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**Are Art Students Nicer than Economics Students?  
A Discussion of How Economic Game Theory Predicts that Art and  
Economics Students Differ in Terms of Reciprocity**

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## Abstract

Neoclassical economic game theory predicts that a player's goal is to maximize her income regardless of others. In playing the Ultimatum Game this means that Allocators will allocate the minimum amount and the Responders will accept that amount because something is better than nothing. Economics students behave differently because they self-select into that field already thinking as economists do and while studying economics they adapt their behaviors to economic theory. Therefore it is natural to assume that Economics students will act according to theory and that non-economics students will not. The Smith College study between Art students and Economics students showed that while Economics students are different and less reciprocal than Art students, they do not act parallel to economic theory. Most do not fully adapt to what economic theory predicts because of the following reasons. Learning theories, in which a player acts based on experience from prior games or learned theory, may change how the player reacts. The fairness equilibrium, which says that if both players cooperate then both players are willing to sacrifice something to reward the other player's cooperative act, could also have a similar effect. The fear of punishment or the will to punish unfair offers also contributes to the absence of economic man. This study suggests that Art students will act less like Homo Economicus than Economics students.

## **I. Introduction**

For this paper, I conducted the Ultimatum Game at Smith College to see if there was a difference between Economics students and Art students. The differences, I predicted, would turn up in the offers each gave and accepted or rejected. Neoclassical economic theory suggests that economic man would maximize income by offering and accepting the minimum allocation. While I did not predict that Economics students would act exactly like economic man, I did predict that they would be less generous than Art students. Art students would allocate higher amounts and be more willing to accept almost any offer. Art students therefore act nicer than Economic students when playing the Ultimatum game. Throughout this paper, I term acting nice to be synonymous with being generous, having an increased awareness of fairness and portraying altruistic mannerisms. A nicer student is more interested in helping others than in maximizing income. Throughout my paper, I will try to show why Art students act less like Homo Economicus than Economics students do. A short introduction to game theory will precede the study conducted, results, a discussion of previous studies and a discussion on how some of my results parallel economic theory and why they do not.

## **II. Game Theory – Brief Overview**

Game theory is a theory of what a player should do. It does not explain how a player acts in a game, but instead identifies individuals' optimal actions in the face of interdependence (Bacharach, 1977, p.3). The theory of games is the theory of rational choice. The theory of utility or the theory of decision under risk proposed by von Neumann and Morgenstern says that if choices under risk are made rationally, players choose the action whose expected utility is the highest. In the case of Homo Economicus this would be to maximize income, but in the case of Homo Reciprocans, it would be to maximize egalitarianism (p. 8). When the payoff is monetary, economic theory assumes players prefer more money to less regardless of the amount. However, there are players whose low character morals might cause them to punish the other player if monetary payoffs are uneven, even at some monetary cost; economic theorists call these players irrational (Anatol, p. 116).

In the Ultimatum game there are two players – the Allocator and the Responder. The Allocator is given a set sum of money and then directed to allocate some of it with the Responder. The Responder can accept or reject the offer – fear of rejection often leads to larger

offers. In the experiments I studied, the money is usually split 70/30 among economists and closer to 50/50 for non-economists. Most offers below 30 percent of the original amount were rejected. In my experiments, I chose to run the ultimatum game and compare Art students and Economics students at Smith College.

Micro theory suggests that in the ultimatum game players will act only to maximize their utility and will allocate the smallest amount possible. In this experiment, since the amount given to students to allocate was \$3.00, micro theory suggests the Allocators will propose to give the responders \$.25 (the amount given must be in \$.25 increments) and keep \$2.75 for themselves. Micro theory also suggests that the responders will keep this amount because the \$.25 is better than nothing. Jan Tullberg (1999) labeled people acting in this manner, *Micronic* or as more commonly known economic man (Tullberg, 1999, p. 4). However, in the studies conducted by Carter and Irons (1991) and Camerer & Thaler (1995) students do not act according to micro theory and instead allocate more than the minimum, and reject offers less than thirty-percent of the overall amount. So instead of suggesting that Smith students will behave according to micro theory, I predict Art students will act nicer than Economics students by proposing more generous offers and by accepting more offers made to them. Economic man's goal is to maximize profits anyway possible regardless of hurting others' feelings in the process. Economists are too focused on maximizing monetary gains and are unconcerned with others who could stand in their way.

### **III. Ultimatum Game at Smith College** (directions found in Appendix)

Each student was an Allocator and a Responder. I tested four classes – two Art classes (Design I and Sculpture) and two Economics classes (Introduction to Statistics for Economists – ECO 190 and Intermediate Microeconomic Theory – ECO 250). Students in ECO 250 would act more like economic man because they will have the most exposure to economic theory. Most students in ECO 190 will not have taken ECO 250, but those who had, I identified by their response to Q.2 of the questionnaire. I combined their results with the ECO 250 class instead of the ECO 190 class because I tested for the difference in theory knowledge. The object of the game was to see if students acted more like *Homo Economicus* or *Homo Reciprocans*. *Homo Economicus* (economic man) acts to maximize his income by offering the minimum amount and accepting the minimum amount because something is better than

nothing. Homo Reciprocans have a propensity to cooperate and share with others, but also possess a willingness to punish those who violate cooperative and other social norms – even when such sharing is personally costly (Bowles and Gintis, 1998-99, p. 2). Homo Reciprocans will offer more than the minimum amount and will reject the minimum amount for reasons given above.

My hypothesis was as follows. Art students will behave less like Homo Economicus when being an Allocator, allocating more than the minimum because of their lack of knowledge in economic theory, but more importantly their inclination to act fairly. Most Art students will accept their offers, even low offers as economic man would, because they are being polite to their fellow classmates and would help them in any way possible. Also, because I predict that their offers will be greater than the minimum amount, Art students will accept the majority if not all of the offers. In general, Economics students will behave more like Homo Economicus when playing the Allocator part of the game because they are greedier and are not as willing to share with others. They will give offers approaching the minimum amount so that they can maximize their income. As Responders, Economics students who receive the minimum amount of \$.25 will reject the offer because punishing the Allocator will give them a higher utility than accepting the offer. Here, income does not maximize utility. The low offer angers her so she believes that the amount is not worth accepting. I originally wanted to compare the differences in the two Economic classes, but because the sample size for ECO 190 was so small ( $N=14$ ), the results were insignificant. However, I will show all the results from the different classes so that empirical comparisons can be made.

