Other-regarding Preferences, In-group Bias and Political Participation: an Experiment

ABSTRACT

This paper presents an experimental study on the relationship between other-regarding preferences, in-group bias and political participation. We conjecture that subjects who are more other-regarding and exhibit higher in-group bias are more likely to bear the costs of participating in group action. Using a participation game, we implement laboratory elections in which two groups compete for victory. We induce different levels of in-group bias across subjects in order to implement treatments in which the competing groups are either highly biased towards the own group vis-à-vis the other one or are characterized by low levels of such in-group bias. Our results show that, at the aggregate level, participation is higher in environments where in-group bias is more pronounced. Furthermore, the least other-regarding subjects participate much less often that others, while the more other-regarding sustain high participation levels. These findings suggest that interpersonal preferences and intergroup bonds can explain the higher participation of close-knit (political) groups observed in the field.

KEYWORDS: In-group bias, Other-regarding preferences, Political participation, Participation Game, Experiment.

1. Introduction

In many modern societies, conflicts of interest center around groups (e.g., workers versus capital owners or Democrats versus Republicans). Such group conflicts can be solved through democratic politics. A group's success in the political arena depends on many factors, however. One important element is the extent to which its members participate in its political endeavors. Often, the group with the highest level of participation is most likely to be politically successful, and therefore has a high probability of success in conflicts with other groups.

The importance of groups in the political arena has been widely recognized. In his appraisal of the rational choice literature on election participation, Feddersen (2004) argues that "while a canonical model does not yet exist, the literature appears to be converging toward a 'group-based' model of turnout, in which group members participate in elections either because they are directly coordinated and rewarded by leaders as in 'mobilization' models or because they believe themselves to be ethically obliged to act in a manner that is consistent with the group's interest as in 'ethical agent' models." It is to this literature on the role of groups in politics that our paper aims to contribute.

In particular, this paper studies political participation in the context of groups competing for benefits. We address the question of how this participation is affected by the interaction between, on the one hand, a sense of in-group bias that members may have and, on the other hand, the extent to which members have preferences that take into account the well-being of others. A higher sense of in-group bias typically results in favoritism towards its members and a discrimination of the out-group's members.

Individuals facing the decision of whether to participate in group action typically experience a social dilemma towards their group, i.e., a situation in which the members of the in-group would be better off if all participated, but where individual incentives make non-participation more attractive (Dawes, 1980). The social dilemma situations we are interested in involve a conflict with other groups. A prime example is an election where two factions of an electorate compete for victory: the group with higher participation wins the election and reaps the benefits. In this environment, free-riding is often an equilibrium strategy if individuals are perfectly rational and have self-interested preferences (Palfrey and Rosenthal 1983). However, relaxing either of these postulates can account for participation, as in the group-based turnout models of Morton (1991), Schram and van Winden (1991) and Shachar and Nalebuff (1999).

Investigating the relationship between participation and in-group bias is important because the outcome of group conflicts can have severe consequences for the members of the groups concerned, irrespective of an individual member's decision to participate in it. If certain individuals or groups participate more than others, this might bias policy in a direction that is not representative of the majority's preferences. If, for example, some groups manage to create a stronger feeling of in-group favoritism than others, this could put them in an advantageous position that is unrelated to the conflict at hand. Either of these effects could harm the efficient use of an economy's resources because they yield an allocation that is biased towards the preferences of the political participators (see Lijphart 1997 for a similar argument with respect to election turnout).

We conjecture that the individual participation decision in group effort takes into account the ties that bind the group together. Moreover, an individual may more generally take the consequences for others into account when deciding on her actions. In other words, an individual may have other-regarding preferences. Other-regarding preferences, as we use the term, are those that include motives related to the well-being of others, as opposed to selfish or self-regarding preferences (Sen 1977). However, other-regarding preferences might discriminate between in-group and out-group members, and how much an individual cares for each is likely to influence the sacrifices she is willing to make. Our paper addresses this conjecture by studying the effect of other-regarding preferences and in-group bias on participation in group action.

An important goal of our experimental design is therefore to create environments with distinct levels of in-group bias in order to study its influence on individual and aggregate participation. In addition, we want to know whether participation depends on other-regarding motivations, both in general and in interaction with in-group bias. For this purpose, the design includes a measurement of such motivations, using a so-called value orientation test. Finally, we measure political participation by studying individual choices in a participation game (Palfrey and Rosenthal 1983): two groups of equal size compete for benefits and the winning group is the one with highest participation. Hence, our experiment induces distinct levels of in-group bias, measures other-regarding preferences and allows us to link (combinations of) these variables to political participation.

In order to derive hypotheses on individual and aggregate behavior, we combine insights from a theoretical analysis of the participation game with the available empirical evidence. First, we hypothesize that other-regarding subjects will participate more often than those who are selfish. Second, we expect environments with a high bias towards the in-group to foster fiercer competition, and therefore generate higher aggregate participation. Third, we hypothesize that subjects who exhibit larger bias towards their group will participate more often.

Our results may be summarized as follows. First, they provide support for the hypothesis that individual participation is higher for other-regarding subjects. In particular, we observe that the most uncooperative subjects stand out from the rest by abstaining much more often. The estimated model predicts a 50 percentage point-difference in participation between the most selfish and the most other-regarding subjects. Second, we were successful in inducing distinct levels of in-group bias across treatments. This allows us to conclude that aggregate participation is higher in environments where in-group bias is high, albeit modestly. Third, individuals who have a higher degree of in-group bias in the first place participate more often. Our experimental inducement of further in-group bias crowds out this relationship, however.

To the best of our knowledge, our laboratory study is the first to measure other-regarding preferences and induce different levels of in-group bias in the context of a political participation game.[1] Our results are an indication that both other-regarding preferences and in-group bias matter. Though groups may not be able to affect their members' preferences, the latter result does suggest that groups that manage to increase their members' bias towards the group will fare relatively well in conflicts with other groups.

The organization of this paper is as follows. The next section discusses the literature that relates political participation to other-regarding preferences and in-group bias. Section 3 presents the conceptual analysis of the participation game and our hypotheses. Section 4

[1] Rabbie and Wilkins (1971), Bornstein et al. (2002), and Reichmann and Weimann (2008) investigate group competition in environments where group identity may play a role, but do not explicitly study the effects of this in-group bias. They also do not compare environments that vary in the extent to which in-group bias has been induced.

describes the experimental design. In section 5, we present and analyze our data. A final section concludes.

2. Related Literature

Both other-regarding preferences and group identity have been the subject of recent attention within the rational choice approach to political participation. This approach has traditionally struggled with the so-called 'paradox of participation': the fact that the high rates of participation observed empirically (e.g., in large-scale elections) are at odds with the theoretical observation that participation is seemingly irrational. For a survey of the literature in economics, political science and related disciplines, see, e.g., Aldrich (1997), Blais (2000), Dhillon and Peralta (2000), or Feddersen (2004).

Notwithstanding, many works in this research paradigm have by now uncovered various factors that help explain why rational individuals may participate in group action (see Palfrey 2009 for an overview). In particular, the addition of other-regarding preferences to the calculus of participation has led to models that escape the prediction of low participation. For individuals with such preferences, participation becomes instrumentally rational if the benefits derived from one's group winning (which now include the benefits to co-members) are not overcome by the low probability of being pivotal. Models in this vein have been proposed by Jankowski (2002), Edlin et al. (2007), Feddersen et al. (2009), and Evren (2012). There is both field (Knack 1992, Jankowski 2007) and experimental (Fowler 2006, Fowler and Kam 2007, Dawes et al. 2011) evidence supporting a positive relationship between social preferences and participation.

Our results add to this stream of literature by relating a direct measure of an individual's level of other-regarding preferences to the frequency of participation in intergroup competition. Moreover, we contribute with novel evidence on the interaction between an individual's other-regarding concerns and the extent to which she is biased towards her own group relative to the other group. To some extent, this analysis supplements the work conducted by Fowler (2006), who uses a combination of field and experimental data to show that social identity (proxied by party identification) amplifies the positive impact of altruistic motivations on political participation. Though the first to combine other-regarding preferences and group identity, Fowler's methodology has some shortcomings related to the lack of control in the field.[2] Our laboratory control allows us to measure other-regarding preferences and induce in-group bias in ways that rule out priming and response bias effects that are likely to occur in a situation where measurements are based on politically framed survey questions.

The empirical literature on the socio-economic determinants of participation (e.g., the seminal work by Verba and Nie 1972) has established a number of important relationships, such as a positive correlation between income and participation. However, some puzzles remain. For example, the positive correlation between income, education, and participation is much weaker for African-American voters, who participate beyond what their socioeconomic status would predict. Leighley and Vedlitz (1999) provide a number of candidate explanations for this

[2] Fowler uses survey questions regarding election participation, party identification, and political knowledge. Subsequently, subjects play a dictator game, either against someone with the same political preference, a different political preference or an unknown preference. These dictator choices are poorly incentivized, however. The observed distribution of giving is at odds with recent meta-studies (Engel 2011), but in line with non-incentivized studies. His results show that more altruistic individuals do not participate more unless they are strong party identifiers.

phenomenon: psychological resources (e.g., political interest and participation efficacy beliefs), social connectedness, and group identity. All of these explanations have a theoretical basis but it is difficult to identify in the field which mechanisms are at work. For example, it is hard to disentangle the effect of group identity from the impact of social connectedness on participation. Do the members of a group voluntarily participate because of their strong sense of group identity, or because their environment encourages participation?

This example shows how difficult it is to isolate the effects of group membership on the participation decision. Furthermore, social context, social networks, and participation behavior are endogenously determined, making it difficult to elicit the direction of causality. In contrast, an easy and clean test of the in-group bias effect can be obtained in the controlled laboratory environment. By comparing the behavior of groups that differ only with respect to their bias toward the in-group, we can isolate the effect of in-group bias on participation.

The so-called group identity paradigm studies the influence of 'group-belonging' sentiments on how individuals make decisions in instances of intergroup behavior (Tajfel 1982, Hogg and Abrams 1988, Ellemers 2012). The body of knowledge on group identity that has developed over the past few decades is quite extensive and has produced a number of robust findings (see Brewer 2007, Eckel and Grossman 2005). Experimental studies have shown that group identity and its salience impacts strategic behavior (Charness et al. 2007) and that individuals tend to be more altruistic towards in-group members (Chen and Li 2009), for example.

As many other papers in this literature (e.g., Eckel and Grossman, Chen and Li 2009), we induce different levels of in-group bias by resorting to procedures that combine minimal group assignment with further manipulations (e.g., communication or team-building tasks). These manipulations aim at generating a strong group identification process through an increase in the salience of the in-group and the out-group. From this increased identification with the in-group we expect to observe high levels of in-group bias, which ultimately is the variable we measure and control in this study. As mentioned, we conjecture that stronger in-group bias will be associated with more frequent participation in group action. Using observational data, Simon et al. (1998) and Stürmer and Simon (2004), among others, have indeed shown that the willingness to participate in group action is significantly related to collective identification processes.

3. Conceptual Framework and Hypotheses

We study participation behavior using the game proposed by Palfrey and Rosenthal (1983). This section provides an outline of this framework and the main results that follow from our implementation (Appendix A presents a more formal analysis).

Two groups of equal size compete for victory, which depends on participation. Each player decides simultaneously and privately whether or not to participate at a cost (c). The group where more players participate wins. Players on the winning side obtain a monetary payoff (B^W) that is higher than the one accruing to players on the losing side (B^L). In case of a tie, the winner is decided by a fair coin toss. The structure and payoffs of the game are common knowledge.

