Show the right thing to do

The effect of exemplary behavior in public good games

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Abstract

Using a linear public good game we investigate the role of exemplary behavior on cooperation in public goods games. Subjects may become a *good* (like the employee of the month*) or a bad example* (as a publicly known tax evader) to the rest of their group, as the unique informational feedback they will get is the largest (or smallest) contribution to the group project. Our results suggest that immaterial incentives have a positive though transitory effect on contribution. Even when they do not alter the game structure or its theoretical prediction, exemplary behavior increases cooperation. Top contributors react positively and significantly to the chance of becoming *good examples.*

Keywords: exemplary behavior, information, experimental economics, public goods, cooperation.
JEL codes: C91, D21, H41, M54.

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1. INTRODUCTION

Exemplary and non-exemplary behaviors are important in shaping collective behavior. We find several everyday situations where individuals are showed, encouraged or even told *what* the right thing to do is: from pulpits (avoid sin), school classes (how correctly answer an exam), to the workplace (be a team player). Showing *good examples* are critical in charitably fundraising as noted by Andreoni (1998) or Croson and Shang (2008), without or with recommended contributions (Croson and Marks, 2001). The downside is that non-exemplary behavior may promote dishonest behavior, as noted by Andreoni et al (1998).

In this paper we analyze the impact of highlighting exemplary behavior in anonymous voluntary contribution games. Anonymity is important because there might be at least two reasons for willing to become a reference point: signaling or social recognition. Previous literature does not disentangle between both motivations because participants are identifiable (see Andreoni and Petri, 2004). Our design avoids this problem keeping anonymity constant across treatments, and giving subjects information about the largest contribution in one treatment, and about the lowest contribution in the other.

Our results suggest that subjects choose significantly higher effort levels in the former treatment, relative to the latter, being the result driven by top performers. The positive effect is temporary, as free riders drain exemplary subjects. The next section describes the experimental design and experimental procedures. Section III reports the results. Section IV concludes.

2. EXPERIMENTAL DESIGN AND PROCEDURES

Our experiment consists of one game and two treatments. In addition, we use the data from Croson et al (2005) as baseline. Table 1 below contains a summary.

[Table 1 around here]

2.1. The game

Our game is a linear public goods game based on the Voluntary Contribution Mechanism (hereafter VCM). In each period, every individual in a group of n must decide how to allocate his endowment between an individual project and a group account. The payoffs to player i are

$$\pi_i(c_1, \dots, c_n) = e - c_i + \frac{b}{n}\sum_{j=1}^{j=n} c_j$$

where e denotes the endowment, c_i is player *i's* contribution to the group output and b/n is the marginal per capita return from the group contribution. Under the assumption $0 < b/n < 1 < b$, free riding is a dominant but socially inefficient strategy.

2.2. Experimental Treatments.

Our two treatments differ in the information provided to subjects. In treatment TOP (BOT) subjects get at the end of each round the largest (smallest) contribution to the group project, plus their individual earnings. We use treatment VCM from Croson et al (2005) as a

natural baseline because the experiment was run in the same conditions, and subjects got the full vector of individual contributions (FULL, hereafter; see Croson et al, 2005, for details).

2.3. Experimental Procedures

Following Croson et al (2005), we use $e = 50, b = 2 \text{ and } n = 4$. The experiment involved a total of inexperienced 72 students, 36 per treatment, and it was run at LINEEX. We consider 10+10 periods with a surprise restart. Neutral instructions were read aloud and subjects filled out a questionnaire to guarantee basic comprehension of the game. Average earnings were around 15€ for a session that took less than one hour.

2.4 Qualitative hypothesis

Based on previous findings, we hypothesize the following qualitative hypothesis about the ordering of contributions.

Hypothesis 1. $BOT \preccurlyeq FULL \preccurlyeq TOP$

3. EXPERIMENTAL RESULTS

We analyze contributions and earnings (as a proxy for efficiency), to conclude with the analysis of the behavioral consequences of highlighting exemplary behavior at the individual level.