To play the game, the entire class first acted as Allocators in that they allocated a portion of \$3.00 to someone else in the class in \$.25 increments. The Allocator must allocate some amount even if it is just \$.25. Their names remained anonymous, but the subjects knew that they were allocating to a classmate. Then the entire class switched roles and played as Responders accepting or rejecting their classmates' offers. The subjects knew that if the Responder accepts the offer that she will receive what the Allocator offered her ( $\$3.00 - x$ ) and the Allocator would receive the rest ( $x$ ). If the Responder rejects the offer, both participants receive nothing. Each student will be directed to play as if she would receive the money if her offer was accepted. The subjects played both roles to see if differences arise when students

have been in one role and then are asked to play in the opposite role. After the game, students responded to a questionnaire. The questions and the responses will be discussed below.

Results of games run and discussion by students who played the games are seen below.

**Table 1:**

**Offers made by Allocators**

	ART	ECO 250	ECO 190
N	24	52	14
Mean	\$ 1.65	\$ 1.32	\$ 1.29
SD	(0.71)	(0.64)	(0.38)
Median	\$ 1.50	\$ 1.25	\$ 1.50
Mode	\$ 1.50	\$ 1.50	\$ 1.50
Maximum	\$ 3.00	\$ 3.00	\$ 1.75
Minimum	\$ 0.50	\$ 0.25	\$ 0.25

**Table 2:**

**Offers accepted by Responders**

	ART	ECO 250	ECO 190
N	24	44	12
Mean	\$ 1.65	\$ 1.45	\$ 1.40
SD	(0.71)	(0.61)	(0.23)
Median	\$ 1.50	\$ 1.25	\$ 1.50
Mode	\$ 1.50	\$ 1.50	\$ 1.50
Maximum	\$ 3.00	\$ 3.00	\$ 1.75
Minimum	\$ 0.50	\$ 0.25	\$ 1.00

**Table 3:**

**Offers rejected by Responders**

	ART	ECO 250	ECO 190
N	0	8	2
Mean	NA	\$ 0.66	\$ 0.63

SD	NA	(0.40)	(0.53)
Median	NA	\$ 0.63	\$ 0.63
Mode	NA	\$ 0.25	\$ 0.25, \$1.00
Maximum	NA	\$ 1.25	\$ 1.00
Minimum	NA	\$ 0.25	\$ 0.25

**Table 4:**

**All Economics Students**

	Total Allocated	Accepted Offers	Rejected Offers
N	66	56	10
Mean	\$ 1.32	\$ 1.42	\$ 0.65
SD	(0.60)	(0.54)	(0.39)
Median	\$ 1.25	\$ 1.50	\$ 0.63
Mode	\$ 1.50	\$ 1.50	\$ 0.25
Maximum	\$ 3.00	\$ 3.00	\$ 1.25
Minimum	\$ 0.25	\$ 0.25	\$ 0.25

Since Art students did not reject any offers, there is not a table with just their results.

I then ran the following regressions on the results to see if my results were significant.

**Equation 1**

$$\text{OFFER}_i = \beta_0 + \beta_1 \text{ART}_i + \epsilon_i$$

OFFER<sub>i</sub> – The amount offered by the Allocator

$$\text{OFFER}_i = 1.326 + .195 \text{ART}_i + \epsilon_i$$

SE (.077) (.149)

t-values 21.7 1.31

Sig. .087

R<sup>2</sup> = .019

The null hypothesis is: H<sub>0</sub>: β<sub>ART</sub> = 0. The alternative hypothesis is H<sub>1</sub>: β<sub>ART</sub> < 0 (one-tailed test) and since it was a one-tailed test, the significance values can be divided in half returning a probability of a Type I Error. On a 10 percent significance level, the null cannot be rejected.



### Equation 2

$$REJ_i = \alpha_0 + \alpha_1 ECO_i + \alpha_2 OFFER_i + \epsilon_i$$

REJ<sub>i</sub> = 0 if offer was accepted, 1 if offer was rejected

OFFER<sub>i</sub> = Amount that Allocator Proposed (3- KEEP<sub>i</sub>)

$$REJ_i = .26 + .10 ECO_i - .17 OFFER_i$$

SE (.072) (.067) (.048)

t-values 5.09 1.53 3.63

Sig. .065 .00

R<sup>2</sup> = .167

The null hypothesis is: H<sub>0</sub>: α<sub>ECO</sub> = 0. The alternative hypothesis is H<sub>1</sub>: α<sub>ECO</sub> < 0 (one-tailed test). There is a probability of a Type I Error of .065.

### Equation 3

$$DIFF_i = \alpha_0 + \alpha_1 ECO_i + \epsilon_i$$

DIFF<sub>i</sub> = 0 if minimum offer allocated was equal to actual allocated, 1 if minimum offer allocated was not equal to actual allocated

$$DIFF_i = .417 + .289 ECO_i + \epsilon_i$$

SE (.097)(.117)

t-values 4.30 2.46

Sig. .008

R<sup>2</sup> = .077

The null hypothesis is: H<sub>0</sub>: α<sub>1ECO<sub>i</sub></sub> = 0. The alternative hypothesis is H<sub>1</sub>: α<sub>1ECO<sub>i</sub></sub> < 0 (one-tailed test). There is a probability of a Type I Error of .008.

