (2006), Deck et al. (2009), Chen & Li (2009), Hargreaves Heap & Zizzo (2009), Chen & Chen (2011), Kranton et al. (2013), Chen et al. (2014), Stoddard and Leibbrandt (2014) pursue field and experimental studies in related areas.

[3] See, e.g., Tajfel & Turner (1979) from social psychology; and Ahmed (2007), Benjamin et al. (2010), Deck et al. (2009), Hargreaves Heap and Zizzo (2009), Klor and Shayo (2010), Cason et al. (2012) from economics.

(but not in the minimal identity) treatment than in the baseline treatment. Furthermore, these results are obtained both due to a reduction in free-riding (expending zero effort), and an increase in efforts in the real identity treatment. None of the racial groups as a whole behaves differently from the other. However, regardless of race, females expend significantly higher effort than males, and the difference widens when the real identity is revealed.

The results make a two-fold contribution. They support Sen (2007)'s argument that a salient real identity initiates (in terms of the reduction of free-riding) and escalates (in terms of higher positive effort) conflict. Moreover, a minimal identity (classification) does not increase conflict significantly – further supporting his hypothesis. Investigating gender differences, we conclude that the effect of identity, at least in this set-up, is asymmetric across gender. This study also contributes to the literature on identity itself by incorporating and analyzing conflict, and show how various types of identity affect conflict behavior.

The rest of the paper is organized as follows. Section 2 provides a theoretical background of the conflict model we use. Section 3 explains the design of the experiment. Section 4 presents the results and Section 5 concludes.

2. Theoretical background

We study a group contest in which multiple groups compete for a prize. Group members expend costly effort that constitutes the 'group effort'. The group effort determines the group's likelihood of winning the prize. In particular, a group's probability of winning the prize is equal to the group's effort divided by the total group effort of all competing groups.

Let the number of groups competing for the prize be n (≥ 2) and the number of (risk-neutral) group members in each group be m (≥ 2). Each player i in each group g ($= 1, 2, \dots n$) has the same endowment, $e > 0$, from which he/she can expend effort $x_{gi} \in [0, e]$. Any effort expended by a member of group g increases the likelihood that group g will win the prize. Any endowment not expended remains with player *i*.

The group effort of group g, X_g, is the sum of the effort expended by all members of group g, i.e., $X_g = \sum_i x_{gi}$. Let the total group effort by all groups competing for the prize, i.e., by all nm players, be $X = \sum_g X_g$. The probability with which group g wins the prize, p_g, is determined by a lottery contest success function (Tullock, 1980) and is given by

$$p_g = \begin{cases} X_g/X & \text{if } X \neq 0 \\ 1/n & \text{otherwise} \end{cases}.$$

The prize is a group-specific public good prize, i.e., each member of the winning group earns the prize regardless of their level of effort expended. Let the common prize value be $V > 0$. The losing groups receive a prize of 0. The expected payoff of player i in group g is

$$\pi_{gi} = p_g V + (e - x_{gi}).$$

where the first term is the expected value of the prize and the second term is the part of the endowment that player i kept with them. From Katz et al. (1990) it can be shown that there exist multiple equilibria and individual equilibrium efforts cannot be characterized. However, in any equilibrium, the group effort for each group is

$$X^* = V(n-1)/n^2.$$

In a finitely repeated game, the equilibrium prediction is that each group will expend X^* in each repetition of the stage game.

3. Experimental Design and Hypotheses

3.1 Design and Procedures

The experiment consists of a finitely repeated contest between two groups of three group-members each, and the core design is very similar to the design implemented in Abbink et al. (2010). In the experiment, each member of each group is endowed with 60 Experimental Currency Units (ECUs) which they can allocate to a group account or to an individual account. Once all individuals make a decision, the lottery contest success function is used to determine the winner. Each member of the winning group is awarded 40 ECUs. Subjects are then informed of the total ECUs in their group account, the total ECUs in the other group's group account, which group has won the prize, and their individual earnings in ECUs from that period. 3-player groups and aggregated information feedback ensure no in-group reputation effect.

This contest is repeated for 20 periods. Subjects cannot use past earnings in future periods and receive a fresh endowment of 60 ECUs in every period. At the end of the session, each subject is shown their individual earnings in ECUs in each of the 20 periods. They are then paid for the same 5 periods chosen randomly at the rate of 25 ECUs to 1 GBP. In terms of the theoretical model presented above, the parameters of the contest in our experiment are $n = 2, m = 3, e = 60$ and $V = 40$. Hence, the equilibrium prediction in our experiment is that group effort for each group is 10 ECUs, i.e., $X^* = 10$, in each of the 20 periods.[4]

[4] Note that the endowment given to the subjects are higher than the Nash equilibrium amount, and the prize value. As shown by Baik et al. (2014), endowment may have an effect on bid level. But, since the endowment is the same across treatments and we are interested in treatment effects, this does not affect our analysis.

In all treatments 9 subjects from each of the two racial cohorts, East Asians and Whites (Caucasians), participate in a session. Within each cohort, subjects are randomly and anonymously assigned to groups of three. Two groups – one from each racial cohort – are then randomly and anonymously paired. Thus, all three members of a group are from the same racial cohort and the two competing groups are composed of subjects from the two different racial cohorts.[5] The matching within and between groups remains fixed throughout a session.

We employ three between-subject treatments and four sessions in each treatment. In the *Baseline* (no identity) treatment no information about the group composition is revealed. In the instructions we use phrases such as 'your group' and the 'group you are matched with'. In the *Color* ('classification' or 'minimal identity') treatment the same experiment is run, but each group is arbitrarily given a different color code – either Green or Blue.[6] The instructions in this treatment mention, at the beginning, that everyone in their group is of the same color code and that everyone in the group they are matched with is of the other color code. All the remaining parts of the instruction remain the same as in the *Baseline*. In the *Race* (real identity) treatment the racial compositions of the groups are revealed. The subjects are informed at the beginning of the instructions that everyone in their group is of the same race and that everyone in the group they are matched with is of the other race. The remaining parts of the instruction stay the same as in the *Baseline*. The instructions are available in the Appendix.

The experiment involved a total of 216 student subjects from the University of East Anglia, UK recruited through the online recruiting system ORSEE (Greiner, 2004) that enabled the selection of participants according to their reported race.[7] A subject could participate in only one session. No subject had prior experience in participating in a contest or in an identity experiment. Sessions were computerized using z-Tree (Fischbacher, 2007). Each session consisted of 9 East Asian and 9 White subjects, and ran by an East-Asian and a White research

[5] Since there are various real identities that can be considered as the focus of conflict, it is important to narrow down on a specific identity. Young (1982) argues that: "(r)ecent history suggests that the major pattern of conflict cohere around two organizing principles: class and ethnicity". Indeed existing studies have shown that race or ethnicity remains one of the most important factors in various social conflicts across the globe (e.g. Esteban & Ray, 2012a, b; Reynal-Querol, 2002). Hence, in this paper we consider race as the real identity. Moreover, in this university there are similar proportions of Caucasian and East Asian students, who together constitute around 90% of the student population. Hence, it is convenient to implement this identity in the laboratory without raising suspicion – as almost all other experiments have similar racial compositions in subject cohorts.

