Does Ethics Training Neutralize the Incentives of the Prisoner's Dilemma?

Evidence from a Classroom Experiment

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Abstract: Teaching economics has been shown to encourage students to defect in a prisoner's dilemma game. However, can ethics training reverse that effect and promote cooperation? We conducted an experiment to answer this question. We found that students who had the ethics module had higher rates of cooperation than students without the ethics module, even after controlling for communication and other factors expected to affect cooperation. We conclude that the teaching of ethics can mitigate the possible adverse incentives of the prisoner's dilemma, and, by implication, the adverse effects of economics and business training.

Keywords: Prisoner's dilemma game, experimental game theory, impact of ethics training

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Introduction

Important to the economic model are the assumptions that people are self-interested and rational, that they prefer more to less, and that they maximize their welfare subject to the various constraints of "income, time, imperfect memory and calculating capacities, and other limited resources, and also by the opportunities available in the economy and elsewhere" (Becker, 1993, p. 386). Does exposure to the economic model and its associated assumptions make people less willing to cooperate? Frank, Gilovich, and Regan (1993) provide experimental evidence affirming "that exposure to the self-interest model does in fact encourage self-interested behavior" (p. 159). Specifically, they find that economics students are more likely to defect in a prisoner's dilemma game than non-economics students. They speculate that the reason for the higher rate of non-cooperation by economics students is not because economists are "simply more self-interested to begin with" (1993, p. 159), but rather because "economics training encourages the view that people are motivated primarily by self-interest [which] leads people to expect others to defect in social dilemmas" (1996, p. 192).

If teaching economics encourages students to defect in a prisoner's dilemma game, can ethics training reverse that effect and promote cooperation? This is the question we examine here from the findings of a prisoner's dilemma experiment similar to Frank *et al* (1993). However, in our experiment some subjects (students) were exposed to an ethics module, based on James (1998), in which the prisoner's dilemma was used to help students recognize and understand the ethical implications of their decisions. A key feature of this ethics module was the emphasis that, from an ethical perspective, participants in a prisoner's dilemma might have a *duty* to cooperate with their partners. We found a marginally positive and statistically significant effect of the ethics training. That is, according to the results of our experiment, students exposed to the ethics training were more willing to cooperate than

students not taught ethics, at least in the short-term; we did not examine whether the ethics module had a long-term impact (e.g., after a year or more).

This research is important because ethics training in business schools seems to enhance the ability of students to recognize ethical dilemmas (Gautschi and Jones, 1998; Carlson and Burke, 1998). Nevertheless, business students are often more willing to cheat *in practice* relative to non-business students, especially once they move into the business world (McCabe, 1992; Kidder, 1995). If business school training, in which economics is a key part, promotes (at least implicitly) the view that students should behave non-cooperatively, then that suggests an even greater role for ethics training if it can be documented that teaching ethics counteracts the negative effects of business economics training.

The Prisoner's Dilemma Experiment

The Prisoner's Dilemma, in its simplest form, involves two players and is represented as a 2 x 2 matrix. Each player is responsible for choosing between two different courses of action, such as Cooperate or Not Cooperate, which the players select simultaneously. For each combination of choices made by the two players, the payoffs received are indicated in the cells of the matrix (see Table 1 for an example). The structure of the game is such that when the game is played only once participants always have a dominant strategy to defect (not cooperate). However, experimental evidence shows that participants in a prisoner's dilemma game frequently cooperate rather than defect (see Dawes, 1980; Dawes and Thaler, 1988). The hypothesized reason for such cooperation is that, even though there is an incentive for players to defect, there may be counteracting incentives inducing cooperation that mitigate the negative incentive effects of the prisoner's dilemma game. Features of experiments that have been shown to result in cooperation by participants when defection is theoretically expected include repetition of the game (Axelrod, 1984) and communication among players (Frank et al, 1993; Tullock, 1999). In our experiment, students played the prisoner's dilemma with a partner only once. Thus, we removed the incentive for cooperation resulting from repeated play of the game. In addition, some students were

allowed to communicate with their partners, while others were not. Thus, we are also able to examine how communication effects cooperation in the prisoner's dilemma. After controlling for the effects of repetition and communication, the incentives of the prisoner's dilemma suggest that students will not cooperate. We want to know if teaching ethics can promote cooperation in this situation. Because teaching ethics does not change the incentive structure of the prisoner's dilemma, however, we would not expect ethics training to result in greater rates of cooperation among players. Therefore, we propose the following null hypothesis:

