Decision Making and the Ultimatum Game:
The Influence of Prediction and Induced Emotional State on Elicited and Revealed Preferences

April 4, 2011

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Abstract

Economic theory assumes individuals are utility maximizing with stable preferences. Several studies using the Ultimatum Game document deviations from rational behavior; however, research does not currently explain the stability of these preferences. It may be that responders hold underlying preferences for fairness and punishment, or it may be that individuals construct their offer preferences in the moment, so that their choices are influenced by current emotional state. In this study, responders were put into different induced emotional states and their elicited and revealed preferences were measured. By comparing subjects' preferences between induced emotional states and between order of elicitation within induced emotional states, this study disentangles these two competing hypotheses. Using both Fisher's exact tests and OLS regressions on the data, it appears that responders' preferences are predominantly stable. However, induced emotional state was found to influence subjects' stated preferences for punishment and—when combined with preference prediction—the consistency of responders' preferences for Ultimatum Game offers.

Introduction

Standard economic models are based on the assumption that individuals are rational, utility-maximizing individuals who act in accordance with stable, underlying preferences. However, several studies examining the Ultimatum Game suggest that these assumptions do not reflect reality.

The Ultimatum Game is a simple bargaining game between two people. One player (the proposer) is told to divide $10 between himself and another player. He must give the second player (the responder) at least $1. The second player can either accept or reject the offer made by the proposer.   If the responder chooses to accept, they both leave with the agreed amounts. If the responder chooses to reject, they both leave with nothing.

According to economic theory, responders should accept any positive offer, as leaving with even a small amount is better than leaving with nothing. However, responders frequently reject amounts they deem to be unfair in order to punish the proposer who gave them such an offer. While it has become well established why responders act in such a way (see Thaler, 1988), little work has been done to establish the stability of these preferences.

By comparing individuals' elicited and revealed preferences, this study examines whether people have underlying preferences for fairness and punishment or if these preferences are derived in the moment based on current emotional state. Elicited preferences are preferences people explicitly state when asked, while revealed preferences are determined by observing people's actions when given a choice. For example, if you were to ask someone if they preferred chocolate ice cream to vanilla and he said yes, this would be an elicited preference. If you watched an individual select chocolate ice cream every time he had a choice between chocolate

and vanilla, this would be a revealed preference. The person did not have to say that he prefers chocolate; he showed you.

In this study, participants were placed into one of three induced emotional state conditions: a no anger condition, a context relevant anger state (an unfair Ultimatum Game offer), and a context irrelevant anger state (writing about an experience that made them angry). Their elicited preferences were recorded by a survey directly asking them about their preferences for fairness and punishment, as well as the lowest offer they would accept. Their revealed preferences were recorded by their responses to ten Ultimatum Game offers of varied amounts.

The data from this study were used to determine whether induced emotional state or the order of the surveys affected elicited or revealed preferences. Fisher's exact tests were run on the data to determine the influence of induced emotional state and the order of the surveys on elicited preferences for fairness, punishment, and minimum acceptable offer, on revealed preferences for minimum acceptable offer, and on preference consistency. Finally, treating the data as continuous, OLS regressions were performed on the data to determine interaction effects between emotional state and the order of the surveys on subjects' minimum acceptable offer and the smallest offer they accepted while playing the Ultimatum Game.

Literature Review

The Ultimatum Game is a popular experiment in the field of behavioral economics. Most studies of this bargaining game focus on why responders reject unfair offers (van't Wout, Kahn, Sanfey, and Aleman (2006); Bosman, Sonnemans, & Zeelenberg (2001); and Andrade & Ariely (2009)). These results suggest that non-monetary arguments are in the responders' utility function (Thaler, 1988), as the positive emotion gained from punishing or spiting the proposer

also gives the player utility. When the utility derived from spiting the proposer is greater than the utility derived from the offer, the responder turns the offer down.

While this aspect of the Ultimatum Game is well documented, the stability of people's preferences in this context is not. Economic principles contend that people have stable, well-defined preferences and make rational choices consistent with those preferences (Thaler, 1988). One study that does examine this issue is that conducted by Andreoni and Miller (2002). The authors focused on proposers' preferences for altruism, and specifically on if these preferences are consistent. Using a modified Dictator Game, the authors concluded that altruism is stable. They found that within-subject preferences were consistent across contexts, so their preferences are underlying but included non-monetary arguments (such as preferences for fairness).

