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Moral Opinions are Conditional on the Behavior of Others

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Abstract In social dilemmas individual behavior creates external effects on others. In such situations, a person's opinions concerning right and wrong might influence his behavior. Understanding moral opinions therefore is important. This paper reports on an experiment which shows that moral opinions are conditional on the behavior of others. This is demonstrated by the finding that a large majority of subjects in a public good game experiment report personal normative beliefs that increase with the actual contributions made by group members. This finding is important for the design of policies attempting to sustain public good provisions.

Keywords: personal normative beliefs, public good game, reciprocity, descriptive ethics, behavioral ethics

JEL Classifications: D03, D63, C91, H41

1. INTRODUCTION

Many of our most challenging issues are, at heart, social dilemmas: for example, environmental problems such as air pollution or climate change, the utilization of publicly provided services, such as health care, and shirking in group activities. Social dilemmas are situations where collective interests are at odds with private interests. In such situations the behavior which in isolation is best for the individual can lead to worse outcomes for the society as whole.

When there is a trade-off between the well-being of self and others a person's opinions concerning right and wrong might influence their behavior. The purpose of this paper is to study what opinions are held by laymen concerning how they themselves, morally speaking, should behave in social dilemmas and, in particular, whether the actual behavior of others influence such moral opinions. The main hypothesis tested in this paper is therefore that the behavior of others influences moral opinions of how one should behave in social dilemmas.

This hypothesis is tested in a laboratory public good game experiment where subjects are asked about their moral opinions concerning contribution behavior. The experiment is also able to test the hypothesis that moral opinions correlate with contribution behavior.

There are several ways of studying whether moral opinions depend on the behavior of others. While previous work includes *survey* studies of uninvolved spectators making moral judgments of other people's behavior (Cubitt *et al.* 2011) and uninvolved spectators prescribing moral opinions for various contribution levels of other group members (Reuben and Riedl 2013), this study has chosen an economic laboratory experiment. The contribution this paper makes is that it studies the moral opinions of decision-makers as and when they are about to make their contribution decisions in a public good game *experiment*, and therefore also the relationship between moral opinions and behavior. This paper contributes to the field of descriptive ethics by studying moral opinions and to the field of behavioral ethics by studying actual behavior in a public good game.

The public good game is chosen in this study because it captures the basics of social dilemmas. The public good game is a standard game within experimental economics commonly used to study behavior in social dilemma situations. Subjects are divided into groups, and within each group each subject can choose whether to contribute the money he or she is endowed with to the group account, or keep the money. All the money contributed to the public good is doubled and shared equally among the members of the group. In this setting, the monetary payoff of the group is maximized when all participants contribute their entire endowment to the group account, while the payoff of each individual is maximized by contributing zero. For good overview articles about behavior in public good game experiments, see Ledyard (1995) and Chaudhuri (2011).

A person's opinions of what he or she ought to do in a given situation are called "personal normative beliefs" (Bicchieri and Xiao 2009; Budd and Spencer 1985). In the current experiment, subjects participate in a public good game and report their personal normative beliefs. Two variants of personal normative beliefs are elicited: *unconditional* and *conditional*—based on the behavior of the other group members. Two groups of subjects report personal normative beliefs before participating in the public good game. One of these groups is asked to report personal normative beliefs *unconditional* on the behavior of others while the other group is asked to report personal normative beliefs *conditional* on the behavior of others before participating in the public good game. A third group reports both conditional and unconditional personal normative beliefs after participating in the public good game.

Behavior in the experiment will support the hypothesis that moral opinions are conditional on the behavior of others if subjects report personal normative beliefs increasing in the average contribution level of group members. If, however,

personal normative beliefs are decreasing in, or independent of the average contribution level of group members, the hypothesis will be rejected.

Although moral opinions will vary between cultures (Ockenfels and Weimann 1999), over time, age (Harbaugh and Krause 2000), and between contexts and even moods (Kirchsteiger *et al.* 2006), this is not the focus of this paper, and will therefore be held fixed in the current study.

The results from the experiment indicate that personal normative beliefs are conditional on the actual contribution behavior of the other group members. In particular, a majority of the subjects report personal normative beliefs to be exactly the average contribution level of the other group members. Such a personal normative belief is in line with the principle of reciprocity stating that moral obligations are conditional on the behavior of others (Sugden 1984).

The remainder of this paper is organized as follows: *Section 2* presents a review of previous studies on opinions regarding right and wrong behavior in public good situations. *Section 3* presents the experiment and its design, *Section 4* presents the results from the experiment and finally *Section 5* provides a concluding discussion.

2. LITERATURE REVIEW

In the following section previous research on moral opinions in *public good games* will be presented.

In a study by Marwell and Ames (1981) subjects were asked about their thoughts concerning fair contributions to the public good. Marwell and Ames (1981) reported 12 different experiments, all variants of the public good game, designed to study the free-rider hypothesis. They reported that they also collected perceptions concerning fairness—what the subjects considered was a fair investment in the public good and whether the subject was concerned with fairness when making their own decision. Unfortunately, the authors did not report whether this information was collected prior to participating in the public good game or after. Their question formulation did not relate thoughts concerning fair behavior to the actual behavior of others, in other words their question formulation was absolute. They found that 75% of the subjects believed that contributing approximately half of the endowment was fair, while the remaining 25% thought contributing the entire endowment was fair. In their experiments the groups were homogenous—all members in each public good game group had identical endowments and returns from the public good.