> H1: *Participants in a prisoner's dilemma game exposed to an ethics module will not be more likely to cooperate than participants not exposed to the instruction, other things being equal.*

Additionally, as explained above, communication among players has been shown to increase rates of cooperation, while exposure to economics training has been shown to increase the rate of defection. Therefore, two additional hypotheses examined in our experiment include:

> H2: *Participants in a prisoner's dilemma game who are allowed to communicate with their partners will be more likely to cooperate than participants not allowed to communicate with their partners, other things being equal.*

> H3: *Participants in a prisoner's dilemma game who are economics majors will not be more likely to cooperate than non-economics majors, other things being equal.*

The Experimental Design

There were 154 participants, or 77 student-pairs, in the experiment, all of whom were students in our Fall 2000 courses. These courses included, at the undergraduate level, principles of microeconomics (86 students in four sections) and intermediate microeconomics (30 students in one section), and at the graduate (MBA) level, managerial economics (10 students in one section) and business ethics (28 students in two sections). Students who participated were offered extra credit to their course grade, equivalent to approximately three to five percent of their final grade, rather than monetary payments as

payouts from the experiment. This differs from the standard practice of paying students in dollars or other monetary units for their participation. The purpose of having extra credit as the payout for participants was so that we could control for how important students felt the payout was. That is, students who believed they were performing poorly in a course may be more tempted to defect than classmates doing well so that they could obtain the highest possible number of extra credit points. This suggests the following hypothesis:

> H4: *The higher the expected grade of participants in a prisoner's dilemma game, the more likely it is that the participant will cooperate, other things being equal.*

[Table 1 about here]

One week prior to the experiment, students in randomly designated economics classes, as well as students in the business ethics class, were given a one-hour presentation on ethics (described below). Attendance was taken so that we could identify which students had received the ethics module. On the day of the experiment, which occurred in class during normal class time,[1] students were told that they would be randomly paired with a student in the class and that they would be asked to indicate whether they would cooperate or not cooperate with their partner in a prisoner's dilemma game, as given in Table 1. According to the table, the extra credit points they received were determined by the combination of their, and their partner's, responses to the prisoner's dilemma game. For example, if a student cooperated with her partner, but her partner did not cooperate with her, then the student would receive 1 extra credit point for that choice (see quadrant II in Table 1). However, if the student did not cooperate with her partner, but her partner did cooperate, then the student would receive 6 extra credit points (see quadrant III in Table 1). Moreover, if both partners cooperated, then each would receive 4 extra credit points

[1] Students who did not want to participate in the game were excused from class for the day.

(quadrant I), and if both did not cooperate, then each partner would receive 2 extra credit points (quadrant IV).

After explaining the game to the class, students were instructed to remain quiet while working on homework as they waited for their turn to participate. Then two students were randomly selected to come to the front of the class, where they were asked to sit at a desk separated by a divider so that the student-pairs could not observe their partner and so that the experimenters and other students could not observe their responses. Each partner was given a worksheet that contained the prisoner's dilemma (based on Table 1). They were asked to answer the following question: "Do you choose to **Cooperate** or **Not Cooperate** with your partner from this class?" In addition to this question, students were asked to answer several questions about honesty as well as a number of demographic questions (their major and expected grade, as well as gender and year in school), which acted as control variables. When the pair completed their questionnaires, they were asked to leave the room and a new pair was randomly assigned to come to the front of the room to complete the survey instrument. After one half of the students had completed the experiment and left the room, subsequent pairs of randomly assigned students were told they could communicate with each other while they waited for their opportunity to complete the survey. That is, while one pair was completing the questionnaire, the next pair was randomly assigned and told they could speak with each other about anything, including how they would like to respond to the cooperation question.

The Ethics Module

Prior to their participation, some students were exposed to an ethics module that consisted of four distinct elements. First, students were told "ethics is about how we ought to live" (Singer, 1994, p. 3). Ethics is the study of the rules, standards, or principles that help us determine whether an action is right or wrong. For instance, statements such as "do not harm other persons," "fulfill your responsibilities,"

"promote your self-interest," and "respect the rights of others" are ethical standards. To be "ethical" is to make decisions consistent with an ethical standard.