In contention with economic axioms is the theory of preference construction, which states that preferences are derived in the moment, so they are subject to external influences, such as question framing and current emotional state. This means that under different contexts people can experience preference reversal (Hsee & Zhang, 2010).   A study conducted by Andrade and Ariely (2009) on the Ultimatum Game supports this theory.

Andrade and Ariely (2009) found that incidental emotions have an impact on decision-making that lasts longer than the emotional experience itself. So even after the emotional stimulus disappears, it still influences subsequent decisions. Specifically, they found that subjects who were made angry before playing the Ultimatum Game by watching a film rejected more offers than participants who watched a happy film. This suggests that current emotional state influence individuals' decision making, so people must use their context as an anchor when creating their preferences.

Another study that looked at the stability of preferences is Ariely and Loewenstein's "Heat of the Moment" (2002) study. In this research, Ariely and Loewenstein looked at the stability of individuals' preferences for sexual decision making. Participants were asked a series of questions about their likelihood of partaking in various sexual activities while they were in an unaroused state. Participants were then presented with images that made them sexually aroused, and afterward were asked the same series of questions. Ariely and Loewenstein found that individual's preferences changed dramatically between the two states. They were much more likely to say they would participate in sexual activities—even those that were risky or violent in nature—while they were in an aroused state. This study demonstrated that people's elicited preferences for sexual situations are inconsistent, as they are vulnerable to the influence of current emotional state.

Taking this research as inspiration, the current study puts individuals in various induced emotional states before eliciting their preferences. It, however, extends this research by putting individuals in either a context relevant anger state or a context irrelevant anger state. The study also combines methods from previous research, such as Andrade and Ariely (2009), to look at the influence of these induced emotional states on revealed preferences. The results from both the elicited and revealed preferences can be compared to determine their stability.

Both economic theory and preference construction have supporting evidence. By looking at people's elicited and revealed preferences to determine if certain preferences are stable or if they appear to be vulnerable to contextual influences, this study pits these two competing theories against each other.

Huber, Van Boven, and McGraw (2010) explored the consistency of people's preferences by having them think about their strategy beforehand. This is known as a mindful decision

making process. Huber *et al.* (2010) found that when people went through mindful decision making, they made decisions that were consistent with their devised strategy. For the current study, some participants think about their preferences and strategy beforehand (participants who answer the elicited preference questions first) to determine if they are more consistent in their decision making than participants who played the game first and were asked explicitly about their preferences after.

Methodology

This study examines whether responders' choices appear more closely aligned with economic theories or preference construction. To answer this research question, an experiment was run to see if elicited and revealed preferences in the Ultimatum Game could be manipulated through changes in participants' emotional state.

Participants and Materials

Participants were undergraduate students at the University of Colorado at Boulder. The study was advertised on the Psychology department's SONA website and in Economics classes. Students signed up for the study on the paid SONA website. They received payment for their participation by having one of their offers randomly selected at the end of the experiment. 71 students completed the experiment and all were included in the sample.

Subjects completed the entire study on a computer using Qualtrics survey software.[1] The study consisted of two phases: one that elicited subjects' preferences and one that recorded subjects' revealed preferences. For the elicited preferences portion, subjects were asked three

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[1] To view the entire survey for each condition, please see the Appendix.

questions: how important is fairness when deciding to propose or accept an offer (they ranked the importance from 1 to 5, 1 being not important, 3 being somewhat important, and 5 being very important), how much they agreed with the statement that it is worth it to give up an offer to punish a player who gave them an unfair offer (again ranking from 1 to 5, 1 being do not agree, 3 being somewhat agree, and 5 being strongly agree), and to type in the lowest offer they would accept. For the revealed preferences portion, subjects were given ten Ultimatum Game offers that they believed were proposed by students in another lab sequentially that they could either accept or reject by clicking the corresponding answer on the computer screen.

Procedure

All testing was done in a computer lab on the CU Boulder campus. Before participants' arrival, they were randomly assigned to one of six conditions, which are summarized in Figure 1 below.

Figure 1
Induced Emotional State

	No Anger	Anger Manipulation 1	Anger Manipulation 2
Elicit First	Version 1	Version 2	Version 3
Play First	Version 4	Version 5	Version 6

Subjects came to the lab and were provided with an informed consent form. If subjects chose to proceed, they were led to a computer and began the study.

