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Investigating the Endogeneity of Risk Attitudes: Experimental Evidence Involving Cooperation and Competition

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Abstract

Individual decision making is at the core of microeconomics. Rarely, however, are decisions made in environments without some element of uncertainty or even in isolation. While people may differ in their inherent willingness to take on risk, their preferences could change when new information is learned or a new relationship is fostered. I designed an experiment in which participants were asked to make investment decisions involving different levels of risk. The participants completed task between these gambles which allowed me to introduce competitive and collaborative relationships. I was interested in: (1) understanding the factors that are important to explaining risk attitudes, (2) whether people change their risk attitudes, and (3) if attitudes are flexible, whether the type of interaction individuals were exposed to would influence their preference for risk. Using 181 participants from Colby College, I found a number of interesting trends in the data. First, I found that gender, playing a varsity sport, and political party affiliation are all significant predictors of risk preference. Second, individuals often changed their risk attitudes during the experiment, even when aggregate information concerning choices made by others was released. Moreover, I found that subjects in a cooperative environment were more likely to converge towards their partner's risk preferences than subjects in a competitive environment or control environment. I also found evidence showing that in competitive environments, like-gender groups were on average more risk seeking than mixed gender groups. These results are particularly interesting when considering group behavior and team dynamics in government, business, and social settings.

Introduction

People routinely make decisions in uncertain environments. Moreover, oftentimes decisions are made not in isolation, but in circumstances where individuals have been either exposed to the choices of others or even directly influenced by someone else. While individuals may differ in their inherent willingness to take on risk, their preferences could change when new information is learned or a new relationship is fostered. I spent time researching risk behavior and peer influences, to better organize, plan, and code an experiment that would answer the questions that arose from my research. Specifically, I was interested in three main questions: first, what general factors are related to risk attitudes, second, are risk attitudes malleable, and third, does the type of interaction individuals are exposed to influence the way in which preference for risk changes?

We all like to feel reassured about the decisions we make in life. In seeking this comfort, we often look to gather data—be it in the form of opinions from friends, advice from parents, or perhaps even a look into how decisions have been made in the past. Decision-making is often the challenge at the core of economic, political, and social issues. Understanding the flexibility of someone's preferences for risk is important when we think broadly about decision making in settings where peer influence might be important—boards of companies, political committees, diplomatic relations, even decisions that are made within households. When looking at decision making through this lens my research questions seem not only *relevant* to these peer interactions, but *necessary* to better understanding how people make decisions with uncertainty.

The core of my project builds on the work of Daniel Kahneman and Amos Tversky (1979). The authors considered lottery experiments (probabilistic alternatives involving risk) which underlie my research approach, and documented that participants are often risk averse with regards to positive outcomes, though they become risk loving with regard to loses. I focus only on gains to avoid complications involving risky loses (i.e., participants owing money or suffering from house money effects). There has been a growing literature in experimental economics considering various ways to elicit risk attitudes. Charness, Gneezy, and Imas (2012) discuss the strengths and weaknesses of common approaches employed in economics and psychology. For my purposes, I am most attracted to the method developed by Eckel and Grossman (2002) which involves subjects making a single choice among a number of gambles which are designed so expected payoffs are increasing with risk. Risk-averse subjects should choose those with a lower variance in payoffs. This is attractive because the chosen gamble implies a range concerning the risk coefficient under the assumption of a particular, often-assumed utility function (constant relative risk aversion). I should note that Reynaud and Couture (2010) provided evidence that this measure correlated

significantly with those elicited using other methods and that Dave et al. (2010) demonstrated that the method produced good estimates of risk preferences.

The most complicated part of my research is looking at whether one person's risk taking behavior might influence another person's willingness to take on risk. For this part I can tie in a literature that looks at peer effects. For example, Sacerdote (2001) found that roommates at Dartmouth College impacted grade point averages and decisions to join social groups. Zimmerman (2003) considered a similar exercise using roommates from Williams College and leveraging each student's SAT scores. Jaccard, Blanton, and Dodge (2005) considered how the behavior of a close friend can affect risky decision concerning binge drinking and sexual activity in middle and high school students. While the literature on peer influence is vast, I list these studies merely to support my suspicion that the behavior of peers can influence decision making. While much of the literature has investigated how influence might affect risk as one ages, I have a relatively homogeneous student body at Colby that allows me avoid such considerations. Rather, my interest is in how the type of relationship between peers might affect choices within the context of investment decisions. Ku et al. (2003) show that competitive environments, through different forms of arousal, can impair decision-making. Through my experiment, I was able to examine the extent of this "impairment" to see if it holds with risk decisions. Similarly, the different treatments will allow me to foster a collaborative environment where I can also test for potential changes in risk attitudes.

While I am not aware of anyone who has directly answered the questions I am investigating, there is a tangent literature on small-group decision-making that is worth noting. For example, Baker, Laury, and Walton-Williams (2008) considered lottery experiments in which individuals make decisions and are then assigned into groups and charged with the task of helping the group come up with a consensus decision. My research differs in two ways: first, I am interested in how an individual's decision changes throughout the experiment—in no phase will the individual be constrained to make a decision that complies with that of others. Second, changes in risk attitudes will result from the pairwise relationships the participant is exposed to in the experiment (it will be clear below in the *Methodology* subsection of the proposal that this varies depending on the treatment group a subject is assigned to).

People are inherently different. I feel there may be important correlations between the subject's personality, cognitive ability, or other idiosyncratic features that may help explain the participant's risk attitudes. In large part, researchers who have used investment decisions as the basis for their experiments have simply presented summary data which documents the frequency a given lottery is selected. I looked to go deeper by trying to account for certain characteristics and personality traits of my participants. For example, I quantified the participants' cognitive ability. Frederick (2005) noted that studies on risk preference rarely make any reference to the possible effects of cognitive abilities. I included two measures

of cognitive ability: a three-question test proposed by Frederick (2005) and a subset of questions from the Philippine Nonverbal Intelligence Test (PNIT) along with some Raven's Progressive Matrices. This allowed me to document any correlations between higher cognitive ability and the risk choices that were made—as well as to control for cognitive level in identifying changes in risk attitudes. The PNIT questions have been shown to be important in explaining risk attitudes above and beyond cognitive ability. I also asked respondents to supply information on their gender, political attitudes and religious beliefs to see if these factors are important in explaining risk attitudes. As a final example, I included a ten-question response form proposed by Rammstedt and John (2008) that allowed me to measure the Big Five personality traits of an individual (the Big Five factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism). By documenting these other characteristics of the participants, I was able to build controls to uncover more of a concrete story for both what might explain risk attitudes and what might drive any observed changes uncovered in my experimental results.

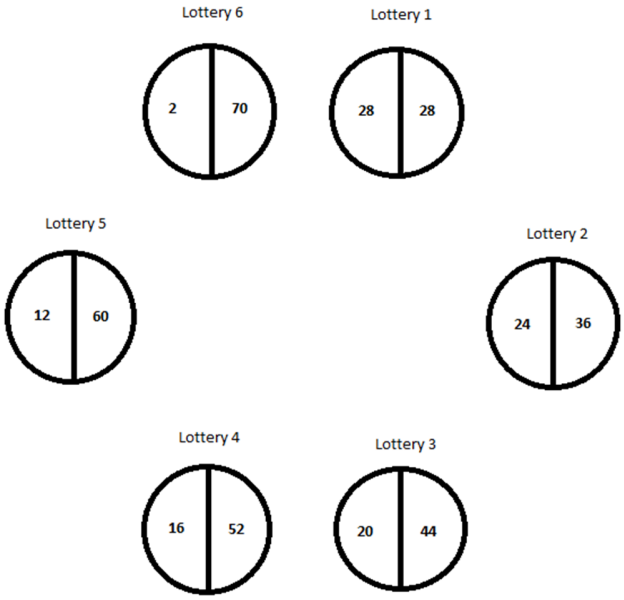
Methodology

I investigated my research questions using computer-based experiments which were conducted in the Quantitative Research Lab of the Diamond Building. Through the all-campus General Announcements, flyers, class announcements, and word-of-mouth, I was able to solicit 181 Colby students to participate in this project. The 181 number was based on a few considerations: (1) I had four treatments (outlined below); (2) the lab held 24 machines but I was trying to avoid things that may have gone wrong (a malfunctioning computer, someone not showing up, etc); (3) in light of these first two points, I targeted between 40 and 50 subjects per treatment, bringing me to a total of 160-200 subjects.

For the coding of the experiment I used a specific experimental software. The experiment was programmed and conducted with the software z-Tree (Fischbacher 2007). The *z-Tree* software was an important workhorse for me—it captured everything the participants did on the computer and generated a spreadsheet for me with each row corresponding to choices of a unique participant. More specifically, it is a program that allows for economics experiments to be conducted over networked computers. I designed and coded the experiment with Professor Timothy Hubbard using this software before finalizing and running the treatment sessions. Participants were asked to complete all tasks on an individual-specific computer. The software collected and tabulated the response data from all participants. I was then able to immediately analyze and use the data for my models (See Appendix M for zTree screenshots).

I am interested in seeing how the release of information and the link between that release and any relationship to the participants, affects investment decisions the participants make. Specifically, my experiment proceeded as follows: first, I benchmarked the participants' risk attitudes by asking them to choose one of six gambles that varied in their risk level. This first decision acted as a baseline from which

Figure 1



I could investigate any possible changes in their following decisions. The lottery choice is shown in figure 1. Each circle (spinner) contains a high value and a low value (or even values) that allowed the participant to choose his or her preferred level of risk. Payoffs were reported in experimental currency units at a ratio of 10 experimental currency units to 1 US dollar. For example, in the figure 1, if someone selected Lottery 5, he or she would have a 50% chance of earning 12/10 = $1.20, and a 50% chance of earning 60/10 = $6.00. Next, I distracted participants from the risk choice by asking them three questions from Frederick's (2005) cognitive reflection test (CRT). I then asked them to make another investment decision, with almost identical choices to the first investment decision they made. The only change I made was to rotate the spinners so that the presentation was different and participants at least had to reprocess the spinners and not make choices based on spinner location. Specifically, I reported aggregate data from a spinner task conducted by Dave et al (2013). In this case, the participant again had to select one of six wheels to spin, each involving a 50-50 lottery. I noted to participants which spinner was the most common one chosen by participants from the experiment conducted by Dave et al (2013). Until this point, the experiment was the same for all participants. I considered four treatments which differed in how the experiment proceeded:

1. The control group was asked to answer questions from the PNIT and some Raven's Progressive Matrices over a 60 second period. In this phase, participants earned 4 experimental currency units for each correct answer and lost 2 for every incorrect answer. The participants were then asked to make one more investment choice decision identical to the first two lottery choices. It is important to note that the fact that the spinners were identical for all three lottery decisions should not have an impact on responses, as I try to mitigate any memory effect (I discuss this further below) by using significant distractions between decisions and altering the presentation by rotating the spinners.
2. The second group was the exact same as my control group, except that after the PNIT/Raven's questions but before the lottery decision is made, I removed the barriers between the computers and allowed the subjects to talk to a partner about their decision. This allowed me to control for the fact that in the control group there were no inter-subject interactions while the other two treatments (introducing competition or cooperation) involve significant partner interactions. More specifically, my main concern for treatments 3 and 4 was that there was social interaction (participants are able to communicate while making their last lottery choice), and in group 1 students made their final lottery decision without any interactions. Adding this treatment allowed me to consider whether the cooperative or competitive relationships generated in treatments 3 and 4 are important, not just the fact that participants were able to discuss their decisions.
3. The third treatment was told they would be completing some task and that teamwork would pay off. Specifically, they were told that in the questions that followed (the PNIT/Raven's questions) they would be paid 4 experimental currency units for each question they *both* answer correctly, but if either participant answered the question incorrectly (this person will be sitting next to them), they would each lose 2 experimental currency units. They were told that they could communicate with their partner during this phase of the experiment if they chose to and partitions were removed between partners to facilitate communication. After this, they were asked to make their final investment decision and were told that they could talk this over with their teammate, but that payoffs were no longer linked.
4. The fourth group was told they would be completing some task that would involve competition. Specifically, they were told that in the questions that followed (the PNIT/Raven's questions), they should try to answer correctly as many of the questions as possible. The subject who answered the most questions correctly received two-times their total score (twice the value of the two points for each correct answer times the number of answers correct, accounting for incorrect responses), while the other subject received half of his or her total score. Partitions were again removed between

paired participants for this phase. After this, participants were told that they could communicate and make their final investment decision.

Before any of the subjects made their third lottery choice, they were exposed to the series of timed PNIT/Raven's questions discussed in each treatment above. In treatments 1 and 2, subjects completed these questions on their own before making the final lottery choice. In treatment 3, subjects were incentivized to cooperate with a single partner on the questions. In treatment 4, subjects were incentivized to compete with a single partner. In treatment 1, subjects made the final lottery decision on their own to act as a control, while in treatments 2, 3 and 4 subjects made the decision while they were allowed to discuss with their partner. The different treatments allowed me to examine my third research question regarding how different relationships subjects are exposed to might influence risk attitudes.

One of my main worries when asking subjects to choose from the same set of lotteries three times, was that they might simply remember their earlier decisions and that those would influence later decisions. I refer to this as the memory effect. The memory effect, as discussed by Arad (2012) shows that past decisions can affect future choices. More specifically, Arad finds that just because someone made a specific choice in the past, he or she is more likely to view that previous decision's traits more favorably in the future. Based on this finding, I was worried that someone who chose lottery 3 for example in his or her first decision would be more likely to choose lottery 3 again, simply because he or she had already chosen it before. Of course, their previously-chosen spinner was also an option, so if that reflected what the participant wanted to again choose, this was possible. If anything, this would make it harder for me to find that risk attitudes change. To deal with this, I realized that I would need to insert distractions between decisions. This would make each lottery choice more of an isolated decision by not letting previous decisions influence current choices. However, I also used this as an opportunity to extract more potentially useful information from participants which might be helpful in analyzing results, constructing covariates, or facilitating treatments. For example, following the first lottery decision, participants were asked to answer three short CRT questions. This provided another way of analyzing the lottery decisions made by looking at how many of the three questions were answered correctly, and would distract the participants before their next decision. The questions were meant to both extend the length of time between the first two lottery decisions and force the subjects to focus their attention on something besides their previous responses. This distraction allowed the participants to then answer the second lottery decision focusing less on past responses and giving me a choice not solely based on past decisions.