We assume that players have a utility function that allows for other-regarding (or 'altruistic', a term we use interchangeably) and group-discriminating components:

$$U_i = u_i + \alpha_i \left(\beta_i \sum_{j \in \{G_i \setminus i\}} U_j + \gamma_i \sum_{h \in G_{-i}} U_h \right) \quad [1]$$

where u_i is i's material payoff, α_i is the weight put on other players' welfare, and $\beta_i \geq 0$ and $\gamma_i \geq 0$ are the weights put on the welfare of players in the same group (G_i, the 'in-group') and in the other group (G_{-i} the 'out-group'), respectively. These preferences express an interdependent utility function which is increasing in other individuals' utilities, but which allows the utility of individuals in the in-group to be given higher weights.[3]

Define m and n as the number of other members in the in-group and the out-group who participate. The expected utility of Participation and Non-participation is then:

$$E[U_i|Participation] = \Pr[m+1>n]\,U_i^w + \Pr[m+1=n]\frac{\left(U_i^w + U_i^l\right)}{2} + \Pr[m+1<n]\,U_i^l - c \quad [2]$$

$$E[U_i|Non-participation] = \Pr[m>n]\,U_i^w + \Pr[m=n]\frac{\left(U_i^w + U_i^l\right)}{2} + \Pr[m<n]\,U_i^l \quad [3]$$

where U_i^w (U_i^l) is the utility in case of victory (defeat). An equilibrium strategy in this game is simply a probability of participating. In equilibrium, players are indifferent between participating and abstaining, which renders the Nash equilibrium condition:

$$\Pr[m=n] + \Pr[m=n-1] = \frac{2c}{\left(U_i^w - U_i^l\right)} \quad [4]$$

This condition tells us that a subject will participate if the probability that she breaks ($\Pr[m=n]$) or creates ($\Pr[m=n-1]$) a tie, multiplied by the expected benefit, equals the cost of participation. As we can see from [4], for constant c, the equilibria will be a function of the cost-benefit ratio, which in turn depends on α, β, and γ (in addition to B^w and B^l, which are also held constant). For example, if the in-group is preferred to the out-group ($\beta > \gamma$), the utility difference is increasing in α.

For participation games it is customary to derive quasi-symmetric Nash equilibria, i.e., equilibria in which all members of a group employ the same strategy (e.g., Palfrey and Rosenthal 1983, Grosser and Schram 2006). Given that our preference structure is richer than in previous studies, it is necessary to derive equilibria in which probabilities may differ across players, however. One problem is that allowing for heterogeneity leads to a multiplicity of Nash equilibria. An alternative is to derive stochastic equilibria, namely a quantal response equilibrium (QRE, McKelvey and Palfrey 1995). QRE is an equilibrium concept that accommodates bounded rationality by allowing players to make mistakes: best-response strategies are played with higher probability, but not with certainty as in a Nash Equilibrium. For participation games, QRE not only helps us select from the multiple Nash Equilibria that result in a setting with preference heterogeneity like ours, but its predictions also fit experimental data better than Nash Equilibrium (Goeree and Holt 2005). Appendix A provides details on the QRE calculations, which we use to inform our hypotheses.

First, consider the relationship between an individual's altruism level (as measured by α) and her participation decision. Intuitively, we expect individuals with stronger other-regarding

[3] We normalize β_i and γ_i such that $\beta_i+\gamma_i=1$, which is possible to obtain from any β_i' and γ_i': $\beta_i=\beta_i'/(\beta'+\gamma_i')$ and $\gamma_i=\gamma_i'/(\beta_i'+\gamma_i')$.

preferences to be more willing to sacrifice themselves for their group, provided they prefer the in-group to the out-group (a weak assumption). This is another way of saying that there is more at stake for an individual who values the welfare of others in her group, and therefore stronger other-regarding preferences will lead to more frequent participation. The theoretical analysis of the game indeed provides evidence that the (quantal response) equilibrium level of participation is increasing in other-regarding concerns (α) in a broad parameter range, including parameters that are compatible with, and estimated from, our data (cf. Appendix A). The existing empirical evidence provides further support for the conjecture that other-regarding concerns foster individual participation. Relating self-stated motivations to participation game behavior, Schram and Sonnemans (1996b) found that subjects with individualistic goals were less likely to participate, whereas subjects with cooperative goals were more likely to participate.[4] Hence, our equilibrium analysis and previous evidence both point to a positive effect of altruism on participation (i.e., altruism is in-group targeting). This yields our first hypothesis:

Hypothesis 1: Individual participation is increasing in the level of other-regarding concerns, i.e., more altruistic subjects participate at higher rates.

Next, we consider the effects of in-group bias on participation. We are mainly concerned whether participation is higher when in-group bias is more pronounced. The QRE that we obtain show that aggregate participation is increasing in in-group bias levels. This is supported by the empirical regularities mentioned in the previous section, in particular the fact that in-group favoritism leads to more competitive behavior. We therefore expect higher aggregate participation when in-group bias is induced. In line with this conjecture, Schram and Sonnemans (1996b) study the effect of group identity on participation behavior by implementing different matching protocols in a participation game.[5] They elicit group identity using the minimal group paradigm and find that the effect of group identity is significant, though not pronounced. Moreover, various studies using the participation game framework (Bornstein et al. 1989, Bornstein 1992, Schram and Sonnemans 1996a,b, Goren and Bornstein 2000) explore experimentally the role of communication within the in-group. Several papers show that the exchange of non-binding promises (cheap talk) between group members reinforces the sense of group identity (e.g., Chen and Li, 2009). In participation game experiments, such communication significantly increases participation levels.[6] This allows us to formulate our second hypothesis:

Hypothesis 2a: Higher in-group bias leads to higher levels of aggregate participation.

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[4] In fact, this is precisely what experimental subjects will tell you. The post-experiment questionnaire asked subjects what they thought moved a participant who participated often. More than 70% responded that this was either cooperation towards the in-group or cooperation towards both groups. Moreover, a participant who participated rarely was attributed a selfish motivation by 77.5% of the subjects. For details, see Table C 1 in the Appendix.

[5] Schram and Sonnemans (1996b) implement three treatment conditions which were conceived to yield increasing levels of group identity: i) group composition varied from period to period, and both subject identity and choices were anonymous; ii) group composition remained constant, and both identity and choices were anonymous; iii) group composition remained constant, identity was revealed, but choices remained anonymous. Participation in ii) was higher than in i), but also higher than in iii).

[6] Goren and Bornstein (2000) show that without communication players associate high participation levels to cooperation towards the in-group and do not associate low levels of participation to inter-group cooperation.

We further consider situations where individuals within groups are heterogeneous in terms of their in-group bias, which allows us to address how it operates at the individual level. Do subjects with a higher level of in-group bias participate more often than subjects with lower levels of in-group bias? The theoretical results show that subjects with a higher in-group bias will tend to participate with a higher probability in a relevant parameter range. Intuitively, the reason may be that individuals who identify more with their group are more willing to incur sacrifices for it, and therefore participate at higher rates. Our third hypothesis follows:

Hypothesis 2b: Subjects with a higher sense of in-group bias participate at higher rates.

4. Experimental Design

Our experiment is composed of three main parts, each to be explained in detail below.[7] In the first part, we measure the subjects' other-regarding preferences. In the second part, we vary the group formation procedure in order to obtain environments where in-group bias is either high or low. Allocation decisions and survey questions are used to measure the degree of in-group bias. In the third part, subjects interact in the participation game (Palfrey and Rosenthal 1983) explained in the previous section. See Figure 1 for a diagram showing the sequence of these parts throughout an experimental session.

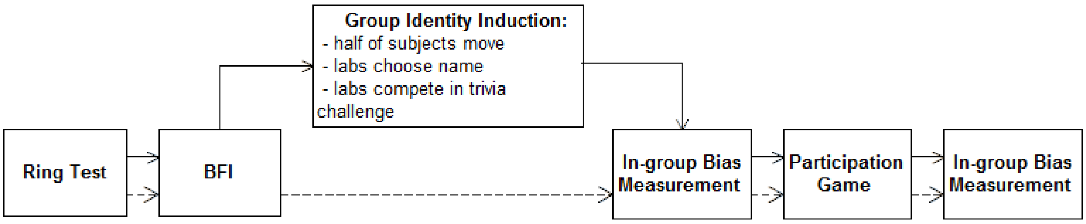

Figure 1 - Sequence in the Experiment.

Notes. Solid lines indicate the sequence in the High and Low treatments, while dashed lines indicate the sequence in the Control treatment. BFI: Big Five Inventory.

The sessions were run at the CREED laboratory of the University of Amsterdam (UvA). Participants were recruited from the CREED laboratory subject pool using the laboratory's online registration system. The subject pool consists of approximately 2000 students, mainly UvA undergraduates from various disciplines. A total of 160 subjects (44% of which were female) participated in 8 sessions (with 20 subjects each), which took place in June and October 2011. On average, participants earned 28.5 Euros, which included a 7 Euro show-up fee. The experiment was programmed and conducted in z-Tree (Fischbacher 2007). Payoffs in the experiment were expressed in tokens, exchanged to Euros at a rate of 0.005 Euros per token. For the first and third parts (ring test and participation game), we administered practice questions before each part to check subject understanding. The typical experimental session lasted around two hours. All procedures within a session were known to participants.

[7] See Appendix E for a transcript of the instructions.

4.1. The Ring Test

We start by measuring other-regarding preferences, i.e., how much each subject cares about the well-being of others in his or her own preferences. For this purpose, we use the ring test, a tool developed by social psychologists to measure social value orientation. Social value orientation is akin to our concept of other-regarding preferences. The ring test estimates the rate at which an individual trades off her own welfare for the welfare of another individual. For a discussion of this test in psychology see Liebrand (1984), and in economics see Offerman et al. (1996). The version used in the experiment was proposed by van Dijk et al. (2002) and consists of 32 pairwise dictator choices, each presenting the participant with two alternative own-other allocations of monetary payoffs (see Appendix B for the list of all choices). Each choice is shown on the screen, both in text and bar graphics.

Each of the 20 participants in the lab goes through the ring test at the start of the session (see Figure 1). A participant is anonymously paired with two other participants; her choices affect one of them, and the choices of the other one affects her in an identical way. The two participants with whom a subject is paired remain constant throughout the first part of the experiment. Participants are informed that they will only learn the earnings or losses from this part of the experiment at the end of the session.

4.2. In-group Bias Induction

In the second part of the experiment, we form groups and induce different levels of in-group bias in order to implement our treatments. A crucial choice concerns the variable (characteristic) used to differentiate between groups. The minimal group paradigm has shown that, in some situations, a mere awareness of belonging to a group, together with group competition for a prize, generates behavior consistent with group discrimination (Diehl 1990). In a laboratory setting the minimal group paradigm has not always been successful in producing such results, as pointed out by Charness et al. (2007). For one, the salience of groups in the laboratory is low, as interaction takes place via computers. More importantly, our hypotheses require a procedure that allows us to distinguish between cases with a markedly different sense of in-group bias. A minimal group paradigm procedure, e.g., simply assigning empty labels to groups (e.g. colors), would likely fall short of achieving distinct levels of in-group bias. For this reason, we propose a procedure that builds upon the minimal group paradigm but includes further manipulations.

The number of variables that can be used to differentiate groups is quite vast. Political groups may differ along many dimensions, including (but not limited to) ideology, income, education, religion, occupation, or race. The relevance of specific variables depends on the political situation one is interested in. For example, opposing groups in a general election may differ along different dimensions than groups on either side of a gun rights rally. To avoid obvious links to specific group conflicts, while using a variable that bears relevance for political choices, we distinguish between groups based on a personality trait: openness to experience (openness, for short). We measure personality traits under the Big Five taxonomy using the Big Five Inventory (John et al. 2008; 'BFI' henceforth). This is a highly validated questionnaire consisting of 44 short sentences based on trait adjectives known to be prototypical markers of the Big Five. This test provides a 1-to-5 score of each personality trait.[8]

In all treatments, each of the 20 participants in a session has to answer the Big Five Inventory (see Figure 1). Subsequently, they are told what the openness personality trait is and how different openness scores translate into personal characteristics and behavior. They also learn their own score.