If subjects were assigned to one of the two no anger conditions, they immediately proceeded to either the elicited or revealed preferences questions. If subjects were assigned to one of the two anger manipulation 1 conditions, they thought and wrote about an experience that made them angry for five minutes before beginning the elicited or revealed preferences questions. If subjects were assigned to one of the two anger manipulation 2 conditions, they

were told that they were going to play the Ultimatum Game and the first offer they received was $1, then they began the survey questions or were given the final nine Ultimatum Game offers.

After the respective emotional manipulation, all subjects were told the rules of the Ultimatum Game. Half the subjects completed the elicited preferences portion first, while the other half played the Ultimatum Game first. When subjects played the Ultimatum Game, they were told that they had been randomly assigned to the role of the second player (the player who chooses to accept or reject an offer) and would be playing with a group of subjects located in another computer lab on campus who would be proposing the offers. Subjects were told they would be randomly paired with a player in the other lab for each offer. In reality, offers were actually determined beforehand, so every participant received the same set of ten offers, but the order of the offers was randomized for each subject. Offers were presented one-at-a-time on the computer screen, with randomized delay periods ranging from 2 to 7 seconds between offers. Participants chose their response by clicking "accept" or "reject" and then a confirmation button on the computer screen. After completing the portion of the study they were assigned to first, participants proceeded to the section of the experiment they had not yet completed.

At the end of the study, one of the participant's offers was randomly selected. If they accepted the randomly selected offer, they were paid that amount in cash, and if they rejected it, they were paid a set minimum payout ($3) for their participation.

Data Analysis

The data analysis consisted of two parts. Treating the data as categorical, Fisher's exact tests were first performed on the data to determine the effects of induced emotional state and the order of the surveys on elicited and revealed preferences. Then, the data was treated as

continuous and put through an OLS regression to determine the interaction effects of emotion

and order of elicitation on these dependent variables.

Fisher's exact test is a small sample test for independence. This test looks at a

contingency table that presents how different treatments have produced different outcomes. The

null hypothesis for Fisher's exact test is that the treatments do not affect outcomes. That is, that

the treatments and outcomes are independent. While both Fisher's exact test and a chi-square

test can be used to analyze contingency tables, Fisher's is more appropriate when some of the

categorical counts are small (less than or equal to 4 in most cells).

Fisher's exact test uses the conditional distribution of cell frequencies given the marginal

totals (the row totals and column totals) of the contingency table obtained from the data. Given

the marginal totals of the contingency table, there is a critical set of tables that have the same

marginal totals. Fisher's determines if the contingency table constructed from the data is

contained in this critical set, which consists of tables that suggest a lack of independence.

The formula for Fisher's exact test is as follows:

$$p = P_{Ho}(n_{11},\ldots,n_{rc} \mid n_{1+},\ldots,n_{+c}) = \frac{\Pi n_{i+}!\Pi n_{+j}}{n!\Pi\Pi n_{ij}!}$$

where n_{i+} is the row total for row i, n_{+j} is the column total for column j, n is the grand

total, and n_{ij} is the count in cell ij. (Lindgren 440-441)

If p is less than the predetermined test size (α), the null hypothesis is rejected and the

treatments and outcomes are determined not to be independent. If this occurred, every

combination of pairs was compared in pair-wise Fisher's exact tests to determine which was

responsible for the statistical significance. The no anger/play first was the control condition,

since in this condition neither induced emotional state or elicitation affect subjects' responses to

Ultimatum Game offers. So the most important pair-wise comparisons were those comparing

each version to this control condition. This way deviations from the control due to either

induced emotional state or preference elicitation could be determined.

In the second phase of the data analysis, the data were treated as continuous and an OLS

regression was performed. The regression equation was in the form:

$$Y_i = \alpha + \beta_{a1} 1_{\{a1\}} + \beta_{a2} 1_{\{a2\}} + \beta_{M1} 1_{\{M\}} + \beta_{Ma1} 1_{\{Ma1\}} + \beta_{Ma2} 1_{\{Ma2\}} + \varepsilon_i$$

where $1_{\{a1\}}$ is a dummy variable that took on 1 if the subject was in anger manipulation 1 (the

writing condition), $1_{\{a2\}}$ is a dummy variable that took on 1 if the subject was in anger

manipulation 2 (the \$1 offer condition), $1_{\{M\}}$ is a dummy variable that took on 1 if the subject's

elicited preferences were measured first, $1_{\{Ma1\}}$ is a dummy variable that took on 1 if the

subject's elicited preferences were measured first and the were in anger manipulation 1, and

$1_{\{Ma2\}}$ is a dummy variable that took on one if the subject's elicited preferences were measured

first and they were in anger manipulation 2.

