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Social Comparisons and Pro-social Behavior

Testing 'Conditional Cooperation' in a Field Experiment

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Abstract

People behave pro-socially in a wide variety of situations that standard economic theory is unable to explain. Social comparison is one explanation for such pro-social behavior: people contribute if others contribute or cooperate as well. This paper tests social comparison in a field experiment at the University of Zurich. Each semester every single student has to decide whether he or she wants to contribute to two Social Funds. We provided 2500 randomly selected students with information about the average behavior of the student population. Some received the information that a *high* percentage of the student population contributed, while others received the information that a relatively *low* percentage contributed.

The results show that people behave pro-socially, conditional on others. The more others cooperate, the more one is inclined to do so as well. The type of person is important. We are able to fix the 'types' by looking at revealed past behavior. Some persons seem to care more about the pro-social behavior of others, while other 'types' are not affected by the average behavior of the reference group.

JEL: H41, D64, Z13

Keywords: public goods, donations, conditional cooperation, social comparisons

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Social Comparisons and Pro-social Behavior

Testing 'Conditional Cooperation' in a Field Experiment

Many important activities, such as charitable giving, voting and paying taxes cannot be explained by standard economic reasoning. So, for example, people pay taxes although the expected utility theory would predict otherwise, due to the low probability of getting caught and being penalized (e.g. Alm et al., 1992). In a large number of laboratory experiments, the self-interest hypothesis was rejected with respect to contributions to public goods (for surveys, see e.g. Ledyard, 1995). A recent study on experimental Ultimatum Games in 15 societies around the world reveals that "the canonical model of the self-interested material pay-off maximizing actor is systematically violated" (Henrich et al., 2001: 77).

Attempting to explain such results, recent theories on pro-social behavior focus on the relationship and interdependence of the people involved (for a survey, see Fehr and Schmidt, forthcoming). In deciding whether to cooperate in a social dilemma situation, people may care about the pro-social behavior of the other persons involved. Such social comparisons, when contributing to public goods, stand in contrast to standard economics theory, where individuals always suboptimally contribute, due to the inherent incentive structure of such situations. People contribute conditional on the pro-social behavior of others by being more willing to contribute the more others contribute. This effect of social comparison and so-called 'conditional

cooperation' may be due to various motivational reasons, such as 'conformity' to social norms or 'reciprocity'.[1]

Testing social comparison is faced with many difficulties. The behavior of an individual may, for example, be positively correlated with the behavior of the reference group due to the fact that the group behavior affects the individual's behavior. But it may also just be the aggregation of individual behaviors (e.g. Manski, 2000). Similarly, it is not sufficient to compare one's expectations about others' behavior with one's own behavior. Even if the correlation between expectations and one's own behavior is positive, as predicted by the theory on 'conditional cooperation', causality is not clear. Expectations about others do not necessarily trigger behavior, but behavior influences expectations. Such a 'false consensus' effect (e.g. Ross et al., 1977) can occur, because people who cooperate may mirror their own behavior based on other peoples' behavior, or they may want to justify their own behavior. To eliminate the problems of how to measure social comparison, one can experimentally manipulate the beliefs about the behavior of the group. Previous studies on social comparison in social dilemma situations used laboratory experiments.[2] Only a few studies, however, explicitly test conditional cooperation. Fischbacher, Gächter and Fehr (2001), testing conditional cooperation in a laboratory public good game, conclude that roughly 50 percent of the people behave like conditional cooperators. To avoid the difficulty of applying the results from laboratory experiments to conditions outside the lab situation, we use a different approach and test conditional cooperation in the field.

[1] See, for example, Messick (1999) and Fehr and Gächter (2000).

[2] See, among others, Falk et al. (2002), Brandts and Schram (2001), Keser and van Winden (2000) and Offerman, Sonnemans and Schram (1996).

This paper presents a field experiment, using the decisions of students at the University of Zurich on whether or not to contribute to two Social Funds administered by the University. Students have to decide each semester totally anonymously whether to contribute to the two Funds or not. We know the decisions of these students over the last nine semesters, which results in a huge panel data set (around 180'000 observations). For the field experiment, 2500 students are selected at random. The University administration provided them with information about the behavior of other students supplied by us. In the field experiment, we provided one half of the subjects with the information that relatively few of the other students (46% of the student population) contribute to the two Funds, and the other half that relatively many of the other students (64%) contribute to the Funds. The low contribution rate corresponds to an average over a longer time period, while the higher one corresponds to the last semester. In the variation of the variable of interest (the behavior of the group), we did *not* use deception, but the real contribution rate. According to the theory of conditional cooperation, social comparison in this situation should lead to higher contribution rates when students are presented with the information that many others contributed. This prediction is not trivial: if students behave according to pure altruism theories (e.g. Clotfelter, 1997: 34-35), they reduce their own contribution when informed that the other students are already contributing.

The results of the field experiment support the theory on conditional cooperation: people's behavior varies depending on the pro-social behavior of others. The contribution increases if people know that many others contribute as well. However, the effect is limited to certain 'types' of people: we determine the 'types' by looking at past revealed behavior and analyze their reactions to others' behavior. People whose decisions are indifferent react to the information about others' behavior the strongest.

To our knowledge, this paper presents evidence for the very first time on conditional cooperation outside the laboratory situation. In a similar field experiment on donations, List and Lucking-Reiley (2002) analyzed the impact of 'seed money' on charitable donations. When they exogenously increased the seed money, which can be interpreted as the donations by others, from 10 to 67 percent, donations increased by a factor of six, with an effect on both participation rates and contributions. This result may also be interpreted as a positive correlation between the giving of others and the giving of the individual donor.[3]

The paper is organized as follows: section II presents the field experiment and the data. Section III derives hypotheses and the empirical strategy to test them. In section IV the results are presented. The last section V offers an evaluation of the results and discusses their relevance.

