

Anonymity reduces generosity in high school students

Elton Emiliano Vargas-Guerrero, Jorge Armando Grajales-Rodríguez, and María Elena Cano-Ruiz
Tecnologico de Monterrey, Cuernavaca High School, Mexico

SUMMARY

The disinterested willingness a person has for helping others is known as altruism. But is this willingness to help others dependent on external factors that make you more or less inclined to be generous? We hypothesized that generosity in adolescents would depend on external factors and that these factors would change the amount of help given. To evaluate altruism and generosity, we conducted non-anonymous and anonymous variations of the dictator game and ultimatum game experiments and explored the role of anonymity, fairness, and reciprocity in high school students. Instead of using money, we randomly selected high school students from six science classrooms to receive extra points on their midterm exam, while the rest of the students did not receive extra points. The students that received extra points became donors, while the students that did not receive extra points became recipients. We varied the ability to redistribute points in three ways. One, donors could donate points, showing true altruism. Two, donors could donate or steal points from the recipients, allowing us to assess fairness. Finally, donors could donate points, but the allocation of points depended upon recipients accepting or rejecting the proposed donation in a measure of fairness and reciprocity. We found that both anonymity and the possibility of taking points decreased the willingness to give, while reciprocity increased the willingness to give as the students based their decision more on strategy than generosity. We concluded that generosity in adolescents is mostly dependent on personal gain and peer judgment rather than pure altruism.

INTRODUCTION

Throughout human history, there has been uncertainty about the factors that determine the disinterested willingness a person has for helping others, and no easy answer has been found. There are two main lines of thought outlining proposed reasons why humans help others: the line of egoism and the line of altruism (1). Supporters of the egoism line claim that deep down, everything people do has an ultimate goal of self-benefit, no matter how beneficial to others a decision may seem. By contrast, advocates of altruism claim that the ultimate goal is maximizing the well-being of others, and that self-benefit could be an indirect result when helping others (1). Prosocial behavior during which humans give to

others can also be differentiated based on motivation. Pure altruistic behavior refers to unconditional giving and helping, norm-based behavior relates to fairness and punishment, and strategic prosocial behavior means giving only because the other can punish you (2). Additionally, feeling empathy motivates people to be altruistic, indicating that genuine concern for others can be part of human nature (2). Altruism is not plain self-sacrifice but rather the willingness to act considering the interests and conditions of others without considering any external motive (3). External motives can exist along with altruism, but they cannot be the only ones (4). One of the main motives of performing altruistic actions can be the personal benefit one gains for the simple act of giving without expecting anything in return (5).

In behavioral economics, a popular experiment used to test the roles of altruism, fairness, and self-interest is the dictator game, which captures the decision of a donor to allocate money to another or not and how much money is donated (6). Dictator games have been made throughout the world, and people have been found to give an average of twenty percent of what they were given (7, 8). Dictator experiments with children found an average of 29% of their participants gave their incentives away, concluding that children behave similarly to adults in these experiments because both live in social environments with continuous interactions that punish or reward their behavior (9).

When dictatorship games were created, they were initially managed to cut factors such as rewarding generosity and punishment of selfishness since recipients were anonymous and they did not have the power to do something about the donation (10). Variations of these games have been carried out, and they have been used to demonstrate that giving changes depending on the setting and specific conditions (10). In one variation of the classical dictator game, when the possibility of taking money exists, the average amount of money given decreases from 20% to zero. Simultaneously, the most selfish outcome is often not chosen, and most people do not take money from others (10). In another variation, when people are asked to work before giving money for donation, the amount of donations also decreases (10). Variations in how money is given to donors seem to cause changes in the perception of moral costs for donors, thus people tend to give less if they feel they earned the money by earlier work. Another game used in behavioral economics is the ultimatum game. During this game, the donor is tasked with splitting the given money with the recipient, but the recipient may accept