Before the payoffs were revealed to the participants, they were asked to fill out a questionnaire. This questionnaire asked as a series of questions using z-Tree and was important to me in collecting

covariates I thought might be important in explaining any changes in risk attitudes I saw. For example, the questionnaire asked participants for their gender, citizenship, political view, natural leadership ability, as well as questions which indirectly reveal their personality traits, known as the "Big 5". Once the questions were answered, the computer acted out the 50-50 lottery choices on the screen and showed the participant his or her individual payoff. The payoff consisted of a show-up fee, the three lottery choices, the CRT questions, and the timed PNIT and Raven questions. An outline of the questionnaire can be found in appendix K. Subjects were given the option to skip almost any of the questionnaire questions, but I found a very good level of participation for all questions.

Descriptive Findings

When I first started looking at the raw experiment data, the first thing I noticed was the amount of variation among all responses. I could see differences in risk attitudes across lottery choices, across treatments, and across sessions. One of my major research questions was to determine if risk attitudes were malleable. In other words, would risk preferences change? I also wanted to look at if I generated a synthetic cooperative or collaborative environment, would people be more or less willing to change their preferences. After splitting the data into the four specific treatments, I looked at changes by treatment from lottery choice 1 to lottery choice 2, lottery choice 2 to lottery choice 3, and from lottery choice 1 to lottery choice 3. Figure 2

Figure 2

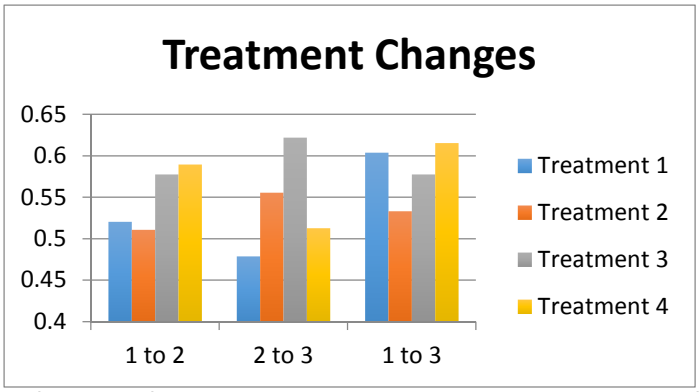
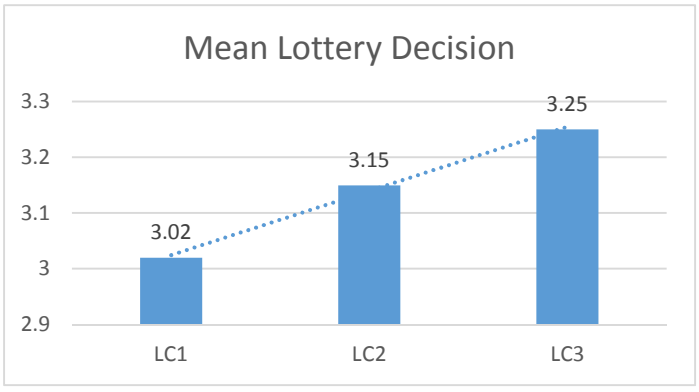


Figure 3



shows the percent of subjects for each treatment that changed. For example, the gray bar in the middle chart shows that about 62% of subjects who were in treatment 3 changed lottery decisions from lottery choice 2 to lottery choice3. Looking at the graphs, it seems like there is variation, but also some strange things stand out. First, I would expect changes from treatment 1 to treatment 2 to be fairly uniform, seeing as though the experiment is the same for all treatments through these lottery decisions. Figure 2 shows some difference from treatments 1 and 2 to treatments 3 and 4. However, the difference does not appear to be significantly more than the changes between the other lottery choices. In the change from lottery choice 2 to lottery choice 3, treatment 3 clearly sees the highest percent of subjects changing, with the control group 1 seeing the least change. This seems to follow more closely with my hypotheses, except the overall change from 1 to 3 seems different. Treatment 1, from which I expected to see the least amount of change is actually over 60% and is higher than treatment 3. I found this result strange, and something to look at more closely later in my analysis.

I also wanted to look at the change in people's overall risk preferences over the course of the experiment. I generated a graph showing the average lottery decision for all subjects for lottery choice 1, lottery choice 2, and lottery choice 3. The higher the value, the more risk loving subjects were on average. Clearly, figure 3 shows that over the course of the experiment subjects were becoming significantly more risk seeking, as is shown by the positive trend from lottery choice 1 to lottery choice 3. However, there was a lot more to my data than just changes in preferences, so I wanted to look more closely at some of the covariates (See Table 1):

Table 1:

	Lottery Decision						
	# Obs	1	2	3	4	5	6
LC1	181	15.5	28.7	22.1	13.3	13.3	7.2
Risk Averse	19	26.3	42.1	15.8	5.2	10.5	0
Risk Neutral	66	15.2	36.4	28.8	10.6	7.6	1.5
Risk Seeking	96	13.5	20.8	18.7	16.7	17.7	12.5
Male	86	12.8	24.4	20.9	12.8	18.6	10.5
Female	94	18	32.9	23.4	12.8	8.5	4.2
Varsity	73	13.7	21.9	23.3	15.1	16.4	9.6
Non Varsity	108	16.6	33.3	21.3	12	11.1	5.5
LC2	181	14.3	29.3	28.2	15.5	10	12.7
Change	97	11.3	25.8	19.6	16.5	9.3	17.5
No Change	84	17.9	33.3	16.7	14.3	10.7	7.1
Conditional Change	141	17.7	30.5	13.5	14.9	9.9	13.5
Conditional No Change	40	2.5	25	35	17.5	10	10
LC3	181	13.8	23.2	24.9	13.8	10.5	13.8
T1	49	14.3	26.5	14.3	14.3	18.4	12.2
T2	46	17.4	28.2	19.6	17.4	2.1	15.2
T3	46	8.7	28.2	30.4	13	8.7	10.9
T4	40	15	7.5	37.5	10	12.5	17.5

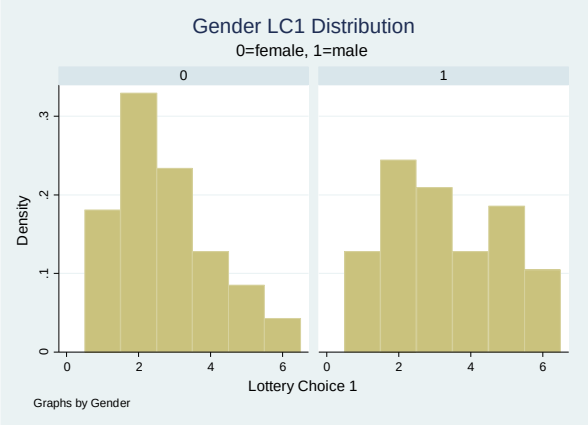
As I presented in the methodology section of this paper, the lottery decisions 1 through 6 laid out at the top of the table correspond to the spinner options. Table 1 lays out the three lottery choices and various covariates from the experiment. The data presented denotes the share of participants that selected each lottery choice given the covariate in the first column. The three lottery choices each have 181 total observations. Subjects were not allowed to skip this question so I have a lottery choice for all three lotteries from each of the 181 subjects. The lotteries are then broken down into interesting covariates that break down the subjects responses into more detail. I give the number of observations for each covariate, but the observations do not always sum to the total sample size of 181. Participants were given a skip option for all questionnaire questions, and I removed the skipped observations from the sample. However, I found that no more than 3 or 4 students skipped any one question.

I only present data from descriptive covariates for lottery choice 1 because of the nature of risk preferences. I was testing for the endogeneity of these preferences, so I used the first lottery choice as a baseline for interpreting risk preference. This first decision was uninfluenced by an outside factors and I had not introduced any new information to the subjects before their decision. Because their decision was uninfluenced, I was later able to compare any changes in risk attitudes to this first risk decision. To check whether the participants seemed to be choosing the lottery consistent with their risk preferences, I added a

check at the end of the experiment asking each subject to directly report their risk attitudes. I then broke this down into risk averse, risk neutral, and risk seeking. If subjects chose options 1 or 2 I classified them as risk averse, if they chose option 3 I classified them as risk neutral, and if they chose options 4 or 5 I classified them as risk loving (the exact wording of the question can be found in Appendix K question 15). This breakdown is shown at the top of the table under LC1. The data for subjects who directly reported being risk averse seemed to be generally consistent in their lottery decision by choosing the more risk averse lotteries. For example, only 10.5% of the subjects who reported that they were risk averse chose lotteries 5 or 6, the most risk loving lotteries, and 68.4% of the subjects who reported being risk averse chose either lottery 1 or lottery 2, the most risk averse lotteries. When compared to the general sample population, the total sample had 44.2% choosing lotteries 1 and 2, and 20.5% choosing lotteries 5 or 6. This comparison clearly shows a more right skewed distribution for those risk averse students than the total population. Similarly, the directly reported risk seeking population reported choosing lottery 5 or lottery 6 a combined 30.2% of the time and choosing lotteries 1 or 2 34.3% of the time, showing a much higher affinity for risk than the total population. The data seems to show that participants' directly reported risk preferences were consistent with their baseline risk decision for lottery 1. However, when I looked at the correlation between direct risk and lottery choice 1, the correlation was .31 which is relatively low. This meant that despite a similar looking distribution, overall people did a relatively poor job self-reporting their risk preferences.

To look at my first research question regarding the general factors related to risk attitudes I only examined the shown covariates for lottery 1, rather than all three lottery choices. What stood out to me the most from my data, was the difference in gender preferences. The data shows females to be significantly more risk averse than males, following the trend found by numerous other researchers. The total number of males and females adds up to 180, meaning that 1 subject chose to skip the gender question. Looking at the

Figure 4

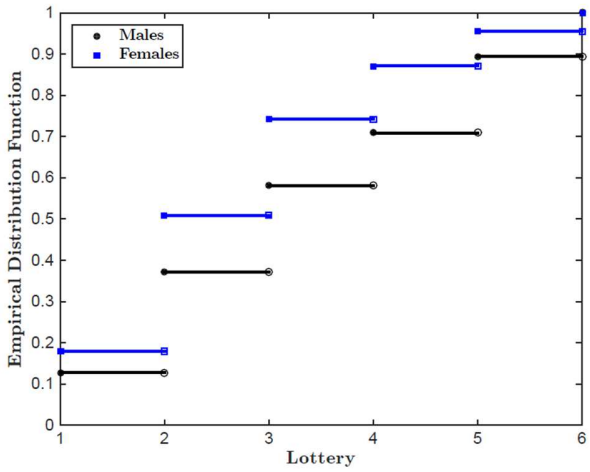


means for lottery choice 1 for males and females, the male mean of 3.31 was significantly higher than the female mean of 2.73. A histogram of male and female lottery 1 choices shows the female distribution

significantly more right skewed than the male distribution, consistent with the lower mean risk preference for females. I then ran a ttest testing the null hypothesis that the difference in lottery choice 1 means for males and females was equal to zero. The test had a p-value of 0.0094 allowing me to reject the null at the 1-percent level and conclude that on average men are more risk seeking than women. Because my samples had unequal variances, I used Welch's approximation for the degrees of freedom to make the ttest valid.

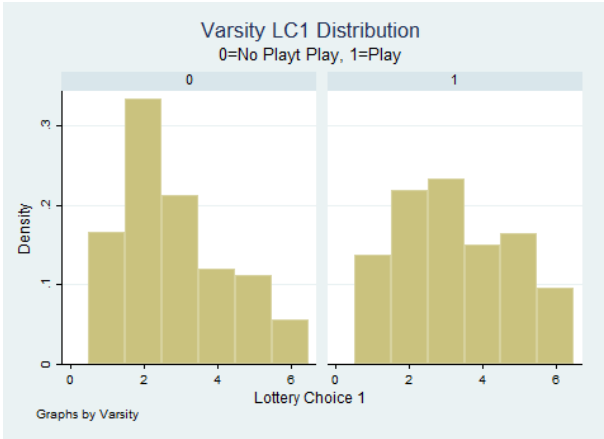
Moreover, I also found that there is first order stochastic dominance for gender. Figure 5 shows the black lines for men clearly below and to the right of the blue lines for women for every lottery choice,

Figure 5



showing a representation of the first order stochastic dominance. Specifically, figure 5 shows that on average women will choose and equally risky or less risky lottery than men. Based on my findings here, differences in risk attitudes based on gender became one of the main focuses of my analysis. Similarly, when I looked at the summary data for lottery choice 1 of varsity athletes, I found some interesting trends. All participants answered this question with 73 of the 181 total subjects reporting that they do play a varsity

Figure 6



sport in college. The distribution across lottery decisions for lottery choice 1 seems to show a greater affinity for risk for those who play varsity sports than for those who do not. Figure 6 shows the LC1 distribution

for those subjects who did play a varsity sport and for those who did not. Looking at the means for the variable *varsity* showed a mean lottery 1 choice of 3.27 for athletes and a mean of 2.84 for non-athletes. Running a two sample ttest of these means returned a p-value of .06 proving that the means are not significantly different at the 5% level, but are significantly different at the 10% level. Again, I used Welch's approximation to deal with unequal variances. I also examined the political variables that are not presented in the table to see how political groups might differ in their risk preferences. The mean lottery 1 decision from all subjects was 3.01. Republicans had a very similar mean of 3.00, but the other groups were different. Democrats had a mean lottery decision of 2.77 and independents had a mean lottery decision of 3.41. These seemed surprisingly different to me, so I looked at ttests for the three variables, leaving those who chose "other" for political view (*politicalo*) out because of its very low sample size. A ttest for republicans and lottery choice 1 was highly insignificant, showing republican's average lottery choice to not be significantly different from all other subjects. However, a two-sided ttest for democrats returned a p-value of 0.043 showing the mean for democrats to be significantly different from the rest of the sample mean at the 5-percent level. On the other side, subjects who identified as independents had a p-value of 0.029, showing them to have a significantly different preference for risk than the rest of the sample at the 5-percent level.