II. Field experiment and data

The field experiment was implemented in a naturally occurring decision situation at the University of Zurich. Each semester, every single student has to decide anonymously whether or not he or she wants to contribute to two Social Funds – in addition to the compulsory tuition fee. On the official letter for renewing their registration, the students are asked whether they want to voluntarily donate a specific amount of money (CHF 7.-, about US$ 4.20) to a Fund which offers cheap loans to students in financial difficulties and/or a specific amount of money (CHF 5.-, about US$ 3) to a second Fund supporting foreigners who study for up to three semesters at the University of Zurich. Without their explicit consent (by ticking a box), students do not contribute

[3] In another field experiment about donations, Falk (2003) offered potential donors with no gift, a small gift or a large gift in the solicitation letter. The relative frequency of donations increased 75 percent if a large gift was

to any Fund at all. The panel data is composed of the decisions of all students for the nine semesters since the winter semester 1998/99 up to and including the winter semester 2002/2003. We observe the decisions of 37,624 students, who decide on average 4.75 times, depending on how many semesters they have already attended University.

In the experimental intervention, we selected 2500 students of the student population at random and provided them with additional information about the two Funds. With the official letter for renewing the registration and the decision about contributing to the two Funds (for the winter semester 2002/2003), the administration supplied the students selected with differing information about the behavior of other students. The sheet of paper that the various treatment groups received differed only with respect to the exact information given (see the appendix for a sample information sheet). Due to the 'institutional difference' that freshmen have to pick up the registration form at the counter of the administration office, only students who decided at least once in the past are included in the treatment groups. All other students constitute the control group. As some students decided not to renew their registration anymore, we could observe the decisions of 2185 subjects in the field experiment.

The main part of the field experiment provides the students with information about the behavior of others. Table 1 shows the two treatments testing for conditional cooperation.

TABLE 1 ABOUT HERE

We provided 1000 students with the information that a relatively *high* percentage of the student population (64%) contributed to the two Funds in the past, and another 1000 students with the

incorporated compared to the 'no gift'-treatment. This experiment focuses more on the interaction between donor and recipient than on social interactions between donors, as in our field experiment.

information that a relatively *low* percentage (46%) contributed to the two Social Funds. The information is based on real contribution rates, but refers to different time periods. The higher contribution rate applies to the winter term 01/02 (as indicated on the sheet for the subjects). The lower contribution rate indicates the average over the last ten years. As some of the subjects did not renew their registration, we observe somewhat less than 1000 subjects in each treatment.

In addition to these two basic treatments, we included an 'expectation' treatment in the experiment. For one group of 500 students, we elicited expectations about the behavior of others by asking them to guess how many other students (as a percentage of the total student population) contributed to *both* of the Funds. The students could return the sheet indicating their expectations free of charge by putting it into the official envelope provided by the University administration. There were monetary incentives for the students to give their truly best guess: the estimate closest to the real contribution rate earned a voucher for music or books valued at CHF 100 (about US$ 75), and there was a cinema voucher valued at CHF 20 (about US$ 15) for the five next best guesses. From the eight students who guessed the correct amount, 67 percent, we selected the six winners of the vouchers at random. 258 made a guesses (out of the 431 students in this treatment who decided to renew their registration). This constitutes a return rate of 58.0 percent, which is high for a 'questionnaire'. People who contribute to the Funds are more likely to return the sheet. However, we are not interested in the level of contribution, but in the correlation between expectations about others' behavior and one's own behavior.

Table 2 shows the summary statistics for the control group and the treatment group. As the assignment was random, no significant differences emerged between the characteristics of subjects in the treatment group and the rest of the student population. The slight difference in the

number of semesters and age are due to the fact that, in the control group, some freshmen are also included, whereas there are no freshmen in the treatment groups.

TABLE 2 ABOUT HERE

Students decide anonymously at home about the contribution to the two Social Funds – having different information about other students' behavior at their disposal. The analysis concentrates on contributions to at least one of the Funds, although students have to decide whether or not to give to two different Funds. We use contributions to at least one Fund firstly because, most students contribute either to both Funds or don't contribute at all, and secondly, because the results do not change when other dependent variables are included, and thirdly, it constitutes the lower limit of contribution. For details on contribution to the two Funds and an analysis of behavior over time, see Frey and Meier (2002).

The design of the field experiment presented here and the decision setting have two clear advantages over previous studies:

(1) For at least two decades, laboratory experiments have challenged the standard economic assumption. While experimental research leads to many insights about the basics of human behavior, it is still unclear exactly how these results can be generalized outside the laboratory situation. Field experiments can close this gap by looking at naturally occurring decisions settings, while still controlling for relevant variables.

(2) Due to the panel structure of the data set, pro-social preferences, as revealed by past behavior, can be included in the analysis. This allows us to identify how different 'types' of people react to social comparison. To analyze such a question with revealed behavior has many advantages over the questionnaire approach.

III. Behavioral Hypothesis

There are, of course, many motives which may trigger contributions to a good cause or a public good, like 'warm glow' (see e.g., Andreoni, 1990). But these motives are completely independent of the behavior of others in the group. In this paper, we are mainly interested in the effects of social comparison, i.e. whether people's behavior is affected by what others do in the same decision situation.

The hypothesis, which will be tested in this paper, assumes that people react positively to the behavior of others. No one likes being the only one who contributes to a good cause and no one likes being the 'sucker' who is 'being free ridden' by others. The most distinctive prediction of such a theory would be that individual *i*'s probability of contributing increases when the percentage of individuals *j* (j=1,…,n; j≠i) who contribute increases within a given group.

> *Hypothesis*: People behave pro-socially conditional on the behavior of others. The individual behavior varies positively with the average behavior in the group. Therefore, the probability of subjects contributing to the Social Funds in treatment *'High'* is expected to be greater than subjects in treatment *'Low'*.

The hypothesis is based on a broad notion of social comparison. The idea that the more others contribute, the more oneself gives, may be based on various motivational reasons: firstly, people may want to behave in an appropriate way and to conform to a social norm (e.g. Messick, 1999); secondly, people have some sort of fairness preferences such as 'inequity aversion' (e.g. Fehr and Schmidt, 1999) or 'reciprocity' (e.g. Rabin, 1993); or thirdly, contributions by others may serve as a signal for the quality of the public good, or for the organization which provides the good in the end (e.g. a charity) (e.g. Vesterlund, 2003). The few studies which try to evaluate in the laboratory whether people undertake social comparison out of conformity or reciprocity mostly

conclude that their results cannot be explained by reciprocity, but rather by conformity (Schroeder et al., 1983; Bohnet and Zeckhauser, 2002; Bardsley and Sausgruber, 2002).