[6] In two sessions, the East Asians are called the 'Green' groups while Whites are called the 'Blue' groups. To check if the artificial color labels have an impact on race-specific behavior, the assigned color labels are reversed in two further sessions (the Green-Blue and the Blue-Green sessions).

[7] The East Asian subject pool consists of individuals from China, Hong Kong, Macau, Taiwan etc. whereas the White subject pool consists of individuals from Canada, France, Germany, UK, USA etc. We also ensured that ethnically the subjects are indeed White or East Asian (e.g., British students of Indian origin are excluded). We recruited more subjects than required, and randomly chose 9 subjects from each race at the start of a session. The remaining recruited subjects received a turn-away fee.

assistant. At the beginning of each session, instructions were handed out and were read aloud by an experimenter. Subjects were required to answer a questionnaire before the experiment began. Each session lasted ~ 1 hour and average earning per subject was ~16 GBP.

3.2 Hypotheses

Given the design and the discussion above, we construct the following hypotheses about behavior in the experiment. We test Hypothesis 1 and Hypothesis 2 both at the group level as well as the individual level, and Hypothesis 3 at the individual level.

Hypothesis 1 (Sen, 2007: Identity). Effort expended in the Race treatment is significantly higher than the effort expended in the Baseline treatment.

Hypothesis 2 (Sen, 2007: Classification). Effort expended in the Color treatment is not significantly different from the effort expended in the Baseline treatment.

Hypothesis 3 (Homogeneous effect). Change in individual effort expended between treatments is the same across racial groups.

4. Results

Each treatment has 72 subjects, but the subjects receive feedback on group efforts of their group and of the competing group after every period. Hence, each competing pair of groups (consisting of 6 subjects) forms an independent observation. We first test if a particular color has an effect on behavior in the Color treatment. We run a random-effects regression of individual efforts on a constant, one-period lagged own effort, one-period lagged effort of the rival group, a time trend and a color dummy and found no significant differences in behavior between these two color labels (p-value for the dummy = 0.372). Hence, in all our subsequent analyses, we pool data from the *Green-Blue* and the *Blue-Green* sessions under the Color treatment. There are thus 12 independent observations in each treatment.

4.1 Group-Level Analysis

We first investigate if there are differences between the treatments at the group level before moving to an individual level analysis of the reasons for any treatment differences. Table 1 presents summary statistics of the mean (averaged over all 20 periods) per-period group effort by competing pairs of groups.

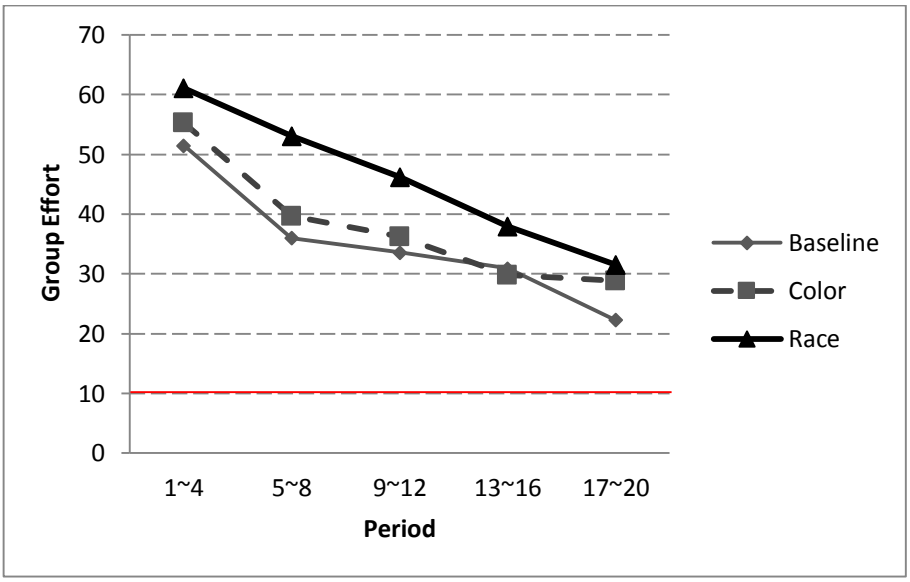
Table 1. Mean (St. Dev.) of Competing group pairs' Efforts

Treatment	Baseline	Color	Race
Average	34.869	38.006	46.008
Standard Dev.	(13.161)	(9.607)	(17.401)

One can immediately observe that the average effort in any treatment is higher than the effort predicted by the Nash equilibrium (10). Wilcoxon signed-rank tests confirm this result (p-value < 0.000 for all treatments). This, however, only reiterates the robust phenomenon that overdissipation, i.e., expending more effort than the Nash prediction, occurs in this type of contest experiments (Dechenaux et al., 2012). A more interesting observation arises when we compare the group efforts across treatments. Mean group efforts over all the 20 periods shows a monotonic increase from Baseline to Color to Race.[8]

To investigate if the patterns observed above are driven by behavior only in particular periods or in particular effort range, we plot the mean group efforts over periods (Figure 1) and over the effort range (Figure 2). For all treatments, overall efforts decrease over time, but still stay over the equilibrium effort. Efforts are also distributed over the whole effort range.[9]

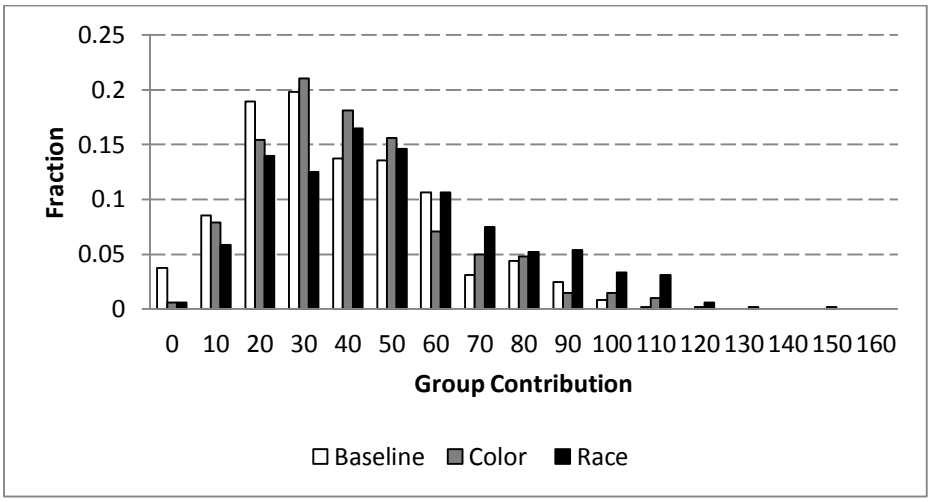
Figure 1. Mean group effort over time by treatment



[8] We also test whether average group efforts between racial groups are different within treatment. We calculate differences of group efforts between pairing groups and run Wilcoxon signed rank test. For all the treatments, there is no significant difference of bids between White and East Asian groups.

[9] The mean group efforts over period for each racial group show similar pattern as in Figure 1. So do the distributions of groups efforts for each racial group with Figure 2. Hence, we do not plot those figures here.