Having found significant evidence showing gender to be a significant indicator of risk attitudes, I wanted to look more closely at this trend. Given my previous test showing first order stochastic dominance for gender, I followed this finding with a Mann-Whitney U test. This is a non-parametric statistic that seemed to fit well with my data and required very few assumptions regarding the distribution of my data. I tested the null hypothesis that there was no difference in the underlying distributions of lottery 1 choice between male and female and found a p-value of 0.014. This meant that I could reject the null hypothesis and conclude that there is actually a significant difference in the risk preferences for male and female. Similarly, using the same test, I found that the estimated probability that a random draw from male lottery choice 1 is higher than a random draw from female lottery choice 1 was 60.03%. These findings confirmed my original conclusions regarding gender's role in risk attitudes. Similarly, when I ran the Mann-Whitney test looking at varsity's influence on risk attitudes, I found a p-value of 0.057. This meant that I could reject the null at the 10-percent level and conclude that varsity athletes' lottery choice 1 distribution is significantly different from non-athletes' lottery choice 1 distribution. Similarly, this confirmed what I assumed in the previous section showing that varsity athletes do seem to be on average more risk seeking than non-athletes. I ran the same test looking at if the lottery choice 1 distributions individually for both democrats and independents to see if they are statistically different from the rest of the sample population. I found democrats to be significant at the 5-percent level and independents to be significant at the 10-percent level.

Looking back at Table 1, I can see some interesting trends that developed from the release of aggregate information in lottery choice 2. Following this release of information, subjects' lottery choices did seem to slightly converge more towards lottery 3, but the mode remained at lottery 2. To look at changes more closely, I created a dummy variable to see if participants changed their decision from lottery choice 1 to lottery choice 2. In total, 97 of the 181 subjects changed their choice and 84 subjects picked the same choice as in their first lottery decision. The people who did not change their choice seem to constitute a higher fraction of those considered risk averse, meaning that those who were unwilling to change seemed to be those who were more risk averse to begin with. Similarly, those who were willing to change seemed to search out riskier alternatives. The data shows that those students who changed their lottery choice seemed to become slightly riskier with the total population average for the lottery choice increasing from 3.02 to 3.15. Subjects also seemed more inclined to choose option 3 with the percentage of students choosing that lottery increasing from 22.1% to 28.2%. I also looked at conditional change, to isolate people who had not chosen lottery 3 in lottery choice 1, but chose it in lottery choice 2. The response data shows that the subjects who chose lottery 3 in their first lottery choice were far more likely to choose it again than those subjects who did not choose lottery 3 in their first lottery choice. In general, it looks like the addition of new information seemed to alter subjects' lottery choices and risk preferences and showed a slight convergence towards lottery 3.

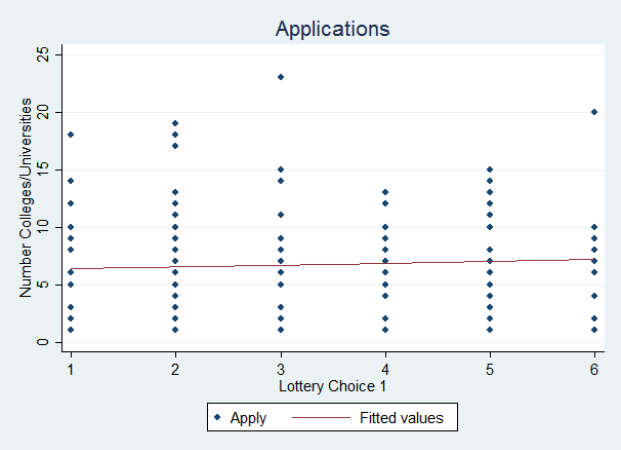
The third lottery choice, as outlined in the methodology section of this paper, was significantly different from the first two lottery choices. Specifically, the cooperation and competition aspects of treatments 3 and 4 allowed me to impose a relationship between subject and partner before the final lottery choice so I could see if the relationship influenced their final risk decision that I discussed in the methodology section. Looking at the data, it appears that treatments 3 and 4 are significantly different from treatments 1 and 2. For example, subjects in treatments 1 and 2 were on average more inclined to choose risk averse alternatives. Similarly, the mean lottery for lottery choice 3 was lowest for treatment 1, second for treatment 2, third for treatment 3 and highest for treatment 4. In other words, when subjects were placed in a competitive or cooperative environment before making their final risk decision, they became on average more risk loving.

Table 2:

	Summary Statistics				
	Obs	Mean	Std. Dev.	Min	Max
LC1	181	3.02	1.49	1	6
LC2	181	3.15	1.60	1	6
LC3	181	3.25	1.59	1	6
age	181	20.51	1.33	18	25
gender	180	0.48	0.50	0	1
democrat	168	0.50	0.50	0	1
republican	168	0.18	0.39	0	1
independent	168	0.27	0.45	0	1
politicalo	168	0.04	0.18	0	1
crtscore	181	1.43	1.08	0	3
apply	181	6.69	4.73	1	23
ed	179	0.65	0.48	0	1
varsity	181	0.40	0.49	0	1
coot	181	0.11	0.31	0	1
finaid	178	0.42	0.50	0	1
uscitizen	181	0.85	0.36	0	1
Payout	181	18.1	3.43	7	30.6

Table 2, provides summary statistics on a portion of the data I collected. All three lottery choices required participation from all subjects giving 181 observations for each. The mean lottery value increased from lottery choice 1 to lottery choice 3, showing people becoming on average more risk seeking as the experiment continued. In each lottery choice, at least one subject chose each lottery as shown by the same

Figure 7



minimum of 1 and maximum of 6. All 181 subjects reported their age giving a mean of 20.51 and a low standard deviation of 1.33. The similar ages for the minimum and maximum ages also shows the homogeneity with regards to age. There has been a lot of research done regarding changes in risk attitudes with respect to age, so with this level of homogeneity I can rule out any risk preference variation with regards to age. On the other hand, the variable *gender* is given as a binary variable with 0 corresponding to female and 1 corresponding to male. The mean of 0.48 can then be interpreted as 48% of the sample was

male and 52% was female. According to the 2015 US News and World Report, 48% of the Colby student body is male, suggesting my sample of 181 students to be an extremely good representation of the Colby population with regards to gender. Similarly, according to the Colby website, 45.3% of the Colby student body is currently on financial aid. The *finaid* variable is another binary variable that equals 0 if the subject is not on financial aid, and 1 if the subject is on financial aid. Therefore, the value of 0.42 says that 42% of my sample is on financial aid, another very close representation of the Colby student body. The variable *apply* looks at the number of schools each subject applied to, showing an average of 6.7 colleges or universities. I originally predicted that more risk averse subjects would apply to a higher number of schools so I looked at a scatter plot of the data by lottery choice 1. I then fit a trend line across the plot expecting to see a downward trend. A downward trend would show me that the more risk averse subjects, those choosing lotteries 1 and 2, applied to a greater number of schools on average. However, as shown in the plot to the left, the trend line is very flat with a very slight upward trend. Because I did not see much variation, I did not expect this variable to show significance in my models with regard to the baseline risk preference (lottery choice 1). Moreover, the number of applications a student submits may have more to do with exogenous factors (such as pressure from their parents, high school counselors, or friends) than it does with their own inherent risk attitude. The *uscitizen* binary variable shows that 85% of the sample is a US citizen. From these demographics, I feel comfortable trusting the subjects' responses and they show that my sample is a good representation of the actual Colby distribution. While there are only a few variables here, a full list and definitions of variables can be found in appendix L.

Following the first lottery choice, I presented the subjects with the CRT from Frederick (2005) to act as a distraction between lottery decisions and minimize the impact of the memory effect. However, the questions also allowed me to look at cognitive ability and its influence on risk preferences. The three CRT questions can be found on slides 5, 6, and 7 in appendix M and was administered to 3,428 respondents in 35 separate studies over a 26-month period that began in January 2003. According to Frederick's paper, MIT had a mean CRT score of 2.18 correct answers (out of 3) from a sample of 61 students (Frederick, 2005). However, Colby's mean score of 1.43 from a sample of 181 students was more similar to Harvard University, which had a mean score of 1.43 from a sample of 51 students. Colby's mean score from my sample ranks them below MIT and Princeton (1.63) and Carnegie Mellon (1.51), but above Michigan State University (.79) and web-based studies (1.10). However, it is important to note that when the students from Frederick's paper were given the questions, the questions were new and the students had never seen them before. In my study, several students mentioned having seen the CRT questions previously, potentially inflating the mean score.

Table 3:

Big 5 Table (Consistent)							
	Lottery Choice 1						
	#Obs	1	2	3	4	5	6
LC1	181	15.5	28.7	22.1	13.3	13.3	7.2
Extravert	181						
<3	21	9.5	52.4	7.7	4.7	19.1	9.5
3	76	10.5	31.6	26.3	11.8	15.8	4
>3	84	21.4	20.2	22.6	16.7	9.5	6.5
Agreeable	181						
<3	3	0	66.7	0	0	33.3	0
3	110	10	36.3	22.7	12.7	13.6	4.5
>3	68	25	14.7	22.1	14.7	11.7	11.7
Conscientious							
<3	6	0	16.7	66.7	0	16.7	0
3	99	12.2	38.4	17.2	13.1	12.1	7.1
>3	76	21.1	17.1	25	14.5	14.5	7.9
Neurotic							
<3	35	22.8	11.4	22.9	5.7	25.7	11.4
3	125	15.2	27.2	23.2	16.8	12	5.6
>3	21	4.7	66.7	14.3	4.6	0	9.5
Open							
<3	8	25	12.5	37.5	12.5	12.5	0
3	126	15.1	27.8	23	14.3	11.1	8.7
>3	47	14.9	34	17	10.6	19.2	4.3

Table 4:

Big 5 Table (Averaged)							
	Lottery Choice 1						
	#Obs	1	2	3	4	5	6
LC1	181	15.5	28.7	22.1	13.3	13.3	7.2
Extravert							
<3	28	14.3	50	10.7	3.6	14.3	7.1
3	34	5.9	17.7	29.4	17.6	20.6	8.8
>3	119	18.5	26.9	22.7	14.3	10.9	6.7
Agreeable							
<3	23	17.4	17.4	21.7	30.4	8.7	4.3
3	22	4.6	50	18.2	4.6	13.6	9.1
>3	136	16.9	27.2	22.8	11.7	14	7.3
Conscientious	181						
<3	13	15.4	7.7	30.8	23.1	7.7	15.4
3	18	16.7	27.8	27.8	11.1	11.1	5.5
>3	150	15.3	30.7	20.7	12.7	14	6.7
Neurotic	181						
<3	100	18	20	21	15	18	8
3	25	16	28	24	12	16	4
>3	56	10.7	44.6	23.2	10.7	3.6	7.1
Open	181						
<3	25	20	20	32	16	8	4
3	44	15.9	29.5	20.4	13.6	11.4	9.1
>3	112	14.3	30.3	20.5	12.5	15.2	7.1

To look closer into what traits might influence people's risk attitude or the malleability of individuals' risk preferences, I incorporated research from Rammstedt and John (2006) on the Big 5 personality traits. The Big 5 Inventory is a way of measuring and looking at the five broad dimensions of personality that describe an individual's personality. The five dimensions are extraversion, agreeableness,

conscientiousness, neuroticism, and openness. Using the 10-item short version of the Inventory developed by Rammstedt and John, I was able to measure my sample's Big 5 characteristics. The subjects were asked a series of 10 questions with 2 questions corresponding to each dimension. For each question, subjects responded on a scale of 1 to 5, with one of the two questions for each reverse ranked. Once switching the reverse ranked question I was able to divide the sample into three segments for each dimension: subjects who responded with a 4 or a 5 for both questions corresponding to that domain, subjects who responded with a 1 or a 2 for both questions, and everyone else. This allowed me to say a subject possessed a certain trait only if he or she was consistent in both his or her responses relevant for that trait. The only issue with this approach was that it resulted in very few observations for some of the characteristic segments (see table 3). I tried approaching this table from a different angle as well, by just computing the average of the two trait scores (Table 4). This approach helped slightly with the low observation problem, but I could still not see any clear trends. However, it is observable from the data that the Colby student body is overwhelmingly extraverted, agreeable, conscientious, and open, regardless of what method I looked at to value the characteristics. Because the student body is so homogeneous in this regard, it makes it difficult for me to analyze differences in risk attitudes with regard to these personality traits. According to a paper by Lauriola and Levin (2001), high scores on openness were associated with higher predicted risk taking, while high scores on neuroticism were associated with less predicted risk taking. However, from tables 3 and 4, it does not seem like my data necessarily follows these findings. This could be a result of the homogeneous sample at Colby, but I examine the influence of these traits a little further in some of my models.

Data Analysis and Modeling

After observing the trends outlined in the previous section, I wanted to start my detailed analysis and modeling by looking first at my basic research question regarding what general factors are related to risk attitudes. To look at this, I considered only lottery choice 1, due to its position as a benchmark for risk attitude. Based on the type of data I was working with, I felt that this question was best approached through an ordered probit regression model. The dependent variable would be *LC1* which takes on integer values 1 through 6 corresponding to the lotteries and reflecting level of risk aversion in an ordered manner. Lotteries were sequenced from most risk averse to most risk loving. I ran this ordered probit model on *gender* to see the likelihood of different genders to make each lottery choice. I looked at the marginal effects for each lottery. The output confirmed my original findings regarding *gender*, showing *gender* to be a significant indicator of risk attitudes. For example, I found that men are on average 9 percentage points less likely to choose lottery 1 than women and 6 percentage points less likely to choose lottery 2. As I would have expected, lottery 3, the most risk neutral lottery, was statistically insignificant, showing no difference in

preference due to gender. However, the regression also showed that men are 5.7 percentage points more likely to choose lottery 5 and 5.2 percentage points more likely to choose lottery 6. When I ran the same model, this time including *varsity* (excluding *gender* because of slight correlation), I found similar results. When run together, *gender* remained significant but *varsity* became insignificant. However, when run alone, *varsity* showed that subjects who played a varsity sport were on average 6.6 percentage points less likely to choose lottery 1, but 4 percentage points more likely to choose lottery 6, significant at the 10-percent level.

Lottery choice 1 provided me with the necessary information to examine my first main research question, but I needed lottery choice 2 to use as a comparison to lottery choice 1 in order to answer my second main question. My second research question concerns whether people's risk preferences are malleable. I want to start by looking at subjects' change from lottery choice 1 to lottery choice 2. Lottery choice 2 introduced new information revealing the most commonly selected lottery from a previous experiment using the same payouts. I revealed this statistic to see if people would be swayed in their decision, and to look at what types or characteristics might make people more or less willing to change. Specifically, given my previous findings and their importance to my study, I wanted to see if gender would be significant in explaining changes in lottery choices.