### IV. Discussion

In Equation 1, I tested to see if there was a difference in offers made by Art students versus Economics students. The following results can be suggested from Equation 1. Economics students offered \$1.33 with a standard error of .077. This can also be shown in Table 4 where the mean allocation was \$1.32 with a standard deviation of .60. This means that seventy-eight percent of Economics students' offers were between \$0.72 and \$1.92. The offers though did vary outside this range to include minimum and maximum offers of \$0.25 and \$3.00. Most offers allocated and accepted by all students was \$1.50. In contrast to Economics students, Art students made offers \$0.20 higher than Economics students. Their average offers according to Table 1 were \$1.65 with a standard deviation of .71. The range of offers within one standard deviation for Art students was \$0.94 to \$2.36, while offers were made as low as

\$.50 and as high as \$3.00. Not one Art student offered the minimum amount as opposed to four Economics students who did. As seen in Table 4, one Economics student did accept the minimum offer, but the other 3 offers of \$0.25 were rejected. It is interesting to note that while none of the offers made by Art students were rejected even at minimal amounts of \$0.50, the average denomination rejected by Economics students was \$0.65 with offers ranging from \$0.25 to \$1.25. This shows that Economics students are more willing to sacrifice income to punish unfair offers than Art students, suggesting that Art students are nicer. From Equation 1, it is suggested that there is a one in ten chance that Economics students will make offers lower than Art students.  $R^2$  denotes the percentage of variation in the dependent variable (OFFER) to the independent variable (ECO). In this case  $R^2$  is .019, which means that 1.9% of variance of ECO can be explained by the variation in OFFER, and while this is not a high level of correlation, it is not what the experiment was testing for. This difference is statistically significant at a .087 level of significance and supports the hypothesis that Art students will make more generous offers than Economics students.

Equation 2 measured the probability of accepting or rejecting offers. After running the regression analysis, the data suggested that Economics students are 10 percentage points more likely to reject offers than are Art students with a standard error of .067. Tables 1 and 4 support this. Art students do not reject any offers as opposed to fifteen percent of Economics students who reject their offers. As mentioned above, the high rejection rates suggest that Art students are more willing to accept all offers, even if some of them are unfair. In Equation 1, the average offer from an Art student was \$1.53 compared to \$1.33 from an Economics student, so it could be suggested that the higher the offer, the more likely it is that it will be accepted. Equation 2 suggests that for every one more dollar allocated, the probability of accepting increases by .17 percentage points. In this case,  $R^2$  is more significant suggesting that 16.7% of the variance in OFFER can be explained by the variation in REJ. A .065 significance level suggests that Art students do accept more often than Economics students. One can assume that this is because Art students are more generous than Economics students.

In Equation 3, I tested the response to Q4 of the questionnaire, which asked, "If the Responder did not have a chance of rejecting your offer, what amount would you propose?" This changes the game from an Ultimatum game to a Dictator game, and shows statistically significant results. When Hoffman et al. (1994a, b) ran this experiment, 65 percent of the

Allocators kept all of the money for themselves (Camerer and Thaler, 1995, p. 213-214). Students who do decide to change their offer usually give offers approaching the minimum amount so they can maximize their income. Equation 3 suggests that Economics students are .29 percentage points more likely than Art students to make a different offer. The probability that Art students would change their offers given these conditions is .41 at a standard error of .097 compared to .70 of Economics students with a standard error of .117. The inclination to offer the minimum amount will increase with the inability to reject when Allocators, acting like economic man, attempt to maximize income. Equation 3 proposes that Economics students are greedier than Art students because Economics students want to keep more money for themselves. The only reason why they offered higher amounts is because they were afraid of rejection. This will be further discussed below. This data was significant at a 10 percent level, meaning that there is a 92% chance that if given the option to change their offers, Economics students would do so at a higher rate than Art students.

Clearly the above data show that there is a difference between Economics students and Art by the offer amounts, the rejection levels and by the minimum amounts given. It also shows that Art students are nicer than Economics students because they are willing to share the money more than the Economics students. Art students are more willing to give more money and accept any offer that comes to them. Below is a discussion of students answer to the questionnaire.

## **V. Art**

As seen in Table 1, offers ranged from full amount of \$3.00 (offered by four students) to \$.50 (offered by one student). The average offer made was \$1.65 and there were zero rejections.

Arts students were asked as Allocators:

*How did you choose to split the money? What prompted you to split the money this way?*

Of twenty-four students, eight students split their offers to be fair or generous; eight students offered their amounts so that the Responder would accept; two students allocated for both reasons. Other students' responses included, "I gave \$2.00 because it will make someone else smile." "I gave \$1.00 and kept \$2.00 because it was my decision so I would get to keep more." "I'm so broke due to art supplies. I NEED the money more."

*Have you ever had any prior experience with game theory? If so, do you think this affected your decision of how much you allocated?*

None of the Art students ever had any experience with game theory.

*Would knowing the identity of the responder have changed your offer? If so, how?*

Most students responded that knowing the identity would not have changed their offers. Other responses included, "If I don't like the other person, I wouldn't give them as much." "No, I don't care all that much about \$3.00." "Yes, I would have felt more as they were sharing as opposed to giving money away." "Yes, because if I were friends with the person, I would want to give them more money as a friendly share." "Yes, I would know if they needed/wanted the money more than me."

*If the person receiving the money did not have a chance of rejecting the money, would you have proposed a different amount? If so, how much?*

As seen in Equation 3, less than half of the Art students said they would change their amount. Those who did not change their offers did so because they felt a different amount would be unfair.

Art students were asked as Responders:

*The Allocator decided to give you \$\_\_\_\_(students filled in the amount). Did you accept or reject the offer? Why?*

All offers were accepted and the general consensus was why would anyone reject because it is free money. Their responses might have been different if one was allocated the minimum amount.

*Have you ever had any prior experience with game theory? If so, do you think this affected your decision of accepting or rejecting?*

None of the students had any experience with game theory.

*Would knowing the identity of the Allocator have changed your decision? If so, how?*

Most students said that knowing the identity would not change whether they would accept or reject. "Maybe. If I really hated the person, I would reject because I wouldn't want them to have the money. But that would be very unlikely." "Yes, if I was friends with them I probably would accept because emotions would be involved."

## VI. Intermediate Microeconomic Theory (ECO 250)

In testing the Intermediate Microeconomic Theory class, results were a bit different as expected. Table 1 shows that offers ranged from \$3.00 (three students) to \$.25 (two students) with an average offer of \$1.32. It is surprising that the maximum amount was offered because prior studies predict that students with economic training will offer less than half than the total amount. There were eight rejections with offers ranging from \$1.25 to \$.25 with an average rejected offer of \$.63. ECO 250 students responded accordingly to the following questions:

ECO 250 students were asked as Allocators:

*How did you choose to split the money? What prompted you to split the money this way?*

Nine students said their allocations were based on fairness and or generosity. Eighteen students said they made their allocations based on what they thought the Responder would accept. As seen in Equation 3, a majority of students would change their offer if Responders could not reject. None of the students said that both factors matter.