These OLS regressions determined if there were interaction effects between the two

independent variables (induced emotional state and order of elicitation) on certain dependent

variables. These regressions were performed on subjects' stated minimum acceptable offer and

the smallest offer they accepted while playing the Ultimatum Game.

Considering past research, the following results are expected. People believe fairness is

extremely important in the Ultimatum Game, so there should be no significant difference across

conditions for subjects' elicited preferences for fairness. However, anger should affect how

much participants want to punish the proposer for giving them an unfair offer, so induced

emotional state should have a significant impact on elicited preferences for punishment. Given

the results of Andrade and Ariely (2009), anger should increase rejection frequency, so there

should be significant differences in the minimum acceptable offers in both the elicited

preferences and revealed preferences phases of the experiment. This would result in statistically significant Fisher's exact tests and statistically significant βs in the OLS regression equations. Finally, given the results of Huber *et al.* (2010), having participants consider their preferences explicitly before playing the Ultimatum Game should make them more consistent when they decide which offers to accept or reject.

Results

Descriptive Statistics

For the Fisher's exact tests, all of the data were converted to counts and placed in contingency tables. The contingency tables for the elicited preferences questions—fairness, punishment, and stated minimum acceptable offer—are summarized below in Figures 2, 3, and 4, respectively.

Figure 2 (Fairness)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
1	0	0	1	0	0	0
2	2	0	1	0	0	1
3	1	1	1	3	4	3
4	3	3	1	2	2	4
5	6	7	8	7	6	4

Figure 3 (Punishment)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
1	1	2	2	0	0	1
2	6	4	2	0	2	3
3	3	3	1	2	9	1
4	1	2	6	9	0	6
5	1	0	1	1	1	1

Figure 4 (Stated Minimum Acceptable Offer)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First

$1	2	4	1	0	2	0
$2	0	1	0	1	2	0
$3	1	0	2	3	1	1
$4	5	4	4	2	3	5
$5+	4	2	5	6	4	6

In the entire sample, only two subjects stated a minimum offer greater than 5, so the last

category is 5+, which indicates subjects who stated offers greater than or equal to 5.

For subjects' revealed preferences, the smallest offer each subject accepted was noted,

and the results were converted into counts, as summarized by Figure 5. If a subject rejected

every offer presented to them, they are counted in the "none" category.

Figure 5 (Minimum Accepted Offer)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
$1	2	4	1	0	1	0
$2	0	0	0	2	3	0
$3	3	0	1	4	0	1
$4	4	3	5	2	4	4
$5	2	4	5	4	3	3
none	1	0	0	0	1	3

The means for all the survey questions are summarized below:

Figure 6

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
Fairness	4.08	4.55	4.17	4.33	4.17	3.92
Punishment	2.58	2.45	3.17	3.92	3.00	3.25
Stated Minimum Acceptable Offer	3.75	2.91	4.00	4.08	3.42	4.67
Minimum Accepted Offer	3.50	3.27	4.08	3.67	3.59	4.75

The last dependent variable examined was consistency. Consistency is categorized in

two different ways. The inconsistency within category denotes individuals who accepted an

offer one time they saw it and rejected the same amount another time.[2] The inconsistency

between category denotes individuals whose stated and actual minimum acceptable offers were

incongruent. The counts for these observations are summarized in Figures 7 and 8.

Figure 7 (Inconsistency Within)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
Inconsistent	4	0	0	4	5	1
Consistent	8	11	12	8	7	16

Figure 8 (Inconsistency Between)

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First	Write, Play First	$1 offer, Play First
Inconsistent	6	2	1	4	6	4
Consistent	6	9	11	8	6	8

Results of Fisher's Exact Tests

The results of the Fisher's exact tests for the elicited preferences questions (Figures 2-4)

are summarized below:

Figure 9

	p
Fairness	0.716
Punishment	0.000***
Stated Minimum Acceptable Offer	0.450

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

The results of the Fisher's exact test for the revealed preferences questions (Figure 5) are

summarized below:

Figure 10

	p
Actual Minimum Acceptable Offer	0.095*

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

The results of the Fisher's exact tests for consistency (Figures 7 and 8) are summarized

below:

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[2] The order of acceptance and rejection did not matter, only that the subject was not consistent with respect to what amounts they would accept.