People who benefit from a public good are seldom equal. When people differ—in their endowments or in the return they receive from the public good—it is plausible that what is demanded from them in order to behave in a morally acceptable way also differs. Nikiforakis *et al.* (2012) and Brekke *et al.* (2014)

studied moral opinions when groups were heterogeneous: in the former study members differed with respect to return and in the latter study, group members differed with respect to the size of the endowments.

Nikiforakis *et al.* (2012) used groups of four people where two earned a high return and two earned a low return. They studied moral opinions by asking subjects, after participating in the experiment, whether they supported certain normative rules. Their focus was on whether the differing returns from the public good gave rise to different normative demands; in other words whether subjects believed that the high return subjects should contribute more than low return subjects, and also whether subjects believed high return subjects were entitled to higher payoffs. They did not, however, study whether moral opinions depended upon the behavior of others.

Likewise, Brekke *et al.* (2014) elicited moral opinions in a public good game where subjects were endowed with either high or low amounts. After participating in the experiment, subjects answered three questions regarding their moral opinions. The first question was an open question asking subjects how much he or she thought that each of the group members (specified by having either high or low endowments) should contribute. In the second question subjects were presented with three proposals for contributions: equal (absolute) contributions, equal contribution shares, and equal payoffs. Subjects were asked to choose the proposal they found most fair. In the third question subjects were asked which contributions they would choose if they could decide the contributions of all members of their group. They did not study whether moral opinions depended upon the actual behavior of others.

The three studies presented so far have in common that they study moral opinions by asking subjects who participated in a public good game experiment about their opinions concerning what is morally good behavior. A different procedure is to study the opinions of impartial or uninvolved people, or spectators—that is, people who do not participate in a public good game themselves. Neitzel and Sääksvuori (2013) did precisely this; they used an online questionnaire to elicit normative views from impartial spectators on behavior in a public good game. The public good game described in their questionnaire involved heterogeneous groups with respect to endowments. The questionnaire included two questions regarding moral opinions. The first question was an open question asking for opinions concerning what constitutes a fair contribution to the public good for a subject with a high or low endowment. The second question related moral opinions to the actual behavior of a group member:

> From the viewpoint of a neutral external observer, what is, in your opinion, a fair contribution to the group account by a member who has an endowment of 25 (15) ECUs, if a group member with 15 (25) ECUs has contributed 9 ECUs to the group account?

In all questions eliciting opinions concerning conditional contribution rules, however, the amount contributed by the other group member was fixed to nine. They were therefore not able to find out whether or how moral opinions depended on *various* contribution levels of others.

Reuben and Riedl (2013) studied, among several other issues, how moral opinions depend upon the various levels of contribution behavior of others. In addition to reporting a public good game experiment, they also reported the results of a survey eliciting moral opinions in a public good game by uninvolved spectators. In their survey subjects answer two questions regarding moral opinions. The first question was an open question related to what subjects perceive as a fair contribution to the public good. The second question, or rather set of questions, were: "what is the *fair* amount that group member i and group member j should contribute if group member k contributes x tokens to the group project?" Their experiment and survey included both homogenous groups and heterogeneous groups, where the heterogeneous groups differed with respect to endowments, return from the public good, and whether contributions are restricted such that they must be below a certain threshold. In homogenous groups where the efficient solution was not attainable, they found that the moral opinions of uninvolved spectators prescribed that all group members should contribute the same amount. In other words, their respondents reported moral opinions prescribing that the fair contribution amount for group members i and j was conditional on the amount x contributed by k.

An alternative procedure for studying moral opinions in public good games is to study what is perceived as faulty or wrong behavior. In Cubitt *et al.* (2011) subjects made moral judgments of a free-rider for various contribution levels made by other group members. Their study was a survey where several vignettes of a public good game with homogenous groups were presented to the respondents. The respondents were spectators and were asked to judge the morality of the hypothetical free-rider on a scale from -50 (extremely bad) to $+50$ (extremely good). They found that free-riding was condemned more when group members contributed higher amounts.

Punishment behavior can also give indications about what behavior we approve of or condemn—that is our moral opinions. Several public good game experiments have allowed third parties to punish subjects participating in a public good game, finding that third-parties are willing to punish people who free-ride when others contribute—even when punishing is costly to themselves (see for instance Fehr and Fischbacher 2004). Such punishment behavior can be regarded as condemning free-riders when others contribute, or in other words that free-riding is perceived as wrong when others contribute.

Several authors argue in favor of using uninvolved spectators for eliciting perceptions of moral behavior (Konow 2009; Reuben and Riedl 2013).

