

Creating Self-Sustained Social Norms through Communication and Ostracism

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Abstract: This experimental study compares the effectiveness and efficiency of ostracism and communication on creating and sustaining cooperation in voluntary contribution mechanism (VCM). We find that the average contributions decline over time in the baseline VCM. There is a significant increase in the average contributions in the VCM with ostracism, and an even larger increase in the VCM with communication. Communication thus leads to more cooperation, higher efficiency and more equitable payoffs than ostracism. Such effects sustain even in the long run, after we eliminate the opportunity to ostracize or communicate. These findings suggest that social norms can form under the influence of different mechanisms and some mechanisms are better than others at creating and sustaining cooperative norms.

Keywords: *cooperation, free-riding, public goods, communication, ostracism, experiments*

1. INTRODUCTION

Economists and social exchange theorists agree that different social mechanisms can be used to create and encourage cooperation (Isaac and Walker, 1988; Ostrom *et al.*, 1992; Fehr and Gaechter, 2000, 2002; Masclet *et al.*, 2003; Andreoni *et al.*, 2003; Janssen *et al.*, 2010). In our daily lives we punish and ostracize individuals who show unacceptable behavior, but we encourage and express gratitude to those who act kindly. For example, an employer may fire an employee for not fulfilling the requirements of the job but he may also encourage and express gratitude to an employee who outperforms the expectations. Similarly, a social club may refuse to renew the membership of misbehaved members, while at the same time communicate appreciation to well-behaved members. In experimental literature, mechanisms of punishment, such as ostracism (Masclet, 2003; Cinyabuguma *et al.*, 2006; Maier-Rigaud *et al.*, 2010), and communication, such as face-to-face and chat-room (Isaac and Walker, 1988; Brosig *et al.*, 2003; Bochet *et al.*, 2006; Bochet and Putterman, 2009), have been well documented to promote cooperation in social dilemma games (*i.e.*, provision of public goods). However, the important question, not addressed in the literature, is whether these well-performing mechanisms can not only create cooperation among groups in the short run (when mechanisms are in place) but also sustain cooperation in the long run (when such mechanisms are removed).

This experimental study compares the effectiveness and efficiency of ostracism and communication on creating and sustaining cooperation in voluntary contribution mechanism (VCM). We also investigate whether these mechanisms have any long term effects on cooperation, *i.e.*, what happens when these mechanisms are removed. In the baseline VCM treatment, subjects with specific endowments can either contribute part of their endowment to the public good or keep it. In the ostracism treatment, after the contributions in the first stage of the VCM, subjects have an opportunity to vote in order to exclude some group members from participation in the next period. Subjects who are not ostracized play VCM again, while the ostracized subjects are excluded from the VCM for one period. In the communication treatment, each period, subjects are allowed to exchange text-form messages through a chat window before making the contribution decisions.

We find that the average contributions decline over time in the baseline VCM. There is a significant increase in the average contributions in the VCM with ostracism, and an even larger increase in the VCM with communication. Communication thus leads to more cooperation, higher efficiency and more equitable payoffs than ostracism. Such effects remain even in the long run, after we eliminate the opportunity to ostracize or communicate. These findings suggest that social norms can form under the influence of different mechanisms and some mechanisms are better than others at creating and sustaining cooperative norms.

It is well recognized that in a standard VCM game people initially contribute a considerable amount of their endowments to the public good, however, the contribution declines with the number of periods played (Ledyard, 1995; Chaudhuri, 2011). Over the last several decades, a number of theoretical mechanisms have been introduced to solve the problem of the under provision of the public goods (Groves and Ledyard, 1977; Walker, 1981; Healy, 2006). Although these mechanisms work in the laboratory (Chen and Plott, 1996; Chen and Tang, 1998; Healy, 2006), they are often complicated and are hard to implement in practice. For that reason, researchers turned to search for simple behavioral mechanisms used in real world and which could improve cooperation in practice (Isaac and Walker, 1988; Ostrom *et al.*, 1992; Fehr and Gaechter, 2000, 2002; Masclet *et al.*, 2003; Andreoni *et al.*, 2003; Janssen *et al.*, 2010).

Dawes *et al.* (1977) and Isaac and Walker (1988) were among the first to show that one of the most effective mechanisms that can improve cooperation is a simple communication (also often referred to as “cheap talk”). Since then researchers have found that communication increases cooperation in trust games (Glaeser *et al.*, 2000; Charness and Dufwenberg, 2006; Ben-Ner *et al.*, 2009), prisoners’ dilemma (Wichman, 1972), common-pool resource games (Ostrom *et al.*, 1992; Janssen *et al.*, 2010), coordination and voting games (Cooper *et al.*, 1992; Van Huyck *et al.*, 1993; Schram and Sonnemans, 1996), and group contests (Cason *et al.*, 2010).