Table 5:

	(1) change12	(2) change12	(3) chtocommonLC2	(4) chtocommonLC2
gender	-0.111	-0.0901	0.00118	0.0326
	(0.0808)	(0.0882)	(0.0375)	(0.0374)
crtscore	-0.0613	-0.0685*	-0.0739***	-0.0646***
	(0.0376)	(0.0390)	(0.0188)	(0.0181)
Apply	-0.0126	-0.0139	0.00153	0.000815
	(0.00870)	(0.00907)	(0.00358)	(0.00298)
ed	0.188**	0.189**	0.0349	0.0270
	(0.0850)	(0.0889)	(0.0341)	(0.0303)
extravert		-0.117***		0.00270
		(0.0450)		(0.0158)
agreeable		-0.00406		-0.00220
		(0.0480)		(0.0189)
conscientious		0.0600		0.0263
		(0.0487)		(0.0205)
neurotic		0.00435		0.0317**
		(0.0409)		(0.0155)
open		-0.0908*		-0.0108
		(0.0464)		(0.0168)
Observations	178	178	178	178

Standard errors in parentheses

* p<.10 ** p<.05 *** p<.01

While gender was a good indicator for overall risk attitude, it was insignificant for all models in predicting the likelihood of changing lotteries from lottery choice 1 to lottery choice 2. More specifically, the above models showed me that while men were on average more likely to choose a risky lottery than women, they were no more or less likely to change their preferences given the introduction of aggregate information. The first model shows the impact of gender, CRT score, how many colleges the subject applied to, and whether or not the subject applied early decision, on the subject's decision to change lotteries from lottery choice 1 to lottery choice 2. The model only looks at those subjects who changed from lottery choice 1 to lottery choice 2, not only those who changed to the revealed spinner 3 option. Only *ed* (early decision) is significant at the 5-percent level, not telling me much about what might influence a change. However, in the second model I controlled for the Big 5 personality characteristics as well. The *crtscore* variable became significant at the 10-percent level, implying that a one point increase on the CRT test (have higher cognitive ability) corresponds to a 6.85 percentage point decrease in the probability that the subject changed from lottery 1 to lottery 2. I kept *gender* in the model based on its importance in determining risk attitudes that I found during my data analysis, despite the fact that it remained insignificant. The early decision dummy variable remained significant, now at the 5-percent level, showing that those who applied early decision were 18.9 percentage points more likely to change from lottery 1 to lottery 2. Including the Big 5 personality variables allowed me to see that extraverts are 11.7 percentage points less likely to change when given aggregate information, significant at the 1-percent level, and those who are open to new opportunities are also 9.1 percentage points less likely to change, significant at the 10-percent level.

Looking at subjects changing from lottery choice 1 to lottery choice 2 showed some interesting trends, but I also wanted to look at not only the individuals who changed, but at the individuals who changed *to* the most common lottery (lottery 3). In the third model shown in table 5, I only included *gender* and *crtscore* as explanatory variables. This model showed *crtscore* to be significant at the 1-percent level, but *gender* remained insignificant. When I added the Big 5 personality traits, *crtscore* remained significant, but the *extravert* and *open* variables were not significant, showing a difference from equation 2. In other words, while those subjects who were considered open and extraverted were less likely to change preferences from lottery choice 1 to lottery choice 2, they were not more or less likely to choose lottery 3 in lottery choice 2. Instead, the subjects who were considered neurotic were more likely to choose lottery 3, significant at the 5-percent level. More generally, these models show that personality traits do actually have an influence on risk attitudes and can explain some of the subjects' willingness to change from one lottery to another. When I repeated these models using a change from lottery choice 2 to lottery choice 3 dummy variable, I found that the only variable that remained significant was the *open* variable which was significant at the 1-percent level. It showed that being an open person would decrease the probability of changing your lottery decision

from lottery choice 2 to lottery choice 3 by 11.8 percentage points. However, in this model as well as the model for change from lottery choice 1 to lottery choice 3, no other covariates were significant.

As further motivation for this finding regarding the release of aggregate information, I looked at a paper about 401(k) plans and savings behavior (Madrian and Shea 2001). The authors found that after a 401(k) plan change that made employees elect to opt out of the plan rather than affirmatively elect enrollment, savings behavior of employees changed significantly. More specifically, they found that employees behaved in such a way that they were more willing to passively accept enrollment, than they were to make the active choice to enroll. Releasing the aggregate information about the most common lottery in lottery choice 2 acted in a similar way as participants did seem to converge towards lotteries 2 and 3 and overall selection of the most common choice significantly increased. Pre-selecting an option for participants is similar to releasing aggregate information because it acts as a benchmark for the employees. At the same time, choosing enrollment in a 401(k) plan is a type of risk decision as enrollment affects future income. My research regarding lottery choice 2 parallels this finding, showing individuals to be willing to shift preferences with the introduction of aggregate information. Moreover, my research looks more closely not only at the fact that individuals actually are changing, but how they are changing and what types of people are more likely to change. For example, including personality traits in the above models shows how personality can affect this willingness to change and different levels of cognitive ability has an influence as well. Employees who are more open or extraverted are less likely to change their savings behavior. The authors found that the biggest changes in preferences that they found were due to age, rather than ethnicity, geographically, or the few other covariates they examined. As my experiment was able to control for age effects, my use of many other covariates also expands on this research to look more closely at these demographic and personality factors. Similarly, one of my other research question asks about the influence of other people on these risk decisions and how a "partner" or coworker might have an influence on these decision. I examine this idea later in the paper when I look at treatment effects on the third lottery choice.

To follow up on these findings, I also thought I would look at the possibility that those who did not state correct preferences in the direct risk choices were more susceptible to change between lottery choice 1 and lottery choice 2. For example, I wanted to see if someone who reported being risk averse but chose a risky lottery in lottery choice 1 would be more or less likely to change from lottery choice 1 to lottery choice 2 in order to balance out the supposedly uncharacteristic first lottery decision. I generated a variable that looked at these circumstances: those who reported being risk averse but chose a riskier lottery first, those who reported being risk neutral but chose either a risky or risk averse lottery first, and those who reported being risk loving but chose a less risky option first. I was then able to run a probit model on the change from lottery choice 1 to lottery choice 2, including gender and this new mismatch variable as explanatory

variables. I tried a few different indicators and also tried isolating the mismatch variables to look at only reported risk averse subjects or only reported risk loving subjects, but I was unable to determine any significant difference in the subjects' willingness to change.

My third main research question focused on whether or not people's risk preferences are susceptible to change given different environments. More specifically, in treatment 3 I exposed the subjects to a cooperative relationship and in treatment 4 I exposed the subjects to a competitive relationship. I wanted to see how these relationships might influence the subject or the partner to change lottery decisions from the first two lottery choices. I first tested this by running ordered probit models, running the lottery choices against the treatment indicator variables. Specifically, I was expecting no change in lottery choice 1 and lottery choice 2 when the partners had not been revealed yet, but I expected to see some level of significance for lottery choice 3 where treatments 3 and 4 exposed subjects to different relationships. However, with just the treatment variables I was unable to find significance for either treatment at any level. I also tried including various covariates but it did not appear that the treatments did a good job in explaining variations in lottery choices. I then thought about examining a different dependent variable.

Table 6:

	(1) sameLC1	(2) sameLC1	(3) sameLC1	(4) sameLC1
T3	0.0365	0.0419	0.0412	0.0450
	(0.0653)	(0.0654)	(0.0652)	(0.0658)
T4	-0.0876	-0.0826	-0.0831	-0.0833
	(0.0592)	(0.0591)	(0.0588)	(0.0580)
gender		-0.0539	-0.0505	-0.0451
		(0.0535)	(0.0552)	(0.0562)
crtscore			-0.00821	
			(0.0229)	
crt23				-0.0400
				(0.0566)
Observations	132	131	131	131

Standard errors in parentheses

* p<.10, ** p<.05, *** p<.01

The table above shows the results from a probit regression model using subject and partner making the same lottery 1 choice as the dependent variable. Treatment 2 acts as a benchmark here and I remove treatment 1 observations. I use treatment 2 as the benchmark because the only condition in treatment 2 was that subjects were allowed to talk when making their final lottery choice. Similarly, I removed treatment 1 because there were no partners for the third lottery choice. I did not expect to see any treatment significance in lottery choice 1 because at this point in the experiment subjects have not been introduced to their partners.

If I had seen significance with this lottery choice I would have been concerned that subjects in treatment 3 or treatment 4 may have had inherently similar risk preferences to their partners. However, I can ignore this based on the lack of significance. I also looked at lottery choice 2 for comparison, but there is no reason subject and partner should make the same choice for this lottery choice for any treatment. Moreover, for lottery choice 2 on the table (LC2), the coefficient for Treatment 3 (T3) is significant at the 10-percent level but negative, which tells me that this is not the case. I then looked at whether the partner and the subject made the same choice for lottery choice 3, indicating that their preferences became more aligned after exposure to these social relationships.

Table 7:

	(1) sameLC3	(2) sameLC3	(3) sameLC3	(4) sameLC3
T3	0.260***	0.260***	0.263***	0.250**
	(0.0996)	(0.1)	(0.101)	(0.102)
T4	0.0599	0.0456	0.0475	0.041
	(0.109)	(0.11)	(0.11)	(0.112)
gender		0.00993	-0.0137	-0.0326
		(0.0905)	(0.093)	(0.0937)
crtscore			0.0555	
			(0.0437)	
crt23				0.161*
				(0.094)
Observations	132	131	131	131
chi-2 test (T3=T4) [p-value]	[0.0601]*	[0.0467]**	[0.0457]**	[0.0535]*

Standard errors in parentheses

* p<.10, ** p<.05, *** p <.01

To look more closely at the treatment effects, I used a probit model with my dependent variable as a binary equaling 1 if subject and partner both made the same lottery decision, this time for lottery choice 3. The first regressions I ran looked at only the effects of treatments by using *T3* and *T4* as my explanatory variables. The coefficient on *T3* was significant at the 5-percent level, and showed that treatment 3 was 26.0 percentage points more likely to result in subject and partner making the same choice for lottery 3 than treatment 2. Treatment 4 was not significantly different from treatment 2. I then added *gender* as an explanatory variable because of gender's influence on risk attitudes that I found in my data analysis. This was not significant, but *T3* remained significant at the 5-percent level. I also added *crtscore* to look at cognitive ability and its impact on people's willingness to choose the same lottery 3 choice. Similarly, this variable was not significant; however, when I substituted the *crt23* variable that split the sample into those who had a high CRT score (2 or 3) and those who had a low CRT score (0 or 1), the coefficient was

significant. Using *crt23* allowed me to isolate those with strong cognitive ability from those with lower cognitive ability, and conclude that at the 10-percent level, those who scored a 2 or 3 on the CRT questions were 16.1 percentage points more likely to choose the same lottery 3 choice as their partner than those who scored a 0 or 1. As in the other models, treatment 3 holds up in this final model at the 5-percent significance level showing that subjects in treatment 3 were 25 percentage points more likely to choose the same lottery 3 choice as their partner relative to treatment 2.

As shown in table 7, treatment 4 is still not significant in the final model, showing that competition did not cause risk attitudes to converge. This tells me that cooperation between partners leads to a loss in diversity of choices as partners converge more to the same choice than in the other treatments. This makes sense as partners in treatment 4 are competing but still answering the PNIT questions largely on their own, so partner interaction is limited. Treatment 3, on the other hand, generally requires more interaction as partners work together to answer the questions. This increased interaction from treatment 3 might be a contributing factor to the loss of lottery decision diversity. I also looked at the strength of the collaborative relationships to see if maybe those partners who worked better together (answered more questions correctly) would be more likely to choose the same lottery, but I did not find any real significance. While my main focus from these models was on any possible treatment effects, I was also curious to see the influence of gender on the likelihood of subjects to make the same choice. I found that the coefficient on gender for all models was insignificant, but I look more closely at the impact of gender on partner behavior in later models.

The chi-2 test, shown at the bottom of table 7, gives the p-values testing the significance of treatment 3 relative to treatment 4 for each equation. All equations are significant at the 5-percent or 10-percent level, showing that I can reject the null that they have the same effect on subjects choosing the same lottery 3 choice. I can conclude that subjects in treatment 3 are more willing to choose the same lottery 3 choice as their partner than treatment 4. Combining this with the significance relative to treatment 2 in my original probit model and conclude that treatment 3 is significantly different than the other treatments. The above table also shows *gender* to be insignificant. When I ran a ttest looking at *gender* in lottery choice 3, *gender* proved significant at the 5-percent level. This showed me that gender differences are significant regarding risk preferences in lottery choice 3, but not significant in whether the subject and partner make the same lottery decision. Furthermore, this proves the importance of the difference in treatments in the making the same lottery choice as variation in the dependent cannot be attributed to gender.

Following the significance I found from treatment 3 in the previous models, I wanted to look more closely at partner effects across the three treatments (there were no partners in treatment 1) to see how a subject may have been influenced by his or her partner. I generated two indicator variables called PImore

and PIless. PImore allowed me to see when a subject chose a less risky option in lottery choice 1 than his or her partner, but followed it up by becoming riskier in lottery choice 3. PIless showed me the opposite; when a partner influenced the subject to become less risky in lottery choice 3. Table 8 shows the coefficient estimates of the covariates used to estimate PImore and PIless.

Table 8:

	(1) Pimore	(2) Pimore	(3) Piless	(4) Piless
T3	0.0153		0.0844	
	(0.0925)		(0.0781)	
T4	0.00781		0.0358	
	(0.0937)		(0.0797)	
varsity	-0.185**	-0.186**	0.0525	0.0427
	(0.0747)	(0.0754)	(0.0647)	(0.0659)
gender	0.0480	0.0493	-0.119**	-0.114**
	(0.0843)	(0.0836)	(0.0568)	(0.0578)
enviro	0.385**	0.385**		
	(0.184)	(0.179)		
coot			0.240*	0.236
			(0.143)	(0.143)
Observations	130	130	131	131

Standard errors in parentheses

* $p<.10$, ** $p<.05$, *** $p<.01$

The first model (1) for PImore includes the treatment indicator variables, *T3* and *T4*. I omitted *T1* and *T2* because subjects do not have partners in this treatment, and so *T2* is left out to avoid perfect collinearity. However, despite what I found in the previous models, the treatment variables are insignificant and therefore do not seem to have any impact on the partners influence to take on either more risk (from equation 1) or less risk (from equation 3). The equations for PImore include the *gender* variable despite its insignificance because of its importance that I found and explored above. However, I did find that when removing the treatment variables, playing a varsity sport decreases the likelihood that your partner influenced you to take on more risk by 18.6 percentage points, and this result is significant at the 5-percent level. Similarly, being an environmental science major increases the probability that you will be influenced by your partner to take on more risk by 38.5 percentage points, and is significant at the 5-percent level as well. These percentages seem high, which might be caused by a small sample size. For example, only 10 people who were influenced to take on more risk by their partner were environmental science majors. However, despite the small sample size, the model predictions do seem to report interesting and understandable results. For example, it makes sense to me that people who play varsity sports may be more

stubborn, aggressive, or competitive and may therefore be less likely to be influenced by their partner. Similarly, for PIless, when the treatment variables were included, despite their insignificance, gender was negative and significant at the 5-percent level, and coot was positive and significant at the 10-percent level. This told me that being male decreases the likelihood of your partner influencing you to take less risk by 11.9 percentage points. It also told me that on average, being a COOT leader increased the probability that you were influenced to take on less risk by your partner by 24 percentage points. The significance for gender remains at the 5-percent level when I remove the treatment variables, but *coot* becomes insignificant even at the 10-percent level. However, similar to the environmental science dummy variable and the PImore models, this equation and the *coot* explanatory variable may suffer from a small sample size. The important thing about these equations is that they motivate more of my subsequent analysis and findings.

