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Group identity and leading-by-example

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GROUP IDENTITY AND LEADING-BY-EXAMPLE

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Abstract:

We study the interplay between leading-by-example and group identity in a public goods game experiment. A common identity between the leader and her followers is beneficial for cooperation: average contributions are more than 30% higher than in a treatment where no identity was induced. In two further treatments we study the effects of heterogeneous identities. We find no effect on cooperation when only part of the followers share the leader's identity, or when followers share a common identity that differs from that of the leader. We conclude that group identity is an effective but fragile instrument to promote cooperation.

Keywords: leading-by-example; leadership; public goods; voluntary contributions; cooperation; identity; experiment.

JEL: C92, D03, H41.

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1. Introduction

Leadership is a central topic in the behavioral and social sciences and has attracted the interest of many researchers. A fundamental question is how a leader can successfully induce followers to engage in behaviors that may run counter their private interests but are beneficial to the group. One way leaders can achieve this is by *leading-by-example*, i.e. by committing to behaviors that serve as an example and inspiration to others. Leading-by-example is ubiquitous in naturally-occurring social groups, from families to firms to complex societies and nations.¹ A recent literature in experimental economics has examined the success of leading-by-example in the context of social dilemma-type situations where individual and collective interests are in conflict.² Results from this literature, which we review below, suggest that leaders' commitment is not always sufficient to induce followers to sacrifice private interest for the common good. Thus, an important issue is which strategies should be adopted to increase the success of leadership. In this paper we examine one such strategy: creating a common sense of identity between the leader and the other group members as to increase their willingness to emulate the leader.

The set-up most commonly used in the experimental literature on leading-by-example is based on a sequential version of the linear voluntary contributions game.³ In this game players receive an endowment and choose how much of this to contribute to a group project. The project yields positive returns to all group members irrespective of the amount they contribute. Contributions to the project are made sequentially. In particular, one group member (the "leader") announces her contribution before the other group members (the "followers") contribute. The game is parameterized such that not contributing maximizes individual payoffs, whereas joint earnings are maximized when all members contribute their entire endowment.

¹ A recent, large-scale instance of leading-by-example comes from Greece's President, Karolos Papoulias, who on February 15th, 2012 announced he would forgo his €400k salary "as a symbolic gesture when the Greek people are being called to make such sacrifices" (source: <http://www.guardian.co.uk/business/2012/feb/15/eurozone-debt-crisis-greece-eurozone-gdp>). A similar announcement had been made in December 2011 by Italy's Prime Minister Mario Monti when his government adopted a package of emergency austerity measures (source: <http://www.bbc.co.uk/news/world-europe-16024316>).

² Other recent studies have focused on "leading-by-words", whereby leaders can use pre-play communication to inspire followers to cooperate. See, e.g., Pogrebna et al. (2011); Koukoulis et al. (2012).

³ Sequential contribution mechanisms have also been studied in the context of step-level public goods games where, in general, there are multiple equilibria and sequential moves can assist coordination on more efficient equilibria (e.g., Coats et al., 2009), and in quasi-linear public good settings where sequential contributions can actually exacerbate the free-rider problem (Varian, 1994; for experimental evidence see Andreoni et al., 2002 and Gächter et al., 2010).

As typical in voluntary contributions game experiments, subjects' contributions in such leader-follower games are found to be lower than the joint earnings-maximizing level, but exceed the zero level predicted under the assumption that all individuals are self-interested payoff maximizers. Moreover, followers' contributions are strongly influenced by the contributions made by the leader: followers contribute little when the leader sets a bad example and makes small contributions to the project, whereas they contribute substantial amounts when the leader is a high contributor (Gächter and Renner, 2003; Moxnes and van der Heijden, 2003; Güth et al., 2007; Levati et al., 2007; Potters et al., 2007; Haigner and Wakolbinger, 2010; Figuières et al., *forthcoming*; Gächter et al., *forthcoming*).⁴ On the other hand, leaders typically contribute more than followers, implying that the latter tend to undercut the example set by the former (Güth et al., 2007; Levati et al., 2007; Rivas and Sutter, 2011; Figuières et al., *forthcoming*). This generally hampers leaders' willingness to lead-by-example as they become aware that followers exploit them. As a result, the impact of leading-by-example on public good provision is ambiguous: whereas some studies report that sequential contributions significantly increase provision relative to settings where players contribute simultaneously (Güth et al., 2007; Levati et al., 2007; Pogrebna et al., 2011), other studies do not find an overall positive effect of leadership (Potters et al., 2007; Haigner and Wakolbinger, 2010; Rivas and Sutter, 2011).⁵

Given the mixed results on the effectiveness of leadership, an interesting question is which factors and mechanisms can be introduced to reinforce leading-by-example and encourage followers to follow more closely the example set by the leader. A number of studies have focused on *institutional interventions* that may enhance leaders' powers, for example by increasing their formal authority or representativeness. Güth et al. (2007) and Levati et al. (2007), for instance, study the effect of empowering leaders with the authority to punish other players by temporarily excluding them from the group. Empowered leaders are found to be more successful in fostering cooperation than leaders who do not have exclusion power when all players receive the same monetary endowment, but not when endowments are asymmetric. Güth et al. (2007) and Levati et al. (2007) also examine the effect of having group members vote on whether or not to appoint a leader and show that leading-by-example

⁴ Followers' behavior can thus be viewed as *conditionally cooperative* (e.g., Keser and van Winden, 2000; Fischbacher et al., 2001; Croson et al., 2005; Fischbacher and Gächter, 2010).

⁵ Figuières et al. (*forthcoming*) find that contributions are significantly higher in the presence of a leader in four-player groups, but not in eight-player groups.

is strongly effective when leaders are elected by the group.⁶ Haigner and Wakolbinger (2010) and Rivas and Sutter (2011) study a different form of endogenous leadership. In their experiments players can volunteer to lead the group. Both studies find that voluntary leadership has a strong and positive effect on cooperation.⁷

Whereas the studies cited above focus mostly on institutional factors to promote the success of leadership, other recent studies have examined the interplay between leading-by-example and leaders' *personal traits* and *characteristics*. Kumru and Vesterlund (2010), for instance, manipulate the status of participants in a laboratory experiment so that some individuals have higher status than others. They find that public good provision is higher when groups are led by high-status individuals. Gächter et al. (*forthcoming*) focus on leaders' intrinsic social motivations and show that groups with more cooperatively inclined leaders outperform groups which are led by less cooperative individuals.