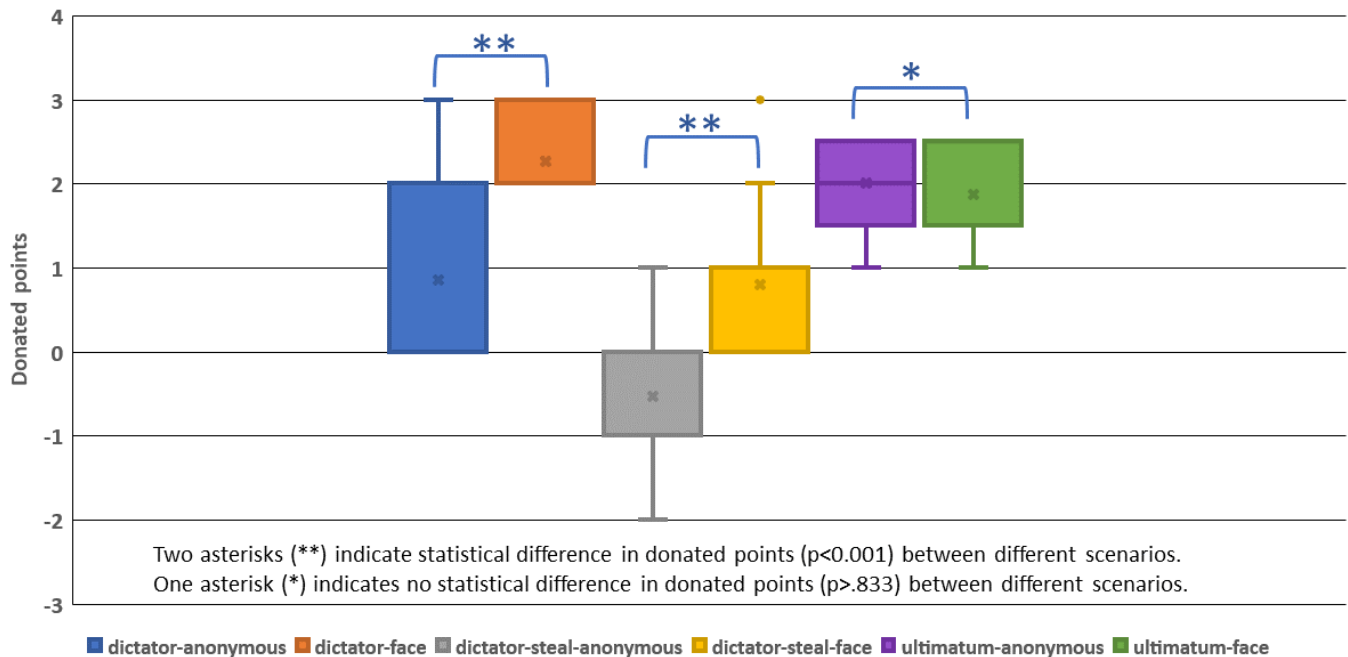


Figure 1. Points donated under two conditions. Dictator game: donors could donate from 0 to 5 points in anonymous (blue) or face-to-face donations (orange). Dictator-steal game: donors could donate from -2 to 3 points in anonymous (grey) or face-to-face donations (yellow). Ultimatum game: donors could donate between 0 and 5 points, and the outcome was dependent on the acceptance or rejection by the recipient in anonymous (purple) or face-to-face donations (green). There was a statistical difference in points donated in the dictator game between anonymous and face-to-face donations (** p -value = 0.0012), and in dictator-steal games between anonymous and face-to-face donations (** p -value = 0.0005). There was no statistical difference in points donated in ultimatum games between anonymous and face-to-face donations (* p -value = 0.8331).

or reject the donation, and if the recipient rejects the donation, both players receive nothing (11). Therefore, the ultimatum game can be used to assess fairness and reciprocity between players.