While the PImore and PIless variables looked at subjects who were influenced *by* their partners, I also wanted to look at the subjects who may have had an influence *on* their partner. To do this, I created a variable called swayer13 that looked at subjects who made the same lottery 1 choice and lottery 3 choice, but whose partner chose a different lottery in lottery 3 choice than lottery 1 choice. The variable would allow me to look more closely at what types of people held onto their risk preferences while their partner changed, possibly showing a subject's influence on his or her partner. I added *gender* and tried *crt23* and *crtscore* as explanatory variables, but only *gender* had any significance. Running the regression with *gender* and *crtscore* told me that being male increases the likelihood of your partner changing lotteries from lottery choice 1 to lottery choice 3 by 11.5 percentage points. However, the overall p-value for the model was insignificant at the 10-percent level when using only these two predictors. I was also hoping to find some variation from the inclusion of political variables, based on what I found in my data analysis. I included the *democrat*, *republican*, and *independent* indicator variables, leaving out *politicalo*. At first the results appeared very significant with all political variables significant at the 1-percent level, and even *crt23* remaining significant at the 10-percent level. However, when I looked at the marginal effects, they seemed to be way higher than I would have predicted. To check, I looked at the *politicalo* variable and found that no one who chose other for their political party had actually influenced their partner to change lotteries, and only 6 people had chosen it out of the entire sample. I realized that this was what was creating the significance, so I had to drop the model. Based on my data analysis, I can say that average risk preference varies across political lines at Colby, but I cannot say that political affiliation has a significant influence on partner risk preference malleability.

Lastly, after finding significance in treatment effects regarding partners making the same lottery choices, I wanted to examine more closely any potential in-group effects, particularly related to gender. More specifically, I wanted to look more closely at the composition of the groups to see if the gender mix

of groups might influence risk behavior. Moreover, this would help me answer my original research questions regarding the malleability of risk preferences and of what types of interactions individuals are exposed to influence the way in which risk preferences might change. My original findings showed that on average men are more risk loving than women. Further analysis showed that males are significantly less likely to be influenced by their partner to take on *less* risk than females. Similarly, tangent research shows that group behavior can differ significantly based on gender factors (Neiderle and Vesterlund 2005). To follow up on these findings, I looked at the influence of like-gender groups on risk preferences in competitive and cooperative environments. I also included like-athlete groups to see if groups of two varsity athletes differed in their preferences from mixed groups.

Table 9:

	# obs	Mean	Std. Dev.	Min	Max
LC3 - T3	46	3.17	1.45	1	6
All Male	10	4	2	1	6
Mixed	22	3	1.38	1	6
All Female	14	2.86	0.86	2	5
All Varsity	8	3.88	1.25	2	6
Mixed	16	3.25	1.69	2	6
All Non-varsity	22	2.86	1.28	1	5
LC3 - T4	40	3.5	1.63	1	6
All Male	6	4.67	1.033	3	6
Mixed	20	2.95	1.54	1	6
All Female	13	3.62	1.66	1	6
All Varsity	2	4	1.41	3	5
Mixed	18	3.33	1.64	1	6
All Non-varsity	20	3.6	1.7	1	6

Based on this previous research, I wanted to see if different genders within groups would lead to different levels of competitiveness. In other words, is the willingness to compete between members of the same gender different than the willingness to compete between members of opposite genders? To look at the group composition effects for the competitive group in my experiment, I looked at lottery 3 choices along with subject and partner genders. I looked specifically at groups of two male partners, two female partners, and at groups of one male and one female. Given the relatively small sample size for treatment 4 (40 subjects with one gender skipped so sample size of 39), it was tricky to trust any trends. However, the groups of both males (6 total groups) had a mean lottery score of 4.67, while the mixed group had a mean score of 2.95 and the groups of both females had a mean score of 3.61. These results showed me that subjects were more willing to take on risk when partnered with a member of the same sex than when

partnered with a member of the opposite sex. I also found that when a female subject was paired with a male partner, the mean lottery 3 choice was 2.6, compared to the overall female average lottery three choice of 2.98. Similarly, when a male subject was paired with a female partner, the mean lottery 3 choice was 3.3, compared to the overall male average lottery 3 choice of 3.52. This shows me that both genders, when paired with a partner of the opposite sex in a competitive environment, have a tendency to reduce risk relative to when they are paired with a member of the same sex.

When I compared the findings regarding treatment 4 to the partner gender effects in treatment 3, I did not find the same result. The groups of both males had a mean lottery 3 choice of 4, while the mixed group had a mean choice of 3 and the both female groups had a mean of 2.86. This spread is more representative of the total sample distribution, with males more risk loving than females, and the two balancing out when paired together. Similarly, the mean for a female paired with a male partner is not significantly different from the female overall average for treatment 3, but when a male subject is paired with a female partner, he seems to become more risk averse than the overall male average for treatment 3. A similar trend appeared when I looked at group composition by varsity sports. However, again given the small sample size I cannot be confident in the statistical significance of my analysis, but it provides insight into hypotheses that could be analyzed with further research using a larger sample size. I found that groups where both subjects played varsity sports in treatment 4 had a mean of 4 while groups where neither played a varsity sport had a mean of 3.6 and mixed groups had a mean of 3.3. This implies that, mixing groups where varsity athletes work with non-varsity athletes reduces the willingness to take on risk. This is a similar result to what I found regarding gender. Again, I cannot show statistical significance due to the small sample size, but it does provide possible insight into guiding companies to put together appropriate teams. My data shows that in a competitive environment, team composition regarding both gender and sports can have a significant influence on risk preferences.

This is an important finding to consider when thinking about workplace environments. Law firms, investment banks, trading corporations, and many other businesses that function with a competitive employee environment. Whether employees are working for a bigger bonus or looking for a promotion, they are often competing with those around them. This means that companies need to be careful when considering the composition of their teams. For example, having two former male collegiate football players on the same trading desk would most likely lead to very different trading activity than having a female collegiate athlete and a male who did not play sports on the same desk. When I compared the results using varsity sports from treatment 4 to the results from the cooperative treatment 3, I found that groups where both played sports had the highest mean, the mixed groups were in the middle, and groups where neither played sports had the lowest lottery 3 choice mean. This seemed to follow my earlier findings that subjects

who played varsity sports seemed on average to be more risk seeking than those who did not. This finding then shows that in a cooperative environment, subjects seemed more likely to align with their own preferences than in treatment 4. Treatment 4 showed me that subjects in like-groups were more inclined to take on risk, while treatment 3 showed that subjects still aligned more with their original preferences. This is also interesting when considering a business team environment. If an employer is trying to create teams with consistent preferences, it might be more beneficial to create a team where employees cooperate than to create a team where they compete. Moreover, a cooperative team seems to show more of a willingness to converge to the same risk preferences. This limits risk diversity and depending on the goal of the specific company can be a good or a bad thing. Either way, it is an important thing for any employer to consider when thinking about composition of teams.

Neiderle and Vesterlund (2005) examined whether women and men on a leveled playing field differ in their selection into competitive environments. The authors found that while there were no gender differences in performance, when given the option to compete or not to compete, twice as many men as women chose competition. The authors attribute this gender difference to the thought that men are possibly more optimistic about their relative performance. Similarly, in my experiment, the male's higher preference for risk could be explained by a higher level of relative optimism regarding the outcome of the lotteries. If this interpretation is correct, it would also lead me to believe that varsity athletes are more optimistic about the lottery outcome than non-athletes. This is an important idea to consider, especially when thinking about risk management programs, or setting up teams of employees. Teams appropriately balanced by gender and athletes would then, theoretically, exhibit more restraint when considering risky choices. The paper says that in order for gender differences in risk aversion to have an effect on willingness to pick competition, the gender difference in risk aversion would have to be very large. While this may be true, according to my data, there is a significantly large difference in risk aversion and could therefore be a driver in willingness to compete. However, what the paper failed to mention was the potential effects of group composition. My data seems to show that women are more likely to accept risk when they are in a group of only other women. Therefore, perhaps the women would have been more likely to compete if they knew they would only be competing against other women. This process highlights the importance of recognizing group composition as this can have a significant influence on group decision making.

While the literature seemed to back up my data analysis, I wanted to test for further significance of the above in-group effects. Specifically, I ran a Mann-Whitney U statistic test to test for a difference in the underlying distributions of lottery choice 3 in treatment 4 for groups of the same gender and groups of opposite gender. The test was significant at the 10-percent level, showing that there is a statistically significant difference between the underlying distributions of the lottery 3 choice in treatment 4 of the same

gender groups and the different gender groups. I then found that the probability that randomly selecting a higher value from the same gender distribution than the different-gender distribution was 67%. This result confirms my analysis above regarding the competitive treatment, so I tested it against the cooperative treatment. When I tested the difference in distributions for lottery choice 3 but in treatment 3, the difference between the underlying distributions was insignificant. This showed me that the in-group difference in lottery choice was unique to the competitive treatment as is shown in the literature.

Conclusions

Basic decision making is at the foundation of every major change. Progress cannot be made and advancements will not happen without people making difficult decisions. Simply, the fact that people make different choices when faced with the same decision reveals how people's preferences can vary. And while some decisions carry little to no risk, most rely on tradeoffs or opportunity costs and different levels of risk. Moreover, these decisions are rarely shaped by one individual alone. Instead, peers can often have a strong influence on decisions. My research focused on bringing these ideas together to see how peer influences might be related to risk attitudes. More specifically, my experiment looked closely at individuals' risk decisions: the attributes and demographic differences associated with risk decisions, any changes in preferences, and the influence of cooperative or competitive environments.

I began by benchmarking risk preferences, and then looked at whether people's preferences for risk were malleable. My basic findings paralleled previous research, showing males to be on average more risk loving than females. Similarly, I found that students who played varsity sports were on average more risk loving than those who did not play varsity sports. I then presented students with aggregate information, and noticed significant changes in preferences from lottery choice 1 to lottery choice 2. Moreover, the addition of aggregate information seemed to help the population converge towards the more risk neutral options, lotteries 2 and 3. Potential reasons for this convergence vary, but according to my data, benchmarking a choice for the subjects does significantly alter risk attitudes. Following these findings, I introduced the subjects to a competitive or cooperative environment to analyze the influence of these social dynamics. I found that subjects in cooperative environments were significantly more likely to make risk decisions similar to their partners than were subjects in a competitive environment, or subjects making decisions on their own. This seemed to show that people in a cooperative environment are more willing to work with others and compromise on decisions, even when compromise is not mandatory. Similar analysis showed me that in competitive environments, like-gender groups were on average more risk seeking than mixed-gender groups. Groups of two men were more risk seeking than groups of two women, but groups

combining one man and one woman were on average the most risk averse. I found this result particularly interesting when thinking about group composition within firms, and how the gender composition of a group could influence the risk behavior of the entire firm.

When considering further research with this study, many things came to my mind. In fact, there are so many possibilities with this research that it can be overwhelming. First, I only examined a handful of possible covariates that could explain risk preferences. I could greatly expand the questionnaire to learn more about each individual by including questions about GPA, socioeconomic factors, siblings, relationship with parents, and many others. I would also like to increase the sample size I was working with, because while I did have a solid number of subjects, I feel that a larger sample would have allowed me to look more closely at some of the covariates. I also feel that a larger sample size would help to smooth out some of the possible irregularities in the lottery responses, such as the large number of subjects who chose lottery 5 in treatment 1 for lottery choice 3. This showed me that participants in treatment 1 became much riskier in the final lottery choice even though they had no partner influence. A larger sample size would either smooth out this irregularity, or make me more confident that this is actually *not* an irregularity in the data but something real and explainable. Either way, this would let me feel more confident in the models predicting lottery choice 3 using treatment variables. I found it odd that I found no real significance between treatments for lottery choice 3, and feel that this is possibly a result of the treatment 1 "bulge" in the data.

Another area I would hope to look at more closely is the influence of the Big 5 personality characteristics. As I discussed briefly earlier, because Colby is relatively homogeneous in this regard, I feel that my sample did not have a broad enough range in these characteristics to find much significance with regard to risk preferences. Again, this might be solved by increasing the sample size, or diversifying outside the Colby population.

Another change I would like to make in future research, is to include a treatment that did *not* include the most commonly selected lottery for lottery choice 2. This would act as a baseline off which to compare the lottery 2 choice changes. I think this would allow me to better interpret any changes in preferences between the first two lottery choices and draw stronger conclusions. On a similar thought, I would be interested to compare my results to a set of experiments where I ran the PNIT questions and treatment lotteries first, to test against lottery choice 1 from my experiment. This would allow me to look at changes in risk preferences without worrying about the memory effect. The subjects in the second set of experiments seeing the treatment lottery first would make that decision without having seen the lotteries before, and I would be able to compare that to the first lottery choices (baseline) from my experiment. If in the second set of experiments the third lottery choice was meant as a baseline equivalent to the lottery choice 1 in my experiment, I would be able to compare the two baseline lottery choices to see how much of an influence

memory or diversification had on risk preferences. The only issue with adding this part of the experiment is I would essentially have to double the sample size, and it would be difficult to illicit that much participation from such a small student body. However, if I was able to expand the experiment outside the Colby population, I think this would be a very interesting and helpful addition to my findings.

Another area I would like to consider expanding is if instead of partners, I created groups of four or five subjects for the cooperation and competition treatments to look at partner versus small group effects. For example, if I administered treatment four using groups of two for the competition segment of the experiment, I would be interested to see how preferences changed between partners on each team as well as between the two competing groups. Obviously this addition would add significant complications not only to the coding and construction of the experiment, but there would be many other outside influences I would have to account for. However, I think competing teams of two would allow me to look at both cooperation and competition in a unique and important way. As I discussed in the motivation for my research, in business and often in life, when important decisions are made the decisions are not made by one individual in isolation. Generally, decisions are made in small groups, so adding a different dimension to the partnerships I examined would add significant credibility to my findings.