In this paper, we consider a different factor that may promote the effectiveness of leading-by-example: the degree of *social similarity* between the leader and her followers. Research in social psychology has shown that interpersonal similarity can increase attraction and liking, which can in turn increase compliance (Byrne, 1971; Cialdini, 2001). Moreover, social identity theory (Tajfel and Turner, 1979) suggests that membership and identification with social groups may affect individual behavior, as individuals adapt their choices to conform with the perceived group norms. In particular, a large number of studies documents that individuals tend to act more favorably towards their own social group ("in-group") and those belonging to their group than towards "out-groups" (e.g., Tajfel et al., 1971; see Hewstone et al., 2002 for a recent review).

These considerations suggest that manipulating group identities to increase the commonality of values and motives between leaders and followers may be a profitable strategy to encourage compliance and spur followers to eschew their narrow interests for the greater good of the group. Indeed, team-building exercises and other activities designed to enhance group cohesion are commonplace in contemporary organizations, and the use of strategies that aim at making followers identify with the group and with the leader are

⁶ However, it is worth pointing out that groups fail to appoint a leader in the majority of cases. The likelihood of successfully appointing a leader increases if the leader has exclusion power, and the results are not affected by asymmetries in endowments (Güth et al., 2007; Levati et al., 2007). Güth et al. (2007) also study the effects of having subjects take turns in the role of leaders rather than having a fixed leader throughout the experiment. They do not find a difference across conditions.

⁷ Arbak and Villeval (*forthcoming*) also study voluntary leadership, focusing on the motives that drive people to lead. They find that voluntary leaders are not more influential than randomly appointed leaders.

regarded as one of the golden rules of successful leadership (e.g., van Vugt and Ahuja, 2010; Haslam et al., 2011).

The importance of group identity for decision-making has recently been recognized also by economists (Akerlof and Kranton, 2000). A growing experimental literature has studied the influence of group identity on individual behavior, both in strategic and non-strategic settings.⁸ A typical finding from these studies confirms one of the key implications of social identity theory: decision-makers tend to favor those who belong to their own social group and disfavor out-groups (e.g., Bernhard et al., 2006; Götte et al., 2006; Ruffle and Sosis, 2006; Chen and Li, 2009; Götte et al., *forthcoming*). A number of studies have focused on the relation between group identity and cooperation. Solow and Kirkwood (2002) and Croson et al. (2008), for instance, find that groups whose members are part of already-existing organizations (high identity groups) are more efficient than groups with lower social identity.⁹ Eckel and Grossman (2005) find that groups where strong identities were induced via a team-building task are more cooperative than groups with weaker identities. More recently, Chakravarty and Fonseca (2011) find a negative relation between cooperation and social fragmentation: public good provision is lower the more heterogeneous the identities of the group members are. Homogeneous groups, however, do not contribute more than groups where identities were not induced. Note that none of these studies focuses on the interplay of group identity and leading-by-example.

In this study, we examine the extent to which group identity can enhance the effectiveness of leading-by-example. In particular, we are interested in studying how successful leaders are in fostering cooperation among followers when i) all followers identify with the leader, or ii) followers are not fully identified with the leader. In the latter case, we distinguish between situations where some or none of the followers share a common identity with the leader.

⁸ Some studies have examined the impact of *natural identities* such as gender, race or membership to naturally-occurring groups and networks (e.g., Bernhard et al., 2006; Götte et al., 2006; Falk and Zehnder, 2007; Goeree et al., 2010), whereas other studies have used *induced identities* where groups are artificially created by the experimenter (e.g., Charness et al., 2007; Hargreaves Heap and Zizzo, 2009; Chen and Chen, 2011; Currarini and Mengel, 2012). Götte et al. (2012) compare the effects of natural and induced identities in a simultaneous prisoner's dilemma game with and without third-party punishment. They find qualitatively similar patterns in cooperation across natural and artificial groups, but different punishment patterns. In this study we induce artificial identities (subjects are randomly assigned to colored teams at the beginning of the experiment), and reinforce these identities by having subjects work with their teammates on a problem-solving task.

⁹ Croson et al. (2008) distinguish between all-female, all-male and mixed groups. High social identity has a positive effect in all-female groups, a negative effect in all-male groups, and no effect in mixed groups. Also related is the literature studying the effects of priming gender identities using pre-experimental questionnaires (e.g. Brown-Kruse and Hummels, 1993; Cadsby and Maynes, 1998). These manipulations do not seem to have a strong impact on outcomes.

We address these research questions by conducting a laboratory experiment with four treatments. In all treatments we use a sequential three-person public goods game which is repeated for ten rounds in fixed groups. In each round one player (the “leader”) makes her contributions before the other two players (the “followers”). Followers then observe the leader’s choice and make their contributions. We induce group identities in the experiment following Chen and Li (2009). In particular, in our three “identity” treatments, the public goods game is preceded by a group identity-building task: subjects are first randomly assigned to “teams”, and can then communicate with other team members via a computer chat program to work on a group problem-solving task. The three “identity” treatments differ in how groups in the public goods game are formed. In one treatment, groups are formed such that all the members belonged to the same team in the problem-solving task. Thus, leader and followers share a common group identity in this treatment. In the other two treatments groups in the public goods game have two players sharing the same identity, and one “outsider”. These treatments vary in whether the outsider is one of the two followers (implying that the leader and one follower share a common group identity), or the leader (in which case no follower share the same identity as the leader). We compare these “identity” treatments with a baseline treatment where we do not induce group identities. Thus, our baseline treatment reproduces the standard “leading-by-example environment” previously studied in the literature, where leaders can only use their own actions to influence followers’ behavior.