*Do you think your economics training affected your decision to split the money accordingly? If so, how?*

Most students said that their economic training did not effect their decision on how much to allocate. Those who said it did affect them said, “[it] taught me to think logically.” “Know that some is better than none.” “Become more risk adverse.” These students demonstrated that by knowing about risk, they would weigh the benefits and costs of their allocations.

*Would knowing the identity of the responder have changed your offer? If so, how?*

A few students responded that identity would affect them, “If she’s someone I’m close to then I might split 50/50 with her.” “[Knowing the responder] you could better estimate their likelihood of rejecting/accepting a certain amount.” “Possibly, if I had a good/bad relationship with the responder.”

*If the person receiving the money did not have a chance of rejecting the money, would you have proposed a different amount? If so, how much?*

The majority of students said that they would give \$.25. Equation 3 gives statistical results about all Economics students in the sample and suggests that over two-thirds of Economics students would change their offer. A couple of students did say that would give the maximum amount because everyone would.

ECO 250 students were asked as Responders:

*In playing another economics student, she offered you \$\_\_\_\_\_ (students filled in the amount).*

*Did you accept or reject this offer? What prompted you to make this decision?*

Most students responded like this student, commenting, “[she] would have accepted \$.25 because that is still more than zero.” Students who rejected offers did so because they thought their offers were too low.

*Do you think your economics training affected your decision on whether to accept or reject?*

Of the students who said that their economic training affected their decision it did so because they know that some is better than none.

*Would knowing the identity of the Allocator have changed your decision? If so, how?*

Students responded that knowing the player’s motivations would help to know how much the Allocator would allocate.

## **VII. Introduction to Statistics for Economists (ECO 190)**

The Introduction to Statistics for Economists’ students responded a bit differently to the game than the other Economics students. Table 1 shows offers ranging from \$.25 to \$1.75 with an average offer of \$1.50. The students responded to the same questions as the other Economics students. Below are their responses.

ECO 190 students were asked as Allocators:

*How did you choose to split the money? What prompted you to split the money this way?*

Nine students said that they gave their offers so that the Responder would not reject. Two students said that they gave their offers to be fair or generous. Five students said that their offers were based on both decisions. The students who gave \$.25 said that they did so because they wanted to maximize their income.

*Have you taken ECO 250 (Intermediate Microeconomic Theory)? Do you think your economics training affected your decision to split the money accordingly? If so, how?*

I identified the students who took ECO 250 and combined their results in with the ECO 250 class instead of the ECO 190 class because they already had the training in micro theory for which I was testing the difference.

*Would knowing the identity of the responder have changed your offer? If so, how?*

Identity did not affect most students. Those who it did affect said, “If it was someone I knew, I would have given more so they would not think I was mean.” “My feelings on the person could influence what offer I am willing to give.”

*If the person receiving the money did not have a chance of rejecting the money, would you have proposed a different amount? If so, how much?*

Equation 3 suggests that given the opportunity, most students would offer a different amount with an inclination towards the minimum amount with a goal of maximizing income.

ECO 190 students were asked as Responders:

*In playing another economics student, she offered you \$\_\_\_\_\_ (students filled in the amount).*

*Did you accept or reject this offer? What prompted you to make this decision?*

Those who did accept did so because their income increased. Those who rejected punished the Allocator and made the following responses. “Reject, share it all or none.” “Rejected \$.25 because the offer is not worth it.” “Reject. I want to teach her that she needs to think twice before offering so little (\$.50). If we were to play the game again, I am sure that the amount she offered would be close to \$1.25 or \$1.50 because she would learn.”

*Have you taken ECO 250 (Intermediate Microeconomic Theory)? Do you think your economics training affected your decision on whether to accept or reject?*

If the students had taken ECO 250, I combined their results with the ECO 250 class instead of the ECO 190 class.

*Would knowing the identity of the Allocator have changed your decision? If so, how?*

Most students said that the identity would not change their decisions. Some commented that they could justify her offer if they knew her identity. Others commented on personality differences and friendships. “If I disliked her personality I would have rejected her offer just to keep her from getting any.” “Would accept lower than \$1.50 from a friend but not from a stranger.”

These results were comparable to my hypothesis that Art students gave higher offers and accepted more often than Economics students. I was surprised any student gave the maximum amount and especially astonished that Economics students did so because of the nature of their studies and the environment they were in. I expected that the ECO 250 students’ offers would have been lower than the ECO 190 students because of the training they received with game theory, but the results of this experiment are comparable with that of Carter and

Irons (1991), who looked at the differences between freshman and senior Economics students. Results between the Art students and Economics students are also similar to other studies conducted between economists and non-economists. The Golden Rule Hypothesis states that playing both roles would raise both the degree of trust and the degree of reciprocity exhibited in the game. The Reduced Responsibility Hypothesis states that each participant might feel less responsibility to allocate a higher amount for the sake of the well-being of her partner in any one of those interactions, and as a result to feel less guilty about acting selfishly (Burks, Carpenter, and Verhoogen, 2001, p. 1-2). In reading over the student's questionnaires, subjects acted both ways. Some felt spited that they gave so much, but then received so little. Others worked to maximize their profits, by commenting on how much she had allocated and if it was accepted and if she accepted, she would gain  $(3-x) + (3-y)$ .