Figure 11

	p
Inconsistency Within	0.013**
Inconsistency Between	0.184

*significant at α=0.1 **significant at α=0.05 ***significant at α=0.01

Since the results of individuals' preferences for punishment, smallest offer accepted in the Ultimatum Game, and inconsistency within were deemed significant at α=0.01, α=0.1, and α=0.1, respectively, this suggests that the treatment and outcomes are not independent. That is, there is statistical evidence that the different treatments influence subjects' preferences for punishment, their smallest accepted offer, and their consistency when responding to offers. However, there is no statistical evidence that the treatment and outcomes are not independent for people's preferences for fairness, their stated minimum acceptable offer, and their consistency between their stated minimum and their actual minimum acceptable offer (consistency between). Pair-wise and three-way comparisons were done on the data for punishment, smallest accepted offer, and consistency within in order to determine what was responsible for the statistical significance.

The pair-wise and three-way comparisons for punishment (Figure 3) are summarized below:

Figure 12

	No Anger, Elicit First	Write, Elicit First	$1 offer, Elicit First	No Anger, Play First (Control)	Write, Play First	$1 offer, Play First
No Anger, Elicit First	----	0.899	0.118	0.001***	0.056*	0.174
Write, Elicit First	0.899	----	0.357	0.007***	0.041**	0.407
$1 offer, Elicit First	0.118	0.357	----	0.380	0.001***	1.00
No Anger, Play First (Control)	0.001***	0.007***	0.380	----	0.000***	0.348
Write,	0.056*	0.041**	0.001***	0.000***	----	0.001***

Play First						
$1 offer, Play First	0.174	0.407	1.00	0.348	0.001***	----

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

Figure 13

	p
Elicited First (All 3 Emotional States)	0.332
Play First (All 3 Emotional States)	0.000***

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

The pair-wise comparisons that compared a condition to the control (no anger, play first) that were statistically significant were no anger/elicit first, write/elicit first, and write/play first. In addition, other comparisons that were statistically significant were no anger/elicit first and $1 offer/elicit first, write/elicit first and write/play first, $1 offer/elicit first and write/play first, and write/play first and $1 offer/play first. The three-way comparison that was statically significant was that comparing all three emotional states when all the subjects played the Ultimatum Game first.

There were statistically significant differences both between emotional states within order of elicitation and within emotional states between order of elicitation. This provides statistical evidence that both induced emotional state and order of elicitation affects participants' elicited preferences for punishment. Comparing the mean preference for punishment for each condition (see Figure 6), participants stated higher preferences for punishment if anger was induced or if their preferences were elicited after playing the Ultimatum Game.

The pair-wise and three-way comparisons for smallest offer when playing the Ultimatum Game (Figure 5) are summarized below:

Figure 14

	No Anger,	Write,	$1 offer,	No Anger,	Write, Play	$1 offer,

	Elicit First	Elicit First	Elicit First	Play First (Control)	First	Play First
No Anger, Elicit First	----	0.299	0.515	0.327	0.269	0.484
Write, Elicit First	0.299	----	0.415	0.033**	0.205	0.073*
$1 offer, Elicit First	0.515	0.415	----	0.192	0.413	0.413
No Anger, Play First (Control)	0.327	0.033**	0.192	----	0.210	0.127
Write, Play First	0.269	0.205	0.413	0.210	----	0.368
$1 offer, Play First	0.484	0.073*	0.413	0.127	0.368	----

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

Figure 15

	p
Elicited First (All 3 Emotional States)	0.399
Play First (All 3 Emotional States)	0.167

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

The pair-wise comparisons that were statistically significant were no anger/play first and write/elicit first and write/elicit first and $1 offer/play first. Looking at the means for each condition (Figure 6), the subjects in the write/elicit first condition accepted significantly lower offers than subjects in the control condition. However, neither induced emotional state nor order of elicitation seemed to affect participants' smallest acceptable offers systematically, as this was the only condition that differed from the control and the three-way comparisons were not statistically significant.

The pair-wise and three-way comparisons for inconsistency within (Figure 7) are summarized below:

Figure 16

	No Anger,	Write,	$1 offer,	No Anger,	Write, Play	$1 offer,

	Elicit First	Elicit First	Elicit First	Play First (Control)	First	Play First
No Anger, Elicit First	----	0.093*	0.093*	1.000	1.000	0.317
Write, Elicit First	0.093*	----	1.000	0.093*	0.037**	1.000
$1 offer, Elicit First	0.093*	1.000	----	0.093*	0.037**	1.000
No Anger, Play First (Control)	1.000	0.093*	0.093*	----	1.000	0.317
Write, Play First	1.000	0.037**	0.037**	1.000	----	0.155
$1 offer, Play First	0.317	1.000	1.000	0.317	0.155	----