[Table 2 about here]

Second, students were told that the purpose of the ethics discussion was not to justify specific ethical standards, but rather to show why it is important that they abide by ethical standards -- that is, why they should be ethical. To this end, students were instructed that the prisoner's dilemma could be used to illustrate the nature of "ethical dilemmas" and to show why it is important to be ethical. Table 2 illustrates an ethical dilemma framed as a prisoner's dilemma game. In this context, being "ethical" can be interpreted to mean "balancing other's welfare with your own," while being "unethical" means "acting without regard to others." Prior to filling in the table indicating preferred rankings, students were asked which combination of ethical/unethical decisions they most preferred: you and others are ethical, you are ethical but others are not, you are unethical while others are ethical, or both you and others are unethical. Students quickly recognize that they are (individually) best off (e.g., they rank 1) when they are unethical but others are ethical. However, the worst-case scenario (e.g., they rank 4) is one in which they are ethical but others are not. Students also recognize that everyone being ethical (e.g., they rank 2) is better than everyone being unethical (e.g., they rank 3). Because this is a prisoner's dilemma framework, it becomes clear that the dominant strategy is one in which students behave unethically, resulting in their third ranked outcome. Consistent with the logic of the prisoner's dilemma, this example is used to show that they can be (individually and mutually) better off being ethical, since ethical behavior by everyone results in a better (rank 2 rather than rank 3) outcome.

Third, students were invited to participate in an N-person variation of the prisoner's dilemma called the Voting Game. The Voting Game is described in detail in James (1998). For this activity, students were asked to secretly write (or vote) either a "0" or a "1" on a one-inch-by-one-inch piece of paper, and they were informed that their papers would be collected and the number of 0s counted.

Students were also informed (prior to voting) that they would, following the counting of 0s, receive a hypothetical payout based on an overhead slide similar to that presented as Table 3. According to the table, the payout for each student increases with the number of 0s, while voting 1 gives the student 8 more than those who vote 0. Because this activity is based on the prisoner's dilemma, the result is that students inevitably receive a lower payout than hypothetically possible, because some students "defect" by voting 1 rather than by voting 0. Indeed, in each class in which this activity was played, on average half of the students voted 0, while the other half voted 1.

[Table 3 about here]

The Voting Game is used to make two important points about ethical behavior. The first point is that "unethical" behavior causes harm to others. Thus, in the context of the Voting Game, students who vote 1 harm others in the class by their vote. According to Table 3, each person who votes 1 causes everyone else in the class to loose 2 hypothetical points. Therefore, one could argue that voting 1 is "unethical" while voting 0 is "ethical." The second point is that unethical behavior is ultimately self-defeating. For instance, if there were 10 students in the class and all ten vote 0, then each student would receive 20 (see Table 3). However, if more than four students vote 1, then their payout is less than what they could have received had each voted 0. The point is that unethical behavior generally makes you worse off than you otherwise could have been, which is a characteristic outcome of the prisoner's dilemma game. A corollary point is that the only way unethical behavior pays is when everyone else is ethical. But, since everyone has an incentive to behave unethically, everyone is better off when they, in fact, behave ethically.

Fourth, students were asked to explain how ethical behavior (e.g., voting 0) could be encouraged in the Voting Game. Suggestions generally involve some form of monitoring of student voting, with appropriate rewards and punishments for desired and undesired behavior. Students were then told that when institutional mechanisms to foster cooperation and ethical behavior are difficult or costly to devise,

then the only other recourse is to appeal to an individual's sense of good will to encourage them to be ethical, even when it is not in their immediate interest to do so, or even if they know they can behave unethically without detection. The point is that, in one sense, people should feel an obligation to behave ethically and cooperate with others, regardless of the incentives they face either to reciprocate the cooperation or take advantage of others.

Discussion of Results

The explanatory variables that we included in our analysis were whether the student was exposed to the ethics module (ETHICS MODULE), whether the student was allowed to communicate with his or her partner (COMMUNICATE),[2] whether the student was an economics major (ECO/FIN MAJOR),[3] the grade that the student expected to receive in the course (EXPGRADE),[4] whether the student was a male (MALE), and the year of the student (YEAR).[5] We hypothesized that the ethics module would not increase the likelihood that participants in the prisoner's dilemma cooperate. Because communication has been shown to increase the rate of cooperation in previous experiments, we expected that the effect of communication would be positive – that is, students who were allowed to communicate with their partner would be more likely to cooperate than students who did not communicate. Furthermore, we expected that students who are economics and finance majors, and students who expected their course grade to be relatively low, would be less likely to cooperate. Finally, consistent with previous empirical research indicating that males are less willing to cooperate and that cooperation rates increase as students move