Figure 2. Distribution of group effort by treatment



The levels of mean group efforts and their trajectory as shown in Figure 1 reinstate that group efforts, while decreasing over time, are consistently higher than the Nash prediction (=10) in all treatments. Moreover, efforts in the Race treatment are *always* higher than the efforts in the Baseline or in the Color treatments. The comparison between the Color and the Baseline treatments, however, is not that obvious. Efforts in the Color treatment remain higher than, although very close to, the efforts of the Baseline treatment.

Figure 2 provides further indication that the effort levels are higher in the Race treatment. The figure shows that, while the efforts are distributed over the whole range, the distribution of group efforts is shifted to the right in the Race treatment relative to the Baseline or the Color treatment; the observed fraction of low efforts is greater in the Baseline treatments while that of higher efforts is greater in the Race treatment. We next test whether the differences noted above are statistically significant with a Kruskal-Wallis test. It confirms that the efforts distributions are different in different treatments (p-value < 0.001).

To further examine treatment differences and direction of the difference, we run a panel random effects regression that uses multiple observations for each group, one for each period. The dependent variable is group g's effort in period t, and the independent variables are two treatment dummies for Race and Color. We also control for the group's own effort in the previous period, the other group's effort in the previous period and a time trend. We estimate robust standard errors clustered on independent competing pairs. The equation below presents the regression estimates, ***, **, and * respectively indicate significance at the 1%, 5% and 10% level. Figures in parentheses are robust standard errors.

$$\text{Group effort}_{gt} = \underset{(2.340)}{10.811^{***}} + \underset{(1.646)}{3.088^{*}}\ \text{Race} + \underset{(1.311)}{0.747}\ \text{Color} + \underset{(0.058)}{0.591^{***}}\ \text{Group effort}_{g,t-1} + \underset{(0.051)}{0.156^{***}}\ \text{Rival's Effort}_{t-1} - \underset{(0.085)}{0.332^{***}}\ \text{Period}$$

No. of obs. = 1368. No. of groups = 72. No. of competing group-pairs (clusters) = 36.

This regression confirms the observations above. The dummy for the Race treatment is positive and significant (p-value = 0.061) but the dummy for the Color treatment is not (p-value = 0.569); groups expend about 3.1 ECUs more per period in the Race treatment than in the Baseline treatment.[10] This gives our first result.

Result 1: *Group efforts are higher in the Race treatment than in the Baseline treatment. But there is no difference between group efforts in the Color and in the Baseline treatment*.

Since efforts are contributed in the contest in order to overcome the opponent's efforts and to win the prize, the efforts can be used as a measure of the level of conflict. Result 1 thus confirms Hypothesis 1 and Hypothesis 2 at a group level. First, introducing a real identity increased the level of conflict in a group. Second, introducing a minimal identity (classification) did not affect the level of conflict significantly.

It can also be observed that group efforts are positively correlated to lagged own and opponent group efforts, and are negatively correlated to time trend. These again confirm earlier findings as in Abbink et al. (2010) that group efforts decline over time and that efforts are increasing in their own past efforts and in those of the competing ones.

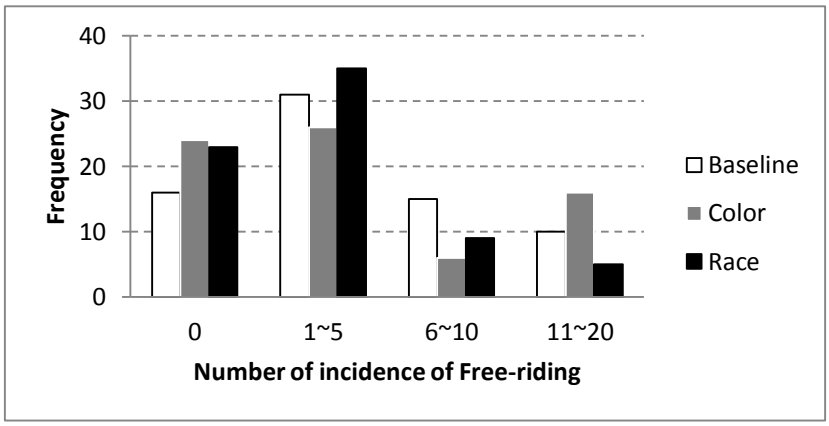
4.2 Individual-Level Analysis

We next investigate the reasons for higher efforts in the Race treatment. To do so, one would have to analyze the data at an individual level. Note that, due to the public good nature of the prize, it is possible for the individual subjects to free-ride completely on group-members by expending zero effort, or partially by expending low effort. So, the increase in effort in the Race treatment can occur due to two reasons: either the subjects are free-riding less under the Race treatment, or they are expending more efforts. To investigate this, and to test whether Result 1 is robust across racial groups (Hypothesis 3) we analyze behavior at the individual level – for each of the racial groups.

[10] Pairwise Mann-Whitney tests at the group-pair level also show a significant difference at the 10% level between the Race and the Baseline treatments (p-value = 0.083), but no difference between the Color and the Baseline treatments (p-value = 0.326).

We first study the extent of free-riding (expending zero efforts) by individual players in each treatment. Note that, each subject can free-ride once in a period, i.e., between 0 and 20 times in the whole experiment of 20 periods. Figure 3 summarizes the distribution of the number of instances of free-riding by subjects in each treatment.[11] The horizontal axis in Figure 3 shows the number of times a subject can possibly free-ride, and the vertical axis shows the corresponding frequency (how many times that number of free-riding occurred). The black and grey bars, representing color and race, are higher than white bars, representing baseline, for the category with no (zero) free-riding. Hence, inducing either a real identity or a classification reduces the number of the instances of absolute free-riding.

Figure 3. Incidence of free-riding by treatment



Further, it also seems that *severe free-riding*, defined as free-riding for over half of the possible 20 periods, is greatly reduced in the Race treatment. To test if these observations are statistically significant, we estimate an *individual-level* ordered probit regression where subjects are categorized into 4 types in terms of the number of incidences of free-riding; category 0 (zero free-riding), category 1-5, category 6-10 and category 11-20 (severe free-riding). The dependent variable is an ordered categorical variable capturing this feature. The independent variables are treatment dummies, and controls for race and gender. The regression is shown below, and the marginal effects are provided in Table 3.

$$\text{Free-riding}_i = \underset{(0.195)}{-0.348^{*}\,\text{Race}_i} \underset{(0.162)}{-0.126\,\text{Color}_i} \underset{(0.157)}{-0.041\,\text{East Asian}_i} \underset{(0.185)}{-0.201\,\text{Female}_i}$$

No. of obs. = 216. Pseudo R-Sq = 0.0104. Figures in parentheses are standard errors.

[11] The complete distribution of the incidences of free-ride across treatments show similar pattern. We also plot distributions of numbers of instances of free-riding by racial group and find a similar pattern with Figure 3. Those figures are not reported, but are available upon request.

Table 3. Marginal effects of identity treatments per category

# Free-ride	0	1-5	6-10	11-20
Color	0.040	0.004	-0.014	-0.031
	(0.051)	(0.007)	(0.018)	(0.040)
Race	0.119*	-0.004	-0.039*	-0.076*
	(0.068)	(0.014)	(0.023)	(0.043)
E. Asian	0.014	-0.000	-0.005	-0.009
	(0.053)	(0.001)	(0.018)	(0.035)
Female	0.068	-0.001	-0.022	-0.045
	(0.062)	(0.006)	(0.019)	(0.043)
# of Obs.	216	216	216	216

***, **, and * respectively indicate significance at the 1%, 5% and 10% level. Figures in parentheses are robust standard errors.