### **VIII. Similar Experiments**

Güth, Schmittberger, and Schwarze, three German economists, conducted the first ultimatum game experiments in 1982. They used the Rubinstein model to predict that Allocators should make offers approaching zero and that responders should accept all positive offers. These predictions are not derived from game theory, but depend on the player's decision to maximize utility. When a responder declines an offer, she signals that her utility function has non-monetary arguments. "I would rather sacrifice [\$0.25] than accept what I consider to be an unfair offer"(Thaler, 1998, p. 197). In the game conducted, Allocators made offers significantly higher than \$0.25 for two reasons – one, they could have a taste for fairness or two, they could be worried that their unfair offers will be rationally or mistakenly rejected. Results from Tables 1, 2 and 4 show that offers were not made at the minimum. Several economists thought that if more money were at stake, people would act more like economic man giving and accepting lower offers. Hoffman, Smith and McCabe invested \$5,000 and ran the experiment with 50 participants each given \$100. Their results proved to be insignificantly different than those run by their colleagues who used smaller dominations of money because participants acted similarly to the other experiments. Responders turned down three offers of \$10 and five offers of \$30 saying those offers were unfair (Camerer, p. 211). The result of these high stakes experiments proved that with more money, subjects are more likely to act like Homo Reciprocans because they are more willing to punish unfair offers. Vilet (2001)



pondered whether fear or fairness was more prevalent in making offers. He ran his experiments hypothetically and showed that the hypothesis of trade-off between fairness and fear is true – fairness was highest for the lowest amount (Hfl 10) and lowest for the medium amount (Hfl 1000) and the highest amount (Hfl 1 billion) was in between (van Vilet, p. 3-4). However, van Vilet did not test whether these amounts were accepted or rejected. I suspect that it would be similar to Hoffman, et. al. in which fairness would rule over fear because it is not their money that they are losing, but just extra money.

Kahneman, Knetsch and Thaler (1986) ran a similar experiment at Cornell University where the allocators had three choices on how to split \$20 - \$18/\$2, \$10/\$10, \$2/\$18. The difference here was the responders could not reject the offers. In my study, both sets of students overwhelmingly responded that they would allocate less than their original amount if the Responder could not reject the offer. Equations 1 and 3 suggest that Economics students are more likely than Art students to allocate closer to the minimum amount especially when offers cannot be rejected. KKT's study showed that over three-quarters of the students split the money in half, which the authors explained to be a taste for fairness on the part of the allocators (Thaler, p. 198). Much of the deviations from economic theory have to do with learning, fairness, punishment and risk.

## **IX. Fairness Equilibrium**

In this discussion, I must define social norms because they are the basis for many of the theories proposed. "Social norms is a behavioral regularity that is based on a socially shared belief how one ought to behave which triggers the enforcement of the prescribed behavior by informal social sanctions"(Fehr and Gächter, 1998, p. 854). In life as well as in the game, subjects make trade offs because most people prefer more money to less, like to be treated fairly and like to treat others fairly, but often these goals are contradictory (Thaler, p. 204). Rabin (1993) introduced the fairness equilibrium, which suggests that if both players cooperate then both players are willing to sacrifice something to reward the other player's cooperative act (Camerer, p. 215). This is relevant in the ultimatum game because if the allocator is egalitarian and the responder acts like economic man, both players receive a substantial reward. However studies have shown that some economists do not care about fairness and often times do not know what it entails. Equation 3 demonstrates that when there are unfair circumstances because

the Responder cannot reject what she deems an unfair offer. In Marwell and Ames' experiment (1981) they asked their subjects whether they were concerned about fairness. Almost all non-economists said yes. When they asked economists,

[m]ore than one-third of the economists either refused to answer the question regarding what is fair, or gave very complex, uncodable responses. It seems that the mean of 'fairness' in this context was somewhat alien for this group. Those who did respond were much more likely to say that little or no contribution was 'fair.' In addition, the economics graduate students were about half as likely as other subjects to indicate they were 'concerned with fairness' in making their decisions (Frank, Gilovich, and Regan, 1993, 160).

## **X. Learning vs. Self Selection**

The learning hypothesis proposes that studies of economic theory influence economists to see things in a different way, while the selection hypothesis proposes that a difference in attitudes comes first, and is a reason for students to choose economics instead of other majors (Tullberg, p. 2). The following three steps can summarize the reinforcement-learning model. First, choose an action using given probabilities. Second, deduce information about payoffs from experience. And third, update the propensities to choose actions (Vriend, 1997, p. 12). A subject can learn from observing another subject's actions and payoffs – or in this case, she can recall hypothetical situations taught in economic theory classes. The action a player chooses depends on two things: first, how well she knows the payoff of certain actions; second, how good the payoffs generated by those actions are. The information received is asymmetric and the player must use this information to make her choices; this, however, could lead to bias in the learning process but only if the players' identities were not anonymous. The steps of the reinforcement-learning model are basic reasoning steps the subject will play in her mind when playing the game – as an Allocator, choosing an amount and speculating whether that amount is too high or too low and whether it will be accepted or not; more than half of the students made offers based on their predictions of acceptance. As a Responder, accepting or rejecting on the basis of how much utility is granted. The adaptive learning hypothesis proposes that ultimatum bargainers modify their behavior on the basis of the outcomes they experienced in previous play (Abbink, Bolton, and Sadrieh, 2001, p. 3). Table 4 illustrates that maximizing income is not an Economics student's highest utility when she rejects an offer. This model will work best when games are played more than once, but it can be applied to the above experiment because

subjects had to play both roles and knew the possible outcomes and how to think like an Allocator and a Responder. Allocators give more generous offers because the adaptive learning hypothesis suggests that Responders are conditioned to learn to accept more generous offers.

While in one-shot games it is hard to use learning models to explain results, if the participants took the games out of context and placed it into real world scenarios, the outcomes might change. The allocators would learn to make more generous offers so that they would not be rejected and the responders would learn to accept low offers. In my study, an Economics student stated she rejected her offer of \$.50 because she wanted to teach the Allocator that she needed to think twice before offering so little. She predicted that if they were to play the game again, she was sure that the amount offered would be close to \$1.25 or \$1.50 because the Allocator would learn.

The punishment hypothesis asserts that, along with the monetary payoff, some bargainers care more about how fair the division is. Bolton (1991) proposed a model that says bargainers care about the relative as well as financial payoffs. Responders will reject unequal offers to obtain a more even relative division (Abbink, p. 2). Emotions are more involved when Responders expect a high or fair offer. This can explain why economic theory has not played out. These expectations can be related to social norms of being fair and dividing equally. Bosman, Sonnemans and Zeelenberg (2001) tested whether emotions played a part in the ultimatum game. Those who expected a high offer experienced emotions of envy, irritation and anger when an uneven or unfair offer was made. The intensity of negative emotions positively correlates to the likelihood of rejecting (Bosman, Sonnemans, Zeelenberg, 2001, p. 9-10). I noticed in my study that if students allocated a rather high amount then they expected to receive the same generosity. One student commented, "I just gave away \$3.00 and all I got was \$1.50." A psychological explanation for why Allocators do not offer the minimum amount is because they fear the observer will judge them as greedy. Over twenty percent of all students said that they gave offers to be fair or generous. Responders also reject minimal amounts for similar reasons because it could make them look like they value [\$.25] more than fairness. Learning, fairness and punishment all have to do with being either Homo Economicus or Homo Reciprocans.