Acknowledgements

Lastly, I could not have done any of this work without significant help from a number of people. My advisor Professor Tim Hubbard helped me with every step along the way and was always willing to offer advice, guidance, and support. My thesis reader, Professor Leonard Wolk, was also instrumental in my work, particularly in the construction of my zTree programs and some of the model analysis. Jeff Carpenter was also very helpful in the use of zTree, offering me his past coded experiments from which I could cherry pick useful coding. His paper also gave me some insights into risky decision making that I was able to incorporate into my own paper. I also want to thank the Goldfarb Center for their very generous grant that allowed me to collect the data I needed for my analysis. Similarly, I want to thank Dean Kletzer and the Committee to Fund Students' Special Projects for their generosity in providing additional funding. I also want to thank Ryan Kendall for his help with zTree, and Eric Cardella for his help outlining the general scope of the experiment. Lastly, I want to thank Sahan Dissanayake and Dan LaFave for their general help throughout the process.

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Appendix A: Experimental Challenges

Probably the biggest challenge I faced from the entire process was learning and programming the experiment on zTree. Much of what I learned and developed came through trial and error, along with significant help from Jeff Carpenter, Ryan Kendall, and Leonard Wolk. This part of the experiment was definitely the longest, as zTree had limitations that I continuously had to work around and figure out alternative solutions for. One of the reasons this was so challenging, was that zTree has no preview option, so every time I wanted to see if a change had worked (again mostly through trial and error), I had to run the full experiment, often on multiple computers. This meant that even small changes often took a lot of time and energy and I spent numerous hours testing small changes and running the different treatments hundreds of times. Another significant challenge I faced due to zTree was when actually running the experiment. When programming an experiment in zTree, the experiment should be split up into stages. The experiment then saves the responses of each participant at the end of each stage in a "gamesafe" file. This allows experimenters to re-run the experiment with the same subject responses as during the actual trial. This not only allows journals to exactly replicate the experiment, but allows experimenters to replicate the experiment and recover the data should a computer crash or something else go wrong. Unfortunately, I was not aware of this feature, and I hardcoded the experiment with only one stage. During one of the sessions, one subject closed out of the zLeaf before reaching the last screen, causing the stage to end early and the data file not to be written. I did not recognize this until I tried to open the excel file with the written payments and realized that the program never actually created one. While the gamesafe file was created, I found no way to rerun the experiment because technically no stages were ever considered "complete" as the experiment was hard coded to only one stage. Unfortunately this also happened at the end of the treatment, so I had to pay all of the participants their entire earnings and lot an entire session worth of data. This was a particularly difficult loss for me because the session seemed to have gone very well with significant communication between partners and good teamwork. In the future, this will teach me to code different stages into the program, and if this were to happen again, I learned that it is possible to simply rerun that one leaf and continue to the final screen, saving the data.

One of the other issues I encountered when running the actual experiment was that I couldn't assume that participants would read all of the directions. One subject failed to read the instructions for the timed portion of the experiment (PNIT questions) and ended up with -30 ECUs (experimental currency units) for that portion. The directions stated a penalty of -2 ECUs for incorrect answers, but he skipped the instructions and randomly selected answers for each question hoping to maximize the number of responses and thus the number of correct responses. Fortunately, I only found one clear instance of this kind of behavior, but it made it so that I couldn't assume that all subjects would read the instructions. Similarly, I realized that I couldn't always assume that participants are utility maximizing in the way I originally thought. The experiment was designed so that utility maximization focused on maximizing payout from answering questions. However, this was not always the case. Some participants seemed more focused on rushing through the experiment and receiving whatever they had earned without focusing on maximizing their payout. I controlled for this a little by telling everyone at the start that they would receive their payout once *everyone* had finished, but there were still some people who did not seem to understand this.

Before running the experiments, I thought I would run out of funding before running out of participants, but this was actually not the case. After the first full week of treatments, I had gone through roughly 100 students and still had roughly $2,200 of my $4,000 remaining. This meant that for the second week, I had to solicit roughly 80 participants with more than half of my funding remaining. The seemed easy, but with a student body of roughly 1800 students and 1600 on campus it proved difficult. To help with this solicitation, I made flyers and talked to students individually to increase numbers, but this only marginally increased participation. What significantly boosted participation was when professors talked to

their classes about an opportunity to make money and support a senior working on his honors thesis by participating in an experiment. When two professors did this, I quickly filled up my three final sessions. They kept the experiment anonymous, but definitely increased participation by econ majors as both professors teach in the economics departments. As I found with the professors' announcements, maintaining anonymity to keep the sample random also proved challenging as students would discuss the experiment with their friends and figure out who was running the sessions. On the other hand, knowing the experimenter definitely boosted participation, as people were more likely to participate if they knew who they were helping. This showed me that while monetary compensation was definitely the driving factor for participation, people respond to other incentives as well. The monetary payments were also more difficult to organize than I thought. Having exact change for the performance based payouts was difficult to maintain with different bills and change. I also did not want to carry around more money with me than I needed for one or two treatments, so I was forced to take many trips to the bank and to keep a close eye on the inventory of different bills to make sure I could always make exact change.

Appendix B: IRB Approval

Colby COLBY COLLEGE
5550 Mayflower Hill
Waterville, Maine 04901-8855
TEL 207-859-5550
FAX 207-859-5555

DEPARTMENT OF PSYCHOLOGY

November 13, 2013

Prof. Timothy Hubbard
Department of Economics
Colby College

Dear Professor Hubbard,

The Colby Institutional Review Board has now reviewed the application for your project entitled "Investigating the endogeneity of risk attitudes: experimental evidence involving cooperation and competition". We are pleased to inform you that your project has been approved. The project meets all of the necessary criteria for human subject research under 45 CFR 46.111, including confidentiality and informed consent. This approval is provided under assurance IRB 00008881.

If you make any substantive changes to the project, please contact me to determine whether additional review is warranted.

Best wishes for a successful project.

Sincerely,

Christopher J. Soto
Chair, Colby Institutional Review Board

Appendix C: Goldfarb Grant Acceptance

Colby

SAHAN DISSANAYAKE
ASSISTANT PROFESSOR OF ECONOMICS
ASSOCIATE DIRECTOR, GOLDFARB CENTER FOR
PUBLIC AFFAIRS AND CIVIC ENGAGEMENT
5241 Mayflower Hill, Waterville, ME 04901-8853
TEL 207.859.5241 FAX 207.859.5340
sahan.dissanayake@colby.edu

To: Timothy Hubbard
From: Sahan Dissanayake
Subject: Goldfarb Center Faculty Research Grant
Date: November 24, 2014

I am pleased to inform you that the Goldfarb Center Grant Review Committee has decided to award a grant of $1,500 to support the *investigation of endogeneity of risk attitudes* student/faculty collaborative research project. These funds should be drawn from account number 01.2540.XXXX (Hubbard). We wish you the best of luck in this endeavor!

As stated in the Call for Proposals – "It is expected that grantees will submit the product to the Colby Digital Commons (note: this can be done so as not to prejudice publication rights)." In addition, we ask that the grantees, where and when reasonable acknowledge the Goldfarb Center grant, this includes in all publications that may result.

In addition we would like you to submit a short white paper, approximately 5-10 pages in length that we would host on a new section on scholarship on the Goldfarb Center webpage. The goal of this will be to highlight the use of funds and help fundraising efforts to be able to support projects similar to yours in the future. Though this is not a required output we hope you will be willing to support these efforts.

For reimbursement we expect that you will keep all receipts and submit the originals in a timely fashion to Assistant Director Amanda Cooley. The receipts need to show both what was purchased and for how much. You should keep a log of all of your expenses, a copy of which must be submitted. For your information, this type of payment is considered taxable income as determined by the Internal Revenue Service (IRS). It may or may not be taxable depending on your personal financial situation and therefore may or may not need to be reported on your federal tax return. We advise that you consult the IRS or a tax professional for more information. Colby will report to the IRS on all payments made in accordance with IRS regulations.

I would also like to welcome you and your student collaborators as part of the 2014-2015 class of Goldfarb Center Faculty Fellows (and Student Research Fellows). We expect that you will note this designation in all publications resulting from this grant. We hope that you will view this as an opportunity to connect further to the mission of the Goldfarb Center through both attending events and encouraging your students to do so as well. We view engagement in this way as an essential part of building and strengthening our shared community. Fellows are required to submit to the Goldfarb Center Director a brief report following completion of the internship summarizing the experience. In addition, we ask for a brief, 350 +/- word article for the Goldfarb Center newsletter. We would also ask that you include photos/diagrams if possible.

Congratulations and we look forward to hearing more about this wonderful project.

Sincerely,

Sahan Dissanayake

Appendix D: Dean Funding

Colby

OFFICE OF THE PROVOST AND
DEAN OF FACULTY
4770 Mayflower Hill
Waterville, ME 04901-8841
TEL 207-859-4770
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deanoffaculty@colby.edu

Memo

To: Erik Solli **ID Number:** 459945
From: Provost Kletzer
Date: November 13, 2014
Re: Student Special Project Funds Granted

Project: Investigating the Endogeneity of Risk Attitutudes: Experimental Evidence Involving Cooperation and Competition

I am pleased to inform you that the Committee to Fund Students' Special Projects has agreed to award you a total of $500.00 to help with the costs of your project.

The account number assigned to you is: **02.2610.6700.6827**
The amount of funds granted: **$500.00**
Fiscal Year **2014-2015**

Your check will be available for you to pick up in the Office of Financial Services within 2 weeks. Feel free to call SFS if you like to see if your check is ready.

For your information, this type of payment is considered taxable income as determined by the Internal Revenue Service (IRS). It may or may not be taxable depending on your personal financial situation and therefore may or may not need to be reported on your federal tax return. We advise that you consult the IRS or a tax professional for more information. Colby will report to the IRS on all payments made in accordance with IRS regulations.

cc: Jill Pierce, (japierce)
Faculty Sponsor, Timothy Hubbard

LGK/bb

Appendix E: General Announcement

Subject: Participate in a Behavioral Economics Experiment and Earn Money

Sign up to participate in a behavioral economics experiment to be conducted in the third floor computer lab of Diamond. Earn some money and, while you're at it, support a senior working on his senior honors thesis. In the experiment, you will make a series of decisions that will earn you money and you will answer a series of questions about yourself. All responses will be made anonymously and participants are promised $5 for showing up plus additional payment depending on their decisions throughout the experiment (participants are expected to earn between $10 and $25). Experiments are expected to last between 25 and 45 minutes.

If you have time, please sign up using the link below. Simply add your name and email and we will send you a reminder before your assigned date.

https://docs.google.com/a/colby.edu/forms/d/1lkjCsdbpX4FB-SH0-a3KREBIdREKFKQqOuIkXe3sE-M/viewform?usp=send_form

Thanks for your support!

Appendix F: Consent Form

Consent Form
Colby College Department of Economics

Thank you for agreeing to participate in this research study being conducted by Timothy P. Hubbard (economics professor) and Erik O. Solli (economics major). The general purpose of our research is to better understand decision making. Participants in this study will be asked to make choices and complete various tasks during the experiment on a computer.

Informed consent is required by Colby College for any person participating in a College-sponsored research study. This study has been approved by the College's Institutional Review Board for Research with Human Subjects.

I hereby give my consent to be a participant in this research study. I acknowledge that the researcher has provided me with:

A. An explanation of the study's general purpose and procedure.
B. Answers to any questions I have asked about the study procedure.

I understand that:

A. My participation in this study will take approximately 45 minutes.
B. No unusual risks are anticipated as a result of participating in this research.
C. I will be compensated for participating in this study with $5 for participating and up to an additional $25 based on decisions I make during the experiment.
D. My participation is voluntary, and I may withdraw my consent and discontinue participation in the study at any time. My refusal to participate will not result in any penalty.
E. The specific nature of and reasons for the procedures employed, those aspects of my behavior that have been recorded for measurement purposes, and what the investigators hope to learn from this study will all be fully explained to me at the end of the experimental session should I have questions.
F. All data collected for this study will be kept confidential. The data will be stored in a secure location, and research reports will only present aggregate statistics without any personally identifying information.
G. After the study's purpose and procedure have been fully explained to me, I may, for any reason, choose to withhold use of any data provided by my participation.

Signature

Date

Appendix G: Welcome Script

I want to start by thanking everyone for coming today and for agreeing to take part in my experiment. At this time, you should see an introduction screen in front of you. If you do not, please raise your hand so I can move you to another computer. I ask that you answer all questions truthfully and to the best of your ability, remembering that you will be paid based on how you answer many of the questions. At this point, you should all have signed in, and received, signed and returned to me your consent form. If you have not completed any of these steps, please raise your hand now.

Throughout the experiment, unless told otherwise, please keep your eyes on your own screen. If or when you see a blank screen, it means you are waiting for the rest of the group to catch up to where you are, so please stay seated and look only at your own screen until the experiment continues.

I would like you all to read the introduction in front of you and if you have any questions before we begin please ask them now. At any time during the experiment if you do not feel comfortable answering a question please raise your hand and let me know. You will all receive a debriefing form and your payment depending on your earnings at the end of the experiment when everyone has finished.

Thank you all again for participating and you may now start by reading the introduction.

Appendix H: Debriefing Script

Debriefing Script

Thank you for participating in this research study. We are conducting this study to better understand individuals' risk attitudes. Our main research focus is to determine what personal characteristics might be correlated with someone's appetite for risk. We are also interested in how the flexibility of these risk attitudes.

While participating in this study, you were asked to make investment decisions. In allowing you to earn actual payoffs which depend on the outcome of these experiments, we hoped you would make decisions that you felt were optimal based on your true preferences.

If you are interested in learning more about this study, please feel free to ask us questions in person, or contact us at timothy.hubbard@colby.edu or eosolli@colby.edu. If you would like to learn more about modeling and determining risk preferences, we recommend the following:

Chapter 12 of Hal Varian's *Intermediate Microeconomics: A Modern Approach*, 8th edition. This textbook is used in EC223 (Microeconomic Theory) on campus.

Daniel Kahneman's *Thinking, Fast and Slow*. This book is a *New York Times* Bestseller.

If you have any concerns about your rights as a participant in this study, please contact the Chair of the Colby Institutional Review Board for Research with Human Subjects, Christopher Soto (cjsoto@colby.edu).

Thank you again for participating!