Note that the coefficient of Race for category 0 is positive and significant whereas for category 11-20 it is negative and significant. This implies that the introduction of a real identity significantly increases conflict participation (increases the likelihood of being in the 0 free-riding category), as well as reduces severe free-riding (decreases the likelihood of being in the 11-20 category). This is not the case for the Color treatment. The table also shows that the decline in severe free-riding in the Race treatment is not driven by any particular racial or gender group overall; the East Asian and Female dummies are not significant. Later, in Table 5 and Table 6, we consider the effects of gender under particular racial groups.

The above results suggest that participation in conflict, in terms of reduction of free-riding, increases with real identity. This is our second main finding, further supporting Hypotheses 1 and 2, and is summarized in Result 2.

Result 2: *The incidence of severe free-riding is lower in the Race treatment than in the Baseline treatment. Color treatment does not show such difference.*

We now test to see if there is an increase in group effort through the second channel, i.e., increase in individual efforts, as well. In Table 4 we present means and standard deviations of individual efforts per period for East Asian and White subjects.

Table 4. Mean (St. Dev.) Individual Efforts per period separated by race

	Baseline	**Color**	**Race**
White	11.539	11.510	14.788
	(11.454)	(11.466)	(12.269)

East Asian	11.707	13.828	15.885
	(11.367)	(13.443)	(13.592)
All	11.623	12.669	15.336
	(11.407)	(12.543)	(12.954)

Table 4 shows that individual efforts are higher in the Race treatment than in the Baseline (15.336 ECUs vs. 11.669 ECUs). Overall, the effort in the Color treatment is not much higher (12.669 ECUs) than in the Baseline. Since individual effort decisions are not independent, it is not possible to run non-parametric tests aimed at race categories. Hence, we once again employ panel regressions to test if the overall treatment differences seen in Table 4 are statistically significant. As a first step, Table 5 presents the estimates of four individual random effects regressions of efforts on treatment dummies and controls. Whereas the first column includes the data from all the treatments, the next three columns consider treatments pairwise. The additional independent variables are lagged effort of the rival group, the individual's one-period lagged effort, a time trend (period), and race and gender dummies.

Table 5. Determinants of individual efforts

Dep variable: $Effort_{i,t}$	**All**	**Baseline + Color**	**Baseline + Race**	**Color + Race**
Color	0.321	0.343		
	(0.473)	(0.548)		
Race	1.156**		1.030**	0.813
	(0.569)		(0.508)	(0.517)
Lag rival effort	0.056**	0.042*	0.082***	0.046***
	(0.016)	(0.024)	(0.012)	(0.018)
Lag own effort	0.547***	0.546***	0.502***	0.579***
	(0.040)	(0.046)	(0.047)	(0.047)
Period	-0.128***	-0.124***	-0.128***	-0.135***
	(0.027)	(0.039)	(0.027)	(0.033)
E. Asian	0.485	0.454	0.325	0.657
	(0.476)	(0.581)	(0.508)	(0.637)
Female	0.998**	0.450	0.879*	1.558***
	(0.468)	(0.605)	(0.532)	(0.553)
Constant	3.397***	4.176***	3.143***	3.415***
	(0.759)	(0.791)	(0.823)	(0.962)
# of Obs.	4,104	2,736	2,736	2,736
# of subjects	216	144	144	144

***, **, and * respectively indicate significance at the 1%, 5% and 10% level. Figures in parentheses are robust standard errors.

The first column in Table 5 shows that individual efforts are indeed higher in the Race treatment than in the Baseline; the treatment dummy is positive and significant at the 5% level. Subjects expend 1.16 ECUs more effort per period in the Race treatment than in the Baseline treatment. However, as observed earlier, although the efforts in the Color treatment are higher than the Baseline, it is not statistically significant. In the next three columns we run the same regression but with pair-wise treatment data – between the Baseline and Race, and between Baseline and Color treatments. As can be seen from the table, the outcomes remain the same.[12] These findings are summarized in the following result.

Result 3: *Individual* effort*s are higher in the Race treatment than in the Baseline treatment, but they are not higher in the Color treatment compared to the Baseline treatment.*

To summarize, Results 1, 2, and 3 provide formal support for Hypotheses 1 and Hypotheses 2 at a group as well as at an individual level. We now test Hypothesis 3, i.e., whether these results are robust across racial and other demographic groups.

Table 4 shows that the increase in efforts in the Race treatment is not very different between the two racial groups. Whereas East Asians increase efforts marginally for both types of identities, Whites increase efforts only in the real identity treatment but not in the minimal identity. The regressions reported in Table 5 suggest no significant difference in effort levels between racial groups. This matches with our earlier finding that average group efforts within treatment between the East Asian and the White group are not different. Note, however, that the regressions in Table 5 do not test for differences in effort levels between genders or racial groups in the different treatments. We investigate this issue below.

Although the East Asian indicator is not significant, the coefficients for the Female indicator in Table 5 are significant for all regressions except the second one. But the regressions in Table 5 do not specifically test for differences in effort levels between genders or racial groups in the different treatments. Therefore, we now investigate whether the effects of identities are heterogeneous across genders. To do so, in Table 6 we first present mean and standard deviation of individual bids by male and female in all treatments.

[12] Although it is not of interest to the research question, note from the last column of Table 5 that the effort level is not significantly different at conventional level (p-value = 0.119) when we compare the Race and the Color treatments. A casual observation indicates that this might be due to the fact that females expend significantly more effort in Race treatment but males do not, and that dilutes the overall effects of the Race treatment.

Table 6. Mean (St. Dev.) Individual Efforts per period separated by gender

	Baseline	**Color**	**Race**
Male	11.523	11.313	12.407
	(7.366)	(7.144)	(7.225)
Female	11.718	14.184	18.265
	(6.668)	(10.331)	(9.343)
All	11.623	12.669	15.336
	(6.967)	(8.848)	(8.801)

The table suggests that higher efforts in the Race treatment are driven mainly by higher efforts by female subjects. Efforts of female subjects increase from 11.718 ECUs in the Baseline treatment to 18.265 ECUs in the Race treatment. Females expend more effort in the Color treatment (14.184 ECUs) than in the Baseline, but the increment is not as high. Males do not show such behavior. This is confirmed by the regression in the first column of Table 5; females expend about 1 ECU more effort than their male counterparts. However, this difference is not as significant in the pairwise comparisons (except in the last column). We further investigate these gender effects by estimating individual-level regressions with interaction between treatments and gender dummies. The dependent variable is once again individual efforts and the independent variables include those in Table 5 along with the interaction terms.