Following this hypothesis, there are two ways of testing this theory, both of which we apply in this study: (1) Expectations about the behavior of others should positively correlate with one's own behavior, as found in various studies (e.g., see Selten and Ockenfels, 1998; Croson, 1998; Dawes et al., 1977). However, the evidence does not reveal the direction of causality. It may be the case that it is not expectations which trigger behavior, but that behavior influences expectations. Such a 'false consensus' effect (Ross et al., 1977; Dawes et al., 1977) can occur because one projects one's own behavior onto others, or because behavior needs to be justified. (2) The second approach to test social comparison is to analyze it in an experimental setting, which allows one to vary the average behavior of the group at random. In a laboratory experiment, Fischbacher, Gächter and Fehr (2001) solve the causality problem by using the strategy method. Subjects in their laboratory public good game have to decide how much to give to a public account, given the contributions of others. The study concludes that roughly 50 percent of the people increase their contribution if the others do so as well. Similar results are found by Falk, Fischbacher and Gächter (2002), who get their subjects to play two separate public good games simultaneously. The authors find two social interaction effects: firstly, people give more to the group with high cooperation rates, and secondly, the contribution within one group depends positively on others' contributions. A number of other studies in economics do not test the effects of social comparison explicitly, but the results of public good experiments show that individual contribution varies with the mean contribution of the group (e.g. Keser and van Winden, 2000; Offerman et al., 1996; Sutter and Weck-Hannemann, 2003). Andreoni and Samuelson (2003) show in their twice-played prisoners' dilemma game that small stakes in the

first game allow people to reveal their willingness to cooperate and to assess the propensity of others to cooperate. The behavior of others in the first game positively influences the behavior in the second laboratory game. Most studies about conditional cooperation are based on laboratory experiments. A non-laboratory exception is provided by Andreoni and Scholz (1998), who find that one's own donation depends on the donations of one's reference group. Their results show that, if the contribution of those in one's social reference group increases by an average of 10%, then the expected rise in one's own contribution rises by about 2% to 3%. However, because the reference group is constructed with socio-economic characteristics, it is not a direct test of how people react to the behavior of others. In our field study, we experimentally induced beliefs about the behavior of others, which is based on real contribution rates by using variations over time in contribution rates.

People may be heterogeneous in their reaction to social comparison. Two different sorts of heterogeneity may be important for the analysis of our results: (1) Only certain 'types' of people are sensitive to the behavior of others. While some persons vary their behavior according to the average behavior in the group, others are not affected by the behavior of others. Glaeser, Sacerdote and Scheinkman (1996) show in their study of social interaction effects on criminal behavior that some people are not influenced by the behavior of others, the so-called 'fixed agents'. This result compares to results from laboratory experiments where a substantial number of the subjects behave completely selfishly, whereas others show some sort of pro-social preferences.[4] (2) Everybody may react to the behavior of others, but people are heterogeneous with respect to the threshold where they change their own behavior. Whereas certain people start

[4] See, for example, Andreoni and Vesterlund (2001), who reveal that about 44% of their subjects are completely selfish, while others are driven by pro-social preferences.

to cooperate when they realize that a small minority does so, others only start to cooperate when they know that a large majority also cooperates. As our experimental intervention induces beliefs about contribution rates of 46 and 64 percentage, only people who have a threshold in between these boundaries are expected to react to the experimental intervention.

Both aspects of heterogeneity lead to the expectation that only a small fraction of people will react to the experimental intervention. And although the 'types' are randomly distributed over the two treatment groups, it is important to control for personal characteristics in order to isolate the effect of social comparison.

In the following section, we test the hypotheses and present the results.

IV. Analysis and Results

A. One's Own Behavior and Expectations About the Behavior of Others

In a first step, we analyze whether the elicited expectations about the behavior of others and one's own behavior correlate positively. Students expect, on average, 57 percent of their fellow students to contribute to both Social Funds (see appendix for the distribution of expectations). On average, they underestimate the real contribution rate of 67 percent of the students. In our context, however, the interesting question is whether expectations have an influence on one's own pro-social behavior.

We observe indeed that the higher the expectation of the students about the average group behavior, the more likely it is that these students are willing to contribute. The coefficient of correlation between the expectations expressed and the contribution to at least one Fund is 0.34. Figure 1 plots the contribution rate and the expectations (grouped in increments of 5 percent

points from 0-5% to 95-100%, which leads to 20 groups). The figure shows that the positive effect is substantial. A change in the perceived cooperation rate of others by ten percentage points, evaluated at the mean expectation, raises the probability of contributing by more than six percentage points.[5] This result corresponds with the results of various laboratory studies. However, as discussed above, the causality is not at all clear. A 'false consensus' effect may be at work, where people project their own behavior onto others. Similarly, Glaeser et al. (2000: 833) found evidence of such an effect in their study about trust. They conclude: "…the best way to determine whether or not a person is trustworthy is to ask him whether or not he trusts others."[6] But due to the problem of causality, it is important to experimentally induce beliefs in order to analyze how people react when actually presented with the relatively *high* or *low* contribution rates of other people.

FIGURE 1 ABOUT HERE

B. Behavioral responses to induced beliefs about the behavior of others

In a second approach, we test whether people adapt their behavior when presented with a relatively *high* or *low* contribution rate on the part of others. The results of the field experiment are consistent with the hypothesis that people are partly driven by 'social comparison': the probability of students contributing correlates positively with the mean contribution rate in the reference group. The percentage of students contributing to at least one of the Funds increases more than 2.5 percentage points when they receive the information that 64 percent of the other

[5] The vector of the marginal effect in a probit analysis is 0.0062 (s.e. 0.0011).