3.1. Contributions

Contributions follow the usual decline in Figure 1. Average contributions are ordered according to Hypothesis 1 (see Table 2) for every time interval. However, the effects are significant only in the first block of ten rounds $BOT \preccurlyeq_{0.05\%} FULL = TOP$ (Mann Whitney rank-sum test at the group level, p-value=.0193 and .1573, respectively, for the first block).

[Figure 1 and Table 2 around here]

Result 1. Exemplary behavior has a significant but transitory effect

A natural issue is whether the behavior of top and bottom performers is affected by our experimental manipulation. Figure 2 presents the evolution of contribution by their relative performance, across treatments (where top and bottom refers to the best and worst round performer).

[Figure 2 around here]

The contribution of top performers in treatment TOP is larger than in treatments FULL and BOT: $TOP \succ_{0.05\%} FULL = BOT$, and significant at the same level, using the same non-parametric test, and the effect disappears in the second block (p-value=.0339 and .7237, respectively, for the first block). There are no significant differences between bottom performers across treatments.

Result 2. Exemplary behavior boosts top performers' contributions, but does not change the behavior of bottom performers.

3.2 Earnings

From the team's performance point of view, making exemplar behavior salient could reasonable have consequences on the public good provision. From the previous section we know that it had a significant but temporary effect on average contribution. It is again natural to ask who is getting the benefits of this. Table 3 presents a basic comparison of individual profits across treatments (where 1000 is the Nash profit and 2000 is the full cooperation profit).

[Table 3 around here]

Total profits are ordered in line with Hypothesis 1. In line with the game dynamics, bottom performers make more money than top performers within any treatment. In addition to that, earnings of participants who become bottom performers frequently (more than 25% of the times) are significantly higher in treatment TOP than in BOT because they benefit from the higher contribution of top performers. More interestingly, frequent top performers (participants who become top performers at least 25% of the rounds) also make significantly more money in treatment TOP than in BOT (in both blocks, though marginally in the second), as they benefit from higher average contributions.[1]

3.3 Individual Behavior

Table 4 checks for the existence of differences top and bottom performers. We present estimations of simple linear models in which the dependent variable is the individual contribution of top and bottom performers across treatments (dummies TOP and BOT; we include a linear combination of these coefficients using the Stata *lincom* command to check for differences between them); variables period and restart control for trend and block effects.[2]

[Table 4 around here]

As usual, period is significant and negative in both models. The last three models suggest that bottom contributors exhibit similar behavior across our three treatments. A different picture emerges from the first three models. Top contributors contribute significantly more when they have the chance of becoming exemplar (as in TOP treatment), than when they not (as in BOT and FULL treatments), even when this difference is temporary in the second comparison.

4. CONCLUSIONS

In this paper we stuy in the laboratory the positive and the negative dimensions of exemplar behavior in a fully anonymous environment. In line with Andreoni (2006), Croson and Shang (2008), Kurum and Versterlud (2005) or Gächter and Renner (2006), *exemplar behavior* (as in TOP) has a significant and temporary effect on cooperation, as differences vanish over time. The treatment effect does not hold when *non-exemplary behavior* is made

[1] p-values of Mann Whitney tests are .009 and .052 for frequent top performers (in blocks 1 and 2), and .001 and .002 for frequent bottom performers.

[2] The constant therefore estimates, and refers to, our baseline treatment FULL.

salient (as in BOT), as the behavior of bottom performers is unaffected by our experimental manipulation.

Our results have some interesting implications on policy design. Subjects seem to easily get adapted to *bad* examples and persist in their low performance without shame or regret. Alm et al (1992) and Webley et al (1991) reach similar conclusions in the tax evasion domain. The upside is that top performers care about the possibility of becoming exemplar: they significantly contribute more. The bad news is that this does not prevent contributions to decline over time. The anonymity provided in our environment may help to explain why this positive effect is temporary.

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APPENDIX. FIGURES AND TABLES.