Table 7. Effects of Gender

Dependent variable: $Effort_{i,t}$	**All**	**Baseline vs. Color**	**Baseline vs. Race**	**Color vs. Race**
Baseline×female	-0.440	-0.371	-0.491	
	(0.485)	(0.499)	(0.554)	
Color×male	-0.559	-0.480		
	(0.693)	(0.721)		
Color×female	0.745	0.813		1.121
	(0.816)	(0.844)		(0.975)
Race×male	-0.140		-0.343	0.400
	(0.710)		(0.711)	(0.762)
Race×female	1.995**		1.921**	2.389***
	(0.803)		(0.769)	(0.743)
Lag rival effort	0.057***	0.044*	0.083***	0.046***
	(0.016)	(0.024)	(0.012)	(0.018)
Lag own effort	0.543***	0.544***	0.495***	0.578***
	(0.038)	(0.045)	(0.043)	(0.047)

Period	-0.130***	-0.123***	-0.132***	-0.137***
	(0.027)	(0.039)	(0.027)	(0.033)
E. Asian	0.556	0.426	0.463	0.716
	(0.508)	(0.605)	(0.566)	(0.655)
Constant	4.156***	4.557***	3.893***	3.653***
	(0.664)	(0.806)	(0.653)	(0.887)
N	4,104	2,736	2,736	2,736

***, **, and * respectively indicate significance at the 1%, 5% and 10% level. Figures in parentheses are robust standard errors.

The first and the third columns in Table 7 show that the higher individual efforts in the Race treatment are essentially driven by higher efforts expended by females in that treatment. Relative to males in the baseline, females in the Race treatment expend significantly higher effort. The second column shows that the result does not hold for the Color treatment. Finally, it is clear from the last column that females expend significantly higher effort in the Race treatment compared to the Color treatment. The race dummy remains insignificant in all the regressions. The other controls show no difference in results from the previous analyses.[13] These findings are summarized below.

Result 4: *The higher efforts in the Race treatment relative to those in the Baseline treatment are driven by the higher efforts expended by female subjects. Females also expend significantly higher effort in the Race treatment compared to the Color treatment. However, there is no significant difference in efforts expended females between the Color and the Baseline treatment, neither there is any difference in effort expended by racial groups.*

Result 4 allows one to reject Hypothesis 3, and asserts that although the conflict behavior are robust across racial groups, it is not so across gender. This conforms to the general observation of higher effort exertion by females in contests (Price and Sheremeta, 2014) or being prone to the winner's curse (Casari et al., 2007). These also match with the existing observation that there are differences between the decisions of men and those of women (Eckel and Grossman, 2008) and that being in a group has stronger effects on female decisions (Croson et al., 2003). These results also add to the existing literature on the competitiveness of females

[13] We further investigated whether the higher effort of females in the race treatment, is due to an effect of real identity or if it is only context-driven behavior (Croson and Gneezy, 2009). We included an interaction of female dummy with race treatment in the first regression of Table 5, and it turns out to be significant along with the race treatment dummy itself. Hence, we conclude that identity itself induces higher efforts by females.

(Apesteguia et al., 2012; Cadsby et al., 2013; Niederle and Vesterlund, 2007, 2011), that has thus far shown mixed results.

5. Conclusion

We investigate the effects of identity and classification in group conflicts in an experiment. We employ a group contest with no identity, real racial identity and a minimal identity and find that compared to baseline conflict is significantly higher in the real identity treatment but not in the minimal identity treatment. This is due to both initiation (less free-riding) and escalation (expending more positive effort) of conflict in the real identity case. Hence, we provide a direct empirical test of the hypotheses coined by Sen (2007) that (i) the salience of an identity can initiate and escalate conflict; but (ii) that of a classification will not do so and find support for both. Adding to his hypotheses, we find that the increase in conflict does not arise due to the behavior of a particular race, but due to the increase in efforts by females across racial groups.

These results also contribute to the literature of conflict and of identity. Existing identity studies rely on experiments on 'conflict of interest' to analyze conflict. Our experiment pushes that front as much as possible in a laboratory setting, and provides with specific results. We also add to the conflict literature by including identity in a controlled setting.

The results, however, cannot tease out the effects of identity on in-group cooperation versus out-group hate. Hence, the most we can conclude from these results is that a real identity has a direct effect on parochial altruism (Choi & Bowles, 2007; Halevy et al., 2008; Abbink et al., 2012, Cason et al., 2012). That is, the incremental effect of identity in conflict efforts can come either through an increase in group cooperation for the love of own group's identity, or through an increase in hate for the other group's identity. While the current design is enough to answer our specific research questions as hypothesized by Sen (2007), it will still be interesting to explore which effect out of parochial altruism turns out to be stronger.

Many other interesting extensions are possible. The results seem to be robust since there is no pre-existing conflict between Whites and East Asians in the UK. But it will be interesting to see the effects when the same experiment is run between groups that have pre-existing conflicts. A lab-in-the-field experiment will also help. Since we found gender effects, another extension could be to replicate our experiment with controlled gender ratio. It would be useful to run individual contest that does not have the issues of in-group cooperation or free-riding. Finally, searching for further mechanisms through which the conflict intensity can be reduced will be an important area of extension.

References

Abbink, K., Brandts, J., Herrmann, B., & Orzen, H. (2010). Intergroup conflict and intra-group punishment in an experimental contest game. The American Economic Review, 420-447.

Abbink, K., Brandts, J., Herrmann, B., & Orzen, H. (2012). Parochial altruism in inter-group conflicts. Economics Letters, 117(1), 45-48.

Ahmed, A. M. (2007). Group identity, social distance and intergroup bias. Journal of Economic Psychology, 28(3), 324-337.

Akerlof, G.A., & Kranton, R.E. (2000). Economics and Identity, Quarterly Journal of Economics, 115(3), 715-753.

Akerlof, G.A., & Kranton, R.E. (2002). Identity and schooling: Some lessons for the economics of education. Journal of economic literature, 40(4), 1167-1201.

Akerlof, G.A., & Kranton, R.E. (2005). Identity and the Economics of Organizations. The Journal of Economic Perspectives, 19(1), 9-32.

Akerlof, G.A., & Kranton, R.E. (2008). Identity, supervision, and work groups. The American Economic Review, 98(2), 212-217.

Akerlof, G.A., & Kranton, R.E. (2010). Identity economics: How our identities shape our work, wages, and well-being. Princeton University Press.

Apesteguia, J., Azmat, G., & Iriberri, N. (2012). The impact of gender composition on team performance and decision making: Evidence from the field. Management Science, 58(1), 78-93.

Baik, K.H., Chowdhury, S.M., & Ramalingam, A. (2014). Resources for Conflict: Constraint or Wealth? University of East Anglia AFE working paper No. 061.

Basu, K. (2005). Racial conflict and the malignancy of identity. The Journal of Economic Inequality, 3(3), 221-241.

Benjamin, D. J., Choi, J. J., & Fisher, G.W. (2010). Religious identity and economic behavior (No. w15925). National Bureau of Economic Research.

Bornstein, G. (1992). The free-rider problem in intergroup conflicts over step-level and continuous public goods. Journal of Personality and Social Psychology, 62, 597–606.

Cason, T. N., Sheremeta, R. M., & Zhang, J. (2012). Communication and efficiency in competitive coordination games. Games and Economic Behavior, 76(1), 26-43.

Cadsby, C. B., Servátka, M., & Song, F. (2013). How Competitive are Female Professionals? A Tale of Identity Conflict. Journal of Economic Behavior & Organization.

Casari, M., Ham, J.C., & Kagel, J.H. (2007). Selection Bias, Demographic Effects, and Ability Effects in Common Value Auction Experiments. American Economic Review, 97(4): 1278-1304.