Appendix I: Session Information

Date	Time	Treatment	# of Participants
2/23/15	9am	2	8
2/24/15	8pm	3	18
2/25/15	9am	1	10
2/25/15	3pm	1	14
2/26/15	3pm	4	16
2/27/15	3pm	2	16
2/27/15	4pm	4	14
3/3/15	3pm	3	12
3/3/15	4pm	1	10
3/4/15	3pm	2	4
3/4/15	4pm	4	10
3/10/15	3pm	2	18
3/11/15	7pm	3	16
3/11/15	8pm	1	15
		Total Participation	181

Appendix J: Funding Spreadsheet

Inflow	
Tim	3,110
Erik	400

Tim's Grant		Dean Funding	Goldfarb Grant	Taxes	Total Balance
2,000		500	1500		4,000

Treatment	Trial 1	Trial 2	Trial 3	Trial 4	Total
Practice Treatment					
Participants	4	16			20
Payments	94.8	264.8			359.6
Treatment 1					
Participants	10	14	10	15	49
Payments	193.2	238.2	180.4	278.2	890
Average					18.16
Treatment 2					
Participants	8	16	4	18	46
Payments	168.6	272.6	79	312.2	832.4
Average					18.10
Treatment 3					
Participants	18	12	16		46
Payments	310.8	207.4	300.6		818.8
Average					17.80
Treatment 4					
Participants	16	14	10		40
Payments	292.4	258.7	181.4		732.5
Average					18.3125

Total Inflow	3,510
Total Participation	201
Participation minus Practice	181
Total Paments	3042.9
Average Payout	18.09
Cash on Hand	467
Remaining Funding Balance (Balan	490
Total Available Balance	**957**

Appendix K: Questionnaire Table

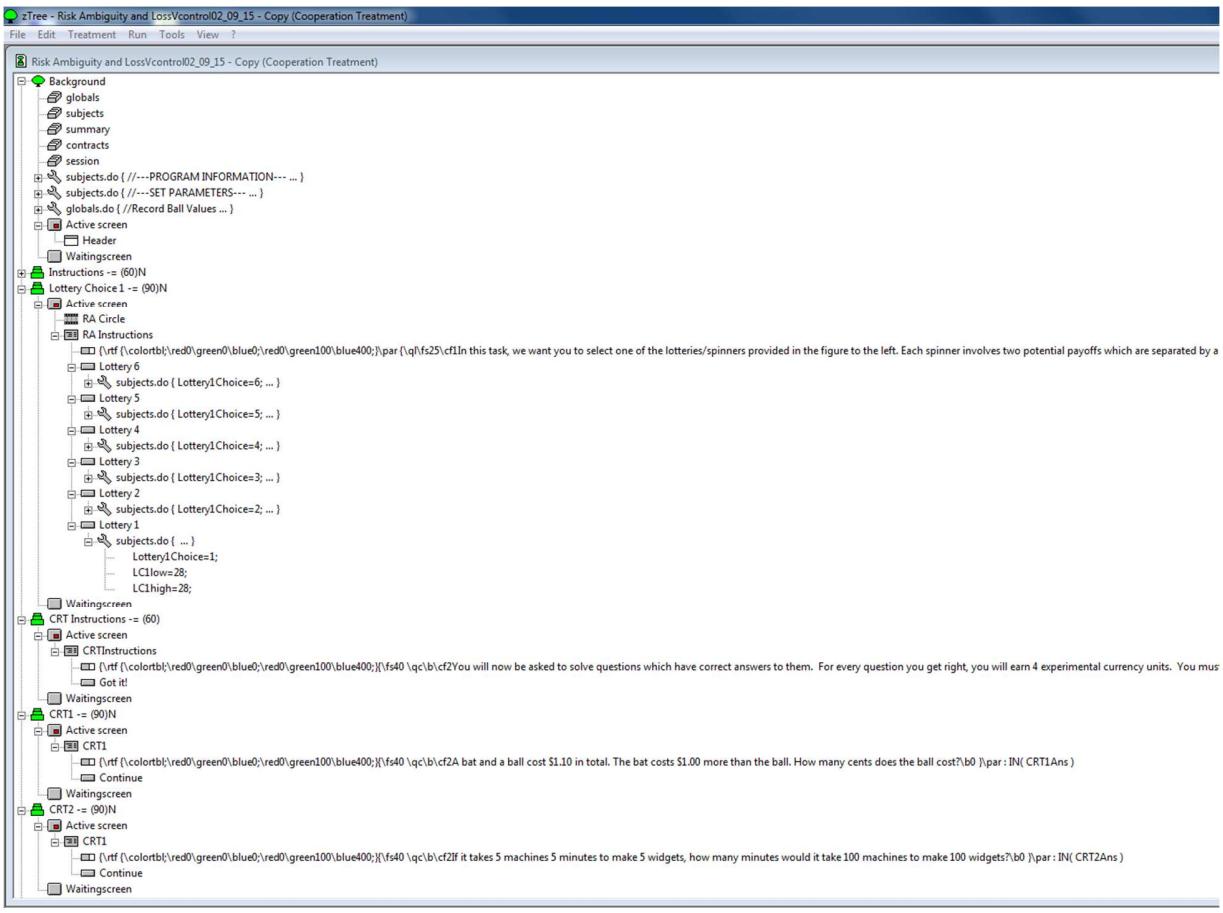
Vbl. Name	Question	Response Options
Q1	What is your Age?	Input variable
Q2	Which gender do you identify as?	female=0; male=1; skip=2
Q3	What is your race/ethnicity?	white=0; Af/am=1; Hispanic/Latino=2; Asian=3; Ntv.Amrcn=4; Pac.Isl=5; Other=6; skip=7
Q4	What is your primary major?	Bio=0; Econ=1; Gov=2; English=3; Psych=4; Env.Stud.=5; Global Studies=6; Other=7; skip=8
Q5	How many colleges/universities did you apply to?	Input variable
Q6	Did you apply to any school early decision (with a binding ag	Yes=0; No=1; skip=2
Q7	Do/did you play a varsity sport while in college?	Yes=0; No=1; skip=2
Q8	Are/were you a captain or co-captain?	Yes=0; No=1; Did not play V. sport=2; skip=3
Q9	Have you ever been a COOT leader?	Yes=0; No=1; skip=2
Q10	Are you currently on financial aid?	Yes=0; No=1; skip=2
Q11	Are you a US citizen?	Yes=0; No=1; skip=2
Q12	What political view do you most closely associate with?	Republican=0; Democrat=1; Independent=2; Green Party=3; Other=4; skip=5
Q13	What is your religious affiliation?	Christian=0; Jewish=1; Mormon=2; Athiest/Agnostic=3; Muslim=4; Buddhist=5; Hindu=6; Other=7; skip=8
Q14	What is your relationship status?	Single=0; Married=1; Dating=2; Other=3; skip=4
Q15	How would you characterize yourself when it comes to takin	Not willing=0; Try to avoid=1; Uncomfortable=2; Enjoy risks=3; Seek out risk=4; skip=5
Q16	I see myself as someone who is reserved.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q17	I see myself as someone who is generally trusting.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q18	I see myself as someone who tends to be lazy.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q19	I see myself as someone who is relaxed, handles stress well.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q20	I see myself as someone who has few artistic interests.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q21	I see myself as someone who is outgoing, sociable.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q22	I see myself as someone who tends to find fault with others.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q23	I see myself as someone who does a thorough job.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q24	I see myself as someone who gets nervous easily.	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5
Q25	I see myself as someone who has an active imagination	Disagree Strongly=0; Disagree a little=1; Neither agree nor disagree=2; Agree a little=3; Agree strongly=4; skip=5

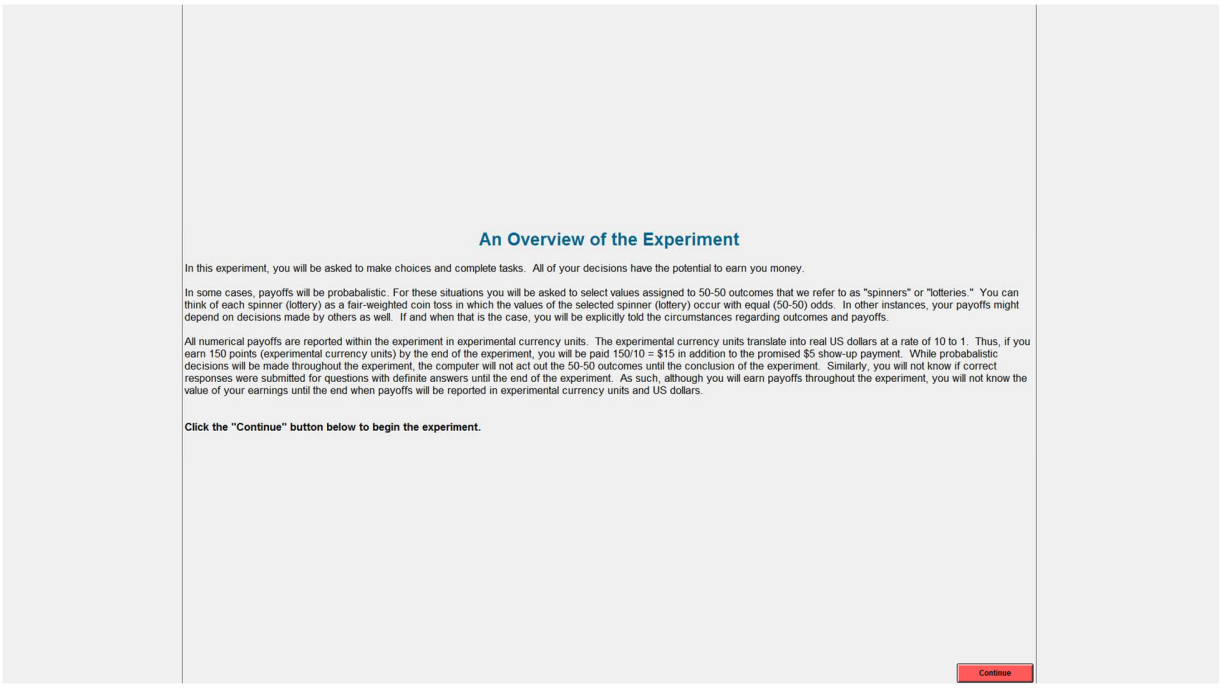
Appendix L: Variable Definitions

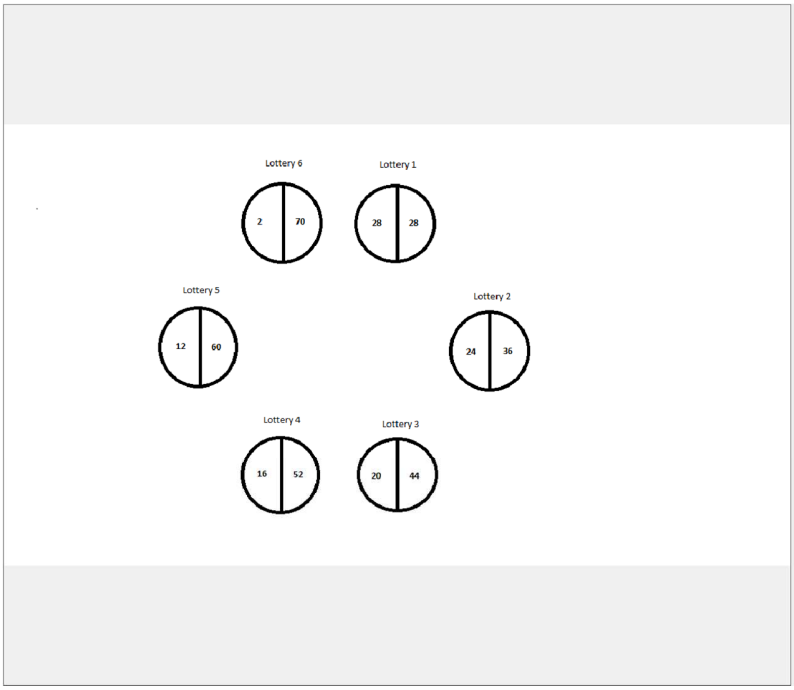
Variable Name	Description
Subject	Marks the number the subject was in his/her particular treatment session. Used to determine group
Group	Assigns partners to each subject in the treatment session
Partner	The subject assigned as partner to each subject, shown in group
Lottery1Choice	Gives the lottery chosen by each subject in their first lottery decision (takes integer values 1-6)
Lottery2Choice	Gives the lottery chosen by each subject in their second lottery decision (takes integer values 1-6)
Lottery3Choice	Gives the lottery chosen by each subject in their third lottery decision (takes integer values 1-6)
CRT1Ans	The subjects input answer to the first CRT question. Discrete variable from 0 to 10000?(as defined in zTree)
CRT2Ans	The subjects input answer to the second CRT question. Discrete variable from 0 to 10000?
CRT3Ans	The subjects input answer to the third CRT question. Discrete variable from 0 to 10000?
LC1Low	The lower of the two numbers from each subjects first lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28
LC1High	The higher of the two numbers from each subjects first lottery choice. Discrete variable can have values 28, 36, 44, 52, 60, 70
LC2Low	The lower of the two numbers from each subjects second lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28
LC2High	The higher of the two numbers from each subjects second lottery choice. Discrete variable can have values 28, 36, 44, 52, 60, 70
LC3Low	The lower of the two numbers from each subjects third lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28
LC3High	The higher of the two numbers from each subjects third lottery choice. Discrete variable can have values 28, 36, 44, 52, 60, 70
Lottery1Draw	The random result of the 50/50 outcome from the subjects first lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28, 36, 44, 52, 60, 70
Lottery2Draw	The random result of the 50/50 outcome from the subjects second lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28, 36, 44, 52, 60, 70
Lottery3Draw	The random result of the 50/50 outcome from the subjects third lottery choice. Discrete variable can have values 2, 12, 16, 20, 24, 28, 36, 44, 52, 60, 70
Time1Choice	Subject's decision on the first timed question. Discrete variable integer 1-5
Time2Choice	Subject's decision on the second timed question. Discrete variable integer 1-5
Time3Choice	Subject's decision on the third timed question. Discrete variable integer 1-5
Time4Choice	Subject's decision on the fourth timed question. Discrete variable integer 1-5
Time5Choice	Subject's decision on the fifth timed question. Discrete variable integer 1-5
Time7Choice	Subject's decision on the seventh timed question. Discrete variable integer 1-5
Time8Choice	Subject's decision on the eighth timed question. Discrete variable integer 1-5
Time9Choice	Subject's decision on the ninth timed question. Discrete variable integer 1-5
Time11Choice	Subject's decision on the eleventh timed question. Discrete variable integer 1-5
Time12Choice	Subject's decision on the twelfth timed question. Discrete variable integer 1-5
Time13Choice	Subject's decision on the thirteenth timed question. Discrete variable integer 1-5
Time14Choice	Subject's decision on the fourteenth timed question. Discrete variable integer 1-5
Time15Choice	Subject's decision on the fifteenth timed question. Discrete variable integer 1-5
Time16Choice	Subject's decision on the sixteenth timed question. Discrete variable integer 1-5
Time17Choice	Subject's decision on the seventeenth timed question. Discrete variable integer 1-5
Time18Choice	Subject's decision on the eighteenth timed question. Discrete variable integer 1-5
Time19Choice	Subject's decision on the nineteenth timed question. Discrete variable integer 1-5
Time20Choice	Subject's decision on the twentieth timed question. Discrete variable integer 1-5
Time21Choice	Subject's decision on the twenty-first timed question. Discrete variable integer 1-5
Time22Choice	Subject's decision on the twenty-second timed question. Discrete variable integer 1-5
Time23Choice	Subject's decision on the twenty-third timed question. Discrete variable integer 1-5
Time24Choice	Subject's decision on the twenty-fourth timed question. Discrete variable integer 1-5
Time25Choice	Subject's decision on the twenty-fifth timed question. Discrete variable integer 1-5
Time26Choice	Subject's decision on the twenty-sixth timed question. Discrete variable integer 1-5
Time27Choice	Subject's decision on the twenty-seventh timed question. Discrete variable integer 1-5
Time28Choice	Subject's decision on the twenty-eighth timed question. Discrete variable integer 1-5
Time29Choice	Subject's decision on the twenty-ninth timed question. Discrete variable integer 1-5
Time30Choice	Subject's decision on the thirtieth timed question. Discrete variable integer 1-5
Time31Choice	Subject's decision on the thirty-first timed question. Discrete variable integer 1-5
Time32Choice	Subject's decision on the thirty-second timed question. Discrete variable integer 1-5