We use the openness score to implement the treatments: High (high in-group bias), Low (low in-group bias), and Control (no manipulation of in-group bias). In the High and Low treatments – but not in Control – the 10 participants whose openness scores are highest are asked to move to a second laboratory, call it Lab 2, while the 10 with the lowest scores remain in the laboratory where the experiment started, call it Lab 1. Participants are not told about any labels, but know that the 10 participants who move to Lab 2 are the ones with the highest openness score.[9] After all participants have settled at their new computer stations, they are asked to decide jointly on a name to identify their laboratory. Participants are presented with three pre-determined options. They can discuss their choice with the other participants in the same laboratory via a chat interface. Each participant submits a choice, and the most-chosen option becomes the name that identifies their laboratory for the remainder of the experiment. Next, the two laboratories compete in a trivia challenge. Each participant is presented with five timed trivia questions; correct and incorrect answers are worth 1 and 0 points, respectively. The individual scores are aggregated by laboratory, and the laboratory with the highest score wins 2000 tokens to be equally distributed among its members. In a sense, we create two distinct 'laboratory identities': 10 subjects sit in each laboratory, knowing that they are either in the most or the least 'open' composition; they are asked to choose a name for their laboratory and to compete in a trivia challenge against the other laboratory.[10]

The distinction between the High and Low treatments will be explained in the next sub-section. However, before we proceed, it is important to note that the relationship between personality traits and political ideology has been widely studied. The literature has reached a broad consensus in that liberals (in the American sense) tend to score higher than conservatives on self-reported measures of openness as measured by the Big Five (Carney et al. 2008 and the references therein). These authors further show that the distinction between liberals and conservatives in terms of self-reported openness translates into "objective behavioral indicators" associated with openness, namely nonverbal behavior in a conversation (facial expressions, nonverbal signals, and interaction style) and the contents of personal bedrooms and work offices (furniture and decoration style, and personal belongings). For example, liberals tend to smile more during a conversation, while the bedrooms of conservatives tend to look more organized. Jost (2006) uses American state-level personality estimates to show that openness scores were the strongest regional personality predictor of the state vote share cast for Democrats and Republicans in the Clinton-Dole, Gore-Bush and Kerry-Bush races. Jost et al.

[8] A clear advantage of using a Big Five personality trait in our context is that, as stressed by Gerber et al. (2011), relative to other psychological constructs "the Big Five are measured with minimal references to political content, and are therefore less likely to be confounded by the political outcomes they may predict."

[9] The second laboratory room is right next to the first one. Most subjects who stayed in the laboratory room where the experiment started also move to a different computer station, such that all subjects in each laboratory are seated next to each other (separated by partitions).

[10] We thank an anonymous reviewer for suggesting the 'laboratory identity' concept.

(2003) show that the relationship between openness and ideology extends to non-American samples.

In sum, openness is one of the best proxies for ideological dispositions and has been shown to matter for political choices, like party choice. However, openness does not affect participation decisions.[11] Groups with contrasting openness levels are thus composed of individuals who would make different political choices, and therefore draw a parallel to what would distinguish groups in many political conflicts. The obvious advantage of using a personality trait instead of self-reported ideology is to avoid confounds implied by the meaning of ideology at a certain point in time or within a particular party system.

4.3. Participation Game and Treatment Implementation

For the participation game, subjects are allocated to groups of five participants, with two groups constituting an 'electorate' of ten participants. The parameter values used throughout the second part of the experiment are B^W=120, B^L=30, and c=30. Groups remain constant and play the game for 40 rounds. At the end of each round, participants are informed of how many others participated in each group, their own token earnings in that round, and their cumulative token earnings in that part of the experiment.

The High and Low treatments differ with respect to the groups that interact in the participation game (see Figure 2). Regardless of treatment, all members of the in-group belong to the same laboratory. The difference lies in which laboratory the out-group is drawn from. In the High treatment, the in-group and the out-group are drawn from different laboratories, i.e., they have different laboratory identities. In the Low treatment, both the in-group and the out-group belong to the same laboratory, i.e., they share the same laboratory identity.

The Control treatment differs from High and Low in that the in-group bias induction does not take place. Subjects in Control answer the BFI, receive feedback on their openness score, and are then immediately matched into participation game groups. All 20 subjects remain in the laboratory where the experiment started. Hence, subjects in the Control treatment do not know that they are allocated to groups based on their openness score.[12]

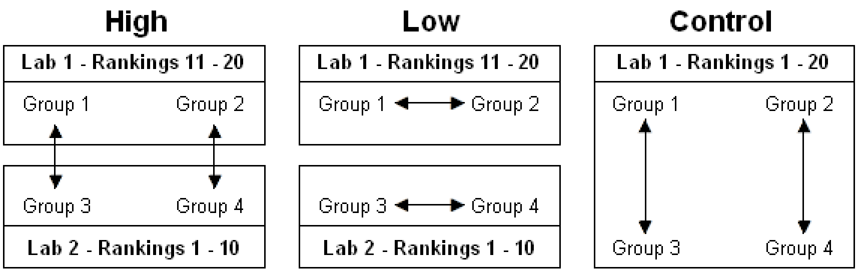

Figure 2– Experimental treatments.

Notes: Arrows indicate competition in the Participation Game. 'Ranking' refers to the openness score ranking. Group 1 is composed of subjects with rankings 1 to 5, Group 2 with rankings 6 to 10, and so on.

[11] Some studies have investigated the relationship between openness and political participation. There is no evidence of a robust causal relationship between openness and participation (Mondak et al.,2010). Similarly, Gerber et al. (2011) find no relationship between openness and recorded voter turnout.

[12] The underlying group formation protocol in Control mimics High in terms of openness scores. That is, Group 1(2) competes with Group 3(4). Note that each group has the same openness score composition across treatments. Our empirical results show that openness does not influence participation (see sub-section 5.2), and therefore the matching protocol adopted in the Control sessions should not influence participation behavior.

In order to measure in-group bias, we use two dictator allocation decisions. In particular, we asked each subject to divide 200 tokens between a random participant of his or her group (except himself or herself) and a random participant of the group with which his or her group is matched in the participation game. Hence, if our manipulations induce in-group bias, we expect to see relatively lower donations to the other group in High (the two groups differ in laboratory identity) than in Low (groups share laboratory identity). As mentioned, this allocation decision is administered twice, right before and right after the participation game (see Figure 1). This allows us to investigate whether the participation game itself alters the extent of in-group bias. In addition, the final questionnaire includes an item for which subjects have to rate, on a 1-10 scale, how attached they feel to their own group and to the other group.

A methodological requirement must be observed for our inference to be valid: openness should neither be correlated with ring-test choices nor with behavior in the participation game. We will assess this requirement empirically when we present our results.

5. Experimental Results

Sub-sections 5.1 and 5.2 present preliminary steps to the analysis of our results, which is carried out in sub-sections 5.3-5.5. In 5.1 we put forward a classification of subjects according to their other-regarding preference type. In sub-section 5.2 we investigate the validity of our in-group bias manipulation. In 5.3 and 5.4 we present results on bilateral relationships between other-regarding preferences, in-group bias, and participation. These analyses provide partial support for our hypotheses. Stronger support is reported in sub-section 5.5, where we present a multivariate analysis explaining the participation decision. Our conclusions with respect to our hypotheses are summarized in section 5.6.

5.1. Subject Classification

Hypothesis 1 concerns differences in participation behavior across individuals with distinct other-regarding concerns. To enable this comparison, we divide subjects into categories representing different other-regarding preference types (henceforth, 'types'). We start with a brief characterization of our measure. The ring test presupposes the existence of a motivational vector for each subject, which represents the individual's trade-off between the own and the other's welfare in a two-dimensional vector space. One dimension indexes the own payoff and the other indexes the payoff accruing to the other. For each of the 32 pairwise choices in the ring test, a participant chooses the allocation that is closest to her motivational vector. Averaging over an individual's 32 choices yields an approximation of her motivational vector.[13]

A subject's motivational vector can be fully described by its length and direction. The length can be interpreted as the degree of choice consistency. We will restrict our sample to the 152 subjects (95% of the total) with a reasonable degree of consistency.[14] The slope of the

[13] The ring test measures other-regarding preferences with respect to distributive outcomes. It does not take into account reciprocity concerns, but it can accommodate inequity-averse preferences as in, e.g., Fehr and Schmidt (1999). For example, a subject who experiences no disutility from a disadvantageous position and places equal weight on the own payoff and the disadvantageous position of others (in Fehr and Schmidt's terminology, $\alpha = 0$ and $\beta = 1$), has a motivational vector in the ring test with slope of 1. However, the ring test's power is limited with respect to the identification of inequity-aversion parameters.

[14] In our implementation of the ring test, each vector (allocation) has a length of 1000. If a subject always chooses the option closest to her (estimated) motivational vector, its length is also 1000. We exclude from the sample subjects

motivational vector – which can also be expressed as the angle formed by the vector and the horizontal axis – describes the trade-off between the own and the other's welfare. For example, one can think of an individual whose vector has an angle of 26.6° – corresponding to a slope of 0.5 – as someone willing to give away 50 Euro cents to another individual for each Euro she keeps for herself. The slope of the vector provides a measure of α in Equation [1]: the marginal rate of substitution of *i*'s utility of money for *j*'s utility. The average angle of the motivational vector in our sample is 6.77°.[15] Figure 3 plots the distribution of vectors in the circle.

The ring test typically comprises a standard set of categories to classify individuals (Liebrand 1984), assigning to them one of five labels ('aggressive', 'competitive', 'individualistic', 'cooperative', or 'altruistic'). Each label corresponds to an area of the circle. One problem with this classification is that it makes for a poor distribution of data across categories, since subjects tend to concentrate on the 'individualistic' and 'cooperative' categories. In our sample, 93.13% of subjects fall within these two categories. We therefore put forward a new classification that balances a good categorization of the data with an empirically relevant set of categories. This is presented in Table 1 and Figure 3.

The competitive category comprises individuals who are willing to sacrifice part of their gains to decrease the other individual's earnings. Individualistic types' only motive is to maximize personal gains, regardless of the trade-off imposed on others. In contrast, altruists are willing to give up some of their personal gains in order to increase the gains of an anonymous other. We divide altruists in three categories ('weak', 'mild', and 'strong') in order to obtain a balanced classification. Of course, this classification is no less *ad hoc* than the standard one. However, we should note that the distribution of motivational vectors in our sample is consistent with previous evidence (e.g., Offerman et al. 1996, van Dijk et al. 2002, and Engel 2011).

Table 1 - Motivational Categories: Definition and Sample Distribution

	Angle (°)	*Slope*	*% subjects*
1 - Competitive	<0	<0	19.74
2 - Individualistic	0	0	23.03
3 - Weakly Altruistic	(0,8.53]	(0,0.15]	20.39
4 - Mildly Altruistic	(8.53,21.8]	(0.15,0.4]	18.42
5 - Strongly Altruistic	>21.8	>0.4	18.42

Notes. Rows define the motivational categories, based on angle (column 2) or slope (column 3) of the estimated motivational vector. The final column shows the distribution of our subjects.

5.2. In-group Bias Induction

In order to assess the extent to which in-group bias was successfully induced, and to know how it varies across treatments, we consider our measurements (the two dictator allocations

whose vector has a length smaller than 600 (60% consistency threshold). For comparison, a random sequence of choices yields a motivational vector with length equal to 500. The same consistency criterion was used by van Dijk et al. (2002). Virtually all works that employ the ring test put in place a consistency threshold for analysis (e.g., Liebrand and McClintock 1988 impose a 25% threshold, while Offerman et al. 1996 impose 33%).

[15] This corresponds to an average slope of 0.12. In our analysis, we use the average vector's angle (and not the slope) to represent a subject's other-regarding preference type.

and the self-reported attachment to in-group and out-group in the questionnaire). Figure 4 presents results from both measures.

The percentage allocated to the in-group member achieves its highest value in High. Using each subject's average of the two allocation decisions as the unit of observation, we obtain significant differences between High and the other two treatments (two-sided Mann-Whitney test p=0.01 and p=0.03 for comparisons with Low and Control, respectively; 'MW' henceforth).[16] High is also different from Low and Control treatments, both before (MW p=0.06 and p=0.08) and after (MW p=0.10 and p=0.03) the participation game with marginal significance. Allocation decisions in the Low treatment are not statistically different from those of Control (MW, p>0.75 for separate and average comparisons).

In the High treatment, a subject allocates approximately 80% of the total amount to the member of his or her own group before the participation game; in the Low and the Control treatments this figure is lower (approximately 72%). These numbers are in line with those typically found in the literature (e.g., Chen and Li 2009 find values in the 65-75% range). Allocations before and after the participation game are not statistically different, neither overall nor for any specific treatment (MW, all p>0.59). Finally note that the results for the Low and Control treatments provide some support for the minimal group paradigm (Tajfel 1982); subjects give more to the in-group member than to someone from the out-group, even when no in-group bias is induced.