Chen, R.W., & Chen, Y. (2011). The potential of social identity for equilibrium selection. American Economic Review, 101, 2562–2589.

Chen, Y., & Li, S.X. (2009). Group identity and social preferences. American Economic Review 99, 431–457.

Chen, Y., Li, S. X., Liu, T. X., & Shih, M. (2014). Which hat to wear? Impact of natural identities on coordination and cooperation. Games and Economic Behavior, 84, 58-86.

Choi, J.K., & Bowles, S. (2007). The Coevolution of Parochial Altruism and War, Science, 318, 636-640.

Croson, R., & Gneezy, U. (2009). Gender differences in preferences. Journal of Economic Literature 47: 448-474.

Croson, R., Marks, M., & Snyder, J. (2003). Groups Work for Women: Gender and Group Identity in the Provision of Public Goods, Working Paper.

Dechenaux, E., Kovenock, D., & Sheremeta, R.M. (2012). A survey of experimental research on contests, all-pay auctions and tournaments, Chapman University, working paper.

Deck, C., Farmer, A., & Zeng, D.Z. (2009). Arbitration and Bargaining across the Pacific. Southern Economic Journal, 76(1), 183-197.

Eckel, C.C., & Grossman, P.J. (2005). Managing diversity by creating team identity, Journal of Economic Behavior and Organization, 58, 371-392.

Eckel, C.C., & Grossman, P.J. (2008). Differences in the Economic Decisions of Men and Women: Experimental Evidence, in C.R. Plott and V.L. Smith (eds.) Handbook of Experimental Economics Results, North-Holland, Oxford, 509-519.

Esteban, J., Mayoral, L., & Ray, D. (2012a). Ethnicity and conflict: An empirical study. The American Economic Review, 102(4), 1310-1342.

Esteban, J., Mayoral, L., & Ray, D. (2012b). Ethnicity and Conflict: Theory and Facts, Science, 336, 858-865.

Fershtman, C., & Gneezy, U. (2001). Discrimination in a segmented society: An experimental approach. The Quarterly Journal of Economics, 116(1), 351-377.

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

Goette, L., Huffman, D., & Meier, S. (2006). The impact of group membership on cooperation and norm enforcement: Evidence using random assignment to real social groups. The American economic review, 96(2), 212-216.

Greiner, B. (2004). The Online Recruitment System ORSEE – A Guide for the Organization of Experiments in Economics, In K. Kremer and V. Macho (eds), Forschung und wissenschaftliches Rechnen, Goettingen. 79-93.

Halevy, N., Bornstein, G., & Sagiv, L. (2008). "In-Group Love" and "Out-Group Hate" as Motives for Individual Participation in Intergroup Conflict A New Game Paradigm. Psychological Science, 19(4), 405-411.

Hargreaves-Heap, S. P., & Zizzo, D. J. (2009). The value of groups. The American Economic Review, 295-323.

Katz, E., Nitzan, S., & Rosenberg, J. (1990). Rent seeking for pure public goods. Public Choice, 65, 49–60.

Kelly, R. C. (2005). The evolution of lethal intergroup violence. Proceedings of the National Academy of Sciences of the United States of America, 102(43), 15294-15298.

Klor, E. F., & Shayo, M. (2010). Social identity and preferences over redistribution. Journal of Public Economics, 94(3), 269-278.

Kranton, R., Pease, M., Sanders, S., & Huettel, S. (2012). Identity, Group Conflict, and Social Preferences. Working paper

Niederle, M., & Vesterlund, L. (2007). Do Women Shy Away from Competition? Do Men Compete Too Much?, Quarterly Journal of Economics, 122, 1067-1101.

Niederle, M., & Vesterlund, L. (2011). Gender and Competition, Annual Review of Economics, 3, 601-630.

Price, C. R., & Sheremeta, R. M. (2014). Endowment origin, demographic effects and individual preferences in contests. Journal of Economics and Management Strategy, Forthcoming.

Reynal-Querol, M. (2002). Ethnicity, political systems, and civil wars. Journal of Conflict Resolution, 46(1), 29-54.

Robinson, J. A. (2001). Social identity, inequality and conflict. Economics of Governance, 2(1), 85-99.

Sen, A. (1985). Goals, commitment, and identity. Journal of Law Economics & Organization, 1, 341.

Sen, A. (2007). Identity and violence: The illusion of destiny. Penguin Books India.

Sherif, M., Harvey, O. J., White, B. J., Hood, W. R., & Sherif, C. W. (1961). Intergroup conflict and cooperation: The Robbers Cave experiment (Vol. 10). Norman, OK: University Book Exchange.

Shih, M., Pittinsky, T.L., & Ambady, N. (1999). Stereotype Susceptibility: Identity Salience and Shifts in Quantitative Performance, Psychological Science, 10 (1), 81–84.

Stoddard, O., & Leibbrandt, A. (2014). An Experimental Study On The Relevance And Scope Of Nationality As A Coordination Device. Economic Inquiry, 52(4), 1392-1407.

Tajfel, H., & Turner, J. C. (1979). An integrative theory of intergroup conflict. The social psychology of intergroup relations, 33, 47.

Turner, J. (1978). Social Categorization and Social Discrimination in the Minimal Group Paradigm, in Henri Tajfel, ed., Differentiation between Social Groups, London: academic Press.

Tullock, G. (1980). Efficient Rent Seeking. In James M. Buchanan, Robert D. Tollison, Gordon Tullock, (Eds.), Toward a theory of the rent-seeking society. College Station, TX: Texas A&M University Press, 97-112.

Young, C. (1982). Patterns of social conflict: State, class, and ethnicity. Daedalus, 111(2), 71-98.

Appendix

Instructions

GENERAL INSTRUCTIONS

This is an experiment in the economics of decision making. The instructions are simple. If you follow them closely and make appropriate decisions, you can earn an appreciable amount of money.

Experimental Currency is used in the experiment and your decisions and earnings will be recorded in Experimental Currency Units (ECUs). At the end of today's experiment, you will be paid in private and in cash. ECUs will be converted to Pound Sterling at a rate of **25** ECUs to **1** British Pound.

It is extremely 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 cooperation.