[6] However, Fehr et al. (2003), in their large-scale combination of survey methods with experiments, cannot reproduce these results. In their study, "none of the survey measure of trust are good predictors of trustworthiness in the experiment" (p. 12).

students contribute, compared to the information that only 46 percent do so. But the difference is not statistically significant at a conventional level (t-value=1.199, p<0.231). However, such a result may be due to heterogeneity in people's behavior. Students in the treatment groups are not deciding for the very first time whether to contribute or not. Many students act in a habitual way and either never or always contribute to the Social Funds. One should therefore not expect a large effect from social comparison. Despite the fact, that in the field experiment people are randomly selected, we control for individual heterogeneity by estimating a conditional logit model with personal fixed effects, in order to get rid of much of the noise.

Table 3 presents the conditional logit model, where the dependent variable takes the value 1 when the subject decided to contribute to at least one Fund, and 0 otherwise. Personal fixed effects and time dummies are incorporated. The control group consists of all students not in the treatment groups. The model can therefore test the effect on the contribution of being in one of the two treatments and – more essential for this study – whether there are differences between the two treatments.

TABLE 3 ABOUT HERE

The results of Table 3 support the theory of 'conditional cooperation': people who are presented with a high contribution rate are more likely to contribute than people who are told that not so many others contribute to the Funds. A χ^2-test of differences between the two coefficients for the two treatments shows that they are statistically significant at a 95%-level ($\chi^2(1) = 5.44$, p<0.0197). The difference in behavior due to others' behavior is substantial, especially if one takes into account the specific features of the naturally occurring decision setting. Firstly, as the experimental intervention is based on *actual* contribution rates, we do not induce extreme cooperation rates. The difference between 46% and 64% of students contributing is relatively

modest compared to past laboratory studies where people are confronted with extreme cases, such as zero contribution rates (see for example, Weimann, 1994). Our results therefore provide even stronger support for 'conditional cooperation'. Secondly, the students face a dichotomous decision (whether to contribute or not). This leaves little room for marginally adjusting one's behavior. Again, it is remarkable that students change their behavior at all. To take as the dependent variable the amount paid to the Funds, which can take the value CHF 0.-, 5.-, 7.- or 12.-, depending on the students' choice to contribute to both, or neither, or only one specific Fund, does not change the results. Thirdly, none of the subjects are contributing for the first time, so contributing may have become a kind of habit, where social comparison may lose importance. Thus, the results from the field experiment show that, even in a naturally occurring situation, people react to relatively small changes in the cooperation rate of others.

Table 3 also shows that people react in an *asymmetrical way* to the induced *high* or *low* cooperation rates. Students *increase* their willingness to contribute when presented with many others doing so. This difference is statistically significant at the 99%-level. But they do *not decrease* their willingness when only a few others contribute. Although the difference has the expected sign, it is not statistically significant at the conventional level. This result is surprising, because one could have expected that people hate being in a minority of people behaving pro-socially while others free-ride. However, the results of the field experiment show that people mimic the behavior of free-riders far less than often assumed. But students behave pro-socially if they see that many others do the same. In the present experiment, using *actual* contribution rates, people increase their pro-social behavior if many others do so, but do not decrease it when many free-ride.

To go into greater detail, the next section addresses the question of who is in fact most sensitive to the behavior of others.

C. Who is sensitive to the behavior of other persons?

One can expect that not all individuals behave in a cooperative way conditional on the behavior of others. Numerous studies find heterogeneity of individual preferences, and therefore of cooperative behavior, in social dilemma situations. Glaeser et al. (1996) explicitly incorporate different 'types' of persons into their model of social interactions. The 'fixed agents' do not react to other people's behavior. Their decisions are 'far too certain' to allow themselves to be affected by others. Other individuals' decisions are uncertain, however, and they are therefore more easily influenced by the average behavior in the reference group. In other studies, the various 'types' are detected by looking at how many people actually behave in a conditionally cooperative way in a laboratory experiment dealing with conditional cooperation.[7] We use a different approach to obtain a proxy for the 'type' of subjects. In the panel data set, we use past behavior as a proxy for how certain or uncertain people are. People who never contributed, or those who always contributed when they had a chance to do so, are expected to react more like 'fixed agents' than people who seem to be more unsure and changed their behavior at least once.

FIGURE 2

Past behavior indicates in how many previous decision situations the subject decided to contribute. This is captured by a coefficient ranging from 0 to 1. Accordingly, a coefficient of e.g. 0.5 indicates that this particular individual contributed in half of the decision situations in which

[7] Ashraf, Bohnet and Piankov (2002) use dictator game giving of individuals to explain behavior in trust games. Similar to our approach, they use revealed behavior to undertake a within-subject analysis.

he or she was involved. Figure 2 shows the distribution of 'types' in the total student population. More than 50 percent of the students contributed in all previous decisions. Around ten percent never contributed to either of the two Funds. The rest fall somewhere in between. The subjects who are more indifferent with regard to the contributions are expected to be more inclined to react to the induced beliefs.

Model I in Table 4 controls for this past behavior. The dependent variable is 1 if students contributed to at least one of the Funds, and is 0 otherwise. The probit model incorporates only students who are the subjects of one of the two treatments. The effect of the *treatment 'High'* (64%) is compared to the reference treatment where students receive the information that few others (46%) contributed (*treatment 'Low'*). As the coefficients of a probit analysis are not easy to interpret, the computed marginal effect shows how much the probability of a contribution changes compared to the reference group.