## **XI. Homo Economicus**

The tendency among economists is to think of themselves and the agents in their models as having hard hearts. Homo economicus is usually assumed to care more about wealth than such issues as fairness and justice (Thaler, p. 204). “Homo economicus spends his waking hours making cool and calculated decisions designed to bring about the top outcome of a set of possible outcomes which are arranged in a clear order of preference” (Bacharach, p. 3). Carter and Irons (1991) conducted the ultimatum game at the College of Holy Cross with four different types of students – freshman non-economists, freshman economists, senior non-economists and senior economists. Economists kept on average \$6.15 of \$10 (62%) in comparison to \$5.44 (54%) by non-economists. The minimum amount accepted by economists was \$1.70 (17%) and by non-economists \$2.44 (24%). In my study, economists and non-economists kept on average \$1.50 of \$3 (50%). The minimum accepted by Economics students was \$.25 of \$3.00 (8%) and \$.50 by \$3.00 (17%) by Art students. The discrepancy here could be explained by the difference in beginning amounts. While generally economists will accept less and propose to keep more, learned economic theory does not play a significant role – economists are different from non-economists at the start of their study of economic theory (Carter, p. 175). Freshman economists’ offers were less than senior economists’ offers implying that economic theory classes do not necessarily have an effect on how games are played. Instead, this correlates with suggestions given by Marwell and Ames on why Economics students behave differently. One, students who are particularly concerned with economic incentives might self-select into economics. Two, Economics students might adapt their behavior over time to the basic assumptions of the theories they study (Carter and Irons, 1991, p. 171). The first conclusion correlates to the results shown from the Statistics course where the majority of the students did not have extensive training in economic theory. The second conclusion however was contradicted by the results from the Theory course because those who had had economic theory training and game theory training reacted against economic theory. It would be interesting if we could retest the ECO 190 students after they had ECO 250 to see if their amounts would change.

“Homo economicus has been called a ‘hedonistic sociopath.’ He has no culture at all and is far too smart. Nobody, not even exponents of ‘rational choice’ theories, is much like Homo economicus, which is good for humanity, but bad for those theories” (Shalizi, p. 1).

However, many economists have argued that rational man and economic man are alike. The minimum assumption behind rational man theories is that human behavior is to be understood as attaining goals by the best available means (Meeks, 1991, p. 29). Those goals are ambiguous because for one person it could be to maximize income and for another it could be to maximize kindness. Marx thinks that the participants in a capitalist economy are rational and insists that behavior which outsiders might think 'irrational' is to be understood only as a behavior the prevailing economic and social system forces upon the participants in that system. It is not 'rational' to promote making money to gratifying our sense of fairness, but we may safely bet that, under capitalism, the CEO will sacrifice honor to money where it is necessary (p. 39). Equations 1 and 3 advocate this because the Economics student is sacrificing being nice to gaining more money. The dispersion of the economists combines generosity as a Responder with selfishness as an Allocator, while the orientation toward equality of non-economists combines generosity as an Allocator with spite as a Responder. This was clearly shown in the ultimatum game. In contrast, the Responder with high demands is not only keen to improve his lot at the expense of somebody else; he is also ready to take a loss for himself to eliminate a larger benefit for somebody else (Tullberg, p. 5). This is Homo Reciprocans.

## **XII. Homo Reciprocans**

Homo Reciprocans care about others' well being and about the processes determining outcomes, whether they are fair or violate a social norm. They are committed to a rough balancing out of burdens and rewards. This is in contrast to Homo Economicus who is self-regarding and outcome-oriented (Bowles, p. 3-4). Social scientists often think that the existence of reciprocal types changes the behavior of the selfish types. The existence of positive reciprocity may induce selfish types to behave nicely for purely selfish reasons because they can expect a reward from reciprocal types and a punishment if they are selfish – this relates back to the learning hypothesis. Reciprocity provides a key mechanism for the enforcement of social norms. Classrooms are not governed by explicit agreements, but by social norms. Afterwards, if students discussed the experiment and confessed that they gave or accepted the minimum amount, they might feel as if their friends would judge as a greedy person. The role of reciprocity as a norm enforcement device is perhaps the most important function. In the ultimatum game, Homo Reciprocans have the opportunity to discipline those subjects who are

selfish or insufficiently motivated by positive reciprocity. Since punishing is costly for the punisher, a selfish subject (economic man) will never punish and, as a consequence, the punishment opportunity provides merely the possibility of incredible threats to not maximize income (Fehr, p. 846). Equation 2 shows that Economics students do not act fully like economic man because they are .10 percentage points more likely to reject offers than Art students.

Strong reciprocity is the propensity to cooperate and share with others in similar situations and a willingness to punish those who violate cooperative and other social norms even when sharing and punishing is personally costly. Weak reciprocity is when the subject is interested in the outcome level as opposed to cooperation. Taking pleasure in others' pleasure often motivates subjects. This is termed pure altruism whereby, "there are evidently some principles in man's nature, which interest him in the fate to others, and render their happiness necessary to him, though he derives nothing from it, except the pleasure of seeing it" (Dawes and Thaler, 1998, 192). As seen in the conducted experiment Art students wanted to help out their fellow classmates by offering them an amount of more than half. Art students presumably benefited from another's niceness. Another form of altruism motivates people involved to be generous or as in the experiment's case, allocating \$1.50 or more (Dawes, p. 192). Equation 1 indicates this because Art students are offering more money than Economics students offer. Some might conclude that having their offer rejected would be enough motivation to be fair, but, as seen, emotions do not seem to bother economists and therefore economists' only motivation is increased profits.