A number of studies have shown that different types of communication can increase contributions to the VCM (Isaac and Walker, 1988; Krishnamurthy, 2001; Brosig *et al.*, 2003; Bochet *et al.*, 2006; Bochet and Putterman, 2009). For example, Bochet *et al.* (2006) studies how three types of communication, such as face-to-face, chat-room and numerical cheap talk, affect contributions to the VCM. The main finding of this study is that face-to-face as well as chat-room communication increase contributions up to 96% of the maximum level, thus almost entirely resolving the problem of free-riding.

Another mechanism that increases cooperation in social dilemma games, and which has attracted enormous attention of behavioral economists, is altruistic punishment (Ostrom *et al.*, 1992; Fehr and Gaechter, 2000, 2002; Masclet *et al.*, 2003). Masclet *et al.* (2003), for example, document that the non-

monetary punishment such as disapproval points substantially increases contributions to the VCM in the short run, but this effect diminishes over time. Fehr and Gaechter (2000, 2002) find that the monetary punishment is even more effective in increasing cooperation, and the high contribution levels are sustained as long as the punishment is available. However, research also show that the mere existence of punishment is not sufficient: even when altruistic punishment increases contributions to the VCM, the net payoffs with punishment are often lower (because of the significant cost of punishment) than without punishment (Casari and Luini, 2005; Nikiforakis and Normann, 2008; Egas and Riedl, 2008).

The punishment mechanism that has been shown not only to increase contributions to the VCM but also to increase the net payoffs is ostracism (Masclot, 2003; Cinyabuguma *et al.*, 2006; Charness and Yang, 2008; Maier-Rigaud *et al.*, 2010). By allowing group members the opportunity to expel free-riders by majority vote, Cinyabuguma *et al.* (2006) find that while there are few actual expulsions, a majority of participants increase their contributions to the VCM. Similarly, Masclot (2003) and Maier-Rigaud *et al.* (2010) find that the threat of expulsion or ostracism not only increases contribution levels but also, contrary to altruistic punishment, has a significant positive effect on net payoffs. The growing interest in different ostracism settings has generated many applications of this radical form of punishment, such as leadership, endogenous group formation, and endogenous formation of institutions (Guth *et al.*, 2004; Kosfeld *et al.*, 2009; Ahn *et al.*, 2009).

The main contribution of our study is that we investigate how communication and ostracism promote cooperation among groups not only in the short run (when the mechanisms are in place) but also whether they can sustain pro-social behavior in the long run (when such mechanisms are removed). This is an important question because mechanisms which encourage certain behavior in the sort run are often designed to impact such behavior for the long run (Lindbeck and Nyberg, 2006; Tabellini, 2008; Dixit, 2009). Dixit (2009), for example, argues that pro-social preferences and norms are not merely exogenous and genetically transmitted, but instead are formed as a result of exposure to a specific mechanism or influence by others. The formation of social norms is of utmost importance as it influences work ethics (Lindbeck and Nyberg, 2006; Tabellini, 2008), optimal contracting (Fischer and Huddart, 2008), and even development of education (Dixit, 2010). Our study contributes to the research on endogenous social norms formation, by experimentally investigating different mechanisms which not only promote cooperation in the short run but also sustain cooperative norms in the long run.

2. EXPERIMENTAL DESIGN

Our experiment consists of three treatments: a linear VCM as a baseline, a VCM with ostracism, and a VCM with communication. In each session, subjects participated for 10 periods in one of the three treatments, followed by 10 periods of the baseline treatment (i.e., baseline-baseline, ostracism-baseline and communication-baseline). Four sessions of each sequence were conducted. Each session involved three groups of four subjects and group compositions were fixed in the whole experiment.

In each period of the baseline treatment, subjects were endowed with 20 francs, with each franc convertible to US dollars at 50 francs = 1 dollar. Subjects simultaneously chose an integer number of the endowed francs to contribute to a group account. The remainder was automatically allocated to an individual account. Each franc contributed to the group account yielded a payoff of 0.6 to each of the four members of the group. Each franc in the individual account yielded a payoff of 1 franc to the subject. Therefore, the payoff of subject i in a period is calculated according to $\pi_i = 20 - c_i + 0.6 \times \sum_{k=1}^4 c_k$, where c_i is the contribution of subject i .