TABLE 4 ABOUT HERE

The results of the conditional logit model are supported: people contribute statistically significantly more to the two Funds when many others do so as well. The marginal effect of 4.6 percentage points is large when taking into account that the decision does not leave much room for reaction and the intervention is not strong. Table 4 also shows that past behavior is indeed an important determinant of behavior. This result again confirms that students are not prone to behavioral changes once they have taken an initial decision. The change from an induced cooperation rate of 46% to 64% can be compared to a change of the elicited expectation of the same magnitude. How much does the probability of contributing change when students either believe that 46% of other students contribute or when they believe 64% of other students contribute? Model II shows the probit model with the elicited beliefs incorporated as an

independent variable. As the marginal effect of a one-percentage change in expectations is 0.6 percentage points, the change from 46% to 64% would be a change in the probability of contributing of around 11 percentage points. This effect is more than double the behavioral change actually occurring due to conditional cooperation. The correlation between elicited expectations and behavior therefore greatly overestimates the effect of 'conditional cooperation'. This can be explained by a 'false consensus' effect: one's own behavior to a certain extent influences the expectations about others. The 'type' of person therefore not only influences the pro-social behavior but also the expectation about the pro-social behavior of others. In Model III of Table 4, we control for the 'type' of person by incorporating the coefficient of past behavior in the probit model. In this specification, the marginal effect of a one-percentage change in expectations is 0.3 percentage points. Now a change in expectations from 46% to 64% would correspond to a change in the probability of contributing of around 5 percentage points. This effect is more in line with the behavioral change due to induced beliefs, because the coefficient of past behavior captures part of the 'false consensus' effect.

In order to illustrate who reacts the most sensitively to the behavior of others, Figure 3 shows the behavioral differences between individuals in treatment group *'High'* versus *'Low',* dependent on past behavior. The figure confirms the expectation that subjects who never (c=0) or always (c=1) contributed are not very sensitive to others' behavior. In contrast, subjects who changed their behavior in the past pay more attention to others' behavior, according to the theory of conditional cooperation. Especially people who contributed less than half of the time but not never ($0<c<0.5$) behave in a very conditional way to the behavior of others. The sensitivity towards the behavior of others tends to decline, the more that people contributed in the past. This pattern is consistent with the findings of the previous section that conditional cooperation works *asymmetrically*: for

some people, the norm to contribute due to 'conditional cooperation' is stronger than for others. People who are already more willing to behave pro-socially do not care that much about the pro-social behavior of others, even when they know that the majority are free-riding. In contrast, people who tend not to contribute are much more influenced by the pro-social behavior of others. This result is in line with evidence on social comparisons in the working sphere, suggesting that, due to peer pressure, an induced high productivity norm increases the productivity of the least productive subject, but a low productivity norm does not have much influence on the most productive subjects (Falk and Ichino, 2003).

FIGURE 3 ABOUT HERE

The finding that sensitivity to the pro-social behavior of others declines the more that individuals contributed in the past is supported by a probit model. Model 1 in Table 5 shows the respective model with an interaction term between *Treatment 'High' * Coefficient of past behavior*. The effect of the treatment declines with the coefficient of past behavior, as already shown in Figure 3. The joint hypothesis of Treatment *'High'*, and the interaction effect not being zero, is statistically significant at the 90%-level ($\chi^2 = 4.87$; $p < 0.0878$). However, if we exclude the subjects who never contributed in the past, the relationship gets much clearer. Model 2 in Table 5 shows the respective estimate. Especially the coefficient of the interaction term *Treatment 'High' * Coefficient of past behavior* shows that the more individuals contributed in the past, the less sensitive they are in reacting to the behavior of others.

TABLE 5 ABOUT HERE

One way to interpret this asymmetry is to assume that all students are conditional cooperators. However, individuals have heterogeneous thresholds as to when they are willing to cooperate, given the behavior of others. Some are willing to cooperate if only a small minority do so as well,

while others cooperate only when a clear majority do so. In the field experimental setting, only people whose threshold is between 46% and 64% react to the treatments. Students who have a threshold below 46% contribute to the Funds independent of the treatments and students who have thresholds above 64% also do not care about the induced beliefs. This leaves a subgroup of the whole population who respond to the pro-social behavior of others. Depending on the distribution of the thresholds, this subgroup may be very small. If the coefficient of past behavior is correlated with the thresholds, it may explain why only certain 'types' react to the induced beliefs in the field experiment.

V. Conclusion

This paper presents evidence from a large-scale field experiment on conditional cooperation: people behave pro-socially conditional on the pro-social behavior of other persons. When students are presented with the information that many others donated to two Social Funds at the University of Zurich, their willingness to contribute increases compared to the situation where students get the information that only a few others contributed. This constitutes one of the first tests of 'social interaction' and conditional cooperation in a field experiment. The result that people cooperate conditionally on others can be refined by three empirical findings:

1. People increase their willingness to behave pro-socially when presented with many others who do so, but their pro-social behavior is not destroyed when they know that only few others behave in this way. People therefore only compare themselves 'upwards' to people who behave in a more pro-social way. Thus conditional cooperation works asymmetrically.

2. There are some 'types' of people who change their behavior due to the pro-social behavior of other persons. Only individuals who are uncertain about what decision to make react conditionally on others' behavior. Past revealed behavior can be used as a suitable proxy for the 'type' of people: individuals whose decisions changed at least once in the past were especially sensitive to conditional cooperation.

3. Those who never contributed, or always contributed, in the past are almost totally insensitive to the behavior of others; their own behavior is fixed.

References

Alm, James, Gary McClelland and William D. Schulze (1992). Why Do People Pay Taxes? *Journal of Public Economics* 48. 21-38.

Andreoni, James (1990). Impure Altruism and Donations to Public Goods: A Theory of Warm-Glow Giving. *Economic Journal* 100. 464-77.

Andreoni, James and Larry Samuelson (2003). Building Rational Cooperation. *Working Paper Series*. Department of Economics. University of Wisconsin.

Andreoni, James and John Karl Scholz (1998). An Econometric Analysis of Charitable Giving with Interdependent Preferences. *Economic Inquiry* 36(3). 410-28.

Andreoni, James and Lise Vesterlund (2001). Which Is the Fair Sex? Gender Differences in Altruism. *Quarterly Journal of Economics* 116. 293-312.

Ashraf, Nava, Iris Bohnet and Nikita Piankov (2002). Decomposing Trust. *Working Paper Series*. John F. Kennedy School of Government. Harvard University.

Bardsley, Nicholas and Rupert Sausgruber (2002). Social Interaction Effects in the Laboratory and Society: Conformism and Reciprocity in Public Good Provision. *Working Paper Series*.

Bohnet, Iris and Richard Zeckhauser (2002). Social Comparisons in Ultimatum Bargaining. *Working Paper Series*. John F. Kennedy School of Government. Harvard University.