The arguments used in favor of uninvolved spectators include that stakeholders can have a self-serving bias, it avoids affecting behavior (or vice versa) and that subjects then have no incentive to misreport perceptions. Acknowledging the value of perceptions of moral opinions among uninvolved spectators, this paper argues that the perception of involved decision-makers also is valuable. First, people have a tendency to believe that they themselves behave better, in moral terms, than others (Epley and Dunning 2000). It is therefore possible that the standards we set for our own behavior are not identical to those we set for the behavior of others. It is also important to investigate what people perceive as morally ideal behavior for him—or herself. Second, precisely because of self-serving biases, if moral arguments matter for behavior, it is relevant to investigate perceptions of moral behavior of decision-makers, or stakeholders, as and when they are about to make their contribution decisions.

The current experiment has undertaken two steps to check whether reporting perceptions of moral behavior affects behavior and whether subjects misreport their perceptions. First, the current experiment compares the reported moral opinions of subjects who reported this before participating in the public good experiment, with those who reported them afterwards, and second, it compares the contributions made by subjects who report moral opinions before participating in a public good game with contributions made by subjects who do not.

3. EXPERIMENTAL DESIGN

The experiment investigates moral opinions, more specifically, personal normative beliefs, in a public good game experiment. Subjects were asked about their moral opinions as well as participating in a public good game experiment.

3.1 The Public Good Game

Subjects were divided into groups consisting of four people. Each subject received an endowment of 10 units of the experimental currency (EC), which was worth 20 NOK (or approximately 3.3 USD at the time of the experiment). Each subject chose how many units to keep and how many units to contribute to the public good. The sum given to the public good was doubled and divided equally between the four group members. For each unit a subject kept, they (and they only) earned 1 EC. For each unit contributed to the public good, they and everybody else in the group earned 1/2 EC.

The dominant strategy for an individual motivated solely by their own material payoff is to contribute zero to the public good—as keeping one unit gives a payoff of 1 EC—while contributing one unit to the public good gives a payoff of 1/2 EC. However, the total payoff of the group is maximized when all subjects contribute their entire endowment to the public good.

This public good game was repeated 10 times, and this procedure was told to the subjects in advance. After each period all subjects were informed of the average contribution to the public game by the other members of the subject's group, and their own payoff in that particular period. There was full anonymity in the experiment, such that at no time did any of the subjects know who the other group members were, or the choices of any of the other participants. In order to avoid strategic behavior, such as high early contributions for the purpose of increasing later contributions of group members or punishing low contributions with low contributions, group composition changed between every period, giving the game a "stranger" design.

3.2 Personal Normative Beliefs

Two question formulations were used to elicit personal normative beliefs. The unconditional question read: "In your view, what is the ethically correct thing to do? How many units *should* you contribute to the group project?" The second formulation allowed subjects to condition personal normative beliefs based upon the behavior of others. It read: "In your view, what is the ethically correct thing to do? If the others in your group on average contributed the following rounded amounts, how many units *should* you contribute to the group project?"

With an endowment of 10 EC (see details below) there are 11 contribution choice possibilities (0, ... ,10) for each individual within every group, and with groups consisting of four people, there are 11^3 = 1331 possible permutations of choices available to the other three group members. To make it simpler for the subjects, subjects were asked to condition their answers based on the average of the other three group members' contributions, rounded to the 11 integers from 0 to 10 (see illustration in *Figure 1*). When answering this formulation, subjects were asked what they considered ethically correct behavior for each of these 11 group average contributions. Subjects reported their personal normative beliefs with integer numbers between 0 and 10.

This gives eleven measures of each individual i's personal normative belief (PNB_i), one for each of the integer average contribution levels of the other group members ($\bar{c}_j$) from 0 to 10: $PNB_i \big| (\bar{c}_j = a)$ for $a \in (0, 10)$.

The main hypothesis, that personal normative beliefs are conditional on the behavior of the other group members, then can be formulated with the following

Figure 1: Screen Shot from Experiment of Question Concerning Conditional Personal Normative Beliefs

null and alternative hypothesis:

$$\begin{aligned} \mathrm{H}_0 &: \mu_{\mathrm{PNB}}|(\bar{c}_j = a) > \mu_{\mathrm{PNB}}|(\bar{c}_j = a-1) \quad \text{for} \quad \text{all}\, a \in (1,10), \\ \mathrm{H}_A &: \mu_{\mathrm{PNB}}|(\bar{c}_j = a) \leq \mu_{\mathrm{PNB}}|(\bar{c}_j = a-1) \quad \text{for} \quad \text{all}\, a \in (1,10). \end{aligned} \tag{1}$$

3.3 Procedures

When the subjects arrived at the lab, instructions were read out loud, the subjects then answered a quiz testing their understanding of the instructions. The quiz contained questions regarding how many subjects a group consisted of, how much the EC was worth in NOK, how much the subject was paid for every unit kept and every unit given to the public good, and some calculations of total payoffs for three examples of contribution decisions. When all subjects had provided correct answers to the questions in the quiz, the experiment began.

After completing the 10 period public good games, all subjects answered a questionnaire including questions about personal normative beliefs, gender, age, and field and length of education. When subjects had completed the questionnaire, the experiment was finished.

All subjects answered both question formulations regarding personal normative beliefs presented above. However, some subjects answered the one formulation before and the other formulation after, participating in the public good game, while some subjects answered both formulations as part of the questionnaire. *Table 1* illustrates how the order of the tasks differed between treatments.