We find that, relative to the baseline environment, total contributions are 30% higher in the treatment where all players have a common group identity, and the effect is statistically significant. However, our analysis also shows that this effect is mainly driven by higher contributions made by leaders: there are no significant treatment differences in followers’ contributions once we control for leaders’ contributions. Thus, it appears that, rather than motivating followers to follow more closely the example set by the leader, a shared group identity encourages leaders to set better examples. Moreover, we also find that the positive effect of group identity vanishes when we introduce heterogeneous identities. In these treatments we observe higher total contributions than in the baseline treatment, but the effect is not statistically significant. Overall, these findings suggest that group identity can be an effective but fragile instrument available to leaders to foster cooperation in groups.

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

2. The Experiment

Our experiment consists of four treatments designed to test the impact of group identity on leading-by-example. In all treatments the experiment consisted of two parts. In the second part of all treatments subjects played 10 rounds of a three-person linear public goods game (Gächter et al., 2008). Groups were randomly formed in round 1 and remained fixed across rounds. In each round subjects were endowed with 20 tokens that they could keep or contribute to a public good, with $0 \leq c_i \leq 20$. Payoffs were computed as:

$$\pi_i = 20 - c_i + 0.5 \cdot \left(c_i + \sum_{j=1}^2 c_{j \neq i} \right)$$

Contributions are made sequentially. At the beginning of round 1, one subject in each group was assigned the role of Leader while the other two subjects took the role of Follower.¹⁰ Roles did not change in subsequent rounds. In each round Leaders contributed first, while Followers waited. Followers were then informed of the contribution of the Leader in their group, and independently and simultaneously made a contribution decision.¹¹

We observe contributions in four treatments. A first difference among treatments is in whether or not the public goods game of part 2 was preceded by a group identity-building task. In part 1 of the *ID condition* we induced group identities using the procedure proposed by Chen and Li (2009). In each session subjects were divided into three “teams” depending on the color of a plastic ball that they randomly drew from a bag containing red, blue and green balls. Six subjects were assigned to each team. To strengthen identities, subjects then participated in a problem-solving task and were given 3 minutes to communicate with their fellow team members via a computer chat program before submitting their answers.¹² In part 1 of the *NO-ID condition* subjects also participated in the problem-solving task, but they were not divided into teams and could not communicate with any other participant before submitting an answer.

¹⁰ In the experiment Leaders were labeled “First Movers” and Followers “Second Movers”. Instructions used in the experiment are available in the Appendix.

¹¹ Subjects in the role of Followers were asked to guess the Leader’s contribution while they waited for their turn to take a decision. Similarly, after having made a contribution decision, Leaders were asked to guess the amount that the two Followers would have contributed. Predictions were not incentivized. Had we introduced payments for correct guesses we might have introduced earnings differentials among Followers (e.g. Followers who were successful in their guesses would have entered the decision stage with higher earnings than Followers whose guesses were not accurate). We will not use data from the unincentivized prediction task in the paper.

¹² In the task subjects reviewed two paintings by Paul Klee and Wassily Kandinsky, and then guessed the artist who made each painting. Communication via the chat program was unrestricted, except that subjects were forbidden to reveal their identity and to use obscene language. After the communication phase, subjects submitted their answers individually and received 20 points (= £0.80) per correct guess. Subjects did not learn whether their guesses were correct until the end of the experiment.

In the ID condition subjects learnt the team affiliation in part 1 of the two participants they were matched with in the public goods game. Depending on how groups in the public goods game were formed, we distinguish among three treatments within the ID condition. Some groups were *homogeneous* in that they consisted of subjects who belonged to the same team in part 1 (*ID-HOMOG* treatment). In other groups we matched two participants who belonged to the same team in part 1 of the experiment with one “outsider”. The “outsider” took the role of Leader in half of these groups, and the role of Follower in the other half. Because the Leader’s identity in these heterogeneous groups was either *minoritarian* or *majoritarian* within the group, we refer to these treatments as *ID-MINOR* and *ID-MAJOR*, respectively. Table 1 below summarizes the design and reports the number of subjects assigned to each treatment.

TABLE 1
Experimental Design

Condition	Part 1	Part 2	Part 2, Group Identity Composition	Treatment	N.
NO-ID	Problem-solving Task	Public goods game	-	NO-ID	48
ID	Problem-solving Task, preceded by random assignment to teams	Public goods game	Leader and Followers were in same team in part 1	ID-HOMOG	54
			Leader and one Follower were in same team in part 1, other Follower was in different team.	ID-MAJOR	54
			Followers were in same team in part 1, Leader was in different team.	ID-MINOR	54

The experiment was programmed in z-Tree (Fischbacher, 2007) and conducted in twelve sessions at the University of Nottingham. Eighteen subjects participated in each session (except for two sessions where only fifteen subjects showed-up). Subjects were recruited from a campus-wide distribution list using the online recruitment system ORSEE (Greiner, 2004), and no subject participated in more than one session.

At the beginning of a session subjects were informed that the experiment consisted of two parts, but detailed information about the second part was only given once everyone had completed the first part. Subjects were paid according to the sum of their earnings from the two parts of the experiment, but knew that any information about earnings in part 1 was only given at the end of part 2.

At the end of part 2, subjects completed a short post-experimental questionnaire eliciting basic demographic and attitudinal information. This included a self-assessment of subjects' risk and trust attitudes. Risk attitudes were elicited using the SOEP general risk question discussed in Dohmen et al. (2011). The question reads: "*Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?*", and subjects answered on a scale from 0 ("*risk averse*") to 10 ("*fully prepared to take risk*"). Trust attitudes were elicited using the WVS Trust question ("*Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?*"), to which subjects replied either by saying that they believe that "*most people can be trusted*" or that one needs "*to be very careful in dealing with people*".¹³ In the data analysis, responses on these two questions will enter as controls in a regression of subjects' contribution behavior.

Subjects were paid in private and in cash at the end of each session. Sessions lasted about 1 hour and average earnings were £11.3 (s.d. £1.7).