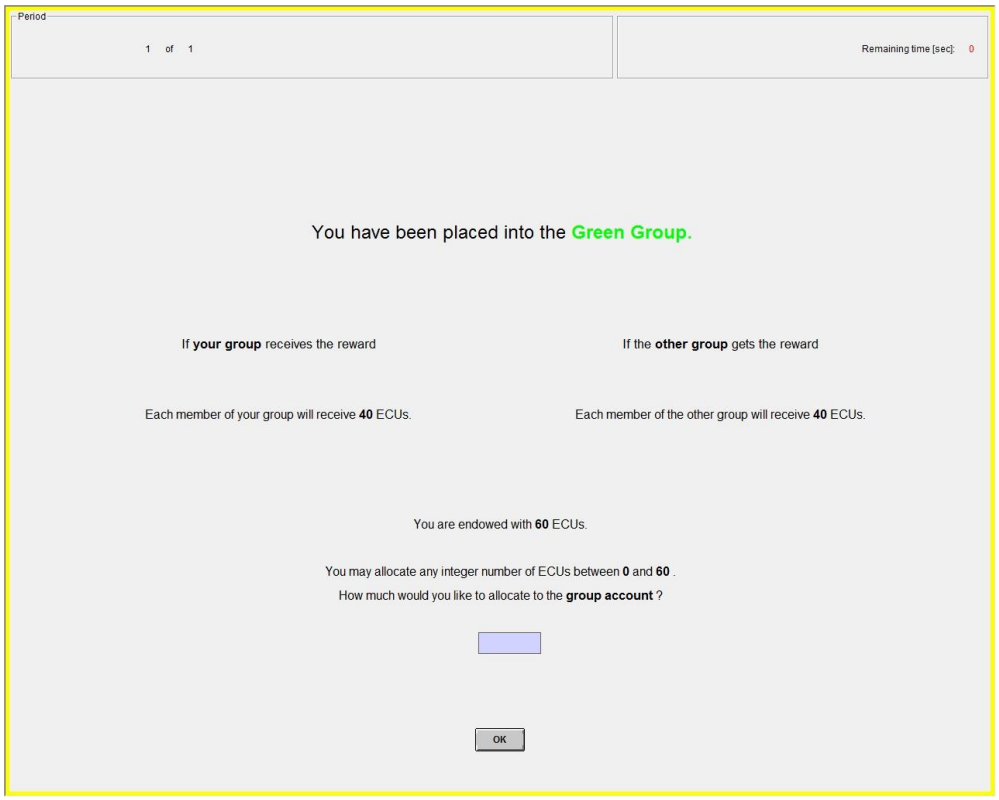
EXPERIMENTAL INSTRUCTIONS

YOUR DECISION

The experiment consists of **20** decision-making periods. At the beginning of the experiment, you will be anonymously placed into a group of **3 people**. You will be placed in either a 'Green' group or a 'Blue' group. Your group will then be anonymously matched with another group of 3 people. If you are placed into a Blue group, then your group will be matched with a Green group. If you are placed into a Green group, then your group will be matched with a Blue group. In each period your group ***as well as*** the group your group is matched with will remain ***the same***. However, at no point will you know who your group members are or who the members of the other group are. Also, you will not know any information about the members of your group or the members of the other group.

Each period you will be given an initial endowment of **60** ECUs. You will then decide how much to allocate to a **group account** or an **individual account**. On your screen, you will be asked to enter your allocation to the group account. You may allocate any integer number of

ECUs between, and including, **0** and **60**. Any ECUs you do not allocate to the group account will automatically be allocated to your individual account. An example of your decision screen is shown below.



At the end of ***each*** period, either your group or the other group will receive a reward of **120** ECUs (40 ECUs per group member). In each period, only one of the two groups can obtain the reward. By contributing to your group account you increase the **chance** of receiving the reward for your group. If the total number of ECUs in your group account exceeds the total number of ECUs in the other group's account, your group has a **higher chance** of receiving the reward.

The computer will assign the reward either to your group or to the other group, **via a random draw** that depends on the total allocation in the group accounts by the two groups. Below is a hypothetical example used to illustrate how the computer makes a random draw to decide which group wins the reward.

Note: The following example is for illustrative purposes only.

<u>Example 1. Random Draw</u>

Think of the random draw in the following way. For **each** ECUs in your group's account the computer puts **1 red token** into a box and for each ECU in the other group's account the

computer puts **1 black token**. Then the computer randomly draws one token out of the box. If the drawn token is red then your group receives the reward, if the drawn token is black then the other group receives the reward. Suppose that members of both groups have allocated their ECUs in the following way (as shown in Table 1 below).

Table 1 – Allocation of ECUs by members of both groups

Your Group	Endow-ment (ECUs)	Allocation to the individual account	Allocation to the group account
Person 1	60	40	**20**
Person 2	60	45	**15**
Person 3	60	50	**10**
Total	180	135	**45**

Other Group	Endow-ment (ECUs)	Allocation to the individual account	Allocation to the group account
Person 1	60	50	**10**
Person 2	60	60	**0**
Person 3	60	55	**5**
Total	180	165	**15**

Members of your group have allocated a total of **45** ECUs to your group account while members of the other group have allocated **15** ECUs. Thus, the computer will place **45 red tokens** and **15 black tokens** into the box (**60 tokens total**). Then the computer will randomly draw one token out of the box. You can see that since your group has contributed more it has a **higher chance** of receiving the reward - your group will receive the reward **45 out of 60** times. The other group has a lower chance of receiving the reward - **15 out of 60** times.

A group can never guarantee itself the reward. However, by increasing your bid, you can increase your group's chance of receiving the reward. If your group receives the reward, 120 ECUs will be divided equally among the members of your group, i.e., you and the other 2 members of your group will receive 40 ECUs each.

YOUR EARNINGS

EARNINGS IN EACH PERIOD:

After all participants have made their decisions, your earnings for the period are calculated.

1) For each ECU in your individual account, you will earn **1** ECU in return. So, if you keep all 60 ECUs that you are endowed with in your individual account you will earn 60 ECUs.

2) You can also earn some ECUs from your group account. After all bids are made, the computer uses the random draw process described above to decide which group wins the reward. If your group wins the reward, you will earn **40** ECUs from your group account in addition to your earnings from your individual account. Each of the other 2 members of your group will **also** earn **40** ECUs from the group account. If the other group wins the reward, you and the other 2 members of your group receive nothing from your group account. In this event, your period earnings will be equal to your earnings from your individual account.

Your period earnings are the **sum of the earnings** from your **individual account** and the earnings from your **group account**. The following example illustrates the calculation of period earnings.

Note: The following example is for illustrative purposes only.

Example 2. Period Earnings

In Example 1, your group allocated a total of 45 ECUs while other group allocated a total of 15 ECUs to the group accounts. Let's say the computer made a random draw and **your group received the reward**. Thus, all the members of your group receive 40 ECUs each from **your group account** plus earnings from their **individual accounts**. All members of the other group receive earnings **only from their individual accounts**, since their group did not receive the reward. The calculation of the total earnings is shown in Table 2 below.

Table 2 – Calculation of earnings for both groups

Your group	Earnings from group account	Earnings from individual account	Total period earnings
Person 1	**40**	**40**	40+40 = **80**
Person 2	**40**	**45**	40+45 = **85**
Person 3	**40**	**50**	40+50 = **90**
Total	**120**	**135**	255

Other group	Earnings from group account	Earnings from individual account	Total period earnings
Person 1	**0**	**50**	**50**
Person 2	**0**	**60**	**60**
Person 3	**0**	**55**	**55**
Total	**0**	**165**	165