In the ostracism treatment, subjects participate in a two-stage game in each period. In the first stage, subjects participate in the VCM. In the second stage, after reviewing the outcome information of the first stage game, subjects decide whether or not to register disapproval of other group members' decisions by distributing points to them. In order to exclude reputation effects, on the outcome screen, the allocations of the three other group members to the group account are randomly re-ordered each period so that subjects are not able to track other members' allocations from one period to another. Subjects can assign points to any group member if they disapproved of his or her decision (10 points for the most disapproval and 0 points for the least disapproval). A group member is excluded from participation in the following period if he receives the majority (more than half) of maximum possible allocation of disapproval points in a given period. Subject who are not excluded, then in the next period are given 20 francs and are asked to decide how much of this amount to allocate to a group account and an individual account. Subjects who are excluded, in the next period receive 20 francs to their individual account and they do not interact with their group, and therefore

they do not receive any income from the group account. After one period of exclusion subjects return back to their group.

In the communication treatment, subjects participate in the VCM, as in the baseline treatment, except that at the beginning of each period, they had an opportunity to exchange text form messages with the members of own group in a chat window before they made the contribution decisions. They had 90 seconds in the first 3 periods (and 60 seconds in the last 7 periods) to chat with each other anonymously. Subjects were told that although we recorded the messages that they sent, only themselves and their group members would see them. We requested subjects to follow two simple rules in sending messages: (1) be civil to each other and use no profanity and (2) do not identify yourself. After the chat time was over, all group members then made their actual decisions simultaneously. Subjects did not learn the actual allocation decisions of their group members until after they made their decisions.

3. RESULTS

Let us first discuss the aggregate individual contribution levels from the first 10 periods where the treatment variables were available. Figure 1 compares the time series of average individual contributions across treatments.

Consistent with previous studies, both social mechanisms are quite successful in increasing cooperation above that of the standard VCM game. The Mann-Whitney test, treating each group in each session as an independent observation, rejects equality between the baseline treatment and the communication treatment ($n=m=12$, $p\text{-value}<0.0001$). In the ostracism treatment, even when we consider the reduction in potential contributors due to ostracism, individual average contributions are higher than the baseline treatment ($n=m=12$, $p\text{-value}=0.0018$). In comparing the two mechanisms over the entire time horizon, a Mann-Whitney test indicates that the average contribution in the communication treatment is significantly higher than in the ostracism treatment ($n=m=12$, $p\text{-value}=0.0109$). On average, groups reached 92% of the efficiency in communication treatment, 83% in the ostracism treatment, and 59% in the baseline treatment.

Both mechanisms are successful in creating cooperative behavior, but the evolution of such behavior seems to be different across mechanisms. Communication appears to have an immediate effect with full cooperation in the first period that gradually declines over time. In contrast, ostracism seems to require a few periods to establish high levels of cooperation that do not decrease over time. Both mechanisms converge to similar cooperation levels in periods 8 and 9 and experience a sharp end game effect in period 10.

3.1. BASELINE TREATMENT

Without a social mechanism in place, in the standard VCM game in the baseline treatment subjects are not able to establish a highly cooperative norm in the first 10 periods. Only 4 of the 12 groups attain full cooperation for a single period in the time horizon, and are followed immediately by a rather sharp decrease in average contribution levels.

3.2. COMMUNICATION TREATMENT

The ability to chat prior to playing in the VCM game is extremely effective in creating highly cooperative norm relative to the baseline treatment. More specifically, 11 out of 12 groups achieve full cooperation in the first period. 8 out of 12 groups maintain full cooperation at least until the end game effect in period 10.

The recorded chat messages provide insights into participants' behavior. Typical messages used to create and maintain full cooperation include "if we all give 20 every time, we can individually make the most"; "even if you deviate, you'll just make yourself less money"; "everybody allocate 20 francs, we will make the most money fairly"; "so we'll all stick to the plan". Participants also discussed the importance of building up trust as they articulated in the chat-room: "thats the point, you're tempted to earn more than you can since you know that its possible"; "but then realized everyone prob thinks that way"; "its just a matter of trusting strangers". Whenever someone in the group defected from the "full cooperation" agreement, we

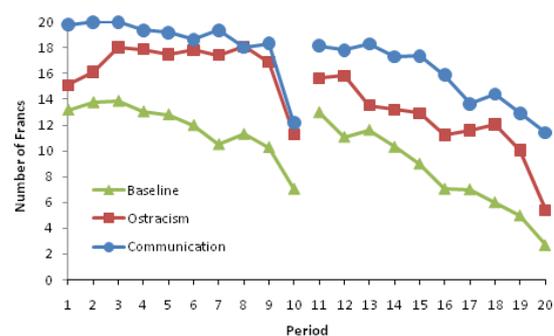


Figure 1: Avg. Individual Contributions

observe expressions of both disapprovals such as “don’t be greedy” “that was not good” “thats not cheating...thats just being dumb” “well if you hate money there's incentive to put it all in your individual” and expressions of approvals such as “team work” “all 20, group effort everyone!”