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

Figure 17

	p
Elicited First (All 3 Emotional States)	0.025**
Play First (All 3 Emotional States)	0.255

*significant at $\alpha=0.1$ **significant at $\alpha=0.05$ ***significant at $\alpha=0.01$

There was statistical significance for the pair-wise comparisons between no anger/play first and write/elicit first and no anger/play first and $1 offer/elicit first, meaning that these two conditions deviated from the control condition. Additional pairs that were statistically significant were no anger/elicit first and write/elicit first and no anger/elicit first and $1 offer/elicit first, which caused their three-way comparison to also be statistically significant. This provides statistical evidence that induced emotional state affects consistency, but only when subjects' preferences are also elicited beforehand. Looking at the counts for how many subjects were inconsistent in each condition (see Figure 7), elicitation beforehand when combined with induced anger makes subjects more consistent.

Interestingly, subjects in the write/play first condition were approximately as inconsistent as subjects in the no anger conditions, which led to statistically significant differences between this condition and write/elicit first and $1 offer/elicit first. Since these two comparisons were statistically significant, but the comparison between this condition and no anger/elicit first was not statistically significant provides further evidence that anger must be paired with elicitation to induce consistency.

Results of OLS Regressions

The OLS regressions performed were in the form:

$$Y_i = \alpha + \beta_{a1}1_{\{a1\}} + \beta_{a2}1_{\{a2\}} + \beta_{M1}1_{\{M\}} + \beta_{Ma1}1_{\{Ma1\}} + \beta_{Ma2}1_{\{Ma2\}} + \varepsilon_i$$

The results for the regression predicting subjects' stated minimum acceptable are summarized below:

Figure 18

	Coefficients	*t Stat*	*P-value*
Intercept	4.083333333	10.4253174	1.65592E-15
A1	-0.666666667	-1.203561245	0.23312427
A2	0.583333333	1.053116089	0.296186953
M	-0.333333333	-0.601780623	0.549413488
MA1	-0.174242424	-0.219947202	0.826601587
MA2	-0.333333333	-0.425523159	0.671860941

The results for the regression predicting subjects' lowest accepted offer when playing the Ultimatum Game are summarized below:

Figure 19

	Coefficients	*t Stat*	*P-value*
Intercept	3.666666667	9.62553347	3.9751E-14
A1	-0.083333333	-0.154688182	0.877546474
A2	0.787878788	1.43035952	0.157403587
M	-0.166666667	-0.309376363	0.75802483
MA1	-0.143939394	-0.186819899	0.85238373

| MA2 | -0.134032634 | -0.175620821 | 0.861137812 |

Since none of the coefficients are statistically significant, neither induced emotional state nor order of elicitation is a good predictor for determining an individual's stated minimal acceptable offer or actual smallest accepted offer.

Discussion

There is statistical evidence that suggests that induced emotional state and order of elicitation influences certain aspects of elicited and revealed preferences but not others. Specifically, there was no statistical support that the treatments and outcomes for fairness preferences, stated minimum acceptable offer, and consistency between are not independent. However, there was statistical evidence to support the notion that individuals' preferences for punishment and consistency within their accepted offers are not independent of treatment. This seems to suggest that individuals have some underlying preferences while they derive others in the moment using context effects as anchors.

There was a statistically significant difference between subjects' smallest accepted offers while playing the Ultimatum Game. However, only one condition (write/elicit first) deviated significantly from the control. Additionally, none of the coefficients (βs) in the OLS regression was significant, which suggests that induced emotional state and order of elicitation are not good predictors of a subject's smallest accepted offer. These two pieces of evidence suggest that individuals' preferences for acceptable offers appear to be stable.

The results seem to present a paradox, which is individuals' preferences for punishment. There were statistically significant differences between treatments in such a pattern that suggests that both induced emotional state and order of elicitation had an effect. Subjects in anger

manipulations (especially the context relevant anger manipulation) and subjects whose preferences were elicited after play judged punishment to me more important with greater frequency. However, there was no statistical evidence supporting that there are nontrivial differences between treatments for either people's stated minimum acceptable offer or their smallest offer accepted while playing. This implies that people actually punished people with the same frequency.