We decided to explore the role of anonymity, fairness, and reciprocity in prosocial behavior of high school students using a variation of the dictator game, where extra points on the midterm test were allocated instead of giving money to students. We hypothesized that generosity in teenagers is conditioned upon external circumstances as well as personal gain. Therefore, we hypothesized that anonymity and personal gain would decrease the willingness of donors to give points to others.

RESULTS

To complete the experiment, we selected six science high school classrooms in Tecnológico de Monterrey High School, Mexico. The participants included 164 students (males and females) whose ages ranged from sixteen to nineteen years old. The students within each classroom were divided randomly into two groups. In three of the science classrooms, the members of these two groups interacted with each other in person (in a face-to-face interaction) to exchange the real extra exam points in the midterm test. In the other three classrooms, the exchange of real extra exam points was done anonymously. We varied the way donations of points were done in three ways. In the first variation, donors received 5/100

extra points (i.e. 5 extra points on a test scored out of a total of 100 possible points), and they were able to donate from 0 - 5 points (group dictator-anonymous and group dictator-face). In the second possible scenario, the donors received 3/100 extra points and could either choose to donate 0 - 3 points or steal 0 - 2 points from the recipients that also received 2/100 extra points (group dictator-steal-anonymous and group dictator-steal-face). In the third set up, donors received 10/100 extra points and could donate from 0 - 10 points, but the recipients could either accept or reject the proposed donation. If the recipients rejected the donation, extra points were not allocated to either the donors or recipients (group ultimatum -anonymous and group ultimatum-face).

The ability to allocate different amounts of total points for donors in the three different settings was as follows. For dictator and dictator-steal scenarios, the allocation of points was done so that the most points a person could get was five points in each scenario. For the ultimatum groups, a total of ten points were allocated for better determination of generosity, fairness, and reciprocity by having more options for the splitting of points.

For the analysis of variance (ANOVA) statistical analysis, the points of the three scenarios of donations were standardized to a range from zero to five. Statistical analysis using two-way ANOVA, one factor being anonymous or face condition and the other factor being the type of dictator game variation (dictator, dictator-steal, or ultimatum) indicated a

	Dictator	Dictator-steal	Ultimatum
Anonymous	17%	-11%	40%
Face-to-face (non-anonymous)	45%	16%	37%
Difference	28%	27%	-3%

Table 1. Mean percentages of points donated under the different conditions. The generosity of students increased for face-to-face donations in dictator and dictator-steal games but did not change in the ultimatum game.

statistically significant interaction between the two factors (anonymity vs. donation scenarios: p -value = 0.0003). The points donated decreased in anonymous conditions for dictator and dictator-steal treatments, but in the ultimatum game, the condition of anonymity did not affect the donation (Figure 1).

We compared the average number of points donated under different conditions (Figure 1). The spread of results of points donated in each classroom can be seen on the box plots. In the dictator scenario classrooms, the average number of points donated \pm the standard deviation was 0.85 ± 1.21 points for the dictator-anonymous scenarios and 2.27 ± 0.89 points for the dictator-face scenarios (individual values ranging from 0 to 5). In the dictator-steal classrooms, the average was -0.53 ± 0.99 points for the dictator-steal anonymous scenarios and 0.8 ± 0.86 points for the dictator-steal-face scenarios (individual values ranging from -2 to 3). In the ultimatum classrooms, the average was 2 ± 0.33 points for the ultimatum-anonymous scenarios and 1.86 ± 0.40 points for the ultimatum-face scenarios (values standardized ranging from 0 to 5) (in Figure 1, means are marked with an x).

We calculated the significance of the difference between the anonymous and face-to-face conditions for each variation of the dictator and ultimatum games using t-tests for two independent samples (Figure 1). We found a statistically significant difference between the mean number of points donated in anonymous and face-to-face dictator games (p -value = 0.0012). Similarly, we found a statistically significant difference between the mean number of points donated in dictator-steal games with and without anonymity (p -value = 0.0005). But we found no statistically significant difference in the mean number of points donated between the anonymous and face-to-face ultimatum conditions (p -value = 0.5909).