Brandts, Jordi and Arthur Schram (2001). Cooperation and Noise in Public Goods Experiments: Applying the Contribution Function Approach. *Journal of Public Economics* 79. 399-427.

Clotfelter, Charles T. (1997). The Economics of Giving. In: Barry, John W. and Bruno V. Manno (Eds.). *Giving Better, Giving Smarter*. Washington, D.C.: National Commission on Philanthropy and Civic Renewal. 31-55.

Croson, Rachel T.A. (1998). Theories of Commitment, Altruism and Reciprocity: Evidence from Linear Public Good Games. *Working Paper Series*. Wharton School of the University of Pennsylvania.

Dawes, Robyn M., Jeanne McTavish and Harriet Shaklee (1977). Behavior, Communication, and Assumptions about other People's Behavior in a Commons Dilemma Situation. *Journal of Personality and Social Psychology* 35. 1-11.

Falk, Armin (2003). Charitable Giving as a Gift Exchange: Evidence from a Field Experiment. *Working Paper Series*. Institute for Empirical Research in Economics. University of Zurich.

Falk, Armin, Urs Fischbacher and Simon Gächter (2002). Isolating Social Interaction Effects - An Experimental Investigation. *Working Paper Series*. Institute for Empirical Research in Economics. University of Zurich.

Falk, Armin and Andrea Ichino (2003). Clean Evidence on Peer Pressure. Institute for Empirical Research in Economics. *Working Paper Series*. University of Zuerich.

Fehr, Ernst, Urs Fischbacher, Bernhard von Rosenbladt, Jürgen Schupp and Gert G. Wagner (2003). A Nation-Wide Laboratory. Examining Trust and Trustworthiness by Integrating Behavioral Experiments into Representative Surveys. *Working Paper Series*. CESifo No. 866.

Fehr, Ernst and Simon Gächter (2000). Fairness and Retaliation: The Economics of Reciprocity. *Journal of Economic Perspectives* 14. 159-81.

Fehr, Ernst and Klaus Schmidt (1999). A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics* 114. 817-68.

Fehr, Ernst and Klaus M. Schmidt (forthcoming). Theories of Fairness and Reciprocity - Evidence and Economic Applications. In: Dewatripont, Mathias, Lars P. Hansen and Stephen J. Turnovsky (Eds.). *Advances in Economics and Econometrics - 8th World Congress, Econometric Society Monographs*.

Fischbacher, Urs, Simon Gächter and Ernst Fehr (2001). Are People Conditionally Cooperative? Evidence from a Public Goods Experiment. *Economics Letters* 71(3). 397-404.

Frey, Bruno S. and Stephan Meier (2002). Pro-Social Behavior, Reciprocity or Both? *Working Paper Series*. CeSifo No 750.

Glaeser, Edward L., David I. Laibson, José A. Scheinkman and Christine L. Soutter (2000). Measuring Trust. *Quarterly Journal of Economics* 115(3). 811-46.

Glaeser, Edward L., Bruce Sacerdote and José A. Scheinkman (1996). Crime and Social Interactions. *Quarterly Journal of Economics* 111. 507-48.

Henrich, Joseph, Robert Boyd, Sam Bowles, Colin Camerer, Herbert Gintis, Richard McElreath and Ernst Fehr (2001). In Search of Homo Economicus: Experiments in 15 Small-Scale Societies. *American Economic Review* 91(2). 73-79.

Keser, Claudia and Frans van Winden (2000). Conditional Cooperation and Voluntary Contributions to Public Goods. *Scandinavian Journal of Economics* 102(1). 23-39.

Ledyard, John O. (1995). Public Goods: A Survey of Experimental Research. In: Kagel, John and Alvin E. Roth (Eds.). *Handbook of Experimental Economics*. Princeton: Princeton University Press. 111-94.

List, John A. and David Lucking-Reiley (2002). The Effects of Seed Money and Refunds on Charitable Giving: Experimental Evidence from a University Capital Campaign. *Journal of Political Economy* 110(1). 215-33.

Manski, Charles (2000). Economic Analysis of Social Interactions. *Journal of Economic Perspectives* 14(3). 115-36.

Messick, David M. (1999). Alternative Logics for Decision Making in Social Settings. *Journal of Economic Behavior and Organization* 39. 11-28.

Offerman, Theo, Joep Sonnemans and Arthur Schram (1996). Value Orientations, Expectations and Voluntary Contributions in Public Goods. *Economic Journal* 106. 817-45.

Rabin, Matthew (1993). Incorporating Fairness into Game Theory and Economics. *American Economic Review* 83(5). 1281-302.

Ross, Lee, David Greene and Pamela House (1977). The 'False Consensus Effect': An Egocentric Bias in Social Perception and Attribution Processes. *Journal of Experimental Social Psychology* 13. 279-301.

Schroeder, David A., Thomas D. Jensen, Andrew J. Reed, Debra K. Sullivan and Michael Schwab (1983). The Actions of Others as Determinants of Behavior in a Social Trap Situation. *Journal of Experimental Social Psychology* 19. 522-39.

Selten, Reinhard and Axel Ockenfels (1998). An Experimental Solidarity Game. *Journal of Economic Behavior and Organization* 34. 517-39.

Sutter, Matthias and Hannelore Weck-Hannemann (2003). On the Effects of Asymmetric and Endogenous Taxation in Experimental Public Goods Games. *Economics Letters* 79. 59-67.

Vesterlund, Lise (2003). The Informational Value of Sequential Fundraising. *Journal of Public Economics* 87(3-4). 627-657.

Weimann, Joachim (1994). Individual Behaviour in a Free Riding Experiment. *Journal of Public Economics* 54. 185-200.

Table 1: Treatment groups for testing 'conditional cooperation'

Contribution rate by others to Social Funds

'High'	'Low'
64 % (1000)	**46 %** (1000)

Note: Number of subjects in parentheses.