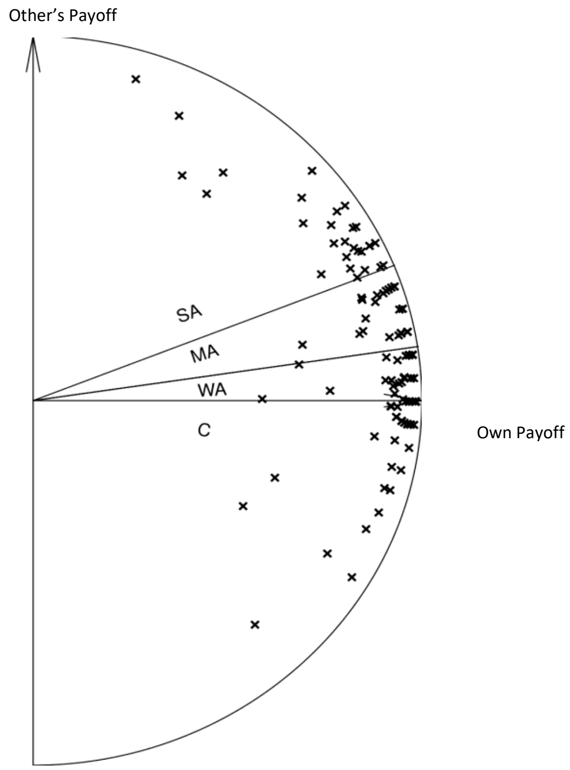

Figure 3 – Distribution of subjects over motivational categories

Notes. SA/MA/WA/C stand for the categories Strong Altruist/Mild Altruist/Weak Altruist/Competitor. The Individualist category coincides with the horizontal axis.

[16] Using a one-tailed t-test, a 5% significance level, and assuming: i) an expected difference of 20 percentage points (i.e., 0.20) between High and Low, ii) a difference of 0.1 between both High and Control and Control and Low, iii) a standard deviation of 0.2 in all treatments, the *ex ante* power of the statistical test is 99.9% for the High-Low comparison, and 78.9% for the other two comparisons.

The results of the allocation decisions are corroborated by the second indicator of in-group bias. In the questionnaire, subjects were asked to report their attachment to the in-group and the out-group on a 1-to-10 scale. [17] Computing the difference between these two values yields a measure of in-group bias on a -10-to-10 scale (see Figure 4). Average in-group bias is 3.9 in High, 2.2 in Low, and 2.9 in Control. The difference between High and Low is statistically significant (MW, p=0.01), while those between High and Control, and Low and Control, are not (MW, p=0.37 and p=0.27, respectively).[18]

The purpose of our procedure was to create distinct levels of in-group bias between the High and the Low treatments. In particular, we conjectured that subjects in High would show higher levels of in-group favoritism, as the out-group has a different 'laboratory identity'. In contrast, the out-group in Low shares the same 'laboratory identity'. The results presented in Figure 4 and the corresponding statistical tests show that our procedure was successful, albeit that the differences are relatively small. This analysis is disaggregated for the different other-regarding preference types in Appendix D.[19]

As mentioned when we discussed the experimental design, for our inference to be valid openness should neither be correlated with ring-test outcomes nor with choices in the participation game. We find statistical evidence in favor of both requisites. Namely, only Agreeableness seems to be significantly correlated with participation behavior, and no personality trait seems to be significantly correlated with other-regarding preferences as measured by the ring test.[20]

[17] The questions are reproduced in Appendix E.

[18] Using the same procedure as before to calculate power, and assuming: i) an expected difference of 2 points between High and Low, ii) a difference of 1 point between both High and Control and Control and Low, iii) a standard deviation of 2.5 in all treatments, the *ex ante* power of the statistical test is 99.7% for the High-Low comparison, and 62.4% for the other two comparisons.

[19] With respect to other-regarding preferences and in-group bias, two questions can naturally be raised: what types are most likely to show a high degree of in-group favoritism, and what types are more likely to be influenced in their in-group bias by interaction in the participation game? In sum, Appendix D yields two main findings on the interaction between other-regarding preferences and in-group bias. First, on aggregate, in-group bias does not differ systematically across types. Second, except for Competitors, in-group bias is not affected by the interaction with others in the participation game.

[20] See Table C 2 in the Appendix. The lack of a relationship between openness and other-regarding preferences in our data should not come as a surprise. Most of the literature finds no relationship between openness and other-regarding preferences, even though a relationship is often found for other personality traits (e.g., Ben-Ner et al. 2004, 2008, Bekkers 2006, Swope et al. 2008).

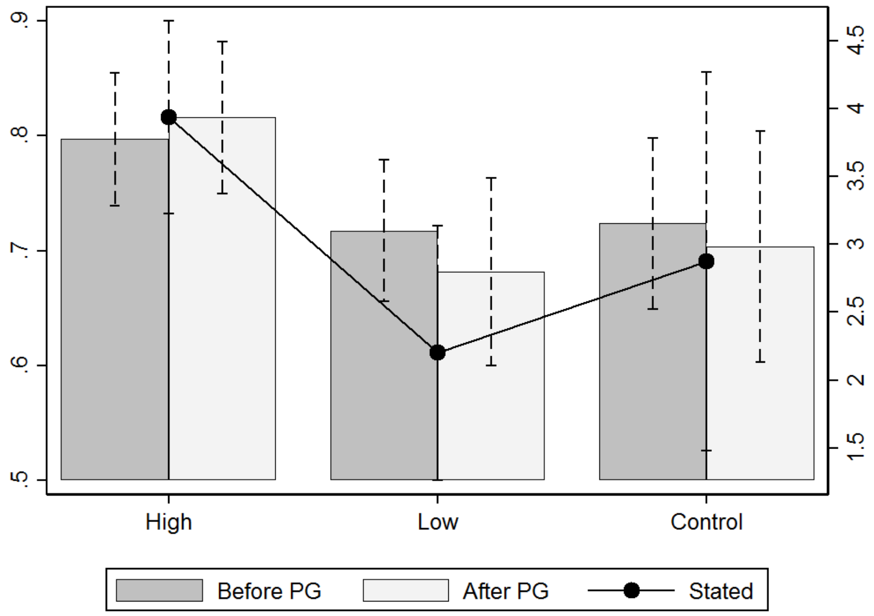

Figure 4 - In-group Bias Induction Across Treatments.

Notes. Bars show the fraction of the endowment allocated to the member of the in-group (left axis). Dark gray (light gray) gives the measurement before (after) the participation game. The difference in reported attachment to the own and other groups is given by the connected dots (right axis). The dashed lines represent 95% confidence intervals.

5.3. Other-regarding Preferences and Participation Behavior

We now turn to our main research question, which is how participation is affected by other-regarding preferences and in-group bias. We start by relating motivational vectors to choices in the participation game. Figure 5 presents average participation rates for each type throughout the participation game. We observe that competitive individuals clearly participate less often than any other type. The difference between the individual average participation of competitors and any other category is statistically significant (MW p<0.01 for all comparisons).[21] There are no other statistical differences once we exclude competitors.

Consistent with previous evidence, there is a tendency for participation levels to decrease as the game unfolds (e.g., Schram and Sonnemans 1996a). Regressing each type's average participation on a linear trend yields a negative and significant relationship for all types except strong altruists, who exhibit a positive, albeit non-significant, increase in participation over time (see Table C 4 in Appendix C). We conclude that strong altruists are the only type whose cooperative behavior towards the in-group does not decrease over time.

[21] Our non-parametric tests of type behavior use individual average participation over the 40 periods as the unit of observation. Non-parametric tests of aggregate behavior use the average participation of a pair of competing groups (an electorate) as the unit of observation. Using the same procedure as before for power calculations, and assuming: i) a 10% difference between average individual participation across types, ii) a 15% standard deviation within each type, and iii) an equal distribution of the sample over the 5 categories, i.e., 32 subjects of each type, results in an *ex ante* power of 84.61%.

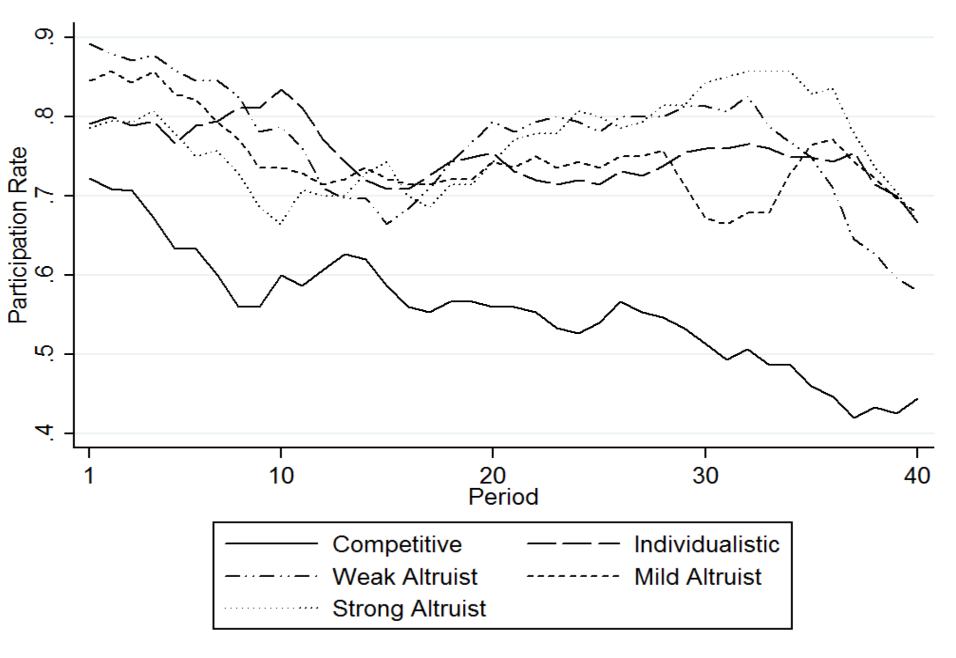

Figure 5 - Evolution of Participation and Motivational Categories.
Notes. Average participation rates of participants of a given motivational category.

In order to see in more detail how participation depends on other-regarding preferences, Figure 6 shows a scatter plot of individual participation rates for each type, as well as a fitted least squares trend. We observe that the relationship between the individual participation rate (i.e., the fraction of the 40 periods that a subject chose to participate) and other-regarding concerns (measured by the angle of the motivational vector) is positive for most categories (by definition, there is no such relationship for the Individualistic category). A regression of individual average participation on the degree of other-regarding preferences produces a positive coefficient for each category, even though statistical significance is only achieved when considering the full sample and (marginally so) for the group of strong altruists (see Table 2). As conjectured, individual average participation is increasing in a subject's other-regarding preferences.

All in all, our analysis shows that there is a positive relationship between other-regarding preferences and participation behavior. The effect is statistically strong at the aggregate level and appears to be present for each of the categories we distinguished. A pronounced difference is observed for the category of competitors, who significantly abstain more than other types. This evidence lends support to Hypothesis 1.

Table 2 - Participation and Other-Regarding Preferences

	All Categories	*Competitor*	*Weak A.*	*Mild A.*	*Strong A.*
Motivational Vector (°)	0.024***	0.012	0.176	0.002	0.038*
	(2.92)	(0.60)	(1.40)	(0.03)	(1.70)
Constant	1.645***	1.114***	1.386*	2.028*	0.175
	(8.97)	(3.02)	(1.83)	(1.65)	(0.21)

Notes: Panel regression (logit with random effects at the individual level); N=152. Dependent variable: average individual participation in the 40 periods of the participation game. A trend and a squared trend terms are included as controls, but not reported. Absolute z-scores in parentheses. *** (**, *) indicates significance at the 1% (5%, 10%) level.