[2] In our experiment, COMMUNICATE is measured as a dummy variable indicating whether the participant was allowed to communicate face-to-face with their partner prior to their participation in the experiment.
[3] Our university offers both an economics as well as an economics & finance major. Students indicating they were either major were grouped together.
[4] Grades are A, B, C, D, or F. The variable EXPGRADE took on a value of 4 for an expected grade of A, a value of 3 for B, 2 for C, 1 for D, and 0 for F.
[5] Students indicated whether they were freshman, sophomores, juniors, seniors, or graduate students. Freshmen were coded as 1, sophomores as 2, juniors as 3, seniors as 4, and graduate students as 5.

through their university training (see Frank *et al*, 1993, and the citations therein), we predicted that the sign on MALE would be negative and the sign on YEAR would be positive.

[Table 4 about here]

Table 4 presents summary statistics of our findings. Of the 154 participants, 46 percent were exposed to the ethics module, nearly 52 percent were allowed to communicate with their partner, and 27 percent reported that they were economics majors. Additionally, students on average expected their final grade to be in the B to B+ range (on an A, B, C, D, and F grading scale). Finally, almost 65 percent of the participants were male, and most were in their junior year of college.

According to our findings, 67 percent of the participants cooperated with their partner. This is consistent with other research indicating a relatively high degree of cooperation among participants in a prisoner's dilemma game, even when it is a one-shot game. Moreover, economics majors were neither more nor less likely to cooperate with their partner. For example, 67 percent of economics and non-economics majors cooperated with their partners. We speculate that the economics variable was not significant because our economics program is non-traditional -- it is taught in a business school and is joint with a finance degree -- and because all undergraduate and graduate business students (both economics and finance majors and non-majors) are required to take two semesters of principles of economics, even if they are not economics majors. Furthermore, whether or not a student was allowed to communicate with his or her partner seemed to be important. Approximately 73 percent of students who communicated with each other cooperated in the experiment, whereas 61 percent of students who did not communicate cooperated, suggesting that communication is an important factor affecting the likelihood that participants in the prisoner's dilemma game cooperate.

Students who were exposed to the ethics module were more likely to cooperate with their partners. Of those students who had the ethics module, nearly 78 percent cooperated with their partner, whereas 58 percent of students who did not have the ethics module cooperated. Thus, the ethics module

seems to increase the likelihood that students cooperate in a prisoner's dilemma game, leading us to reject the hypothesis that ethics training will have no effect on the rates of cooperation in a one-shot prisoner's dilemma game.

In order to examine how exposure to the ethics module affects the probability that students cooperate in a prisoner's dilemma game, we estimated Probit regressions for the experimental data (see Table 5). In the Probit regression, the dependent variable takes the value of zero if the student chose not to cooperate, and one if the student chose to cooperate. According to our analysis, the coefficient on the ethics module is positive and significant (see models 3 and 4 in Table 5). This implies that, on average, exposure to the ethics module increases the likelihood that students cooperate.

[Table 5 about here]

Although the coefficient itself in a Probit model is not directly interpretable in terms of the magnitude of the effect on the probability of cooperation, it is possible to calculate the change in probability of cooperation resulting from exposure to the ethics module by looking at the estimated coefficient times the density function of the standard normal distribution evaluated at the fitted value of the regression. This fitted value is basically the sum of all of the regressors times their respective estimated coefficients. Implementing this analysis, we found that, for students exposed to the ethics module, the probability they cooperated with their in-class partners rose on average by approximately 15 percent, holding all other variables constant (see model 4 in Table 5). Moreover, communication increases the rate of cooperation between 10 and 12 percent (see Models 2 and 4 of Table 5), thus leading us to fail to reject the hypothesis that communication is important. It is interesting to note that the effect of the ethics training on cooperation is greater than the effect of communication. As shown in model 4 of Table 5, communication increases the rate of cooperation by nearly 12 percent, while ethics training increases the rate of cooperation by nearly 15 percent.

Interestingly, in our study economics majors and expected grade had no significant impact on rates of cooperation, thus leading us to reject hypotheses H3 and H4. Furthermore, inconsistent with previous findings, students who are male were not more likely to defect in the prisoner's dilemma game than female students. However, the student's year in school was important. Specifically, for each one year increment in the schooling of participants, cooperation increased by more than 8 percent.