The kind of communication messages that we observe in our experiment are similar to those observed in other studies (Krishnamurthy, 2001; Brosig *et al.*, 2003; Bochet *et al.*, 2006; Bochet and Putterman, 2009). One could also provide a formal content analysis of messages (Charness and Dufwenberg, 2006; Zhang, 2009) to identify specifically what kinds of messages induce cooperation in the VCM. However, this is not the research objective of the current paper. It is very well documented in the literature that communication is a powerful mechanism that promotes pro-social behavior in many environments (Cooper *et al.*, 1992; Ostrom *et al.*, 1992; Van Huyck *et al.*, 1993; Charness and Dufwenberg, 2006; Ben-Ner *et al.*, 2009; Janssen *et al.*, 2010). Therefore, our findings are not that surprising. The main question of our study, however, is whether pro-social norms created by communication can sustain in the long run, when the ability to communicate is removed.

3.3. OSTRACISM TREATMENT

The ostracism is also a powerful mechanism at increasing cooperation above that of the standard VCM game. 10 of the 12 groups achieve full cooperation at some point during the first 10 periods of the experiment. Once full cooperation is achieved, it maintains until period 9 in 6 of the 12 groups.

Even though excluding another member of the group may be costly to the individual, assuming that the excluded individual is not a complete free-rider, ostracism is relatively frequently employed. Out of the 120 cases, exclusion occurred in 21% of the time. Specifically, one member was excluded in 19 cases, two members were excluded in 3 cases, three members were excluded in 2 cases, and the entire group was excluded once. Exclusion was never imposed if the group size was smaller than four. In other words, once some members of a group were excluded in a period, no one was ever excluded in the following period. Among the 35 exclusions, 26 subjects were excluded once, 3 subjects were excluded twice, and 1 subject was excluded 3 times. Recall every subject had 10 disapproval points to distribute. 8 cases received unanimous disapproval points (30 points in total, 10 from each other member), 10 cases received 20 points, and other cases received points ranged from 16 to 30. The average individual contributions of subjects who were excluded in period t increase from 6.46 francs to 15.63 francs when they return to the group in period $t + 2$ after one period of exclusion. Yet, their contributions are still less than the average contributions of 18.26 by subjects who were never excluded.

Consistent with Masclet *et al.* (2003) and Fehr & Gächter (1998), we find the number of disapproval points assigned by a subject increases significantly in the negative difference of his contribution from the contribution of the subject who received the points. Also, we observe spiteful preference as the subjects also assign significantly more points to group members who contribute more than themselves. On the other hand, the more subject k deviated positively from the average group contributions, the fewer points he would receive from subject i .

The fact that ostracism performs so well is again not surprising, given the previous findings of experimental literature (Masclet, 2003; Cinyabuguma *et al.*, 2006; Charness and Yang, 2008; Maier-Rigaud *et al.*, 2010). Moreover, the behavior of subjects in our experiment is very similar to the behavior observed in Masclet (2003) and Charness and Yang (2008). The main question of our study, however, is whether pro-social cooperative norms created by ostracism (or communication) can sustain in the long run, when the ability to ostracize (or communicate) is removed.

3.4. LONG RUN COOPERATION

We now examine whether social mechanisms are successful at creating cooperation that sustains even after the opportunity to communicate or ostracize is removed. Recall that subjects were unaware during the first 10 periods, while the social mechanisms were in place, that they would be playing a second 10 periods of the standard VCM game with no social mechanisms available.

The Mann-Whitney test indicates significantly higher contributions in the ostracism treatment than the baseline treatment ($n=m=12$, p -value=0.0566) and higher contributions in the communication treatment than the ostracism treatment at 10% significance level ($n=m=12$, p -value= 0.0934). On the other hand, the Wilcoxon signed-rank tests indicates that the average contributions in periods 11-20 are significantly lower than the contributions in periods 1-10 in all three treatments ($n=m=12$, p -value=0.0022 for baseline treatment, p -value=0.0037 for ostracism treatment, and p -value=0.0173 for communication treatment).