Table 1: Treatments and Phases in the Experiment

Treatment	Phase 1 Question	Phase 2 Public good game	Phase 3 Questionnaire included	Number of subjects (subj. per session)
Unconditional first	Unconditional	Yes	Conditional	40 (20 + 20)
Conditional first	Conditional	Yes	Unconditional	40 (20 + 8 + 12)
Questions after	None	Yes	Unconditional, conditional	24 (16 + 8)

The experiment was programmed in ztree (Fischbacher 2007) and was conducted at Oeconlab at the University of Oslo. In total 104 students participated in the experiment. *Table 1* includes an overview of the number of subjects distributed between treatments and sessions. The participants were recruited by email, posters, electronic posters, and flyers at the University Campus.

4. RESULTS

4.1 Descriptive Ethics in the Public Good Game: Personal Normative Beliefs

This section presents the personal normative beliefs reported in the public good game. Recall that subjects were asked two questions: in one question personal normative beliefs was conditioned based upon the behavior of the other group members, while in the other question they were not.

Figure 2 illustrates the cumulative distribution of personal normative beliefs unconditioned by the behavior of group members. The *x*-axis contains the response alternatives subjects were given for moral opinions, while the *y*-axis contains the fraction of subjects reporting each of these response alternatives. Regardless of whether subjects answered this question before or after participating in the public good game, the most common personal normative belief is to contribute 10 (out of their endowment of 10 units) to the public good. This means that when reporting personal normative beliefs unconditioned by the behavior of others, approximately 60% of the subjects reported that their personal normative belief is to maximize the total payoff to their group, consistent with utilitarian ethics.

Figure 3 illustrates personal normative beliefs when conditioned by average contribution behavior of group members. Here the *x*-axis contains possible average contribution levels by group members (rounded to integers), while the *y*-axis contains

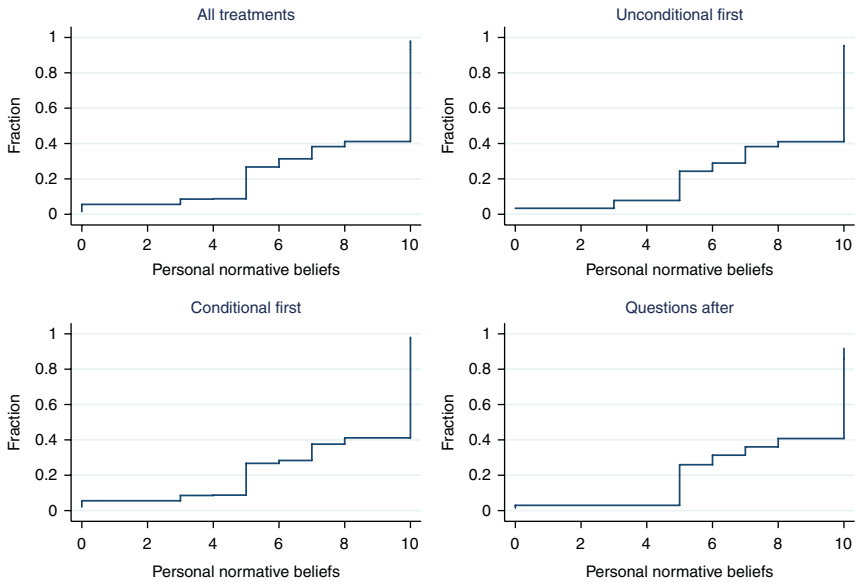

Figure 2: Personal Normative Beliefs, Unconditional. Cumulative Distribution of Answers, by Treatment

the response alternatives for personal normative beliefs. The frequency of each response alternative is illustrated through the size of the circles. For example, the large circle around origo reflects that if group members on average contribute zero units each to the public good, many subjects (large circle) report that their personal normative belief in this case would be to also contribute zero. The smaller circle in the top left corner, however, reflects that, when group members contribute nothing, only a few subjects report full contribution as their personal normative belief.

Because the *x*-axis contains the possible average contribution levels by group members, taking a vertical slice somewhere on the *x*-axis of the figure gives the distribution of personal normative beliefs among subjects for that particular average group contribution level. The figure clearly illustrates how the distribution of personal normative beliefs shifts according to the behavior of group members.

The largest circles in *Figure 3* are around the 45-degree line, indicating that a large share of subjects reported personal normative beliefs close to the contribution behavior of others. Imposing a regression line of fitted values (the straight line in *Figure 3*) shows a clear positive relationship between group average contributions and personal normative beliefs. The positive slope of the regression line in *Figure 3* supports the main hypothesis presented in (1). The main hypothesis also has been tested with paired one-tailed *t*-tests which gave *p*-values of $p = 0.0000$ for all