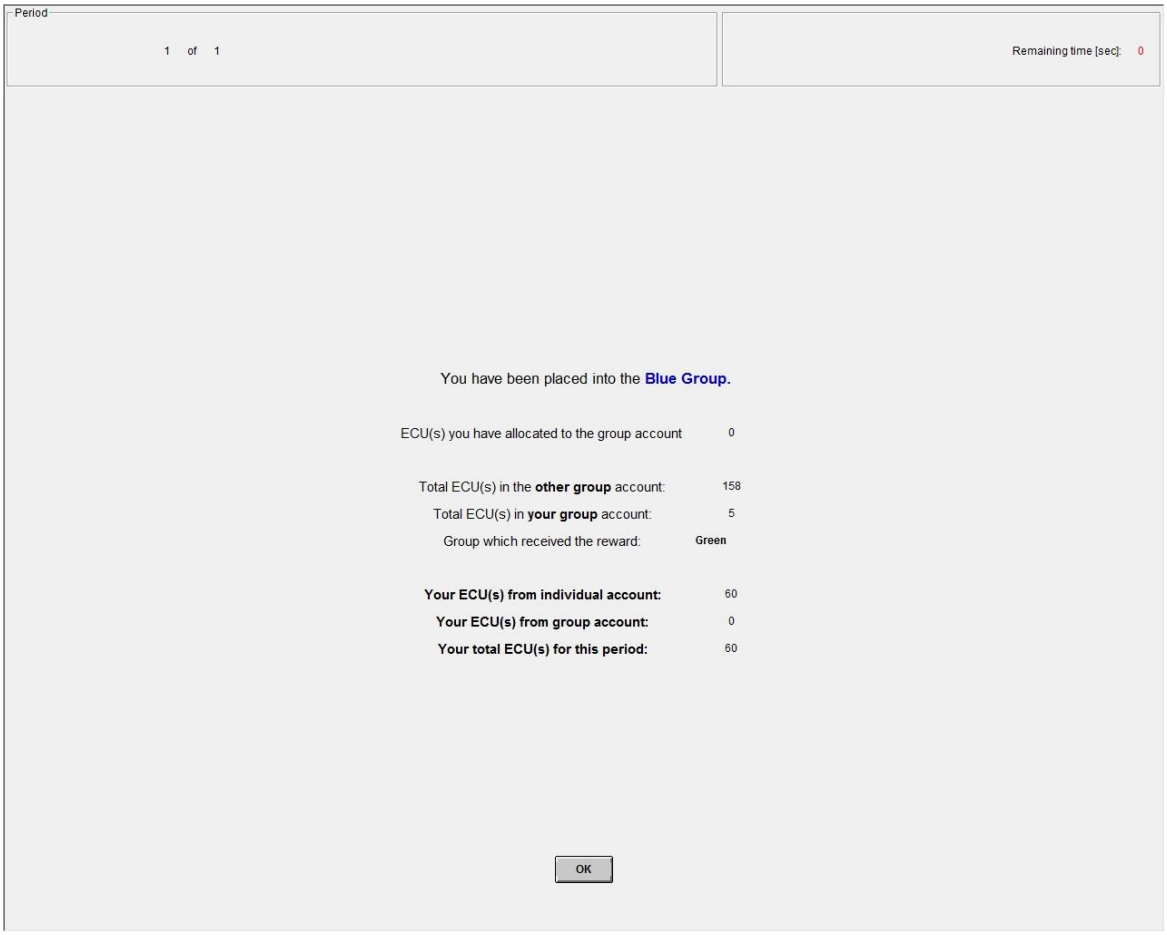
EARNINGS FROM THE EXPERIMENT:

At the end of the experiment we will randomly choose **5 of the 20** periods for actual payment using a computer program. You will be paid the sum of the earnings in each of these 5 periods. These earnings will be converted to cash at the exchange rate mentioned earlier and will be paid at the end of the experiment.

Note: All participants in this session will be paid for the same 5 periods.

OUTCOME SCREEN

At the end of each period, the total number of ECUs in the two groups' accounts, which group received the reward, your earnings from your individual and your group accounts, and your total earnings for the period are reported on the outcome screen as shown below. Please record your results for the period on your **record sheet** under the appropriate heading.



QUESTIONS TO HELP YOU BETTER UNDERSTAND THE DECISION TASKS

When everyone has finished reading the instructions, and before the experiment begins, we will ask you a few questions regarding the decisions you will make in the experiment. The questions will help you understand the calculation of your earnings and ensure that you have understood the instructions.

ARE THERE ANY QUESTIONS?

Personal Record Sheet

Period	Earnings from individual account	Earnings from your group account	Total earnings for this period
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Total Earnings

Period Chosen	Total earnings for this period
Total	=

Sum earnings from table above: _____

Divide earnings by conversion rate: ÷ **25**

Earnings in British Pounds: £_____ (1)

Earnings from Showing up: **£2** **(2)**

Total payment received: (1)+(2) £_____

QUIZ

1. Does group composition change across periods in the experiment?

Ans. Yes No

Questions 2 to 6 apply to the following information.

In a given period, suppose the members of your group and the other group chose to allocate their ECUs to the group account as it is shown in the table below.

Your group	Endow-ment	Allocation to the individual account	Allocation to the group account
Person 1	60	35	25
Person 2	60	60	0
Person 3	60	55	5
Total	180	150	30

Other group	Endow-ment	Allocation to the individual account	Allocation to the group account
Person 1	60	40	20
Person 2	60	40	20
Person 3	60	50	10
Total	180	130	50

2. How many **total ECUs** will the computer place into the box?

Ans. _____

3. If the computer makes a random draw out of the box what is the **chance of your group** receiving the reward?

Ans. _____ out of _____

4. If the computer makes a random draw out of the box what is the **chance of the other group** receiving the reward?

Ans. _____ out of _____

5. If you are Person 1 in your group and your group **did not receive** the reward what are your period earnings?

Ans. _____

6. If you are Person 2 in your group and your group **received** the reward what are your period earnings?

Ans. _____

EXPLANATIONS FOR QUIZ ANSWERS

1. Does group composition change across periods in the experiment? Correct answer: No

Questions 2 to 6 apply to the following information.

In a given period, suppose the members of your group and the other group chose to allocate their ECUs to the group account as it is shown in the table below.

Your group	Endow-ment	Allocation to the individual account	Allocation to the group account
Person 1	60	35	25
Person 2	60	60	0
Person 3	60	55	5
Total	180	150	30

Other group	Endow-ment	Allocation to the individual account	Allocation to the group account
Person 1	60	40	20
Person 2	60	40	20
Person 3	60	50	10
Total	180	130	50

2. How many **total ECUs** will the computer place into the box? Correct answer: 80

Allocation to the group account by your group and by the other group, i.e., 30 from your group PLUS 50 from the other group.

3. If the computer makes a random draw out of the box what is the **chance of your group** receiving the reward? – Correct answer: 30 out of 80

Out of a total of 80 tokens, 30 belong to your group. Thus the chance of your group winning any random draw of one token from the box is 30 tokens out of 80.

4. If the computer makes a random draw out of the box what is the **chance of the other group** receiving the reward? – Correct answer: 50 out of 80

Out of a total of 80 tokens, 50 belong to the other group. Thus the chance of the other group winning any random draw of one token from the box is 50 tokens out of 80.

5. If you are Person 1 in your group and your group **did not receive** the reward what are your period earnings? Correct answer: 35

Since your group did not win the reward, your earnings from the group account for this period are zero. So, your period earnings are equal to your earnings from your individual account. From the above table, this is equal to 35 ECUs, your allocation to your individual account.

6. If you are Person 2 in your group and your group **received** the reward what are your period earnings? Correct answer: 100

Since your group did win the reward, your earnings from the group account for this period are **40** ECUs (Your group wins 120 ECUs which are split equally among all 3 of you). So, your period earnings are equal to your earnings from your individual account plus 40 ECUs (your earnings from the group account). From the above table, your allocation to your individual account is 60. Thus your total period earnings are 60 + 40 = 100 ECUs.