3. Results

3.1 The impact of group identity on leading-by-example

We observe leading-by-example under four different conditions. In a first benchmark condition (the NO-ID treatment) we do not induce group identities among participants, and we can thus measure cooperation levels in our leader-follower game in the absence of group identity effects. We then examine the impact of (homogeneous and heterogeneous) group identities by comparing contribution behavior in the NO-ID treatment with behavior in the ID-HOMOG, ID-MAJOR and ID-MINOR treatments.

Figure 1 and Table 2 show average contributions to the public good disaggregated by treatment. In Figure 1 Panels A and B show respectively the average contributions made by Leaders and Followers, while Panel C shows total average contributions. Table 2 reports average contributions and standard deviations over all rounds, the first 5 rounds, and the last 5 rounds of the experiment.

¹³ The average response to the SOEP risk question was 6.10 (s.d. 2.19). Responses to the WVS Trust question show that about 48% of subjects believe that "*most people can be trusted*".

FIGURE 1
Average contributions per round, disaggregated by treatment

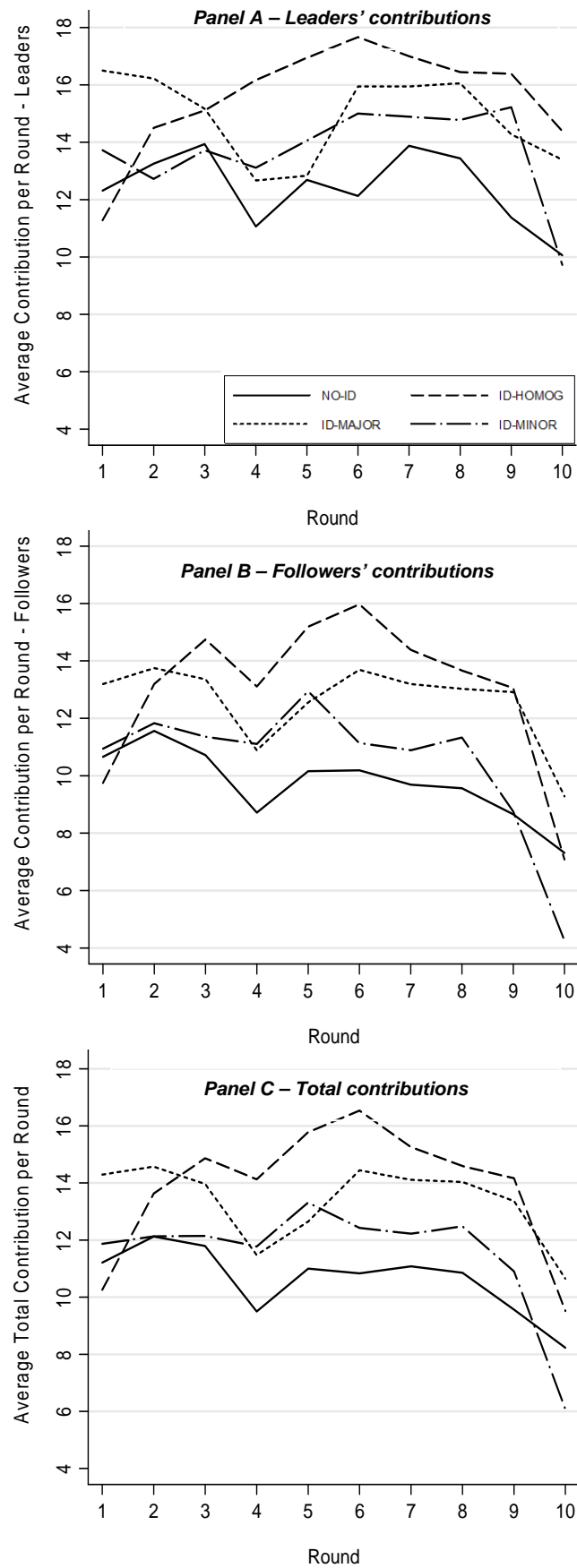


TABLE 2
Average contributions disaggregated by treatment*

	NO-ID	ID-HOMOG	ID-MAJOR	ID-MINOR
Leaders, rounds 1-5	12.6 (4.65)	14.8 (3.94)	14.7 (4.18)	13.5 (6.12)
Leaders, rounds 6-10	12.2 (5.49)	16.4 (5.30)	15.1 (5.90)	13.9 (5.34)
Leaders, all rounds	12.4 (4.35)	15.6 (3.78)	14.9 (4.44)	13.7 (5.33)
Followers, rounds 1-5	10.4 (5.34)	13.2 (4.53)	12.7 (5.89)	11.6 (6.26)
Followers, rounds 6-10	9.1 (6.28)	12.8 (5.89)	12.4 (6.94)	9.3 (6.20)
Followers, all rounds	9.7 (5.49)	13.0 (4.56)	12.6 (6.12)	10.5 (5.86)
Total contributions, rounds 1-5	11.1 (5.02)	13.7 (4.04)	13.4 (5.11)	12.2 (5.88)
Total contributions, rounds 6-10	10.1 (5.76)	14.0 (5.38)	13.3 (6.44)	10.8 (5.58)
Total contributions, all rounds	10.6 (4.98)	13.9 (4.03)	13.4 (5.44)	11.5 (5.39)

* Standard deviations based on part 2 groups averages in parentheses.

In the NO-ID treatment Leaders contribute on average 12.4 tokens, and contributions are fairly stable across rounds, averaging 12.6 tokens in the first 5 rounds of the experiment and 12.2 tokens in the last 5 rounds. Leaders contribute significantly more than this in the ID-HOMOG treatment: contributions average 14.8 tokens in the first half of the experiment and 16.4 tokens in the second half. Averaging across all rounds, contributions are more than 3 tokens higher in ID-HOMOG than in NO-ID (15.6 vs. 12.4 tokens), and the difference is statistically significant ($p = 0.023$).¹⁴ Thus, when Leaders and Followers share one common group identity, Leaders are more willing to contribute relative to a setting where no group identity is introduced.