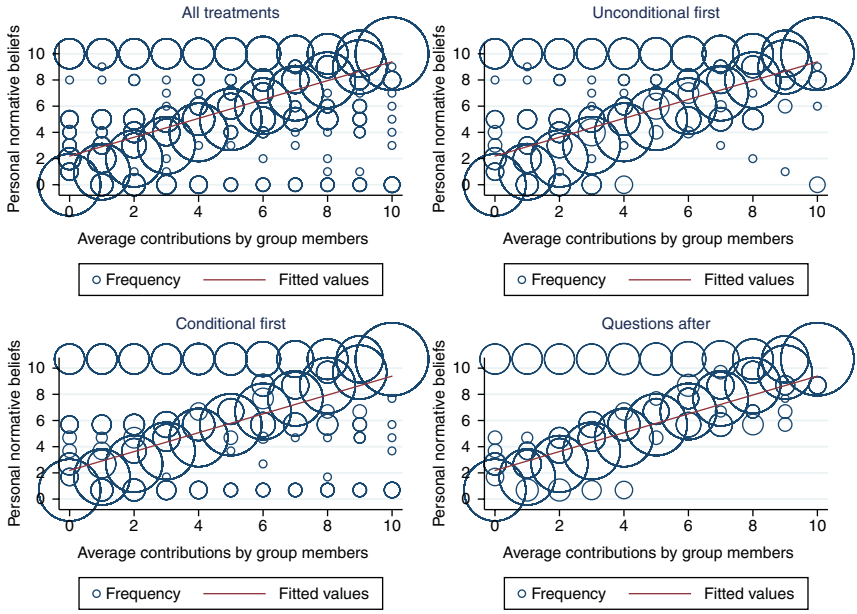

Figure 3: Personal Normative Beliefs, Conditional. Distribution and Frequency, by Treatment

$a \in (0, 10)$. In summary, the reported personal normative beliefs are significantly higher for each level of group average contributions, giving support to the main hypothesis presented in (1).

Several authors argue in favor of using uninvolved spectators for eliciting moral opinions, and one of the reasons for this is the possibility of misreporting personal normative beliefs. A relevant question therefore is whether the subjects in this experiment have reported their personal normative beliefs truthfully. One way of checking this, is by comparing the personal normative beliefs of those subjects who reported before participating in the public good game experiment with those who reported afterwards. A *t*-test of the difference between the personal normative beliefs reported by subjects who reported *before* and *after* participating in the public good game concludes that there is no difference in either the unconditioned personal normative beliefs (p-value $= 0.253$) nor the personal normative beliefs conditional on the behavior of group members (p-values all above 0.05).[1] Thus, there is no evidence of misreporting moral opinions in this experiment.

1 Average contribution levels of group members of 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10, gives p-values in t-tests of 0.452, 0.444, 0.393, 0.617, 0.496, 0.742, 0.592, 0.463, 0.238, 0.197, and 0.073, respectively.

4.2 Behavioral Ethics in the Public Good Game: Do Personal Normative Beliefs Correlate with Behavior?

Before we proceed to look at whether personal normative beliefs correlate with behavior, we will take a look at whether answering questions about moral opinions per se influences behavior. If it does not, data from the three treatments can be pooled together in the subsequent analyses.

When subjects report personal normative beliefs, they are encouraged to reflect on and thus give more attention to the moral aspect of the situation. This might in itself influence contribution behavior. Indeed, Cappelen *et al*. (2011) found that the reporting of fairness ideals itself influenced behavior in a dictator game.

We will test whether reporting personal normative beliefs influences behavior by comparing the contribution behavior of subjects who answered each of the moral questions *before* and both questions *after* participating in the public good

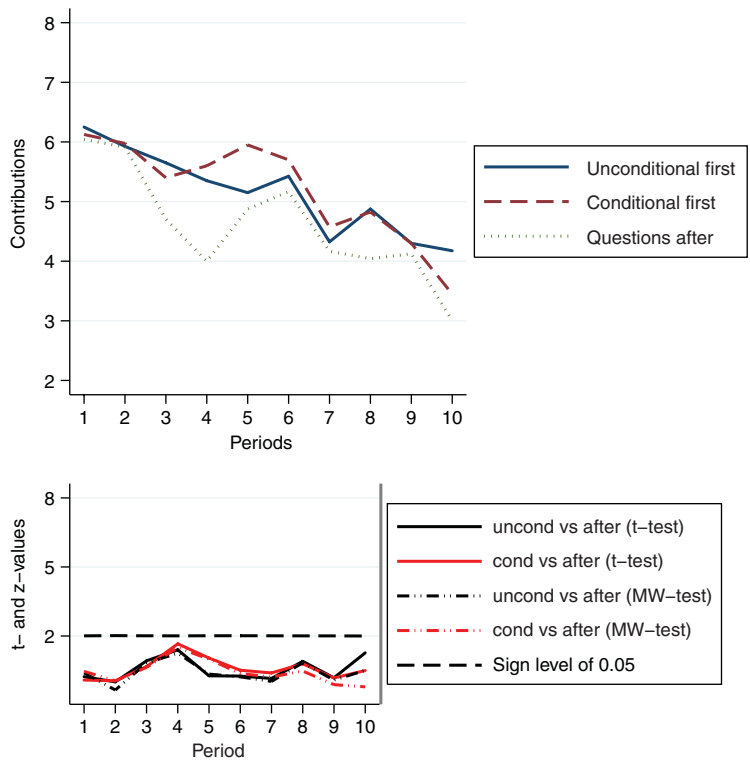

Figure 4: Above: Average Contributions by Treatment. Below: Test Statistics (Student *t*-Tests and Mann–Whitney *U* tests) of Differences in Contributions Between Treatments

game. The upper panel of *Figure 4* illustrates contributions to the public good by treatment and period. The lower panel illustrates test statistics from student's *t*-tests and the non-parametric Mann–Whitney *U* test on differences in contributions, period by period, for each of the treatments where personal normative beliefs were reported before versus the treatment where such questions were provided after participating in the public good game. As the figure illustrates, contribution behavior did not differ significantly in any period between subjects who reported personal normative beliefs before compared to those who reported after participating in the public good game.