The mean percentages of points donated under the different conditions show the generosity of the students (Table 1). When we compared the anonymous conditions and face-to-face conditions between dictator and dictator-steal games, we found a similar trend. Face-to-face conditions increased the number of points donated (Figure 1). In both game types, there was a 27-28% difference in the percentage of points donated when the groups interacted face to face

instead of anonymously. However, in the ultimatum game, the difference between anonymous and face-to-face donations was not important (3%) and around 40% of the points were donated, similar to face-to-face dictator game (45% donated points). Comparing dictator vs. dictator steal settings, donors in the dictator steal group decreased the number of points they gave away, regardless of whether the conditions were anonymous or face to face (Figure 1).

DISCUSSION

Different studies where dictator games were made throughout the world found that people gave on average twenty percent of what they were given under anonymity (7,8,10), which could be considered as altruistic behavior. Nevertheless, varying the set of action choices and the origin of the endowment gives different results (10). Taking this into account, the results of our experiments with 17% of points donated on average under anonymous dictator game (Table 1) were not as different as the average 20% donation of money found in previous research (7,8,10) considering that regardless of the conditions, on average people did give a part of what was given to them. If we consider only this result, we may be led to conclude that people are naturally altruistic because they tend to donate. However, other important factors need analysis because we conducted dictatorship games with extra exam points under different conditions (Figure 1, Table 1). When the conditions of the dictatorship games changed, donations from the dictators suffered significant changes, and when donors could take money from the recipient, donations reduced, and some donors even took money from recipients (10).

In our experiments, the results followed the same pattern as mentioned above. We were also able to see that donations reduced in response to anonymity (Figure 1), as well as in the dictator-face group allowed only to donate to recipients (mean of 45% points donated) compared to the dictator-steal-face group that could either give or take away points from the recipient (mean of 16% points donated). There are likely two reasons donors donated fewer points in the dictator-steal scenarios. First, since recipients received two extra points in the dictator-steal scenario, donors presumably concluded that a fair condition was already established. Second, donors had the opportunity to steal points, which decreased the moral cost for donors. The donors likely felt that it was fair not to donate points because they were turning down the option to steal from others, even in non-anonymous conditions. We conclude that when given a situation of fairness (each party gains points from the beginning), students are less likely to be altruistic.

Under the ultimatum game, in which the allocation of points for the donor and recipient was dependent on acceptance by the recipient, donors were as generous as under the dictator game face to face (45% donation), regardless of whether the ultimatum game was anonymous (40% donation) or face-to-face (37% donation). This indicates that the donations in

these cases may be driven by strategy and the donors' fear of losing their points if they do not give fairly.

We varied the conditions of the dictatorship games to explore the effect of anonymity on altruism. Social behavior can be explained by purely external causes and a significant part of such behavior is influenced by social norms (12). Moreover, when carrying out non-anonymous dictatorship games, there was a significant increase in donations when these donations were to a person thought to be "deserving" (13). In our face-to-face dictator-steal and ultimatum games, norm-based prosocial behavior and strategic prosocial behavior were responsible for the donation of points, resulting in a decrease in the number of points donated compared to the original dictator-game due to a reduction in moral cost and increase in moral disengagement (10, 14). Moral disengagement in adolescents temporarily allows them to ignore moral responsibilities towards others (14). This enables them to prioritize their own needs over those of others (14). Nevertheless, the mean donation of points in the dictator game and the dictator-steal game increased significantly from anonymous to face-to-face (non-anonymous), indicating a strong influence of peer judgment and the presence of social norm motivation and prosocial behavior on the donation outcome (**Table 1**). The importance of peer influence in teenagers has been related to neural brain processes in the developing adolescent brain. Peer influence evokes activation in the social brain network, influencing teenagers on prosocial decision making (15, 16). This social brain network activation occurs much less in children or adults (15, 16).