There was no financial benefit to accepting fewer offers. In fact there was financial disincentive. Five subjects, for example, rejected every offer presented to them, so they walked away with the minimum payout—$3—when they could have potentially walked away with $4 or $5. Since there was no financial incentive to reject offers—particularly ones $3 or higher—the only motivation for rejecting such offers is a desire to punish the other player. One subject who rejected every offer commented while receiving his payout, "It doesn't matter that I didn't win. It only matters that the other guy lost." This is a clear desire for punishment, but many participants did not state that punishment was very important. Only five participants out of the entire sample rated punishment a "5" (very important).

Moreover, the mean smallest offer accepted while playing across all subjects was $4. If participants did not have a strong desire to punish, as they indicated, they should have accepted smaller offers than $4. The very high mean minimum accepted offer along with evidence that preferences for these offers are stable suggests that perhaps preferences for punishment are strong and underlying, but what differed was people's willingness to admit that they believe and are willing to carry out punishment against another player. It may be that angry participants were more willing to admit their desire for punishment, and participants who were asked this question after playing were more likely to admit it, because they clearly already carried it out.

So while the statistical evidence suggests that induced emotional state and order of elicitation affect people's preferences for punishment, when looking at the data holistically, it may just be that these treatments increase the likelihood of people admitting their true preferences for punishment.

There was also statistical evidence that treatment influence individuals' consistency when playing the Ultimatum Game. Referencing Huber *et al*. (2010), individuals should be more consistent if they partake in a mindful decision-making process before entering a situation. This process involves making individuals think about the way they think, in a way strategizing before having to make their decision. Thus, it seems that participants who were asked to explicitly think about their preferences beforehand should have been more consistent. However, it was not order of elicitation that made the only difference in consistency. Induced emotional state interacted with order of elicitation to produce the differences. This means that although prediction did affect subjects' consistency, it was only when predication was paired with anger that the results became significant.

Non-significant results are often overlooked; however, in this experiment, the statistically non-significant results are equally important. The fact that preferences for fairness were independent of treatment suggests these preferences are underlying. Similarly, it appears that preferences for offers are stable, as they are not influenced by question ordering or induced emotional state. The similar rejection rates across treatments suggests that people's preferences for being treated fairly and their actual (not stated) preferences for punishment are also stable and underlying.

Looking at the results, subjects' preferences are largely stable and invulnerable to changes in emotional state. So it appears that responders' preferences seem to be more closely aligned with economic theory.

Conclusion

The Ultimatum Game has most often been used to explore deviations from assumed rationality and the presence of non-monetary arguments in the utility function. However, neither the stability of these preferences nor the differences between subjects' stated and revealed preferences had been explored. Using an original experiment that extended from existing research, these areas were examined.

There were, however, limitations to this experiment. The most salient of these is the relatively small sample size. In order to correct for the small sample size, Fisher's exact test was used, which led to several significant differences—many of which at $\alpha=0.01$. Typically the issue with a small sample size is power. Given that several significant differences were found at extremely strict test levels, power is not likely an issue for this study. So if a larger sample size was used, it is improbable that more effects would be found, just that the found effects would be even more robust. Additionally, one of the anger manipulations was not as robust as originally intended. Looking at the written responses in the anger manipulation 1 conditions, there was a wide gamut in the emotional strength and personal investment of the subjects who wrote these responses. Some participants wrote very thoughtful and strong responses, while others barely wrote a full sentence about the experience before they started commenting on how they did not want to write for the allotted time. This may have resulted in a less robust manipulation than originally intended.

Despite these limitations, this study still gives valuable contributions to the fields of economics and psychology and fills a current gap in the Ultimatum Game literature. Given its promise, research extensions based on this study are imperative. More subjects should be collected to increase the experiment's power, and the context irrelevant anger manipulation should be exchanged for one that is more robust, again increasing the power of the experiment.

The assumed theories of economics remained largely untested in the context of the Ultimatum Game. This study illuminates this area and provides support for economic assumptions in this situation.

Appendix
Version 1 (No Anger, Elicit First)

You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player.   If the second player chooses to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

Now that you know the rules of the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.
Record your answer as a whole dollar amount.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$1

$2

$2

$3

$3

$4

$4

$5

$5

Version 2 (Write, Elicit First)

Think of a past experience that made you very angry. In the text box below, please describe the experience, including what happened, how you felt, and why you felt so strongly. You will write for 5 minutes, and after you will be directed to proceed to the remainder of the study.

You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player.   If the second player chooses to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

Now that you know the rules of the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.

Record your answer as a whole dollar amount.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$1

$2

$2

$3

$3

$4

$4

$5

$5

Version 3 ($1 offer, Elicit First)
You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player. If the second player chooses

to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

$1

Before you proceed to the rest of the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.
Record your answer as a whole dollar amount.