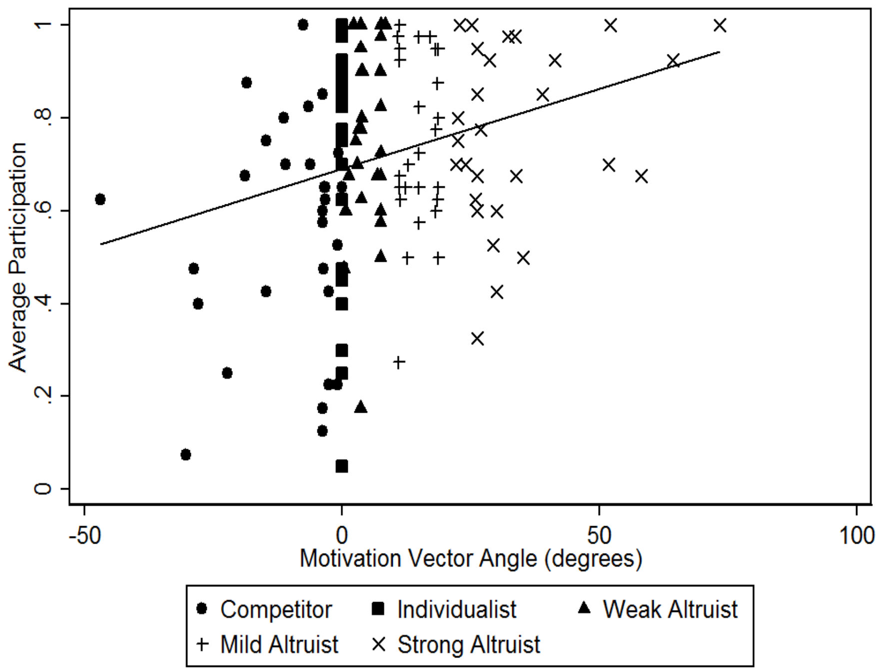

Figure 6 - Individual Participation Rates and Other-Regarding Preferences.
Notes. The plotted line is a linear least squares trend fitted to the entire sample.

5.4. In-group bias and Participation Behavior

Our second and third hypotheses concern the relationship between in-group bias and participation behavior. As formulated in Hypothesis 2a, we expect electorates where in-group bias is stronger to exhibit higher levels of aggregate participation. At the individual level, Hypothesis 2b predicts that subjects with higher in-group bias participate more often.

Figure 7 shows aggregate participation levels for each of the three treatments across the 40 periods of the participation game. Aggregate participation rates are highest in the treatment High (74.3%), followed by Low (69.3%) and Control (69.2%). Participation variance is lowest in High, followed by Low and Control (standard deviations equal to 4.3%, 7.1% and 10.9%, respectively).

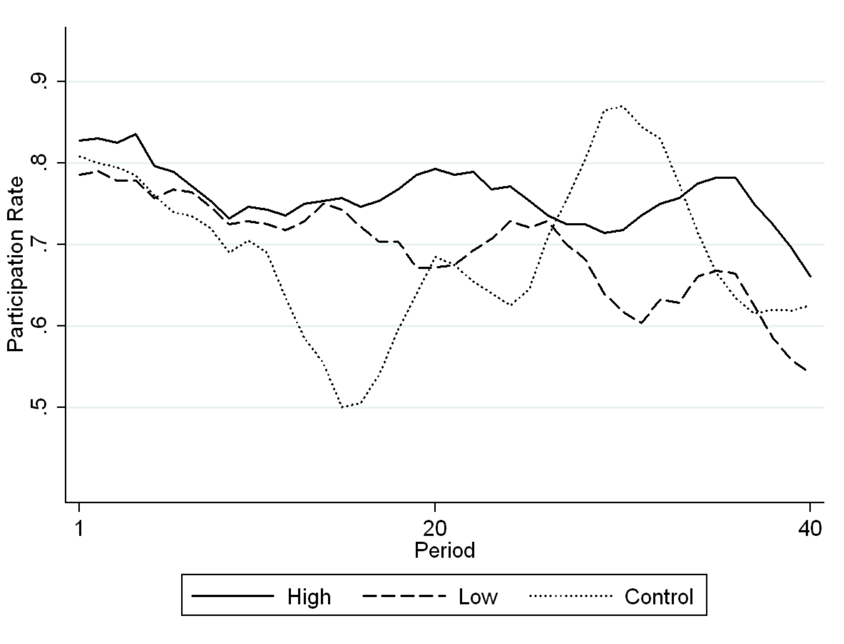

Figure 7 - Participation across Treatments.

Notes. For each treatment, the corresponding line shows the five-period moving-average (two lags and two leads, where available) average participation rate.

The participation patterns we observe are similar to previous evidence in some respects: a decrease in participation as interaction is repeated, and an abrupt decline in the last couple of periods (see Schram and Sonnemans 1996a, b). In the first 10 periods participation is remarkably similar in the three treatments. After this point, we observe a departure of participation in High from the levels observed in Low, while Control exhibits a more erratic pattern. Despite the 5 percentage-point difference between High and the other treatments, neither mean nor median participation in High is statistically different from Low and Control (MW $p>0.33$, where the average participation rate in an electorate is the unit of observation). Similarly, we observe no treatment differences in the last 20 or 10 rounds. A possible reason is that the in-group bias difference between High and the other two treatments, despite being significant, is not sufficiently large to produce differences that can be detected at this level of aggregation.

Hence, based solely on a non-parametric analysis, we cannot reject a null hypothesis of no differences in favor of Hypothesis 2a.[22] On the other hand, if we regress (with OLS) the difference in participation in High and Low on a linear trend, the coefficient is statistically significant ($p=0.00$), which indicates a difference does appear to develop over time.[23]

At the individual level, we first compare average participation across all treatments. Splitting the sample in terciles according to average allocation decision in the two dictator allocation tasks, we find that the first tercile (those with the lowest in-group bias) participates less often (69.6%) than the second (73%) and third (72.8%) terciles. The difference does not

[22] Using the same power calculation procedure as before, and assuming: i) an average participation rate of 80, 65, and 50% in High, Control, and Low, respectively, ii) a 15% standard deviation in each treatment, would result in *ex ante* power of 96.6% for the High-Low comparison, and 46.4% for the other two comparisons.

[23] Another variable that can influence participation differences is the level of consensus when choosing the laboratory's name. Comparing the average group participation rates of high consensus groups (more than 6 out of 10 votes in favor of the chosen name) vis-à-vis the low consensus units produces no statistically significant results (MW $p>0.30$).

reach statistical significance when we use individual average participation as the unit of observation, however (MW *p*>0.21). At this level of aggregation, we find no support for Hypothesis 2b. Below, we will see that more support for the alternative Hypothesis 2b is obtained when employing a multivariate analysis framework.

5.5. Multivariate Analysis

For the multivariate analysis of the participation decision, we use a regression model that takes the panel structure of our data into account and corrects for individual heterogeneity. Two points related to our empirical strategy are in order. First, since we observe decreasing participation rates across repetitions, we estimate models that include a time trend (the results confirm that there is a significant negative trend). Second, we employ the average of the two allocation decisions as a subject's in-group bias measure (recall that there is a great degree of consistency between the first and the second allocation decision). Table 3 provides our regression model's estimates, which allow us to establish three results.

First, we note that the level of other-regarding preferences as measured by the angle of the motivational vector significantly and positively affects the likelihood to participate. The 'average subject' (the one assigned the sample average value of each independent variable) is predicted to participate approximately 80% of the times by the model. A marginal increase in altruism leads to an increase in the probability of participating equal to 0.36%-points, an effect that is statistically significant (Wald, p<0.01). This means, for example, that an individual moving from the category Weakly Altruistic to Mildly Altruistic (a difference of approximately 10°) increases the probability of participation by approximately 3.6 percentage points. The difference between the two widest vectors is 142.18°, which implies a predicted difference of 49.8 percentage points in participation probabilities at the average marginal effect. The significant effect of other-regarding preferences on participation provides further support for Hypothesis 1. This effect is also observed when considering the High and Low treatments separately.[24]

Second, in support of Hypothesis 2a, we observe a positive aggregate effect of in-group bias on participation, compared to the control treatment, that is significant at the 5%-level. This follows from the coefficient estimate for the dummy variable High. Hence, being in an electorate with high in-group bias raises everyone's probability of participating in group action, independent of the individual's own level of in-group bias.[25]

Third, the coefficients for the in-group bias are weakly supportive of Hypothesis 2b (an individual effect) for the Control treatment. The effect is marginally significant (*p*=0.085).[26] The effect is not significant in High or Low, however. A similar regression for decisions in High gives a coefficient for in-group bias that is equal to -0.363 (*p*=0.522). For Low, the coefficient is 0.030 (*p*=0.952). We conclude that there is a weak relationship between individual in-group bias and participation in groups where we have not induced in-group bias in any way. Indeed, in Control, the coefficient for in-group bias is 1.062 (*p*=0.067*) with a marginal effect of 0.189 (*p*=0.07*). We will return to this point in the concluding discussion of section 6.

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[24] The effect is also positive for the control treatment, but not statistically significantly different from zero at conventional levels.

[25] The lack of a significant coefficient for Low indicates that the procedures we used to induce group identity in and of themselves did not affect participation.

[26] If we use the measure of group identity (based on the responses in the questionnaire), this effect is significant at the 5% level.

Table 3 – Panel Regression Model

	Coefficient	*Marginal effect*
Motivational Vector	0.022***	0.004***
	(2.74)	(2.69)
In-group bias	0.980*	0.158*
	(1.72)	(1.71)
High	1.096**	0.162**
	(2.07)	(2.23)
Low	0.397	0.062
	(0.89)	(0.92)
Trend	-0.032***	-0.005***
	(2.66)	(2.61)
In-group bias*High	-1.336*	-0.215*
	(1.72)	(1.72)
In-group bias*Low	-0.961	-0.155
	(1.31)	(1.31)
Constant	1.083***	---
	(2.99)	---

Notes Cells present the panel logit estimation (with random effects at the individual level) coefficients (column 2) and marginal effects (column 3); *N*=152. Dependent variable: individual participation in each of the 40 periods. High and Low are dummy variables representing these treatments. In-group bias is measured as the average of the two dictator allocation decisions, re-scaled to the interval [-1,1]. Absolute z-scores in parentheses. * (**, ***) indicates significance at the 10% (5%, 1%) level. Marginal effects are computed for the mean sample values of our variables.

5.6. Conclusions with respect to our Hypotheses

To sum up, we find robust evidence in favor of a positive relationship between individual participation and other-regarding preferences (Hypothesis 1). The data depicted in Figure 6 and the regression analysis of Table 2, together with the significant coefficient obtained in the panel models, provide ample evidence in this respect. Regarding the conjecture that participation should be higher in the High treatment (Hypothesis 2a), we find confirming evidence when we use the panel regression framework, in spite of the inconclusive evidence reported in section 5.4. We also show that, whenever in-group bias is not manipulated (the Control treatment), there is tentative evidence that subjects who show a higher degree of in-group bias tend to participate more (Hypothesis 2b).

6. Conclusion

This paper is an attempt to contribute evidence from a controlled environment to the stream of literature that tries to evaluate political participation in light of other-regarding concerns and group-directed duties. In particular, we have used an experimental framework to address the influence of other-regarding motivations and in-group bias on political participation decisions. Our work follows in the footsteps of the emerging rational choice literature that puts forward a 'group-based model of turnout', as put forward by Feddersen (2004).

The empirical literature in political science and psychology has shown that group identity sentiments that result in in-group bias help explain patterns of individual political participation among several groups in society (e.g., Leighley and Vedlitz 1999 and Stokes 2003). However, establishing a causal link in the field poses considerable challenges, mostly because of the co-evolution of group identity, social connectedness, and group mobilization processes.

In this paper we report evidence from an environment where in-group bias is varied in a controlled fashion and in which we can observe the behavior of groups that subsequently compete for benefits. Victory depends on the sum of the individual efforts by the individuals in a group. Despite the extensive literature that analyzes the relationship between in-group bias and individual and group behavior in the laboratory, we believe to be the first, together with Cason et al. (2016), to do so in the context of inter-group competition.

Our main conclusions are that individual participation is increasing in other-regarding concerns and in-group bias, as conjectured. We also found support for an impact of in-group bias on aggregate participation levels (but only in a multivariate analysis that corrects for the influence of confounding factors). This latter result implies that the higher participation levels observed in field studies for environments where group identity is high (e.g., contexts with pronounced ethnic divisions and high political participation) might be due to this heightened sense of group identity. Whether group mobilization adds something to this effect is a question for further research.

Finally, there is a modest correlation between individual-level sense of in-group bias and participation in our Control treatment, i.e., when we did not induce any in-group bias. In this case, people with a large bias towards the in-group tend to participate more in political action. When we induce a high sense of in-group bias at the electorate level, individual differences still exist, but no longer matter for the participation decision. Similarly, when our procedures induce bias towards both the in-group and the out-group, differences still exist (at a lower level), but do not matter for participation. In other words, individual differences within a group matter only when people experience moderate differences between the groups.