On the other hand, in the ultimatum scenario, when the allocation of points for both donor and recipient was dependent on the acceptance or rejection of the recipient, anonymity had no impact on the outcome. Although some generosity could be observed, strategic prosocial behavior dependent on giving only because the other can inflict punishment seems more probable (2). Under the ultimatum game, which was trying to check fairness and reciprocity, the lowest offer was 1 out of 5 points (2 out of 10 in non-standard values), and the donor kept 4 of 5 points (8 out of 10 in non-standard values). No recipient rejected the offered donation, even if a small donation seemed unfair. This could be because it is more convenient to end up gaining a little, even if the circumstances are not ideal.

Comparing results among the different scenarios, we conclude that students were not purely altruistic. Instead, they let external factors influence their giving. We found that more points are donated in non-anonymous environments compared to anonymous conditions. Furthermore, when altruism was evaluated with fairness added, most of the students did not give points to the recipients. This may have been because the recipients already had gained points. In some instances, students even took points from the recipient in anonymous conditions for personal gain. When the donations of points were evaluated with fairness and reciprocity added, students on average split the points given. They acknowledged that if

the recipient did not like the proposed donation, both would have lost the points, independent of the presence or absence of anonymity.

To further gain understanding about generosity and altruism among adolescents, this study can be expanded by considering other factors, such as evaluating if the recipient's need for points could trigger empathy in the donors and increase donations. To accomplish this test, one could create scenarios where the recipients are students that need extra points. Another variation of the test could be to have the donors be students that do or do not need extra points. These results would clarify the extent to which students would relate and respond to a perceived need in others. Our results are important because they show us that social behavior can be influenced by external forces, supporting our hypothesis that generosity in adolescents is dependent upon external circumstances as well as personal gain.

METHODS

The experiments were performed at the Tecnológico de Monterrey-Cuernavaca high school, Mexico. Participants included six science classrooms with a total of 164 students (46% males and 54% females). Student ages ranged from sixteen to nineteen years old. The members of each classroom were divided randomly into two groups. In three of the science classrooms, the two groups interacted face-to-face in an exchange of real extra exam points on the midterm test between their members. In the other three classrooms, the exchange of extra exam points was done anonymously. In all the groups, talking was forbidden during the experiment to avoid negotiations in the exchange of points. The extra points were given one week before the midterm tests, so the midterm score would not affect the donations.

Every classroom was presented with different conditions for exchanging the extra points. Four same level Chemistry course classrooms (11th grade students, $n = 26$ for group 1 and $n = 30$ for groups 2, 3, and 4) and two same level Introduction to Research Method course classrooms (12th grade students, $n = 26$ for group 1 and $n = 22$ for group 2) participated in this study. Members of the chemistry classroom 1 (dictator-anonymous) were told that their teacher gave half of the group (donors) five out of one hundred points on their midterm exam and gave the other half (recipients) no points. Then, students randomly were given a piece of paper to indicate if they were donors or recipients. It was also explained that the students who received the points had the opportunity to decide and write on that piece of paper if they wanted to donate from zero to five extra exam points to another anonymous classmate chosen randomly that did not receive the points. Students that did not receive any points were just asked to write their names on the paper given to them. Finally, they were told that matches between donors and recipients were going to be done randomly and the number of points each student ended with was going to be communicated after the midterm exam was taken by all students, the next week.

In the chemistry classroom 2 (dictator-face), the procedure was the same as in chemistry classroom 1 (dictator-anonymous); however, in chemistry classroom 2, pairs of students were matched randomly at the beginning and a face-to-face, non-anonymous condition was placed. Students were told that one member of the pair was going to receive the points (donor) and the other one was not (recipient). They were given a piece of paper randomly that indicated if they were the donors or the recipients, and they were asked to write their name, their donation decision, and the name of their partner. Recipients were just asked to write their name and the name of their partner. After the experiment, they were told that results were going to be communicated after the midterm exam was taken by all students the following week.