A second test to establish if reporting personal normative beliefs influences contribution behavior is to regress contributions on whether moral opinions were reported *before* or *after* participating in the public good game. Let *Contribution_it* be the contribution of individual *i* to the public good in period *t*, *Unconditional before* be a dummy variable taking the value 1 if the subject reported unconditional personal normative beliefs before, and *Conditional before* be a dummy variable taking the value 1 if the individual reported conditional personal normative beliefs before. The comparison group therefore consists of the subjects who answered both questions concerning personal normative beliefs after participating in the public good game. In *Table 2* specification (1), panel data random effects regressions are reported doing precisely this. The coefficients for the two dummy variables *Unconditional before* and *Conditional before* are not significantly different from zero, indicating that reporting personal normative beliefs does not influence contribution behavior.

Because one of the questions about moral opinions specifically conditions personal normative beliefs on the behavior of group members, it is interesting to look at whether this question influences the degree to which subjects are influenced by others. Although the experiment has a stranger design to avoid strategic forward-looking behavior, it is still possible that subjects use information from past periods to update their beliefs regarding how other people will behave. Specification (2) in *Table 2* shows that an increase of 1 unit in the average contribution of group members in period t-1 on average leads subjects to increasing their contributions by 0.13 units. This effect is not similar across treatments, however, as shown by adding interaction variables in specification (3). While subjects who reported both conditional and unconditional personal normative beliefs after participating in the experiment increased their contribution by, on average, 0.3 units in response to a 1-unit increase in the contribution level of group members in period t-1, subjects who reported unconditional moral opinions before the public good game only increased their contribution by 0.05 units (0.3 – 0.25). Interestingly, there is no difference between the influence of others on subjects who answered the conditional question before and subjects who answered both questions after participating in the public good game

Table 2: Random Effects Regression of Treatment on Contributions

	(1)	(2)	(3)
Unconditional before	0.779	0.739	1.968
	(0.70)	(0.74)	(1.57)
Conditional before	0.753	0.722	1.475
	(0.70)	(0.74)	(1.13)
Female	0.131	0.191	0.219
	(0.18)	(0.25)	(0.29)
Age	0.0659	0.0637	0.0580
	(1.13)	(1.03)	(0.92)
Economics	−1.235*	−1.224*	−1.223*
	(−1.81)	(−1.84)	(−1.86)
Length of education	−0.0751	−0.0827	−0.0680
	(−0.37)	(−0.39)	(−0.32)
Contribution_jt-1		0.130***	0.301***
		(2.64)	(3.18)
Unconditional × Contribution_jt-1			−0.252***
			(−2.83)
Conditional × Contribution_jt-1			−0.161
			(−1.60)
Constant	5.776***	4.863***	4.020***
	(4.45)	(3.53)	(2.58)
Period dummies	Yes	Yes	Yes
Cluster by session	Yes	Yes	Yes
N	1,030	927	927

Note: *t* statistics in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

(the interaction effect of *ConditionalxContribution_jt-1* is not significantly different from zero). This means that reporting unconditional moral opinions made subjects less influenced by the behavior of others, while reporting conditional moral opinions did not make subjects more influenced by others.

In the current experiment, reporting personal normative beliefs per se does not seem to have influenced contribution behavior in the public good game. In the following analyses the data from the three treatments will therefore be pooled together.

Finally, we will look at whether personal normative beliefs correlate with contribution behavior. The panel data random effects model regression in *Table 3* suggests it does. In this table contributions to the public good are regressed on personal normative beliefs and some background variables. From the experiment, we have two measures of personal normative beliefs: not conditioned by the behavior of group members, and conditioned by the behavior of group members. Let *Personal normative belief* be a variable that takes the value of the unconditional personal normative beliefs (for definition of other variables see below). From specification (1) in *Table 3*, we can see that an increase in the unconditional personal normative belief by 1 unit coincides with an increase in contributions by 0.4 units.

Table 3: Random Effects Regression of Personal Normative Beliefs on Contributions

	(1)	(2)	(3)
Personal normative beliefs	0.418***	0.360***	0.365***
	(4.72)	(4.39)	(3.78)
Personal normative beliefs|Contribution_jt-1		0.105**	0.106**
		(2.28)	(2.29)
Unconditional before			−0.185
			(−0.27)
Female	0.0541	0.0856	0.0910
	(0.09)	(0.14)	(0.15)
Economics	−1.053*	−1.037**	−1.049*
	(−2.03)	(−1.97)	(−1.93)
Length of education	0.0891	0.0424	0.0429
	(0.48)	(0.23)	(0.23)
Age	0.0418	0.0427	0.0401
	(1.05)	(1.07)	(0.91)
Constant	3.061***	2.706***	2.731***
	(4.81)	(4.13)	(4.03)
Period dummies	Yes	Yes	Yes
Cluster by session	Yes	Yes	Yes
N	1,030	927	927

Note: *t* statistics in parentheses.
*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$.