### **XIII. Inequality and the Real World**

In class, discussion was brought up of how game theory relates to inequality and to the real world. In essence, game theory has a lot to do with inequality. How the Allocator and the Responder are picked is just the beginning of inequality. In Carter and Irons (1991), the Allocators were not chosen randomly; instead they were chosen by a trivia game in which the winners of the game were Allocators. Implying that Allocators are superior almost gives them a right to not allocate the money generously. In a real world situation the Allocator is usually the person in a superior or senior position. The ultimatum game can often be played out in work situation when the boss acts as the Allocator and the employee acts as the Responder. If the

employee has done an exceptional job or been exceptionally loyal, the boss might feel an inclination to treat his employee well even though it might not be in the boss' best interest. The boss, acting like Homo Reciprocans, gives the raise if his sole interest is in keeping the worker content. The boss, acting like Homo Economicus, gives the raise if only interested in increasing profits, efficiency and effort. Likewise, if the employee feels that she has been maltreated, she may engage in acts of sabotage – punishing the boss by doing the minimum required. Bowles describes an experiment using UCLA fraternity brothers. In it, the UCLA fraternity brothers were asked how much they wanted to allocate to fellow frat brothers, another a frat brother from another UCLA fraternity, a USC frat brother or a UCLA campus police officer. The UCLA fraternity brothers acted to allocate their money in descending amounts to the respective parties (Bowles, p. 7). This correlates to how well they would treat someone of those parties and the amount of respect they would have for each one. While one would think that they would have more respect for the UCLA campus police because they help to keep the campus safe, they might have had a bad encounter with them. On the other hand, members of the UCLA fraternity might feel that the campus security is not doing their job properly and deserved to be punished accordingly. This is an obvious example of how game theory plays into inequality.

Two other examples show how game theory relates to inequality in real life situations. First are hotel reservations during a busy weekend, i.e. – graduation weekend. If a local hotel knows that it will be able to sell out during this time period, it could demand that each party stay a minimum of three days. But if the hotel normally charges \$105 a night, it knows that it could easily increase the price to \$150 a night and that it would still sell out because there are only so many hotels in the local area. This is similar to the Equation 3 where the Allocator knows that her offer will not be rejected. In this case the hotel owner is the Allocator, renting (allocating) a room to the guests and the guest is the Responder renting (receiving) the room at an unfair price. Not renting the room, the guests would act like Homo Reciprocans “punishing” the hotel owner for having such high prices. However, the guests would also punish themselves because they would have to drive farther and not be as easily accessible during those weekends. A similar example is a hardware store owner who raises his prices of snow shovels directly after a snowstorm. Those who were unprepared for the snowstorm must buy the shovels or could punish the owner and not buy a snow shovel and just wait for the snow to melt. In both of

these cases as in the experiments, the Allocator has the control and the Responder must just react to the scenarios given to him. In ultimatum games Allocators act very much like sophisticated profit maximizers. They realize that unfair offers are likely to be rejected by the Responders, but are willing to take the risk for those who act like economic man (Camerer, p. 214).

The fact that Homo Economicus is alive and well is good news as people often rely on a social individualism to undermine socially harmful forms of collusion ranging from price fixing to ethnic violence (Bowles, p. 5). Any time a monopolist (monopsonists) sets a price (wage) it has the quality of an ultimatum game. Just as the responder in an ultimatum game may reject a small but positive offer, a buyer may refrain from purchasing at a price that leaves a small bit of consumer surplus but is viewed as dividing the surplus in an unfair manner. Consumers may be unwilling to participate in an exchange in which the other party gets too large a share of the surplus. This can explain why some markets fail to clear at market price – sporting events, concerts, first class airline tickets (Thaler, p. 203). Players will behave irrationally when they expect others to behave even more irrationally, which is one common explanation for excessive volatility in financial markets. A realistic description of a Homo Reciprocan should include the following traits. They care about being treated fairly and treating others fairly. They are willing to resist unfair firms even at positive cost. They have systematic implicit rules that specify which actions of firms are considered unfair. Further, fairness rules are not describable by the standard economic model or by a simple cost-plus rule of thumb. Instead, judgments of fairness are influenced by framing and other factors considered irrelevant in most economic treatments (Kahneman, Knetsch, and Thaler, 1986, p. S299).

As seen in the experiments Art students did not act like Homo Economicus because none of their offers were of the minimum amount. The Art students acted nicely in the role of Responders as opposed to the Economics students because all offers were accepted. This could be because none of their offers seemed “unfair” as did some of the offers Economics students made. “The failure of game theory to give unambiguous solutions in certain classes of games does not necessarily imply that the theory is flawed, or inadequately developed. It may be in the nature of things” (Bacharach, p. 5-6). This quote is very true because social norms incline individuals to act fairly and to play according to the Golden Rule Hypothesis. Is it any coincidence that none of experiments conducted have been able to support the assumptions of



economic man? While economic man does exist, he is only a rare minority and the majority of the population is between pure altruism and economic man.

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## Appendix

### Ultimatum Game at Smith College:

#### Directions:

1. Before handing out the response sheets, write Identification Codes on each sheet so you can correctly match it up after the experiment is over. Each entire response sheet (Allocator and Responder) should have the same number so you know who responded to which allocation.
2. Have the response sheets and the questionnaires placed on the desks before the subjects arrive.
3. Once they arrive, direct them to read over the response sheet before explaining any of the rules.
4. Rules of the game:
  - a. The room must be kept silent.
  - b. Each student will play 2 roles – once as an Allocator and one as a Responder.
  - c. All identities will remain anonymous.
  - d. Each student will fill out only the top part of the response sheet and the first question of the response sheet. Make sure each indicates her name, her box number, her class year, her major and her offer. On the Responder part of the response sheet, have each student also fill out the amount she allocated in the first sentence of the response sheet. This is imperative so that the Responder knows what the offer is.
  - e. After they have filled out the Allocator portion and the first question of the Responder portion, have each student tear the sheet in half and hand the experimenters both halves.
  - f. The experimenters will then distribute the Responder portions to the class and the students will fill them out accordingly.
  - g. Emphasize to the students that they are playing against someone else in the class and the rewards and consequences of accepting and rejecting.
  - h. After students have completed the Responder portion, have them fill out the questionnaire and turn everything back into the experimenters.