These results can be interpreted in light of Fowler (2006), who has shown that other-regarding subjects only participate more often in politics if they are strong party identifiers. We have shown that a positive relationship between other-regarding preferences and participation exists even if we control for in-group bias. In the world outside the laboratory, it seems natural that more generous party identifiers participate more, as they believe that their supported party will improve the well-being of their fellow citizens. We show that, more generally, individuals with pro-social motives are more likely to bear the costs of participation for the group's benefit. Our results suggest that, in principle, all individuals with other-regarding concerns should be willing to participate, provided there exist platforms that advance their group's interests.

All in all, we conclude that other-regarding individuals participate more. Moreover, a common sense of identification with the group yields higher aggregate levels of political participation. As described above, the effect of in-group bias is more complex at the individual level and depends on experienced differences between groups. Each of these results may serve as input in a canonical model as envisaged by Feddersen (2004).

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Appendix

A. Equilibria of the Participation Game

In this Appendix, we formally derive the equilibria of the participation game, which allows us to obtain comparative static results on the hypotheses we want to test.[27] Define the set of players as $I = [1, \ldots, M, M+1, \ldots, M+N]$, where M and N are the number of players in groups 1 and 2, respectively. We denote the in-group and the out-group of player i by G_i and G_{-i}, respectively. We consider the case where $M = N$ and both are odd. The action space of a player has two elements: participation and non-participation. A (mixed) strategy is simply a probability of participation, which is denoted by p.

We posit individual preferences that accommodate general altruism towards others, as well as discrimination between in-group and out-group members:

$$U_i = U_i\big(u_i(x_i); U_j, j \in \{G_i \backslash i\}; U_h, h \in G_{-i};\ \alpha_i, \beta_i, \gamma_i\big) \qquad [1A]$$

In Equation [1A], U_i denotes *i*'s utility, x_i gives her monetary earnings, and $u_i(x_i)$ describes her utility of wealth. α_i is a parameter describing the weight i attributes to the others' utility, relative to her own, β_i is the weight she attributes to the utility of other members in her own group, and γ_i is the weight she attributes to the utility of members in the other group.

To derive comparative statics for the participation game, we make the following three assumptions:

1. If members of the own group receive higher utility from an outcome than members of the other group do, then more in-group bias leads to higher utility:

$$U_{j,j \in \{G_i \backslash i\}} > U_{h,h \in G_{-i}} \Rightarrow \frac{\partial U_i}{\partial \beta_i} > 0 \qquad [2A]$$

2. If members of the own group receive lower utility from an outcome than members of the other group, then more in-group bias leads to lower utility:

$$U_{j,j \in \{G_i \backslash i\}} < U_{h,h \in G_{-i}} \Rightarrow \frac{\partial U_i}{\partial \beta_i} < 0 \qquad [3A]$$

3. The utility derived from winning the participation game (and, as a consequence, $j \in \{G_i \backslash i\}$ also winning and $h \in \{G_{-i}\}$ losing the participation game) is larger than the utility derived from losing the participation game (and, as a consequence, $j \in \{G_i \backslash i\}$ also losing and $h \in \{G_{-i}\}$ winning the participation game):

$$U^w \equiv U_i\big(x_i = B^w, x_{j,j \in \{G_i \backslash i\}} = B^w, x_{h,h \in G_{-i}} = B^l\big) > U^l \equiv U_i\big(x_i = B^l, x_{j,j \in \{G_i \backslash i\}} = B^l, x_{h,h \in G_{-i}} = B^w\big) \qquad [4A]$$

[27] We derive stage-game equilibria for the game our subjects play for forty rounds in fixed electorates. Due to a multiplicity of equilibria in the one-shot game (recall that we follow the literature in considering only quasi-symmetric equilibria) there is a plethora of equilibria in the repeated game. A repetition of the stage-game equilibrium that we derive is one of these. Note that we only use the theory as a benchmark with which we can derive comparative statics.

where U_i^w (U_i^l) is the utility in case of victory (defeat). Note that [4A] implies an intuitive restriction on the parameters α_i and β_i, i.e., they are such that any individual prefers the own team winning the participation game to the other team winning.

Equations [2A]-[4A] yield:

$$\frac{\partial U^w}{\partial \beta} > 0, \frac{\partial U^l}{\partial \beta} < 0 \Rightarrow \frac{\partial \left(U^w - U^l\right)}{\partial \beta} > 0 \qquad [5A]$$

In words, [5A] states that an increase in an individual's in-group bias will lead to a higher marginal benefit of her group winning the participation game.

Next, we need to determine how this increased marginal benefit affects the choice to participate. *Ceteris paribus*, this will yield a higher participation probability, simply because the benefits increase while the costs remain unchanged. This is not necessarily true in an equilibrium analysis, however, because other voters may respond to variations in an individual's incentives. We therefore proceed with equilibrium analysis. We assume complete information throughout: in addition to the rules of the game, monetary payoffs and group size, we assume that players know the utility functions of all other players. This simplification does not hinder the derivation of broad comparative statics and keeps the analysis tractable. The alternative would be to adopt incomplete information (i.e., players do not know the other players' preference parameters), which would require further *ad hoc* assumptions on beliefs.

We use a utility function of the type defined in [1A]. These individual preferences accommodate general altruism towards others, as well as discrimination between in-group and out-group members (see section 2 of the main text for an explanation of the notation):

$$U_i = u_i + \alpha_i \left(\beta_i \sum_{j \in \{G_i \setminus i\}} U_j + \gamma_i \sum_{h \in G_{-i}} U_h \right) \qquad [6A]$$

The utility payoff depends on whether a player's group wins or loses the game: define $\Gamma = \{w, l\}$ as these two events. Given our preference structure, the payoffs of the game are interdependent across players. Assuming that i is in the winning group, [6A] can be rewritten by substituting u_i for B^w and plugging in B^w and B^l in the utilities of the other players. The utility if i loses, U_i^l, can be obtained in a similar fashion. For given preferences and for each case (winning or losing), this yields a system of $M + N$ equations (the individual utilities) in $M + N$ variables (the utility payoffs):

$$\begin{aligned} &[I - \Omega]u(\Gamma) = b(\Gamma) \\ &\Rightarrow u(\Gamma) = [I - \Omega]^{-1} b(\Gamma) \end{aligned} \qquad [7A]$$

where $I_{((M+N)\times(M+N))}$ is the identity matrix,

$$\Omega_{((M+N)\times(M+N))} = \begin{bmatrix} 0 & \alpha_1\beta_1 & \dots & \alpha_1\beta_1 & \alpha_1\gamma_1 & \dots & \alpha_1\gamma_1 \\ \alpha_2\beta_2 & \ddots & & & & & \alpha_2\gamma_2 \\ \vdots & & & & & & \vdots \\ \alpha_M\beta_M & & & & & & \alpha_M\gamma_M \\ \alpha_{M+1}\gamma_{M+1} & & & & & & \alpha_{M+1}\beta_{M+1} \\ \vdots & & & & & \ddots & \vdots \\ \alpha_{M+N}\gamma_{M+N} & & \dots & \alpha_{M+N}\gamma_{M+N} & \alpha_{M+N}\beta_{M+N} & \dots & 0 \end{bmatrix},$$

$u(w) = \left(U_1^w, \dots, U_M^w, U_N^l, \dots, U_{M+N}^l\right)'$, and $b(w) = \left(B^w, \dots, B^w, B^l, \dots, B^l\right)'$ (with the case of $\Gamma = l$ defined accordingly). The solution to [7A] allows us to calculate the utility of a winning and losing player for any combination of B^w, B^l, c, and other-regarding and in-group bias parameters (Ω).

Following Palfrey and Rosenthal (1983), it can be shown that for the case with equal group sizes there exists a unique Nash equilibrium in pure strategies with full participation (for $c < (U^w - U^l)/2$). In addition, a plethora of mixed-strategy Nash equilibria exist. To refine this set, and for reasons discussed in section 3 of the main text, the analysis of participation games has often resorted to the quantal response equilibrium concept (QRE; McKelvey and Palfrey 1995).

Adding a stochastic component to decision rules [2] and [3] in the main text, ($\mu\varepsilon_i, i = \{P, NP\}$, respectively) implies that a player prefers participation to non-participation if:

$$[\Pr[m = n] + \Pr[m = n-1]]\frac{(U_i^w - U_i^l)}{2} - c > \mu(\varepsilon_P - \varepsilon_{NP}) \quad [8A]$$

where μ is a parameter that governs the extent of bounded rationality (noise) in players' decisions, and the ε_i represent i.i.d. realizations of a random variable. Following much of the literature, we assume that the difference of the errors in [8A] follows a logistic distribution. This implies the following equilibrium condition for each player (see Goeree and Holt 2005 for details):

$$p_i = \frac{1}{1 + exp\left[\frac{c - \left[(\Pr[m = n] + \Pr[m = n-1])\frac{(U_i^w - U_i^l)}{2}\right]}{\mu}\right]}, i = 1, \ldots, 10 \quad [9A]$$

The μ parameter is typically estimated from experimental data. Goeree and Holt (2005) show that a value of μ=0.8 accommodates the data of Schram and Sonnemans (1996a), in which participation fluctuates in the 30-50% range. Since we observe higher participation levels, our data would possibly imply a slightly higher value of μ. For our purposes the precise value of this parameter is not particularly relevant as only point predictions, and not comparative statics, will depend on it. For this reason, we use μ=0.8, for the numerical QRE results that follow.

In-group Bias and Aggregate Participation

To start, we consider totally quasi-symmetric equilibria (Palfrey and Rosental 1983) where all voters in group 1 vote with the same probability p_{G1} and all voters in group 2 vote with the same probability p_{G2}. For participation games where both groups have an equal size the probability terms are then defined as (for a player in group 1):

$$\Pr[m = n] = \sum_{k=0}^{M-1} \binom{M-1}{k}\binom{N}{k}(p_{G1})^k(1 - p_{G1})^{M-1-k}(p_{G2})^k(1 - p_{G2})^{N-k} \quad [10A]$$

$$\Pr[m = n-1] = \sum_{k=0}^{M-1} \binom{M-1}{k}\binom{N}{k+1}(p_{G1})^k(1 - p_{G1})^{M-1-k}(p_{G2})^{k+1}(1 - p_{G2})^{N-k-1} \quad [11A]$$

The assumption that in equilibrium every player in the same group participates with the same probability can be intuitively justified by the assumption that players are homogenous in their other-regarding preferences. For our analysis, we further assume here that players in both groups have the same parameters (and therefore, $p_{G1} = p_{G2} = p$), which means that we will investigate how equilibria change when we vary the in-group bias parameters for all players. Our strategy is to numerically determine the equilibrium p for distinct parameters and to derive comparative static predictions from comparing these equilibria.

We first determine the effect of in-group bias for this homogenous case. With respect to the preferences put forward in [6A] (with $\alpha_i = \alpha$, $\beta_i = \beta_i$, $\gamma_i = \gamma$, $\forall_i$) we implement five parameterizations that use $\alpha = 0.12$ (the average slope of the motivational vector in our data) but have different in-group bias ratios $\beta/\gamma = \{0, 1/3, 1, 3, \infty\}$. For each parameter configuration, we solve [7A] and substitute the result and the above probabilities in [9A] and solve for *p*. This yields the QRE $p = \{0.26, 0.28, 0.32, 0.48, 0.58\}$, respectively These are also the predicted levels of aggregate participation. We conclude that for the homogenous case, and the moderate level of altruistic concerns found in our data ($\alpha = 0.12$), equilibrium (aggregate) participation is increasing in in-group bias.

The same is true for the parameters obtained via a standard maximum likelihood procedure performed on our experimental data from the participation game. The likelihood function is the product of the likelihood contributions of each single individual decision in the participation game. Holding the QRE error parameter constant at 0.8, we computed the (log-)likelihood for several combinations of parameter values. We implemented a combination of values of α between 0.1 and 2, in steps of 0.1 (20 values), and of values of β/γ between 2/3 and 8/3, in steps of 0.1(20 values). We imposed the restriction that β_i+γ_i=1, as mentioned above. Using a grid search, we conclude that the (log-)likelihood is maximized for α=0.5 and β/γ=2.067 (Log-likelihood=-3618.56). Note that the magnitude of α depends on the normalization chosen for β_i+γ_i.