Table 2: Summary statistics for winter term 2002/03

Personal characteristics	Control group	Treatment 'High'	Treatment 'Low'	Treatment Expectation
Observations	19855	878	876	431
Number of semesters	10.018	11.530	11.406	11.325
	(8.561)	(7.973)	(8.289)	(7.693)
Age	27.291	27.698	27.887	27.826
	(9.575)	(6.819)	(6.787)	(7.160)
Gender (=Female)	52.6%	49.3%	51.6%	49.0%
Coefficient of past behavior	0.732	0.738	0.748	0.696
	(0.358)	(0.358)	(0.353)	(0.378)

Notes: Standard deviations in parentheses.
Source: Own experiment and data provided by the accounting department of the University of Zurich.

Table 3: Conditional Cooperation

Dichotomous dependent variable: Contribution to at least one Fund
Conditional logit model with personal fixed effect

Variable	Coefficient (z-value)	P>|z|
Treatment 'High' (64%)	0.363**	0.006
	(2.73)	
Treatment 'Low' (46%)	-0.063	0.633
	(-0.48)	
Personal fixed effects	included	
Semester dummies	included	
N	71,658	
Log likelihood	-26981.483	

Notes: Test of differences for treatment *'High'* - *'Low'* = 0.0: $\chi^2(1) = 5.44$, $p < 0.0197$
Level of significance: * $0.01<p<0.05$, ** $p<0.01$

Table 4: Conditional Cooperation Controlling for Past Behavior

Dichotomous dependent variable: Contribution to at least one Fund
Probit estimate

	Model I		Model II		Model III	
Variable	Coeff. (z-value)	Marginal effect	Coeff. (z-value)	Marginal effect	Coeff. (z-value)	Marginal effect
Treatment 'High' (64%)	0.180** (2.20)	4.6%				
Treatment 'Low' (46%)	Reference group					
Elicited Expectations			0.0215** (5.17)	0.6%	0.0128* (2.31)	0.3%
Coefficient of past behavior	2.721** (24.30)	69.1%			2.821** (8.95)	63.8%
Constant	-1.162** (-12.59)					
N	1754		250		250	
Log likelihood	-594.28409		-122.02608		-70.236785	

Source: see Table 1.
Level of significance: * 0.01<p<0.05, ** p<0.01

Table 5: Some Respond More than Others to the Behavior of Others

Dichotomous dependent variable: Contribution to at least one Fund
Probit estimate

	Model 1			Model 2 excluding subjects who never contributed		
Variable	Coeff. (z-value)	Marginal Effect	P>|z|	Coeff. (z-value)	Marginal Effect	P>|z|
Treatment 'High' (64%)	0.198 (1.23)	5.0%	0.219	0.533* (2.27)	10.7%	0.023
Treatment 'Low' (46%)	Reference group					
Coefficient of past behavior	2.735** (17.27)	69.5%	0.000	3.193** (13.89)	63.6%	0.000
Interaction Treatment 'High' * Coefficient of past behavior	-0.028 (-0.13)	-0.7%	0.899	-0.424 (-1.39)	-8.4%	0.165
Constant	-1.171** (-9.95)		0.000	-1.558** (-8.55)		0.000
N	1754			1575		
Log Likelihood	-594.276			-504.530		