In order to study how conditional personal normative beliefs correlate with contribution behavior, we need information about the actual behavior of group members, and the individual's personal normative beliefs for that specific average contribution level. As decisions in the experiment were made simultaneously by all group members, no individual subject, when deciding to contribute, knew what the others would contribute during that period. I therefore assume that subjects used the information they were given regarding what group members on average contributed in the previous period to update beliefs about what the others would contribute in the current period. I have constructed a variable, *Personal normative belief|Contribution_jt-1*—that takes the value of the personal normative belief reported for the actual average contribution level of group members in the previous period. So, if the other group members contributed, on average, 3 units to the public good in the previous period, this variable will be the personal normative belief reported by the subject when other group members contribute, on average, 3 units. As we can see from specification (2), conditional personal normative beliefs have a positive and significant effect on individual contributions. Increasing the reported conditional personal normative belief by one unit for a given actual average contribution level of the other group members is estimated to lead to an increase in the contribution to the public good by 0.1 units. Specification (3) includes a dummy variable for whether the subject answered the unconditional question before participating in the experiment or not, but this does not change the results.

Summing up, the results presented in *Table 3* indicate that contribution behavior correlates both by the reported unconditional and conditional personal normative beliefs in the public good game.

5. CONCLUDING DISCUSSION

The present experiment has shown that in social dilemma situations, moral opinions are conditional on the behavior of others. This has been demonstrated by the finding that a large majority of subjects in a public good game experiment report that personal normative beliefs increase as the actual contributions made by group members increase. In other words; the more others contribute to the public good, the more the individual thinks he himself or she herself should contribute, or conversely, the less the other group members contribute to the public good, the less he or she, morally speaking, is obliged to contribute. This finding lends empirical support to Sugden's (1984) principle of reciprocity.

The present experiment does not find evidence of subjects misreporting their personal normative beliefs, and no evidence that reporting of moral opinions influences contribution behavior. There is compliance, although not perfectly so, between a person's definition of right and wrong and his or her own behavior.

Marwell and Ames found that three out of four thought that "about half" or more of the endowment was a fair contribution, and that one out of four thought that people who were fair would contribute the entire endowment. The equivalent question in the present experiment, the question regarding unconditional personal normative beliefs, found even stronger support for the social welfare maximizing choice of contributing the entire endowment. Perhaps the strong support of this absolute view reflects that subjects interpret the question which is unconditioned on the behavior of others as "what is ethically right for you and everyone else to do?"

Previous work studying whether moral opinions depend on the behavior of others includes studies of uninvolved spectators making moral judgments of other people's behavior (Cubitt *et al.* 2011) and uninvolved spectators prescribing moral opinions for various contribution levels of other group members (Reuben and Riedl 2013). Cubitt *et al.* (2011) found that free-riders are condemned more when group members contribute higher amounts. Reuben and Riedl (2013) found that in cases where the efficient outcome of full contribution was not possible, uninvolved spectators prescribe that when one group member in a homogenous group contributes a certain amount, the remaining group members should contribute the same amount.

There can, however, in principle at least, be a difference between how we judge others and how we judge ourselves, and between what we demand from other people and what we demand from ourselves.[2] We might judge others more strictly than we judge ourselves, or we might be better at noticing the mistakes and bad behavior of others (cf. "Why do you look at the speck of sawdust in your brother's eye and pay no attention to the plank in your own eye?" (Matthews 7:3)).

If behavior is influenced by personal normative beliefs, it is valuable to know the moral opinions of involved decision-makers as they are about to make their decision. This paper thus contributes to the literature by eliciting moral opinions conditional on the behavior of others among involved decision-makers in a public good game experiment. The current study finds that involved stakeholders prescribe that they themselves should contribute the same as the other group members contribute on average. The results of this study, together with the results of the aforementioned studies, provide evidence of moral opinions being conditional on the behavior of others.

In a related article on decision-making in a dictator game, Bicchieri and Xiao (2009) studied normative and empirical expectations. Normative expectations are what we believe others think we ought to do,[3] while empirical expectations are what we think others will do. Bicchieri and Xiao (2009) presented an experiment

2 However, Brekke *et al.* (2014) do not find support for subjects having different demands for moral behavior for themselves and others with equal endowments.

3 Notice that this differs from personal normative beliefs as the latter are the decision-maker's opinion regarding what he himself or she herself should do.

designed to find the relative importance of these two types of expectations and found that what we think other people will do influences what we do ourselves and that other people's view of what we ought to do only influences us when we believe that others will also behave accordingly. The main differences between Bicchieri and Xiao (2009) and the current paper, is that they used a dictator game, while the experiment reported here uses a public good game, and that they looked at our beliefs about how others think we should behave (the normative expectations), while this paper looks at our opinions about how we think we should behave ourselves, that is our personal normative beliefs. The results from the current experiment might explain why they found that we don't live up to what other people think we ought to do in a situation where we don't expect that other people will either; our own moral opinions are conditional on the behavior of others. When others don't live up to a moral standard, we don't think we need to either.