FIGURE 1

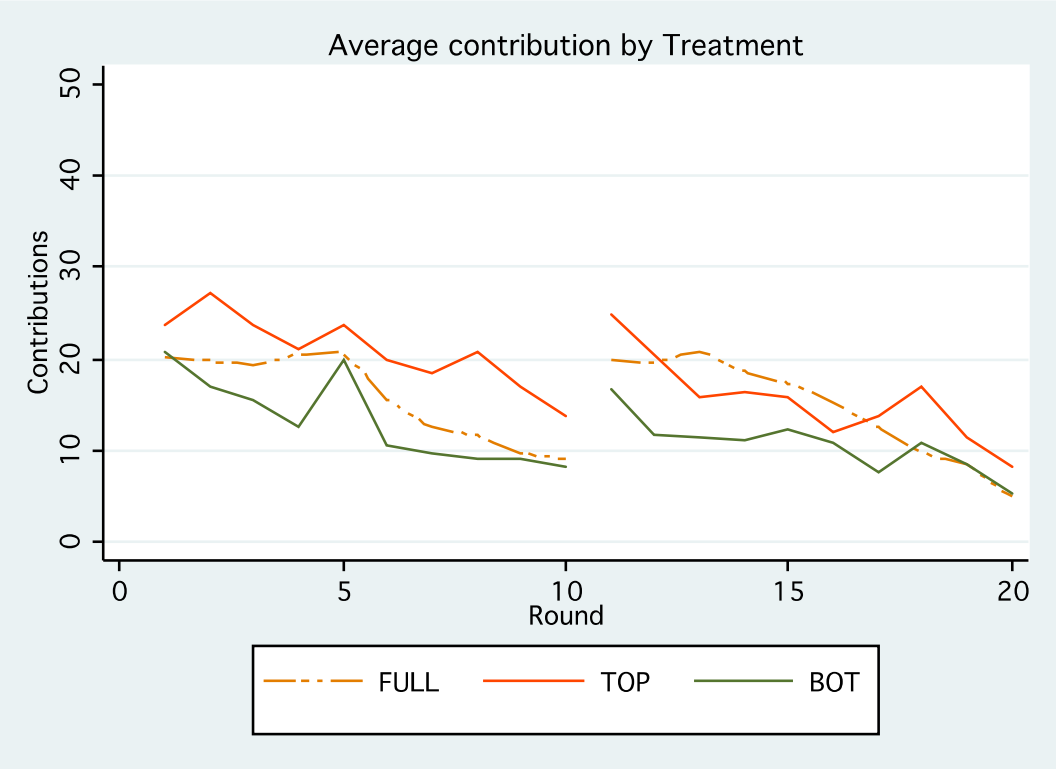
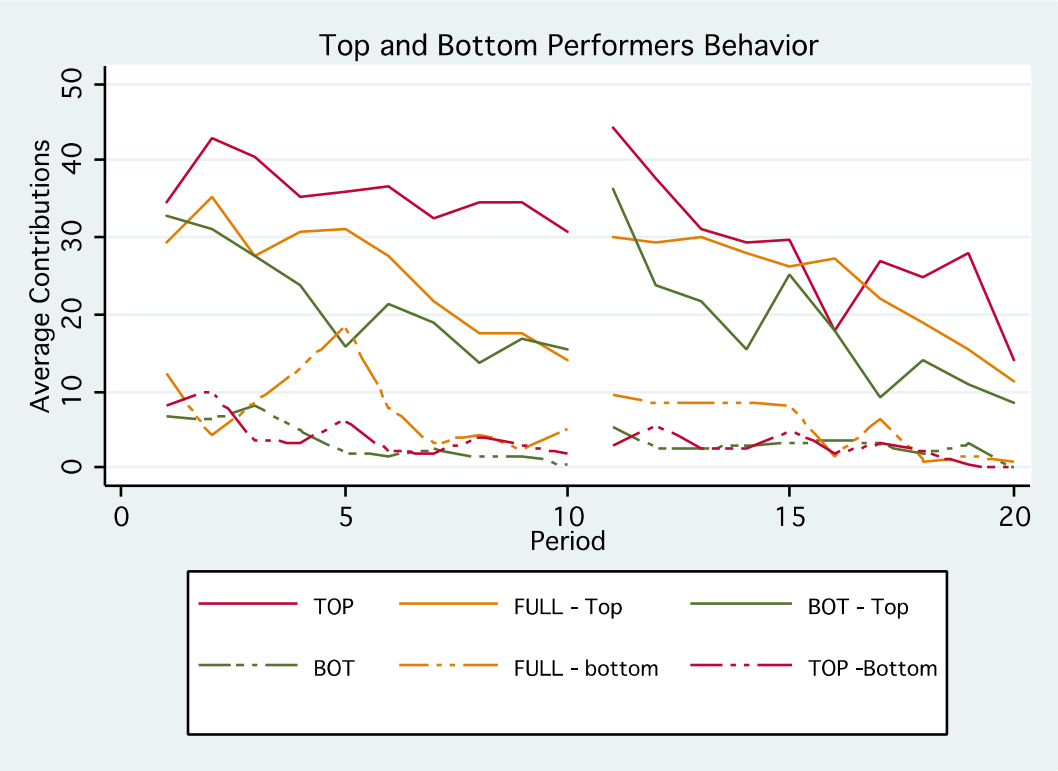