### Response Sheet

Identification Code: \_\_\_\_\_

#### ALLOCATOR – Art or Eco

*You will be given \$3.00. You can choose to share any part of this money with your fellow classmate. You must share some of it in \$.25 increments, even if it is \$.25.*

**Your classmate can accept the offer, in which case she will receive the amount you allocated to her and you will receive the rest. Or she can reject the offer, in which case you both receive nothing.**

**Your identity will remain anonymous, but we will need your name if your offer is accepted so you can receive the money.**

Your name: \_\_\_\_\_ Box number: \_\_\_\_\_

Your class: FY SO JR SR (circle one)

Your major: Art/Art History OR Economics (circle one)

Offer: \$ \_\_\_\_\_

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**Identification Code:** \_\_\_\_\_

**RESPONDER – Art or Eco**

*One of your classmates has been given \$3.00. She has chosen to share \$\_\_\_\_\_ with you and to keep the rest for herself.*

*You may accept the offer, in which case you will receive the amount she allocated and she will receive the rest. Or you can reject the offer, in which case you both receive nothing.*

**Your identity will remain anonymous, but we will need your name if you accept your offer so you can receive the money.**

**ACCEPT OR REJECT (circle one)**

Your name: \_\_\_\_\_ Box number: \_\_\_\_\_

Your class: FY SO JR SR (circle one)

Your major: Art/Art History OR Economics (circle one)

**Questionnaire for Non-economists**

Allocators

1. How did you choose to split the money? What prompted you to split the money this way?
2. Have you ever had any prior experience with game theory? If so, do you think this affected your decision of how much you allocated?
3. Would knowing the identity of the Responder have changed your offer? If so, how?
4. If the person receiving the money did not have a chance of rejecting the money, would you have proposed a different amount? If so, how much?

Responders

1. The Allocator decided to give you \$\_\_\_\_\_ (please specify amount). Did you accept or reject the offer? Why?
2. Have you ever had any prior experience with game theory? If so, do you think this affected your decision of accepting or rejecting?
3. Would knowing the identity of the Allocator have changed your decision? If so, how?

## Questionnaire for Economists

### Allocators

1. How did you choose to split the money? What prompted you to split the money this way?
2. Have you taken ECO 250? Do you think your economics training affected your decision to split the money accordingly? If so, how?
3. Would knowing the identity of the Responder have changed your offer? If so, how?
4. If the person receiving the money did not have a chance of rejecting the money, would you have proposed a different amount? If so, how much?

### Responders

1. In playing another economics student, she offered you \$ \_\_\_\_\_. (please fill in amount) Did you accept or reject this offer? What prompted you to make this decision?
2. Have you taken ECO 250 or the equivalent (Intermediate Microeconomic Theory)? Do you think your economics training affected your decision about how much to offer? If so, how?
3. Would knowing the identity of the Allocator have changed your decision? If so, how?

**ECO 250**

Amount	Year	A/R	Year
\$ 1.00	JR	0	JR
\$ 1.50		0	FY
\$ 3.00	JR	0	JR
\$ 1.50	SO	0	
\$ 1.25	SO	0	SO
\$ 1.50		0	
\$ 1.50	JR	0	
\$ 1.00	JR	1	SO
\$ 1.00	SO	0	
\$ 1.00	JR	1	JR
\$ 1.00	SO	0	
\$ 1.50		0	SO
\$ 1.00	SO	0	SR
\$ 1.00	JR	1	
\$ 0.50	SO	0	
\$ 1.25		0	
\$ 1.25	JR	0	
\$ 1.50	SO	0	SR
\$ 3.00		0	SR
\$ 1.25	SO	0	
\$ 3.00	SO	0	
\$ 2.00	SR	0	
\$ 1.00	SR	0	
\$ 1.50		0	SO
\$ 1.00		0	JR
\$ 1.25	SO	0	SO
\$ 1.00		0	JR
\$ 2.75	SR	0	SO
\$ 1.25	SO	0	SO
\$ 1.00	SR	0	
\$ 1.50	SO	0	SO
\$ 1.25	SO	1	SO
\$ 1.50	SO	0	SR
\$ 0.25	SO	0	SO
\$ 1.25	SO	0	SR
\$ 1.00	SO	0	SO
\$ 1.50		0	SR
\$ 1.00	JR	1	SO
\$ 1.25	SR	0	SO
\$ 1.50	SO	0	SO
\$ 1.25	SR	0	SO
\$ 1.50	SO	0	JR
\$ 2.75	SR	0	SO

**ECO 190**

Amount	Year	A/R	Year
\$ 1.50	SO	0	
\$ 1.00	SO	1	SR
\$ 1.00	SO	0	SO
\$ 1.50	SO	0	
\$ 0.25		1	SO
\$ 1.50	SO	0	SO
\$ 1.50		0	JR
\$ 1.00	SO	0	SO
\$ 1.50	SR	0	SR
\$ 1.50	SO	0	SR
\$ 1.75	SO	0	SO
\$ 1.25		0	
\$ 1.50		0	SO
\$ 1.25	JR	0	SR

**ART**

Amount	Year
\$ 1.50	SR
\$ 1.50	SR
\$ 1.00	SR
\$ 0.75	SR
\$ 2.00	SO
\$ 1.75	SR
\$ 1.50	
\$ 0.50	SO
\$ 1.00	SR
\$ 1.50	SR
\$ 1.50	FY
\$ 1.50	FY
\$ 1.50	SO
\$ 3.00	FY
\$ 1.50	FY
\$ 1.00	FY
\$ 1.00	FY
\$ 2.00	SR
\$ 1.50	SO
\$ 1.50	SO
\$ 3.00	JR
\$ 3.00	SR
\$ 3.00	SR
\$ 1.50	FY

**Legend**

Amount - Amount Allocated

Year - FY - First Year, SO - Sophomore, JR - Junior, SR - Senior

A/R - If offer accepted = 0, If offer rejected = 1



\$ 1.00	JR	0	JR
\$ 1.75		0	JR
\$ 1.50		0	SO
\$ 1.25		0	
\$ 1.50		0	SR
\$ 0.50		1	SR
\$ 1.25		0	SR
\$ 0.25		1	SR
\$ 0.25		1	SR