Conclusion

We conducted an in-class experiment of undergraduate and graduate students to determine how likely they are to cooperate in a prisoner's dilemma game. We found that students were generally willing to cooperate with their partners. Furthermore, we found that students who were exposed to an ethics module were more likely to cooperate with their partners than students not trained in ethics. This effect is also observed when controlling for the effect of communication among partners as well as other factors. Therefore, the ethics module seems to induce cooperation among students, although the effect of the ethics training is possibly only short-term, since some evidence suggests that the improvement in rates of cooperation is temporary (Fan, 2000). Therefore, additional research is needed to determine how long the ethics training effect lasts. Will students who cooperated in a one-shot play of the prisoner's dilemma, as a result of the ethics training, still be willing to cooperate over time, even though there are incentives not to cooperate in the prisoner's dilemma game?

Tables

Table 1. The Prisoner's Dilemma experiment, in which the payoff received is extra credit points

	Your partner chooses **Cooperate**	Your partner chooses **Not Cooperate**
You choose **Cooperate**	I +4 extra credits for you +4 extra credits for your partner	II +1 extra credits for you +6 extra credits for your partner
You choose **Not Cooperate**	III +6 extra credits for you +1 extra credits for your partner	IV +2 extra credits for you +2 extra credits for your partner

Table 2. The Ethical Dilemma

	Others are **Ethical**	Others are **Not Ethical**
You are **Ethical**	You rank 2 Others rank 2	You rank 4 Others rank 1
You are **Not Ethical**	You rank 1 Others rank 4	You rank 3 Others rank 3

Table 3. Payoffs to individuals voting either 0 or 1 in the "Voting Game"

Number of Zeros	**You vote 0**	**You vote 1**
0	--	8
1	2	10
2	4	12
3	6	14
4	8	16
5	10	18
6	12	20
7	14	22
8	16	24
9	18	26
10	20	28
etc.	etc.	etc.

Table 4. Summary statistics

Variable	Average or Percent
Number of participants	154
% ETHICS MODULE	.461
% COMMUNICATE	.519
% ECO/FIN MAJOR	.273
Average EXPGRADE	3.195 (B to B+ range)
% MALE	.649
Average YEAR	3.260 (juniors)
Cooperation in PD Game	**.669**
ETHICS MODULE	.775
Not ETHICS MODULE	.578
COMMUNICATE	.725
Not COMMUNICATE	.608
ECO/FIN MAJOR	.667
Not ECO/FIN MAJOR	.670

Table 5. Regression Results for the Prisoner's Dilemma Question: "Do you choose to **Cooperate** (dep. var. = 1) or **Not Cooperate** (dep. var. = 0) with your partner from this class?"

	Model 1	Model 2	Model 3	Model 4
Variable	Coefficient	Coefficient	Coefficient	Coefficient
CONSTANT	-0.538 (-1.293) [-0.171]	-0.684 (-1.578) [-0.218]	-0.544 (-1.307) [-0.173]	-0.717[c] (-1.646) [-0.228]
ETHICS MODULE	---	---	0.410[c] (1.766) [0.131]	0.465[b] (1.965) [0.148]
COMMUNICATE	---	0.310 (1.431) [0.099]	---	0.370[c] (1.672) [0.118]
ECO/FIN MAJOR	0.098 (0.387) [0.031]	0.108 (0.422) [0.034]	0.172 (0.666) [0.055]	0.197 (0.752) [0.063]
EXPGRADE	-0.038 (-0.272) [-0.012]	-0.033 (-0.240) [-0.011]	-0.056 (-0.404) [-0.018]	-0.058 (-0.406) [-0.018]
MALE	0.113 (0.490) [0.036]	0.089 (0.384) [0.028]	0.083 (0.360) [0.026]	0.053 (0.226) [0.017]
YEAR	0.317[a] (2.965) [0.101]	0.313[a] (2.927) [0.100]	0.282[a] (2.587) [0.090]	0.275[a] (2.531) [0.088]
Pseudo-R^2	0.061	0.072	0.078	0.092
Log Likelihood	-91.778	-90.751	-90.208	-88.800
Density at average of $X\hat{b}$	0.3186	0.3187	0.3186	0.3187

z-statistics in parentheses.
[a] significant at 1% (2-tailed test), [b] significant at 5% (2-tailed test), [c] significant at 10% (2-tailed test)
Estimated slope in brackets, calculated by multiplying coefficient with density.

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