FIGURE 2


Top and Bottom Performers Behavior
Average Contributions
0
10
20
30
40
50
0
5
10
15
20
Period
TOP
FULL - Top
BOT - Top
BOT
FULL - bottom
TOP -Bottom

TABLES

TABLE 1. SUMMARY OF EXPERIMENTAL DESIGN

Treatment	Information	# Sessions	# Groups	# Subjects
TOP	Largest contribution	1	9	36
BOT	Smallest contribution	1	9	36
FULL	Complete vector of contributions	1	6	24

TABLE 2. SUMMARY STATISTICS

AVERAGE CONTRIBUTION	TREATMENT		
	BOT	FULL	TOP
Round 1	20.86	20.21	23.61
Block I	12.36	15.9	20.9
Round 11	16.58	19.79	24.81
Block II	10.64	14.7	15.64
Overall	11.5	15.3	18.27

TABLE 3. TOTAL PROFITS PER TREATMENT

Treatment	Profits		
	Total	Top performers	Bottom performers
BOT	1,229.97	1,157.73	1,208.80
FULL	1,306.63	1,263.61	1,327.54
TOP	1,365,42	1,241.48	1,434.94

TABLE 4: TREATMENT EFFECTS ON TOP AND BOTTOM PERFORMERS

Random effects regression results (S.E.)

Dependent variable: Highest (Lowest) contributions.

	Top Contributors			Bottom Contributors		
	All rounds	Rounds 01-10	Rounds 11-20	All rounds	Rounds 01-10	Rounds 11-20
Constant	37***	34.03***	36.27***	10.11***	10.90***	8.24***
	(3.69)	(3.49)	(4.36)	(2.27)	(3.17)	(1.64)
Restart	-3.70***	--		-1.07	--	--
	(1.34)			(1.02)		
Period	-1.68***	-1.38***	-1.98***	-0.59***	-0.65***	-0.53***
	(0.24)	(0.31)	(0.28)	(0.12)	(0.16)	(0.14)
TOP	7.50*	9.88**	5.13	-2.37	-2.49	-2.25
	(4.23)	(4.50)	(4.66)	(2.31)	(3.51)	(1.78)
BOT	-3.58	-2.41	-4.74	-2.18	-3.23	-1.13
	(4.71)	(4.88)	(5.08)	(2.76)	(3.52)	(2.75)
TOP vs BOT[a]	11.08***	12.29***	9.87**	-0.19	0.74	-1.12
	(3.75)	(8.84)	(4.21)	(2.56)	(2.83)	(2.68)
Nº Obs	480	240	240	480	240	240
R-sq:						
Between	0.2714	0.2229	0.2229	0.0367	0.0420	0.0684
Overall	0.2316	0.3116	0.3116	0.0722	0.0746	0.0294
Prob>chi2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

a: linear combinations of coefficients

*p<0.10. ** p<0.05. *** p<0.01.

Standard errors in parenthesis.