You have completed all the required questions and will continue playing the remaining rounds of the Ultimatum Game.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$2

$2

$3

$3

$4

$4

$5

$5

Version 4 (No Anger, Play First)

You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player. If the second player chooses to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$1

$2

$2

$3

$3

$4

$4

$5

$5

Now that you have played the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.
Record your answer as a whole dollar amount.

<div align="center">Version 5 (Write, Play First)</div>

Think of a past experience that made you very angry. In the text box below, please describe the experience, including what happened, how you felt, and why you felt so strongly. You will write for 5 minutes, and after you will be directed to proceed to the remainder of the study.

You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player.   If the second player chooses to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-

time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$1

$2

$2

$3

$3

$4

$4

$5

$5

Now that you have played the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.
Record your answer as a whole dollar amount.

Version 6 ($1 offer, Play First)

You will be told the rules of a bargaining game. Afterward you will be asked to respond to questions regarding the game.

The Ultimatum Game is a bargaining game between two people. One player is told to divide $10 between himself and another player. He must give the second player at least $1. The second player can either accept or reject the offer made by the first player.   If the second player chooses to accept, they both leave with the agreed amounts. If the second player chooses to reject, they both leave with nothing.

You are now going to play the Ultimatum Game.
Before your arrival, you were assigned to play the role of the second player (the player that responds to offers). Subjects who were assigned to the role of making offers were told to go to another lab. You will be playing the game for more than one round. For each round that you play, you will be randomly matched with a player in the other lab. Offers will appear one-at-a-time on your screen. You must choose to accept or reject an offer before you will receive the next offer. When you see a loading screen, you are waiting for a player to propose an offer.

If you choose to accept an offer, click the accept button on the screen. If you choose to reject an offer, click the reject button on the screen. Then click next to receive the next offer.

At the end of the experiment one of your offers will be chosen at random and you will be paid that amount in cash.

(The following offers then appeared one-at-a-time in a randomized order for each participant with random delay periods between each offer)
$1

$2

$2

$3

$3

$4

$4

$5

$5

$1 (All participants in this condition saw a $1 offer as their last offer)

Now that you have played the game, please answer the following questions.

1. How important do you think fairness is when deciding to propose or accept an offer?

Rate from 1 to 5, where 1 is not important, 3 is somewhat important, and 5 is very important.

2. Suppose a player gave you an offer you felt was unfair.
How much do you agree with the following statement; it is worth it to give up the offer to punish the player who made the offer.

Rate from 1 to 5, where 1 is don't agree, 3 is somewhat agree, and 5 is strongly agree.

3. What is the smallest offer you would accept?
$1 is the lowest possible offer, $5 is an even split.
Record your answer as a whole dollar amount.

Works Cited:

Andrade, Eduardo B. and Dan Ariely. "The Enduring Impact of Transient Emotions in Decision

    Making." *Organizational Behavior and Human Decision Processes* 109 (2009): 1-8.

    Print.

Andreoni, James and John Miller. "Giving According to GARP: An Experimental Test of the

    Consistency of Preferences for Altruism." *Econometrica* 70.2 (2002): 737-753. Print.

Ariely, Dan, and George Loewenstein. "The Heat of the Moment: The Effect of Sexual Arousal

    on Sexual Decision Making." *Journal of Behavioral Decision Making* 19.2 (2006): 87

    -98. Print.

Bosman, Ronald, Joep Sonnemans, and Marcel Zeelenberg. "Emotions, Rejections, and Cooling

    Off in the Ultimatum Game." (2003): Manuscript submitted for publication.

Hsee, Christopher K., and Jiao Zhang. "General Evaluability Theory." *Perspectives on

    Psychological Science* 5.4 (2010): 343-355. Print.

Huber, Michaela, Leaf Van Boven, and A. Peter McGraw. "Donate Different: External and

    Internal Influences on Emotion-Based Donation Decisions." (2010): Manuscript

    submitted for publication.

Lindgren, B. W. *Statistical Theory*. 3rd ed. New York: Macmillan, 1976. Print.

Thaler, Richard H. "Anomalies: The Ultimatum Game." *Journal of Economic Perspectives* 2.4

    (1988): 195-206. Print.

Van 't Wout, Mascha, Rene S. Kahn, Alan G. Sanfey, and Andre Aleman. "Affective Sate and

    Decision-Making in the Ultimatum Game." *Experimental Brain Research* 169.4 (2006):

    564-568. Print.