Previous research in experimental economics has shown that people do not behave as egoistic as assumed by standard economic theory. In dictator games, for instance, people share considerable amounts of money with anonymous strangers (Engel 2011). From decades of research on behavior in public good games, we know that in public good games people contribute positive amounts to the public good, but that the positive contributions fall as the game is repeated (Chaudhuri 2011; Ledyard 1995). This study adds to this literature that people feel morally obliged to contribute to the public good only as long as others contribute as well.

When designing policy it is important to keep in mind that a large portion of people have a moral motivation that depends on how others behave, and that the existence of free-riders can destroy the motivation behind voluntary contributions to public goods. Policy should therefore focus on preserving this moral motivation, by for instance punishing those who do not contribute.

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APPENDIX

Instructions

[Information given in brackets only applies to the two treatments with moral questions posed before participation in the public good game]

Welcome to this experiment in economics. The results from this experiment will be used in a research project. Therefore it is important that you follow certain rules. It is important that you do not speak, or in any other way communicate with the other participants during the experiment. Mobile phones must be turned off, and it is not allowed to use any other software on the computer other than the program that is already open on your screen. There will be full anonymity in this experiment, which means that none of the other participants in this room will be aware of the decisions you make, and even the experimenters will be unable to trace decisions back to you as an individual. The experimenter will tell you when the experiment starts and when you can enter your answers on the screen in front of you. If you have any questions during the experiment, please raise your hand and one of the experimenters will come over to you and answer your question.

As a compensation for participating in this experiment, you will earn money. How much you earn will depend on the choices you make and the choices made by other participants during the experiment.

The experiment consists of 2 [3] phases: [the question phase], the decision phase and the feedback phase. [The experiment starts with the question phase, where you will be asked a question related to the experiment. The answer you give to this question has no impact on your payoff from the experiment.] The decision phase and the feedback phase is both repeated 10 times. At the beginning of each decision period you will receive 10 units of the Experimental

Currency (EC). 1 EC = 2 NOK. Your task is to decide how many units to keep and how many units to contribute to a group project.

Your payoff from the experiment is based on your choices in the decision phase. In the feedback phase you will receive a summary of how many units you have contributed to the group project, how many units the other group members on average contributed to the group project and your payoff. How much money you earn, depends on how many units you decide to keep, how many units you contribute to the group project and how many units the other group members contribute to the group project. After all of the members of your group have decided how many units to contribute to the group project, the total amount given to the group project will be doubled and divided equally between the members of your group. For each unit you keep, you (and only you) will earn 1 EC (= 2 NOK). For each unit you contribute to the group project you and everybody else in your group will earn 1/2 EC (= 1 NOK). The same applies to the other members of your group. That means that your group in total will earn most if everybody contributes everything to the group project, while you as an individual earn most if you keep all units for yourself.

In the experiment you will at all times be part of a group consisting of four persons, you and three others. You will not know the identity of the three other group members. In each decision phase you will become a member of a new group. In other words, your group will consist of different people in every period. Which group you will be part of is decided by a random draw.

Notice that what happens in your group does not influence the payoff of members in other groups. Likewise the decision of other groups will not influence your payoff.

After the experiment is over, you will get to know your total payoff in the experiment. Your total payoff in the experiment is the sum of your payoff in each of the 10 decision phases. After you have learnt your total payoff, a code will appear on your screen, which you should write down on the payment sheet on the desk in front of you. It is very important that you write down the payment code correctly, because this code is the only thing that traces you to the decisions you have taken during the experiment. In addition you must fill out your name, address, and bank account details on the payment sheet. When you have completed the payment sheet, fold the sheet and put it in the envelope on the desk in front of you. The envelope is addressed and the postage prepaid. It will be sent to the accounting department who will transfer your payoff to your bank account. No one other than the accounting department will know how much you have earned in the experiment, and they will not know what the experiment is about or what choices you have made. Are there any questions?

Summing up:

- There are 2 [3] phases:
  - [The question phase: the answer to this question will not affect your payoff.]
  - The decision phase: here you decide how many units to keep and how many units to give to the group project. Your decisions in this phase will determine your payoff from the experiment.
  - The feedback phase: in this phase you get feedback on your own choices and the choices of the other members of your group.
  - The decision phase and the feedback phase are each repeated 10 times.
  - There are four people in each group.
  - In each decision phase you are member of a new group.
  - In each decision phase you start off with an endowment of 10 EC.
  - The sum given to the group project is doubled and divided equally between the members of the group.
  - By keeping one unit, you will earn 1 EC.

- By contributing 1 EC to the group project you will earn 1/2 EC. The group as a whole will earn most if all group members contribute everything to the group project, while you earn most if you keep your units.
- 1 EC = 2 NOK.

It is very important for the results of the experiment that there are no misunderstandings around the instructions. To be sure there are no misunderstandings, we ask you to fill out the question sheet in front of you. This is not a test of your knowledge, but a way for us to ensure that we have managed to formulate the instructions clearly. Now you will get a couple of minutes to read through the instructions on your own and fill out the questions. Please raise your hand when you are finished or if you have any questions.