The ID-MAJOR and ID-MINOR treatments allow us to examine whether this positive effect obtains also in heterogeneous groups, where Leaders have a different identity from at least one of the Followers. Although in both treatments Leaders contribute more than in NO-ID (14.9 in ID-MAJOR and 13.7 in ID-MINOR, averaging across all rounds), the differences are *not* statistically significant (ID-MAJOR vs. NO-ID: $p = 0.128$; ID-MINOR vs. NO-ID: p

¹⁴ Unless otherwise indicated, all p-values are based on two-sided Wilcoxon Rank Sum tests applied to group averages. All statistical tests reported in the paper are applied to 18 independent observations per treatment (16 in the NO-ID treatment).

= 0.300).¹⁵ Thus, the positive effect of group identity on leadership contributions observed in ID-HOMOG *vanishes* as soon as we introduce heterogeneous identities in the group.

Turning to Followers' contributions, these are on average lower than Leaders' contributions in all treatments (two-sided Wilcoxon sign rank tests: $p = 0.001$ in NO-ID; $p = 0.002$ in ID-HOMOG; $p = 0.004$ in ID-MAJOR; $p = 0.002$ in ID-MINOR). Nevertheless, Followers do follow the example set by Leaders: in all treatments Leaders' and Followers' contributions are positively correlated (Spearman correlation coefficients: 0.77 in NO-ID; 0.62 in ID-HOMOG; 0.66 in ID-MAJOR; 0.70 in ID-MINOR). As mentioned in Section 1, these findings are typical of experiments with sequential voluntary contributions games, where followers do respond to the example set by the leader, but undercut her contributions (e.g., Güth et al., 2007; Levati et al., 2007; Rivas and Sutter, 2011).

Turning to the treatment comparisons of Followers' contributions, we find that Followers contribute least in NO-ID (9.7 tokens) and most in ID-HOMOG (13.0 tokens). The difference in contributions between these treatments is statistically significant ($p = 0.053$). Contributions in ID-MAJOR are about 3 tokens higher than in NO-ID, averaging 12.6 tokens across all rounds. Nevertheless, as with Leaders' contributions, we do not detect a statistically significant difference between Followers' contributions in ID-MAJOR and NO-ID ($p = 0.214$).¹⁶ Turning to ID-MINOR, where the Followers have a common group identity that differs from that of the Leader, we find that Followers contribute only slightly more than in NO-ID (10.6 tokens), and the difference is not statistically significant ($p = 0.581$). Overall, similarly to what we found among Leaders, group identity has a positive effect on Followers' contributions only in homogeneous groups. Of course, this positive effect could be just a reflection of the beneficial effect of group identity among Leaders, given that Followers' contributions are positively correlated with Leaders' contributions. We will examine whether or not Followers contribute more in ID-HOMOG for a *given* Leader contribution in Section 3.2, where we perform a regression analysis of contributions.

The last three rows of Table 2 and Panel C of Figure 1 report the average public good provision in the four treatments of the experiment. As we would expect given our previous

¹⁵ We detect a statistically significant difference (at the 10% level) between ID-MAJOR and NO-ID in the last 5 rounds of the experiment ($p = 0.063$). We do not find statistically significant differences between ID-MINOR and NO-ID, regardless of whether we focus on the first or second half of the experiment.

¹⁶ If we distinguish between Followers in the ID-MAJOR treatment who are "insiders" (i.e. who have the same identity as the Leader) or "outsiders" (who have a different identity from the Leader), we find that Insiders contribute more in ID-MAJOR than Followers in NO-ID (12.9 vs. 9.7 tokens, averaging across all rounds), and the difference is weakly significant ($p = 0.084$). Outsiders contribute 12.2, which is not significantly different from Followers' contributions in NO-ID ($p = 0.162$).

discussion of Leaders' and Followers' behavior, total contributions in ID-HOMOG are about 30% higher than in NO-ID (13.9 vs. 10.6, averaging across all rounds), and the difference is statistically significant ($p = 0.027$). Across all rounds, total contributions in ID-MAJOR are 13.4 tokens, about 25% higher than in NO-ID, but the difference is not statistically significant ($p = 0.173$). Finally, average contributions in ID-MINOR exceed contributions in NO-ID by about 8% (11.5 tokens), and the difference is not statistically significant ($p = 0.427$).

3.2 Regression analysis of contribution behavior

We further examine contribution behavior using regression analysis that allows us to control for observable differences across subjects. Table 3 reports OLS regressions of subjects' contributions to the public good.¹⁷ Models Ia and IIa use contributions made by subjects in the role of Leader, while Models Ib and IIb use contributions made by Followers. In Models Ic and IIc we use contributions by both Leaders and Followers.

In all models, we regress contributions on a constant and on dummy variables indicating whether a subject was in the ID-HOMOG, ID-MAJOR or ID-MINOR treatment (thus, the reference category is the group of subjects in the NO-ID treatment). Moreover, in all models we control for period effects by including the variable "*Round*" and its quadratic term "*Round*²" which allows us to capture potential nonlinearities in the relationship. In Model IIb we augment the regression of Followers' contribution by adding the variable "*Leader's Contribution*" which measures the amount contributed by the Leader in a given round of the experiment. We use this model to identify whether or not the positive effect of group identity on Followers' contributions found in Section 3.1 is a mere reflection of the higher Leaders' contributions in the ID condition. The regressions presented in Models Ic and IIc use contributions by both Leaders and Followers and include a dummy variable assuming value 1 if the subject was in the role of Leader and value 0 if they were in the role of Follower. This allows us to confirm whether Leaders tend to contribute more than Followers, as reported in the previous sub-section. Finally, in Models IIa, IIb and IIc we include controls for subjects' personal characteristics (gender, a dummy variable taking value 1 if a subjects studies Economics, and a self-assessment of the subject's risk and trust attitudes).

¹⁷ We obtain qualitatively similar results using alternative models that take into account the censored nature of the data. These alternative estimates are available upon request.