Altruism, In-group Bias, and Individual Participation

Next, we drop the assumed homogeneity and allow for different mixed strategies for each player. This enables an investigation of the comparative statics at the individual level. The probability terms become, for each player i:

$$\Pr[m = n] = \sum_{j=1}^{126} \prod_{h \neq i} p_h^{A_{jk}} (1 - p_h)^{(1-A_{jk})}, k = \begin{cases} h, if\ h < i \\ h - 1, else \end{cases} \quad [12A]$$

$$\Pr[m = n - 1] = \sum_{j=1}^{126} \prod_{h \neq i} p_h^{B_{jk}} (1 - p_h)^{(1-B_{jk})}, k = \begin{cases} h, if\ h < i \\ h - 1, else \end{cases} \quad [13A]$$

where the A_{jk} correspond to the elements of a matrix, $A_{(126\times10)}$, whose rows contain combinations of binary elements corresponding to cases where *m*=*n* (a total of 126 cases). For example, for player i=1:

$$A_{(126\times10)} = \begin{bmatrix} -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 \\ -1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 0 & 1 \\ & & & & etc. & & & & & \end{bmatrix} \quad [14A]$$

We use –1 for the (unused) element of player i. As an example, consider the first row. This indicates the case where all of player i(=1)'s co-members vote, and four of the other group's members do so, which yields a 4-4 tie that makes her pivotal. There are five such configurations that yield a 4-4 tie (any of the five members of the other group can abstain). For the case of a 3-3 tie, there are 20 configurations (five for each of the four possible abstainers in the own group). In aggregate, this yields 126 situations where player i faces a tie. The matrix *B* is defined in an analogous way for the cases where she is pivotal because she can turn a loss into a tie, i.e., $m = n - 1$.

For diverse parameter sets, we again solve [7A] and substitute the results with the probabilities of being pivotal in [8A]. This allows us to numerically compute the vector of QRE probabilities,

p_i. We do so for parameter configurations in which we induce heterogeneity either in α_i (individual other-regarding concerns) or in β_i/γ_i (individual in-group bias). Table A 1 and Table A 2 present parameterizations for these two cases, respectively.

We induce other-regarding heterogeneity by allowing each player in a group to have a different α_i, while keeping groups symmetric for parsimony reasons. One player, call her player 1, has a baseline value of $\alpha_1 = \alpha^*$, which increases with an increment of 0.1 for the subsequent players, such that player 4 has $\alpha_4 = \alpha^* + 0.3$, for example. We compute equilibria for seven different values of α*, which were chosen such that values within two standard deviations of the average α in our data are covered. For each of these baseline values of α^*, we compute equilibrium probabilities for seven values of in-group bias, which is kept constant in both groups ($\overline{\beta/\gamma}$). We therefore have forty-two parameter configurations. For each configuration, the individual participation probabilities always have a monotonic relationship with respect to the parameter's increment.

The results are presented in Table A 1. For each parameterization, we report whether this relationship is negative ('-'), positive ('+'), or constant ('='). We observe that the individual probability of participation is generally increasing in other-regarding concerns for in-group bias levels of 4/3 and above. If the in-group bias is smaller than 1 (i.e., *i* prefers the other group), more altruistic people will participate less. For the average level of other-regarding concerns in our data (α=0.12), individual participation is increasing in other-regarding concerns for all values of in-group favoritism. This relationship is reversed when a high level of other-regarding concerns is combined with very high values of in-group favoritism, though one may doubt the empirical relevance of this combination as it is not observed in our data. In general, the results presented in Table A 1 provide support to Hypothesis 1: individual participation is increasing in other-regarding for parameter values that are empirically relevant.

Table A 1 - Other-regarding concerns and individual participation

α^*	$\overline{\beta/\gamma}$	0	2/3	4/3	2	8/3	∞
-0.75		+	-	+	+	+	+
-0.5		+	-	+	+	+	+
-0.25		-	-	+	+	+	+
0		-	-	+	+	+	+
0.25		-	-	+	+	+	-
0.5		-	-	+	+	-	-
0.75		-	-	+	+	-	-

Notes. The parameter α takes a baseline value for each parameterization, α*, which is incremented in steps of 0.1 for the players in each group in order to generate heterogeneity. The relationship between individual participation probabilities and α can be negative ('-') or positive ('+').

Table A 2 employs the same procedure to induce heterogeneity in the individual in-group bias parameters, i.e., each player in one of the symmetric groups has a different β_i/γ_i. One player, call it player 1, has a baseline value of $\beta_1/\gamma_1=\beta^*/\gamma^*$. The β ($\gamma$) increases (decreases) with an increment of 0.1 for the subsequent players, such that player 4 has $\beta_4/\gamma_4=(\beta^*+0.3)/(\gamma^*-0.3)$. We compute equilibria for six different values of β*/γ*, the ones presented in Table A 1 except 0 (such that in-group bias does not take negative values). The presented results show that individual participation is increasing in individual in-group bias for low values of other-regarding concerns. For values of α above 0.5 (which seem empirically irrelevant), an in-group bias above 8/3 (i.e., β>0.72) leads to a negative relationship. The in-group bias measurement that we implemented in the experiment does not allow for a precise correspondence between the subjects' choices and the parameters of our model. However, we find it plausible that someone allocating ¾ of the endowment to the in-group member cares three times more about the in-group, and therefore has an in-group bias ratio of $\beta/\gamma=3$. Subjects allocated an average of 148.6 out of 200 tokens to the in-group member (pooling all treatments and both decisions), which leads us to believe that such a ratio is plausible. Assuming an other-regarding parameter equal to the data average, our results support Hypothesis 2.b in the sense that individual participation is increasing in in-group bias in a parameter range that is compatible with the observed data.

Table A 2 In-group bias and individual participation.

$\bar{\alpha}$	β^*/γ^*	2/3	4/3	2	8/3	∞
-0.75		-	-	-	-	-
-0.5		-	-	-	-	-
-0.25		-	-	-	-	-
0		=	=	=	=	=
0.25		+	+	+	+	+
0.5		+	+	+	-	-
0.75		+	-	-	-	-

Notes. The parameters β/γ takes a baseline value for each parameterization, β*/γ*, which is incremented for subsequent players in each group in order to generate heterogeneity. The relationship between individual participation probabilities and β/γ can be negative ('-'), positive ('+') or constant ('=').

B. Value Orientation Test

The ring test of van Dijk et al. (2002) is reproduced in Table B 1.

Table B 1 – Ring Test

Decision	*Alternative A*		*Alternative B*		*Decision*	*Alternative A*		*Alternative B*	
	Self	Other	Self	Other		Self	Other	Self	Other
1	0	500	304	397	17	0	-500	-304	-397
2	304	397	354	354	18	-304	-397	-354	-354
3	354	354	397	304	19	-354	-354	-397	-304
4	397	304	433	250	20	-397	-304	-433	-250
5	433	250	462	191	21	-433	-250	-462	-191
6	462	191	483	129	22	-462	-191	-483	-129
7	483	129	496	65	23	-483	-129	-496	-65
8	496	65	500	0	24	-496	-65	-500	0
9	500	0	496	-65	25	-500	0	-496	65
10	496	-65	483	-129	26	-496	65	-483	129
11	483	-129	462	-191	27	-483	129	-462	191
12	462	-191	433	-250	28	-462	191	-433	250
13	433	-250	397	-304	29	-433	250	-397	304
14	397	-304	354	-354	30	-397	304	-354	354
15	354	-354	304	-397	31	-354	354	-304	397
16	304	-397	0	-500	32	-304	397	0	500

Figure B 1 reproduces a snapshot of the first decision in our experimental environment:

Figure B 1 – Snapshot of a ring test decision

C. Auxiliary Tables

Table C 1 presents the input of subjects on the motivations of different strategies in the participation game. This information was collected in the post-experiment questionnaire. Note that the available options correspond to motivations that have a rough correspondence to our preference specification: (α=0), competitive (α<0), in-group co-operator (α>0, β>γ), overall co-operator (α>0, β=γ).

Table C 1 - Reported motivations in the questionnaire

Main goal of a participant who…	*…participated most of the times.*	*…did not participate most of the times.*
Make as much money as possible for himself or herself.	27.50%	77.50%
Increase the difference between his or her earnings and the earnings of other	1.88%	20.00%
Help his or her group make as much money as possible.	63.75%	1.25%
Help both his or her group and the other group make as much money as possible.	6.88%	1.25%

Table C 2 presents OLS regression results on the relationship between personality traits and participation behavior, and between personality traits and other-regarding preferences.

Table C 2 - Participation, personal traits, and value orientation

	Average Participation	*Altruism (motivational vector's angle)*
Agreeableness	-.0608*	0.080
	(-1.71)	(0.03)
Conscientiousness	.007	2.167
	(0.24)	(0.93)
Extraversion	.029	-2.539
	(0.93)	(-1.09)
Openness	-.056	0.449
	(-1.64)	(0.19)
Neuroticism	.007	-2.321
	(0.22)	(-0.90)
Altruism (motivational vector's angle)	.003**	
	(3.02)	
Constant	.975**	16.196
	(4.38)	(0.98)
R^2	0.11	0.02
OLS regression. *N*=152. t-statistics in parentheses. * (**) indicates significance at the 10% (1%)		

Table C 3 (left-hand side panel) shows average scores on the in-group bias measures separately for individuals with high and low in-group bias. The right-hand side panel presents the same results for individuals whose group won the quiz between laboratories and those who lost the quiz.

Table C 3 - In-group bias, openness, and uiz utcome.

In-group bias	Low Openness	High Openness	Lost Quiz	Won Quiz
Average of 1st and 2nd allocation	101.2	95.5	110.2	95.4
	(94.5)	(92.5)	(96.1)	(90.9)
1st allocation (before PG)	92.7	109.2	112.4	97.4
	(99.5)	(95.4)	(99.6)	(96.8)
2nd allocation (after PG)	109.7	81.8	108.0	93.4
	(117.2)	(131.4)	(127.7)	(119.3)
Stated	3.6	2.5	3.1	3.2
	(3.3)	(3.8)	(3.5)	(2.9)
N	76	76	57	55

Each cell presents the mean and standard deviation (in parentheses). Low (High) openness: bottom- (top-) 10 openness. Note that Control subjects are not included in the right-hand side panel, as this treatment does not include the quiz tournament. Using Mann-Whitney tests, we find no statistically significant differences (at the 5% level) across openness.

Table C 4 presents OLS regression results on the relationship between average individual participation and a linear trend, for each motivational category.

Table C 4 – Regression of Average Participation on a Linear Trend

	Competitors	*Individualists*	*Weak Altruists*	*Mild Altruists*	*Strong Altruists*
Constant	0.682**	0.794**	0.845**	0.804**	0.734**
	(34.42)	(40.12)	(30.58)	(37.05)	(23.83)
Linear Trend	-0.601**	-0.210*	-0.373**	-0.296**	0.150
	(-7.21)	(-2.49)	(-3.21)	(-3.21)	(1.15)
R^2	0.58	0.14	0.21	0.21	0.03

OLS regression, *N*=152. t-statistics in parentheses. * (**) indicates significance at the 10% (1%) level. Linear trend coefficients multiplied by 10^2.

Table C 5 presents model specifications that supplement the results presented in Table 3.

Table C 5 – Robustness checks

	1	2	3
Motivational Vector	0.022***	0.006	0.038***
	(2.74)	(0.62)	(3.12)
In-group bias	0.980*	0.984*	1.008*
	(1.72)	(1.71)	(1.78)
High	1.096**	1.097**	1.137**
	(2.07)	(2.07)	(2.16)
Low	0.397	0.399	0.424
	(0.89)	(0.89)	(0.96)
Trend	-0.032***	-0.038***	-0.039***
	(2.66)	(3.13)	(3.22)
$Trend^2$	0.000	0.000	0.000
	(1.19)	(1.21)	(1.28)
In-group bias*High	-1.336*	-1.339*	-1.401*
	(1.72)	(1.72)	(1.82)
In-group bias*Low	-0.961	-0.966	-1.037
	(1.31)	(1.31)	(1.42)
Strong Altruist			-1.599***
			(3.00)
Strong Altruist * Trend			0.035***
			(4.62)
Motivational Vector * Trend		0.001***	
		(4.46)	
Constant	1.083***	1.204***	1.253***
	(2.99)	(3.30)	(3.46)

Notes: *N*=152. Cells present the logit estimation (with random effects at the individual level); *N*=152. High and Low are dummy treatment variables. In-group bias is measured as the average of the two dictator allocation decisions, re-scaled to the interval [-1,1]. Strong Altruist is a type dummy. Absolute z-scores in parentheses. * (**, ***) indicates significance at the 10% (5%, 1%) level.