Source: see Table 1.
Level of significance: * 0.01<p<0.05, ** p<0.01

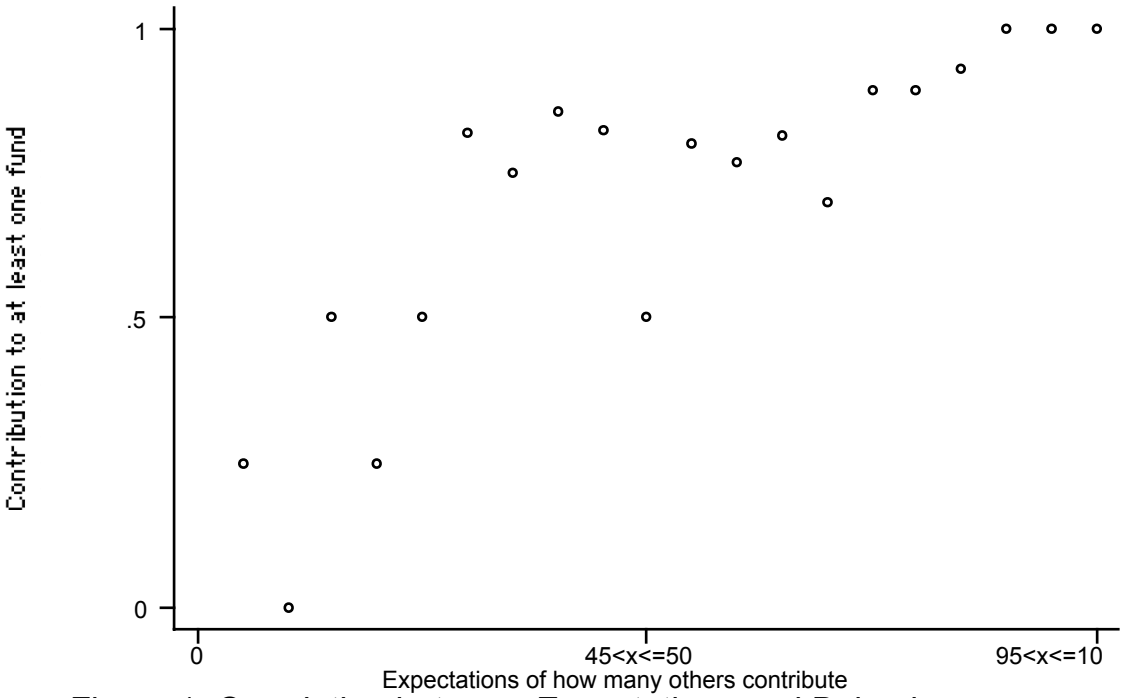


Figure 1: Correlation between Expectations and Behavior

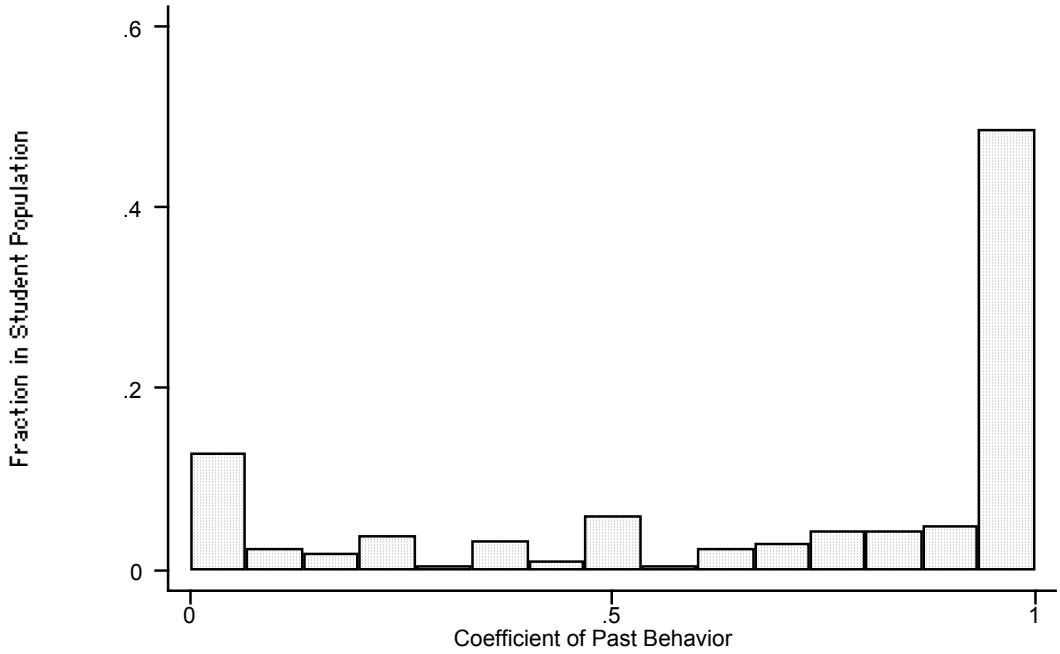
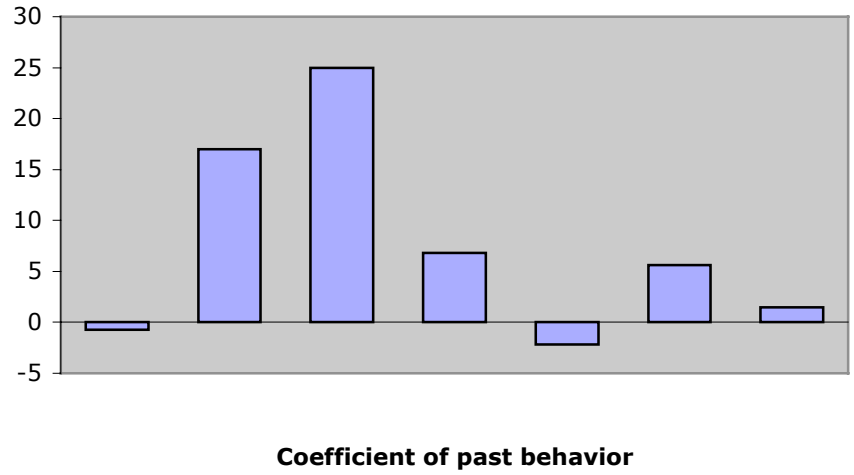
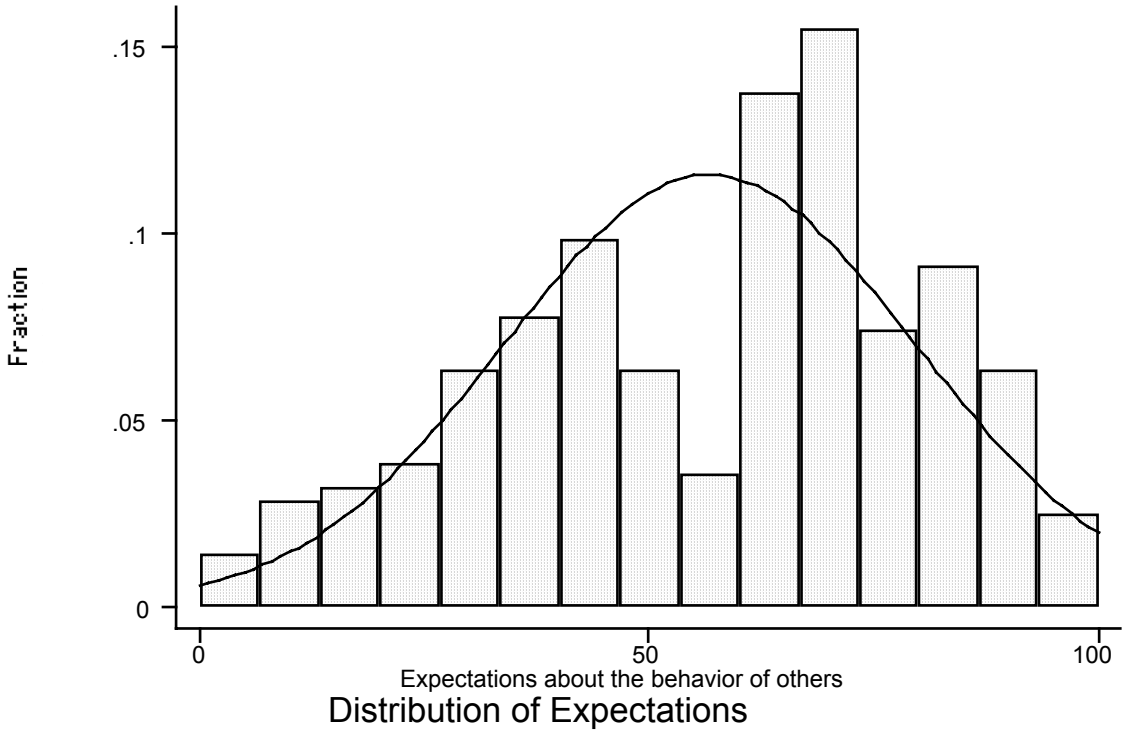


Figure 2: Distribution of 'Types'

Figure 3: Different reactions to others' behavior



Appendix



Distribution of Expectations