TABLE 3
Analysis of contribution behavior (OLS regressions)

	Leaders		Followers			Leaders & Followers	
	Ia	IIa	Ib	IIb	IIIb	Ic	IIc
1 if ID-HOMOG	3.18** (1.38)	2.92** (1.39)	3.29* (1.71)	1.07 (1.12)	0.57 (1.05)	3.25** (1.53)	2.73* (1.46)
1 if ID-MAJOR	2.49* (1.48)	2.30 (1.54)	2.86 (1.95)	1.12 (1.171)	0.81 (1.07)	2.74 (1.75)	2.42 (1.64)
1 if ID-MINOR	1.28 (1.63)	0.50 (1.84)	0.73 (1.91)	-0.16 (1.19)	-0.77 (1.21)	0.92 (1.74)	-0.02 (1.77)
Leader's Contribution	-	-	-	0.70*** (0.04)	0.69*** (0.03)	-	-
1 if Leader	-	-	-	-	-	2.70*** (0.38)	2.42*** (0.42)
1 if Male	-	1.44 (1.07)	-	-	0.62 (0.64)	-	0.76 (0.69)
1 if Studies Economics	-	-2.24 (1.46)	-	-	-2.04 (1.32)	-	-1.26 (1.21)
Willingness to Take Risks	-	0.18 (0.26)	-	-	0.02 (0.17)	-	0.08 (0.17)
1 if Believes That "Most People Can Be Trusted"	-	3.07** (1.15)	-	-	1.80** (0.70)	-	3.02*** (0.81)
Round	1.00** (0.42)	1.00** (0.42)	1.39** (0.41)	0.69** (0.27)	0.70** (0.27)	1.26*** (0.39)	1.26*** (0.39)
Round ^ 2	-0.09** (0.03)	-0.09** (0.03)	-0.15** (0.03)	-0.09*** (0.02)	-0.09*** (0.02)	-0.13*** (0.03)	-0.13*** (0.03)
Constant	10.45*** (1.42)	7.53*** (2.04)	7.99*** (1.53)	0.67 (0.92)	0.18 (1.43)	7.90*** (1.42)	6.32*** (1.42)
N	700	700	1400	1400	1400	2100	2100
R ²	0.04	0.09	0.06	0.41	0.43	0.07	0.11

Dependent variable is subject's contribution to the public good. Robust standard errors adjusted for intragroup correlation in parentheses (a subject's group in part 2 of the experiment is used as the independent clustering unit). * $0.05 \leq p \leq 0.10$; ** $0.01 \leq p < 0.05$; *** $p < 0.01$.

Starting with Leaders' regressions, Model Ia confirms that Leaders' contribution in ID-HOMOG are about 3 tokens higher than in NO-ID. The effect is significant at the 5% level ($p = 0.024$) and remains statistically significant in Model IIa after controlling for observable differences across subjects ($p = 0.039$). In Model Ia we also find a positive effect of group identity on Leaders' contributions in the ID-MAJOR treatment, although the effect is only marginally significant ($p = 0.098$) and it becomes statistically insignificant in Model IIb ($p = 0.140$).¹⁸ Contributions in ID-MINOR are somewhat higher than in NO-ID, but the effect is far from being statistically significant ($p = 0.434$ in Model Ia; $p = 0.786$ in Model IIa).

The coefficients on the variables "Round" and "Round^2" are respectively positive and negative, suggesting an inverted-U relationship between contributions and rounds of play: the

¹⁸ Moreover, recall that using the non-parametric Wilcoxon Rank Sum test we did not find a significant difference in Leaders' contributions between ID-MAJOR and NO-ID using data from all rounds.

estimates reveal that Leaders' contributions increase over rounds up to round 5, and decline afterwards. Among the variables controlling for individual characteristics, we find a positive and significant correlation between contributions to the public good and our attitudinal measurement of trust (the dummy "Most People Can Be Trusted", $p = 0.010$). The effect is sizeable: trusting Leaders contribute about 3 tokens more than Leaders who are not trusting. As in other studies of the determinants of leaders' contributions (Arbak and Villeval, *forthcoming*; Gächter et al., *forthcoming*), we do not observe a clear gender effect: males tend to contribute more than females, but the difference is statistically insignificant ($p = 0.183$). Economics students are less willing to contribute when they are in the role of Leader, although the effect is not significant ($p = 0.131$). Finally, as in Gächter et al. (*forthcoming*), self-reported risk attitudes are not predictive of leadership contributions.

Turning to Followers' regressions (Models Ib to IIb), we find a positive and significant difference in contributions between ID-HOMOG and NO-ID in Model Ib ($p = 0.058$). The estimates also show a positive effect on contributions for the ID-MAJOR and ID-MINOR treatments, but the differences are statistically insignificant ($p = 0.146$ and $p = 0.701$, respectively). These results are consistent with our earlier discussion of treatment effects based on the non-parametric Wilcoxon Rank Sum tests reported in Section 3.1.

Model IIb augments Model Ib by introducing the variable "*Leader's Contribution*". As expected, the variable enters the regression with a positive coefficient, and the effect is highly significant ($p < 0.001$). The estimates show that Followers increase their contributions by about 0.7 tokens for each additional token contributed by the Leader: thus, as often found in the literature on leader-follower games, Followers' contributions are strongly but imperfectly correlated with Leaders' contributions. To check whether the correlation between Leaders' and Followers' contributions varies across treatments, in an additional regression model (not reported) we interact the treatment dummies with the variable "*Leader's Contribution*". None of the interaction terms is significantly different from zero ($p \geq 0.576$), suggesting that the example set by the Leader is not followed differently across different treatments.¹⁹

Most importantly, Model IIb shows that the positive effect group identity on Followers' contributions found in Model Ib vanishes once we control for the differences in Leaders' contributions across treatments. The coefficient of the dummy ID-HOMOG is reduced by two-thirds relative to Model Ib and is no longer significantly different from zero ($p = 0.342$). The coefficients on the ID-MAJOR and ID-MINOR dummies remain statistically

¹⁹ These additional estimates are available upon request.

insignificant ($p = 0.341$ and $p = 0.890$, respectively). The ID-MINOR dummy even enters with a negative coefficient in Model IIb, suggesting that Followers in ID-MINOR actually contribute *less* than in NO-ID once we control for the Leaders' contributions.