D. Other-regarding Preferences and In-group bias

In this Appendix, we examine the relationship between altruism and in-group bias. In other words, we are interested in whether distinct motivational types respond differently to in-group bias manipulations. For this purpose, Figure D 1 shows the average percentages of the endowment allocated to the in-group member – both before and after the participation game – per motivational category and treatment.

Consider first the average in-group bias across treatments. Individualists are the category showing the highest in-group bias, with an average allocation of 79,1% of the endowments to the in-group. The group showing the lowest in-group bias are Competitors, for whom the average allocation to the in-group member is 67.4%. Despite the apparent diversity in allocation behavior, the only significant difference across categories when using the average of the two decisions is between Competitors and Individualists (MW, p=0.05). A Pearson's chi-square test corroborates this point: there is no significant systematic difference over categories for the average of the two decisions, neither across all treatments, nor for any particular treatment (all p>0.35). In the allocation decision before the participation game, the bias is stronger for

Individualists than for Competitors and Mild Altruists (MW, p=0.02 for both comparisons; pooling treatments). For the allocation after the participation game, there are no statistically different decisions across motivational types. We conclude that subjects with distinct other-regarding preferences do not exhibit strong and systematic differences in in-group bias if we pool treatments.

Some types react differently to in-group bias manipulations, however. Considering the average of the two decisions, we find (weak) evidence of differential behavior of Weak Altruists between High and Control (MW, p=0.07), Strong Altruists between High and Low (MW, p=0.04), and Mild Altruists between both High and Low, and High and Control (MW, p=0.05 and p=0.08, respectively). Other comparisons do not reach statistical significance below 0.10. Bearing in mind that we observed a difference between the average allocation in High and in the other two treatments (sub-section 5.2), this evidence suggests that differences in in-group bias across treatments are mostly driven by the three altruistic types. Altruistic types not only share more with an anonymous other; they also allocate a relatively higher amount to the member of their in-group when in-group bias is high.

Next, we consider whether our subjects' in-group bias is affected by the interaction in the participation game. Eyeballing Figure D 1 suggests similar patterns across the two decisions, with a possible exception for Competitors. However, the difference between the two decisions is not statistically significant for this group, nor for any other.[28] The changes between the two measurements are symmetric. We observe some instances where subjects seem to be punishing their group (21.05% of the subjects decrease their allocation to the in-group after the Participation Game), a majority of subjects exhibiting stable in-group bias (54.61%), and some rewarding the in-group by giving more after the participation game (24.34%).

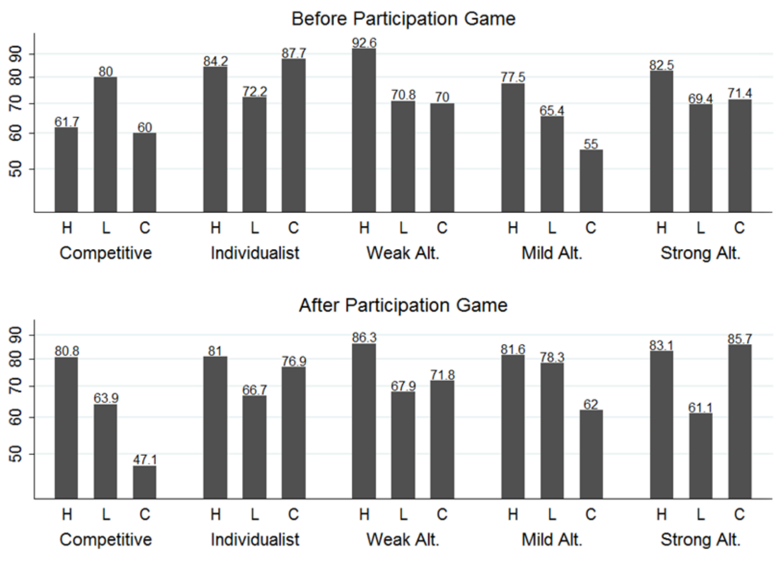

Figure D 1 – Other-regarding preferences and in-group bias

Notes: bars depict, for each motivational category, the average allocation to the member of the in-group, as measured before (upper panel) and after (lower panel) the participation game.

[28] At this level, the number of observations is small. The conclusions do not change if we aggregate data. Pooling across treatments, there is only evidence of different behavior for Mild Altruists across the two decisions (MW, p=0.08). Pooling across types, we observe no statistically significant differences for any treatment, when comparing behavior before and after the participation game.

E. Experimental Instructions

In this Appendix, we reproduce the experiment's instructions. Italicized text corresponds to text that was part of High and Low, but not Control. Text within square brackets was not part of the instructions, but is included to clarify the experimental protocol. Trivia questions and other non-reproduced details are available upon request. We also provide the post-experiment questionnaire.

Welcome to this experiment in decision-making. Depending on your decisions and the decisions of other subjects you may earn money. You will be paid privately at the end of the session. This is an anonymous experiment: your identity will not be revealed to other participants. The choices you make in early parts of the experiment may be used in later parts. Since this experiment involves gains and losses, it is possible (though very unlikely) that you make a negative amount in the experiment. In that case, your earnings will be deducted from the show-up fee. It is not possible that your losses exceed the show-up fee. This experiment is composed of three main tasks: Task 1, Task 2, and Task 3. You will receive instructions for a new task after the previous one has been completed. Note that a new task will only begin when every participant has finished the previous one.

Ring Test: In Task 1 you will be asked to make 32 decisions with monetary consequences. In each of the 32 situations you will have to choose between two options: Option A and Option B. For each option, two numbers will be displayed. The first is the number of tokens that you yourself will receive (positive amounts) or pay (negative amounts). The second is the number of tokens that the "Other" will receive or pay as a consequence of your decision. The "Other" is an anonymous person in this room, with whom you are randomly matched for the entire duration of Task 1. You will also be randomly matched with a second, different anonymous participant whose choices will affect you in the same way that your choices affect the "Other". Note: this means that the person who receives or loses money due to your decisions is a different person than the one whose decisions make you earn or lose money.

Your total payoff is the result of both your decisions and the decisions made by the participant whose choices affect you. No participant will know with whom he or she has been paired. Participants will only be informed about the total amount they earned or lost at the end of the experiment.

BFI: In Task 2 you will be asked to rate a number of characteristics that may or may not apply to you. There are 44 statements in total, distributed over 4 screens. Please pick a number from 1 to 5 next to each statement to indicate the extent to which you agree or disagree with that statement. Most people take no more than 10 minutes to complete this task.

The Openness Score: The statements you rated in Task 2 constitute a self-report inventory of personality traits (characteristics). We employed one of the most used and reliable personality trait tests. One of the traits that was measured is 'Openness', whose score can range from 1 to 5.

What is Openness?: Openness is a personality trait that involves active imagination, aesthetic sensitivity, attentiveness to inner feelings, preference for variety, and intellectual curiosity. It captures receptivity to novel experiences and ideas. It is not the cultural habits and knowledge acquired through education or breeding, nor is it related to intelligence or any other cognitive ability.

People whose Openness Score lies more to the left-hand side of the scale:

- tend to be more conventional and traditional in their opinions and behavior.
- prefer familiar routines to new experiences.
- generally focus on a narrower range of interests.
- are practical and down-to-earth.
- are able to more easily separate ideas from feelings.

People whose Openness Score lies more to the right-hand side of the scale

- are curious, open to unknown things and variety.
- are frequently described as imaginative, artistic, unconventional and tolerant.

- are more willing to accept the validity of astrology and esoteric phenomena.

- have more easily access to thoughts and feelings simultaneously, thus experiencing things more intensely.

We have constructed a ranking of the Openness Scores of the twenty participants of this experiment. This ranking ranges from 1 to 20, with 1 being the participant with the Openness Score more to the right, and 20 the participant with the Openness Score more to the left.

We would like to ask the ten participants with rankings 1 to 10 to move to another lab. Please wait for the organizers' instructions to do so. The other ten participants can remain seated. Given your ranking, we would kindly ask you to prepare to move to the other lab/remain seated.

[Subjects are asked to stand up and move to new computer stations]

For the next 3 minutes, we would like the participants in each lab to pick a name to identify their lab. We provide you with three pre-defined possibilities. You can discuss this with the other participants in the same lab as you by using the chat box below.

Each participant submits his preferred choice, and the most picked choice will be the name that will identify your lab for the remainder of the experiment.

Trivia Challenge: *The participants in [name of the participant's lab] and [name of the other lab] will now compete in a trivia challenge. Each participant will be asked five trivia questions. You have 30 seconds to answer each question. You cannot answer after time is up. Each correct answer corresponds to one point, an incorrect answer corresponds to zero points. In the end, the points of all participants in [name of the participant's lab] will be summed, and compared to the total number of points achieved by the participants in [name of the other lab]. The lab with more points gets a total reward of 2000 tokens (10 Euros), to be equally distributed among all participants of the winning lab, i.e. each participant gets 200 tokens (1 Euro). In case the two labs achieve the same number of points, the winner is decided randomly (with equal probability).*

First Allocation Decision: We would like to ask you to divide 200 tokens (1 Euro) between a random participant who is part of your group (excluding yourself) and a random participant who is part of the other group. *Recall that your group is composed of you and 4 other participants from [name of the participant's lab]. The other group is composed of 5 participants from [name of the other/the participant's lab in High/Low, respectively].*

These amounts will be paid at the end of the experiment. We will randomly select both a member of your group and a member of the other group who will receive your chosen allocation. You will be affected by the choices of two other random participants in the same way.

Participation Game: In Task 3 you will be asked to make decisions in 40 rounds, with one decision per round. You will be part of a group of 5 participants: you and 4 others. *The participants that are part of your group are all drawn from [name of the participant's lab].* Group composition will remain constant for the whole of Task 3. Your group will interact with another group of 5 participants*, all of them drawn from [name of the other/the participant's lab in High/Low, respectively]*.

In every round, each member of a group will have to decide on whether to buy a "disc" or not. A "disc" costs 30 tokens. Members of the group with more "discs" receive a higher reward: 120 tokens. Members of the group with fewer "discs" receive a lower reward: 30 tokens.

If the number of discs in the two groups is the same, the group who gets the higher reward in that round is picked with equal probability. In other words, in case of a tie each group has a 50% chance of getting the high reward. Note that if one of the groups gets the high reward the other necessarily gets the low reward.

As an example, assume that 3 people in your group buy discs, but only 2 people in the other group buy discs. In this situation, your group gets the high reward in this round. A member of your group who bought a disc gets a payoff of 90 tokens in this round. A member of your group who did not buy a disc gets a payoff of 120 tokens in this round. A member of the other group who bought a disc gets a payoff of 0 tokens in this round. A member of the other group who did not buy a disc gets a payoff of 30 tokens in this round.

Second Allocation Decision: [identical to the First Allocation Decision.]

Post-experiment Questionnaire

1. Can you please briefly describe what you did in the disc-buying part of the experiment and why you did it.
2. How attached did you feel towards your group on a scale from 1 (not at all) to 10 (very much)?
3. How attached did you feel towards the other group on a scale from 1 (not at all) to 10 (very much)?
4. In your opinion, the main goal of a participant who bought many discs was to:
    - Make as much money as possible for himself or herself.
    - Increase the difference between his or her earnings and the earnings of other participants.
    - Help his or her group make as much money as possible.
    - Help both his or her group and the other group make as much money as possible.
5. In your opinion, the main goal of a participant who bought few discs was to:
    - Make as much money as possible for himself or herself.
    - Increase the difference between his or her earnings and the earnings of other participants.
    - Help his or her group make as much money as possible.
    - Help both his or her group and the other group make as much money as possible.