Students of chemistry classrooms 3 and 4 (dictator-steal-anonymous and dictator-steal-face) were told that half of the classroom (donors) received three out of one hundred points in the midterm exam and the other half (recipients) received two exam points. Group members that received three exam points were told that they had the opportunity to either donate zero to three points or take away zero to two points from one of their classmates (recipients). The rules for assigning donors and recipients randomly and the anonymous or face-to-face non-anonymous conditions were the same as described above, with chemistry classroom 3 working on anonymous conditions and chemistry classroom 4 under face-to-face non-anonymous conditions.

Two more experiments were done in the research methods classrooms. In research methods classroom 1 (ultimatum-anonymous), students were randomly divided in two groups, and then students were told that one group (donors) would receive ten out of one hundred points in the midterm exam and that the other group (recipients) would not receive any points. Papers that indicated if you received the points or not were randomly assigned to every student, and students that received the points were asked to write on the papers if they wanted to donate from zero to ten extra exam points to other student that did not received any points. Before writing down their decisions, students were told that the anonymous recipient had the decision of accepting or rejecting the donation, but if the recipient rejected the donation, no one received any extra exam points. Each of the donor and recipient papers had one three-digit identification number so that every donor could be matched with the recipient that had the same identification number. After every donor wrote his or her decision, papers were collected, and donors were asked to leave the classroom for the purpose of conserving anonymity. After donors left the class, recipients received the proposed donation and wrote down whether they accepted or rejected the offer. Donation decisions were communicated to recipients according to their identification number.

In research methods classroom 2 (ultimatum-face), student pairs were assigned randomly (as in non-anonymous chemistry courses) and then students were told that one

member (donor) of the pair would receive ten out of one hundred points on the midterm exam and that the other person (recipient) would not receive any points. The papers that indicated whether you receive the points or not were randomly assigned to every student, and students that received the points were asked to write on the papers if they wanted to donate from zero to ten exam points to his or her partner. Before writing down their decisions, students were told that his or her partner had the right to either accept the donation so that both received the extra exam points allocated or reject it so that no one received any extra exam points. After donors wrote their decisions, they passed the paper to the recipient. Recipients needed to write on their paper whether they accepted or rejected the donation, and the decisions were communicated to the donors.

The decision to allocate different amounts of total points for donors in the different settings was as follows: for dictator and dictator-steal scenarios, the most points a person could get was 5 points in each scenario. For the ultimatum groups, a total of 10 points were allocated for better determination of generosity, fairness, and reciprocity since there are more options for splitting points. For the statistical analysis, the points of the three scenarios were standardized in a range from 0 to 5 (dictator scenarios remained the same from 0 to 5, dictator-steal values were standardized adding 2 points: so went from -2 to 3 to 0 to 5, and ultimatum scenario were standardized dividing the values by 2, so went from 0 to 10 to 0 to 5).

Statistical Analysis

The data were analyzed using two-way ANOVA in a 2x3 factorial design, with one factor having two levels: anonymity and non-anonymity, and the other factor having three levels: dictator, dictator-steal, and ultimatum scenarios. After standardizing the values for the three different scenarios and since the sample sizes were not balanced, for the two-way ANOVA (with Microsoft Office Excel Data Analysis Tool pack, 2016), the missing cells for each sample were filled using the weighted means for each treatment to have the same sample size for each treatment (17).

After ANOVA showed significant interaction, t-tests for two independent samples assuming unequal variances (Microsoft Office Excel Data Analysis Tool pack, 2016) were done to compare each pair of classrooms that followed the same procedure with the only difference of anonymity or non-anonymity (face-to-face). The significance threshold was set at $p = 0.05$.

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