In Model IIIb we add controls for subjects' personal characteristics. The treatment dummies remain statistically insignificant, while the coefficient on the variable "*Leader's Contribution*" remains positive and highly significant. As with Leaders' regressions, also among Followers we find a positive and significant relation between trust attitudes and contributions ($p = 0.012$). None of the other controls introduced in Model IIIb is statistically significant.

Models Ic and IIc present regressions of contributions made by both Leaders and Followers. These regressions confirm the existence of a positive effect of group identity on overall contributions in the treatment where groups are homogeneous (ID-HOMOG: $p = 0.037$ in Model Ic; $p = 0.066$ in Model IIc). There is no statistically significant effect of group identity, instead, when groups are heterogeneous (in Models Ic and IIc ID-MAJOR: $p > 0.121$; ID-MINOR: $p > 0.599$). The Models also confirm that, as discussed in Section 3.1, Leaders contribute significantly more than Followers in the experiment (about 2.5 tokens more, $p < 0.001$). Finally, among the controls introduced in Model IIc, only the measure of trust attitudes enters significantly in the regression, confirming that trust is positively related to subjects' willingness to contribute to public goods. This result is consistent with findings from other studies that also document a positive correlation between the measure of trust used in this study and cooperativeness (see, e.g., Anderson et al., 2004; Thöni et al., 2009).²⁰

4. Conclusions

We report an experiment which examines whether a shared group identity between leaders and followers increases the success of leading-by-example in promoting cooperation. As in most of the previous literature, our set-up is based on a linear sequential voluntary contribution game. In a baseline treatment we do not establish any shared identity between leader and followers. In three "identity" treatments we use a procedure introduced by Chen and Li (2009) to induce common group identities among players. The three "identity" treatments differ in whether the leader and all followers share the same group identity, or whether the leader's identity conflicts with the identity of at least one of her followers.

²⁰ Gächter et al. (2004) find a positive but insignificant relation between trust (as measured by the WVS question) and cooperativeness.

Consonant with previous studies, we find that in all treatments followers' contributions are positively correlated with leaders' contributions. However, followers tend to undercut the contribution made by the leader. As a consequence, leaders end up contributing significantly more than followers.

We report two main insights about the effect of group identity on the effectiveness of leading-by-example. First, we observe significantly more cooperation in groups where leaders and followers share one common group identity. Total contributions to the public good are 30% higher in the treatment with social identity and homogeneous groups than in the baseline treatment with no induced identity. This result suggests that strategies aiming at increasing the social similarity between leaders and followers in a social group or organization may be successful in fostering cooperation and enhancing efficiency. As such, promoting a shared group identity may represent a useful instrument to reinforce leadership-by-example that can be used instead of other mechanisms, such as sanctioning group members through exclusion, which may be costly to implement and may not always be feasible. In this sense, our results complement the literatures showing that the use of non-material incentives can successfully curb the free-rider problem in simultaneous public goods games (e.g., Masclet et al., 2003; Rege and Telle, 2004).

However, our analysis also reveals that the main driver of the positive effect of group identity is leaders' behavior. Inducing a shared group identity seems to have more an effect on the willingness of leaders to set a good example than on followers' willingness to emulate it. Moreover, we find that the positive effect of group identity disappears in heterogeneous groups. When already one of the followers has a different group identity than the leader, contribution levels are not significantly higher than in groups without identification. Thus, a second insight from our results is that there are potential limitations to the use of group identity-building strategies. The positive effects of group identity are fragile and are diminished when the common identity is not shared by all group members. In a world of multiple and conflicting social identities (gender, ethnicity, religious and political identities, etc.), this may prove to be an important obstacle to the success of policies that promote group identification, and one that leaders should be aware of.

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Appendix – Instructions Used in the Experiments (For Online Publication)

We reproduce below the preliminary instructions used in the experiment (common to all treatments), the instructions used in part 1 of the ID and the NO-ID treatments, and the instructions used in part 2 of the NO-ID treatments. These differ from the instructions used in part 2 of the ID treatments only in the sentences included in squared brackets.

Preliminary Instructions

Welcome! You are about to take part in a decision-making experiment. This experiment is run by the “Centre for Decision Research and Experimental Economics” and has been financed by various research foundations.

There are other people in this room, who are also participating in this experiment. Everyone is participating in this experiment for the first time, and all participants are reading the same instructions. It is important that you do not talk to any of the other participants during the experiment. If you have a question at any time, raise your hand and a monitor will come to your desk to answer it.

This experiment consists of two parts, PART 1 and PART 2.

In each part you will be asked to make one or more decisions and will have a chance to earn money. The amount of money you will earn in each part of the experiment will depend on your decisions and may depend on other participants’ decisions.

The total amount you will earn from the experiment will be the sum of the earnings you make in the two parts of the experiment. During the experiment your earnings will be calculated in points. These point earnings will be converted into cash at a rate of **4p per point**. Your cash earnings will be paid to you in private at the end of the experiment.

You will be informed of any outcome (including your earnings) from the two parts of the experiment only at the end of the session. Therefore, in PART 2 everyone will make their decisions without knowing any outcome from PART 1.

You find on your desk instructions for PART 1 of the experiment. You will receive instructions for PART 2 once everyone in the room has completed PART 1.

If you have a question now, please raise your hand and a monitor will come to your desk.

Instructions Part 1, NO-ID

In PART 1 of the experiment you will be shown a screen with two paintings by two modern artists: Paul Klee and Wassily Kandinsky. Your task in PART 1 of the experiment is, for each painting, to select the artist who you think made the painting. For each correct answer, you will be rewarded with 20 points. You will be paid in private and in cash at the end of the experiment.

Please raise your hand if you have any questions.