Although over time, contributions declined in all three treatments, the average contributions in periods 11-20 of the communication treatment are still higher than the average contributions in periods 1-10 of the baseline treatment (Mann Whitney tests, $n=m=12$, p -value=0.0373). This difference is insignificant comparing periods 11-20 of the ostracism treatment and periods 1-10 of the baseline treatment (Mann-Whitney tests, $n=m=12$, p -value=0.6861). In summary, we find that after 10 periods of cooperation, created via social mechanisms, groups continue to cooperate by contributing significantly more in the VCM, even after the social mechanisms are removed. To analyze this further, we compare group level decisions from the first 10 periods to the second 10 periods across treatments. As one would expect for the baseline treatment, average individual contributions within each group in periods 11-20 are quite low. A social norm of free-riding established within the first 10 periods continues to the second 10 periods. In periods 11-20, only 1 of the 12 groups attained a single period of full cooperation, and 6 of the 12 groups had at least one period of complete free-riding.

Communication is extremely successful at establishing cooperation during the first 10 periods among all groups and this social norm of cooperation continues to the next 10 periods when there is no communication. More specifically, 6 of the 12 groups were still able to maintain full cooperation for at least 8 periods. The other 6 groups which did not achieve full cooperation had no instances of complete free-riding.

Even though ostracism is quite successful at creating high levels of cooperation, it does not match up to the performance of communication during the periods 1-10 and even less so periods 11-20. Only 1 of the 12 groups was still able to maintain full cooperation for at least 8 periods. 4 of the 12 groups were able to achieve at least 75% of full cooperation for the first 8 periods. 3 of 12 groups had at least one period of complete free-riding.

There are several possible explanations for why contributions to the VCM remain high after the removal of the social mechanisms. First, better coordination in the first 10 periods of the experiment with the social mechanism in place may create a focal point for the second 10 periods (Binmore and Samuelson, 2006). Note that with communication and ostracism, subjects converge to very similar contribution levels in the last three periods of the experiment, and thus the focal point created by these two mechanisms should be the same. This would imply that individual behavior in the VCM should be very similar after the removal of communication and ostracism. Nevertheless, we find that subjects contribute significantly more after communication than after ostracism. Thus there are additional forces that drive the superiority of communication. A second explanation for sustained contributions comes from a literature on behavioral spillover (Van Huyck *et al.*, 1991; Schotter, 1998; Knez and Camerer, 2000; Ahn *et al.*, 2001; Cason *et al.*, 2009; Bednar *et al.*, 2009). In particular, Cason *et al.* (2009) find that participating in a more cooperative environment can cause behavioral spillover and thus increase cooperation in a less cooperative environment. On the one hand, this explanation is supported by our data since the high levels of cooperation established via participating in the VCM with communication seems to have “spilled over” to the subsequent standard VCM. With communication, 8 groups sustained full cooperation till period 9, and 6 of these 8 groups transferred full cooperation to when the communication is no longer available (Figure 3). 6 groups in periods 11-20 were not able to effectively cooperate, and 4 of these 6 groups experienced defection at some point during the middle periods of the first 10 periods. On the other hand, the extent of the spillover is sharply different with ostracism (Figure 4). In the first 10 periods, cooperation was established and maintained at full level (or very near) in 6 of the 12 sessions, but only 1 of these groups transferred the sustained full cooperation to the next 10 periods of the experiment (when ostracism was no longer available). Therefore, behavioral spillovers can only partially explain sustained long run cooperation. A third explanation is that social mechanisms help to form self-sustained cooperative norms (Lindbeck and Nyberg, 2006; Tabellini, 2008; Dixit, 2009). Dixit (2009) argues that pro-social preferences and norms are formed as a result of exposure to a specific mechanism or influence by others. Similarly, subjects in communication and ostracism treatment learn cooperative norms created by social mechanisms. And even after these mechanisms are removed, subjects behave according to the learned norms.

4. DISCUSSION AND CONCLUSIONS

This experimental study compares the effectiveness and efficiency of ostracism and communication on promoting and sustaining cooperation in voluntary contribution mechanism (VCM). We find that the average contributions decline over time in the baseline VCM. There is a significant increase in the average contributions in the VCM with ostracism, and an even larger increase in the VCM with communication. Communication thus leads to more cooperation, higher efficiency and more equitable payoffs than ostracism. Such effects remain even in the long run, after we eliminate the opportunity to ostracize or communicate.

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