Instructions Part 1, ID

In PART 1 of the experiment you and 5 other participants will be assigned to a team. Shortly, the experimenter will bring around a bag containing 18 plastic balls and ask each of you to randomly draw a ball from the bag. 6 balls in the bag are RED, 6 are GREEN, and 6 are BLUE. Depending on your draw you will be assigned either to the RED team, to the GREEN team, or to the BLUE team. Likewise, all other participants in the room will be assigned to a team according to their draw. Thus, there will be 5 other participants in your team. You will not learn the identity of the other participants in your team, during or after today’s session.

Once every participant has been assigned to a team, you will be shown a screen with two paintings by two modern artists: Paul Klee and Wassily Kandinsky. Your task in PART 1 of the experiment is, for each painting, to select the artist who you think made the painting. For each correct answer, you will be rewarded with 20 points. You will be paid in private and in cash at the end of the experiment.

Before you begin making your choices, you will have 3 minutes to **use a team chat program to get help from or offer help to the other members in your own team. Messages will be shared *only* among the members of your own team.** You will not be able to see the messages exchanged among the members of the other teams. People in the other teams will not see the messages from your team. Except for the following restrictions, you can type whatever you want in the lower box of the chat program.

Restrictions on messages

- 1 - You must not identify yourself or send any information that could be used to identify you (for example, your name, contact details or seat in the room);
 - 2 - You must not make any threats, insults or use any obscene or offensive language.
- If you violate these rules your payment will be forfeited.

Please raise your hand if you have any questions.

Instructions Part 2, NO-ID (ID TREATMENTS within squared brackets)

At the beginning of PART 2 the computer will match you with two other participants in this room to form a group of three people. You will remain in this group for the whole duration of PART 2. You will not learn the identity of the other two participants in the group, during or after today's session.

[The two participants you will be matched with in PART 2 may or may not have been in your team in PART 1. The computer will let you know which team each of the two participants belonged to.]

PART 2 of the experiment will consist of 10 rounds. Before the first round begins, the computer will assign the role of 'FIRST MOVER' to one person in your group. The other two people in the group will be assigned the role of 'SECOND MOVER'. You will be informed of your role, either FIRST MOVER or SECOND MOVER, at the beginning of round 1 and you will keep this role throughout the 10 rounds.

The Decision Task

At the beginning of each round each person is given an endowment of 20 points and has to decide how many of these points to contribute to a **group project**. The points that a person does not contribute to the project are placed into his or her **private account**.

In each round the decisions are made as follows. The FIRST MOVER first decides how many of his or her points to contribute to the project. The SECOND MOVERS are then informed of the FIRST MOVER's decision. Each SECOND MOVER then simultaneously and privately decides how many of his or her points to contribute to the project.

Earnings depend on decisions as follows.

- Each point contributed to the **group project** generates 1.5 points to be shared equally among the group members, regardless of whether a person contributed or not to the project. For example, if the sum of all contributions to the project in your group is 40 points, then the project generates $40 \times 1.5 = 60$ points. These will be shared equally among you and the two other people in the group, so each of you will receive $60 \div 3 = 20$ points. As another example, if you and the two other people in the group contribute a total of 10 points to the project, each of you will receive: $(10 \times 1.5) \div 3 = 5$ points.
- Each point a person places into his or her **private account** earns 1 point to that person. For example, if you do not contribute to the project and therefore place 20 points into your private account your earnings from your private account will be 20 points. If there are 6 points into your private account, your earnings from your private account will be 6 points. No one except you earns points from your private account.

Your total earnings from a round are given by the sum of your earnings from the group project and your earnings from your private account in that round.

To make sure everyone understands the instructions so far, please complete the questions below. If you want to, you can use an electronic calculator while you answer the questions. To use the electronic calculator, click the CALCULATOR icon on the bottom-right corner of your computer screen. In a couple of minutes someone will come to your desk to check your answers. (The decisions and earnings used for the questions below are simply for illustrative purposes. In the experiment decisions and earnings will depend on the actual choices of the participants.).

Questions about PART 2:

1. Each person in the group has an endowment of 20 points. Suppose nobody (including you) contributes any point to the project.

- What are your total earnings? _____
- What are the earnings of each other person in your group? _____
2. Each person in the group has an endowment of 20 points. Suppose you contribute 20 points to the project. The two other people in your group contribute 20 points each to the project.
- What are your total earnings? _____
- What are the earnings of each other person in your group? _____
3. Each person in the group has an endowment of 20 points. Suppose the two other people in your group contribute a total of 30 points to the project.
- a. What are your total earnings if you contribute 0 points to the project? _____
- b. What are your total earnings if you contribute 14 points to the project? _____
4. Each person in the group has an endowment of 20 points. Suppose that you contribute 8 points to the project.
- a. What are your total earnings if the two other people in your group contribute a total of 6 points to the project? _____
- b. What are your total earnings if the two other people in your group contribute a total of 22 points to the project? _____

The Prediction Task

In each round of PART 2 you will also be asked to make a prediction:

- If you are a FIRST MOVER: you will be asked to predict what the two SECOND MOVERS in your group will contribute in total to the project. You will submit your prediction after you have chosen how many points to contribute to the project and while SECOND MOVERS are making their decisions.
- If you are a SECOND MOVER: you will be asked to predict what the FIRST MOVER in your group will contribute to the project. You will submit your prediction before you choose how many points to contribute to the project and while the FIRST MOVER is making his or her decision.

Please note that your predictions will NOT have any influence on the actual decisions made by the other participants, nor will they have any consequences for the computation of earnings. But we are very interested to know your predictions, so please think carefully about your responses.

How Your Earnings Are Determined

Your total earnings from PART 2 of the experiment will be the sum of the earnings you make in the Decision Task across the 10 rounds. You will be paid in private and in cash at the end of the experiment.

Please raise your hand if you have any questions.

As before, to make sure everyone understands the instructions about PART 2, please complete the questions below. In a couple of minutes someone will come to your desk to check your answers.

Questions about PART 2:

1. How many times will you do the Decision Task? _____
2. Is the following statement true: you will be matched with the same two people throughout the 10 rounds of PART 2. _____
3. Is the following statement true: the computer will either assign you the role of FIRST MOVER or the role of SECOND MOVER and you will keep this role throughout PART 2. _____