LotteryProfit	The subject's total profit from the three lottery choices. Equal to the sum of Lottery1Draw, Lottery2Draw, and Lottery3Draw. Discrete integer variable
CRTProfit	The total profit from the CRT questions. Discrete variable equal to 0, 4, 8, or 12
TimeProfit	Total profit from the timed section of the experiment
ECUProfit	The sum of LotteryProfit, CRTProfit, and TimeProfit. Units in ECUs
USDProfit	ECUProfit divided by the exchange rate (10:1)
Payout	The total payout from the experiment in USD. The $5 payment for showing up plus USDProfit
Treatment	The number of the treatment (1=control, 2=interaction, 3=cooperation, 4=competition)
Session	The session in which the treatment was run. Discrete, depends on how many sesions were run of each treatment (could be values 1-4)
Order	The order in which the sessions were run. (could be values 1-14?)

Appendix M: Screenshots







In this task, we want you to select one of the lotteries/spinners provided in the figure to the left. Each spinner involves two potential payoffs which are separated by a vertical line. Given your choice, you will have a fifty-percent chance of the left-hand payoff, and a fifty-percent chance of the right-hand payoff. Your decision will be recorded and the outcome as well as your payoff will be revealed to you at the end of the experiment.

Pick the spinner you most prefer by clicking on the corresponding button below.

Lottery 1
Lottery 2
Lottery 3
Lottery 4
Lottery 5
Lottery 6

You will now be asked to solve questions which have correct answers to them. For every question you get right, you will earn 4 experimental currency units. You must enter integer values (whole numbers, so no decimals) in the designated box and then click continue to move on to the next question.

Got it!

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball.
How many cents does the ball cost?

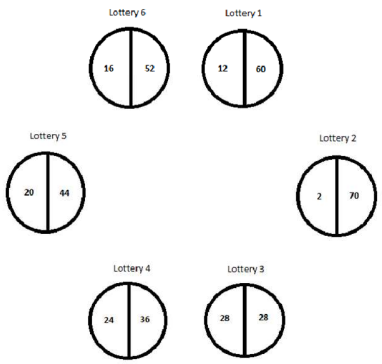
Continue

If it takes 5 machines 5 minutes to make 5 widgets, how many minutes
would it take 100 machines to make 100 widgets?

Continue

In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how many days would it take for the patch to cover half of the lake?

Continue



When presented with the opportunity to select a lottery from those identical to the ones presented on the left, other researchers (C. Dave, C.C. Eckel, C.A. Johnson, C. Rojas) published results documenting that the **most commonly-selected choice for participants was Lottery 5.**

Remember, each spinner involves two potential payoffs which are separated by a vertical line. Given your choice, you will have a fifty-percent chance of the left-hand payoff, and a fifty-percent chance of the right-hand payoff. Your decision will be recorded and the outcome as well as your payoff will be revealed to you at the end of the experiment.

Pick the spinner you most prefer by clicking on the corresponding button below.

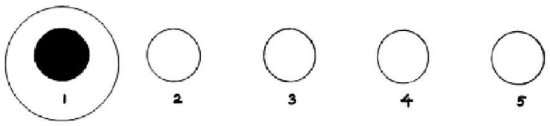
Lottery 1
Lottery 2
Lottery 3
Lottery 4
Lottery 5
Lottery 6

For the next part of the experiment, the experiment proctor will remove the partition separating you from one other experiment participant which we will refer to as your partner. Each of you will be given a series of questions. For each question, you will be asked to either select an image that does not belong or select an image that appropriately completes a figure with missing elements. The circumstances will be made clear and before beginning these questions we will show you an example of each on the next two slides.

You will be rewarded for cooperating with your partner in trying to answer as many questions correctly in the given time. Your payoff will depend both on whether you answer the question correctly and on whether your partner answers the question correctly.

Questions answered correctly by both you and your partner will earn you 4 points while an incorrect answer by either of you will cost you each 2 points. You will have 60 seconds to answer as many as you can and the clock will not start until you have reviewed the examples on the next two slides.

Got it!



Identify the image that does not belong with the others.

Click on the appropriate (corresponding) button below.

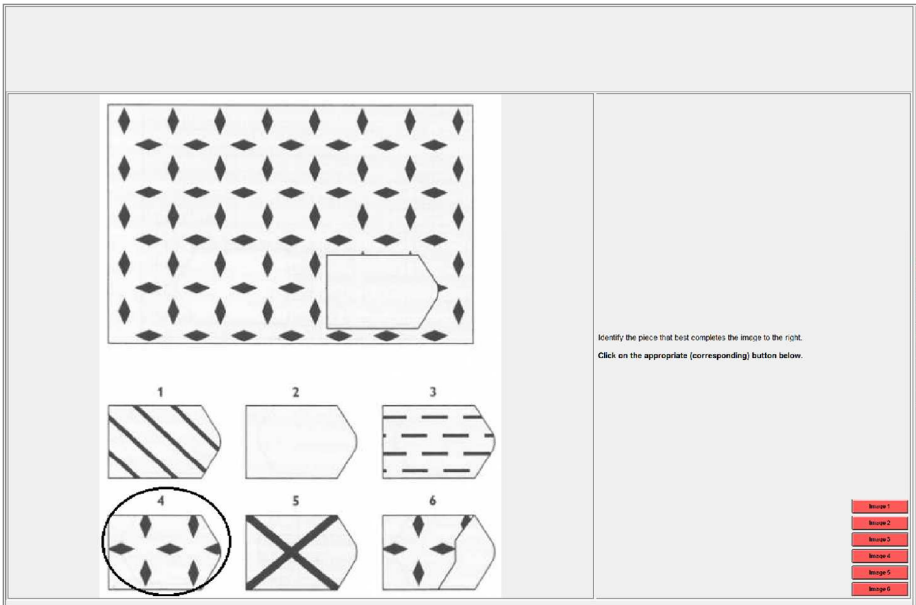
Image 1
Image 2
Image 3
Image 4
Image 5

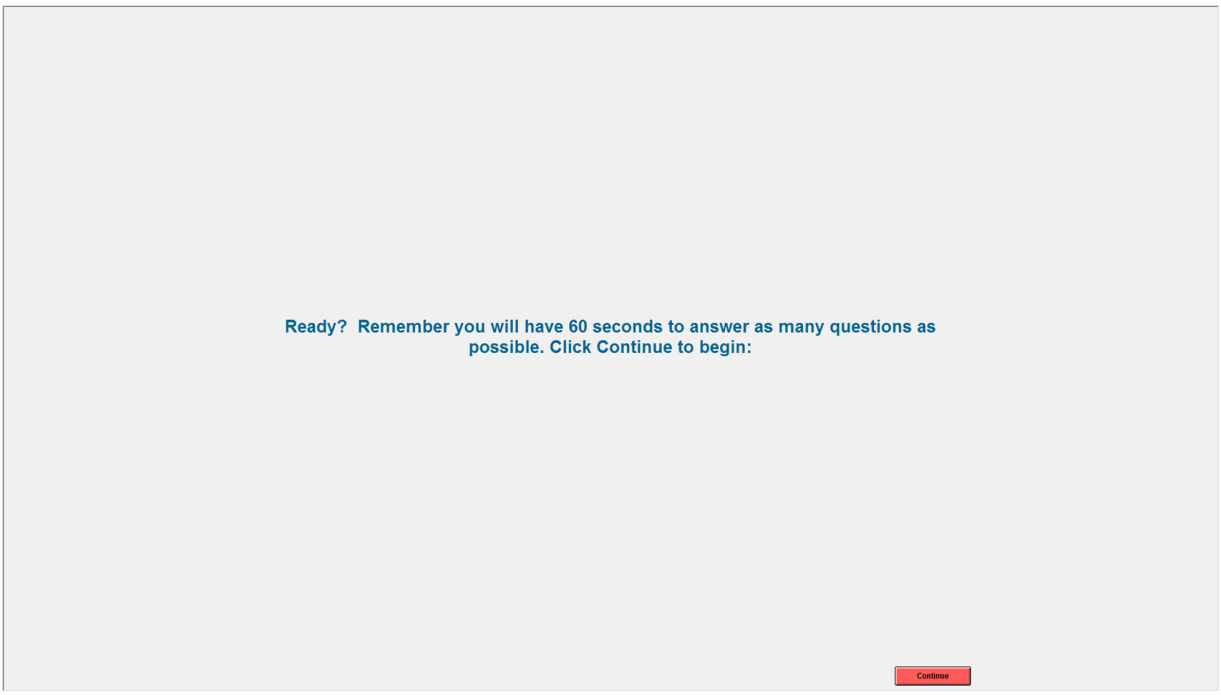
In this phase of the experiment you will encounter slides that look like the one depicted to the left. Here, we have circled the correct response but that will not be the case in what follows.

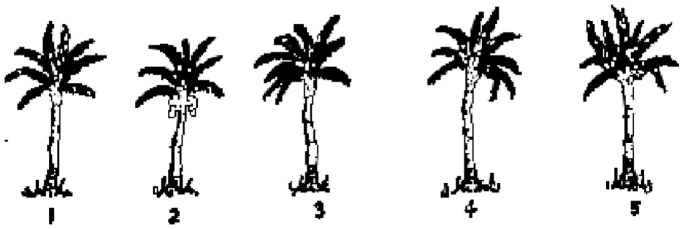
Selecting the button "Image 1" would earn you 4 points (experimental currency units) since it is the correct response, whereas selecting any other button would reduce any accumulated points earned by 2.

To see one more example of the type of question, click the Continue button below.

Continue


1
2
3
4
5
6
Identify the piece that best completes the image to the right.
Click on the appropriate (corresponding) button below.
Image 1
Image 2
Image 3
Image 4
Image 5
Image 6
In this phase of the experiment you may encounter slides that look like the one depicted to the left. Here, we have again circled the correct response but that will not be the case in what follows.
Selecting the button "Image 4" would earn you 4 points (experimental currency units) since it is the correct response, whereas selecting any other button would reduce any points earned by 2.
To begin this phase of the experiment, select the Continue button below.
Continue

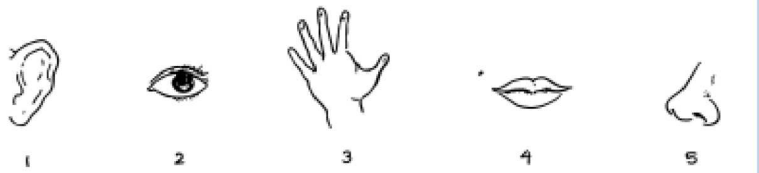

Ready? Remember you will have 60 seconds to answer as many questions as possible. Click Continue to begin:
Continue



Identify the image that does not belong with the others.

Click on the appropriate (corresponding) button below.

Image 1
Image 2
Image 3
Image 4
Image 5



Identify the image that does not belong with the others.

Click on the appropriate (corresponding) button below.

Image 1
Image 2
Image 3
Image 4
Image 5

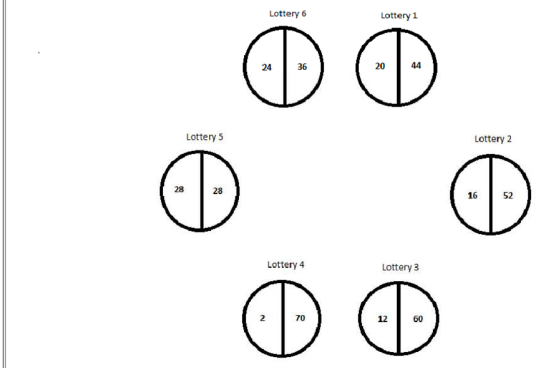
Identify the image that does not belong with the others.

Click on the appropriate (corresponding) button below.

Image 1
Image 2
Image 3
Image 4
Image 5

The experiment will continue on the next page. Please choose continue when you are ready to begin.

Continue



In this task, we want you to select one of the lotteries/spinners provided in the figure to the left. **For this choice, the dividers will remain removed between you and your partner. You are free to discuss your lottery decision with your partner, but you DO NOT need to choose the same lottery and your payoffs will be in no way linked for this choice.** Each spinner involves two potential payoffs which are separated by a vertical line. Given your choice, you will have a fifty-percent chance of the left-hand payoff, and a fifty-percent chance of the right-hand payoff. Your decision will be recorded and the outcome as well as your payoff will be revealed to you at the end of the experiment.

Pick the spinner you most prefer by clicking on the corresponding button below.

Lottery 1
Lottery 2
Lottery 3
Lottery 4
Lottery 5
Lottery 6

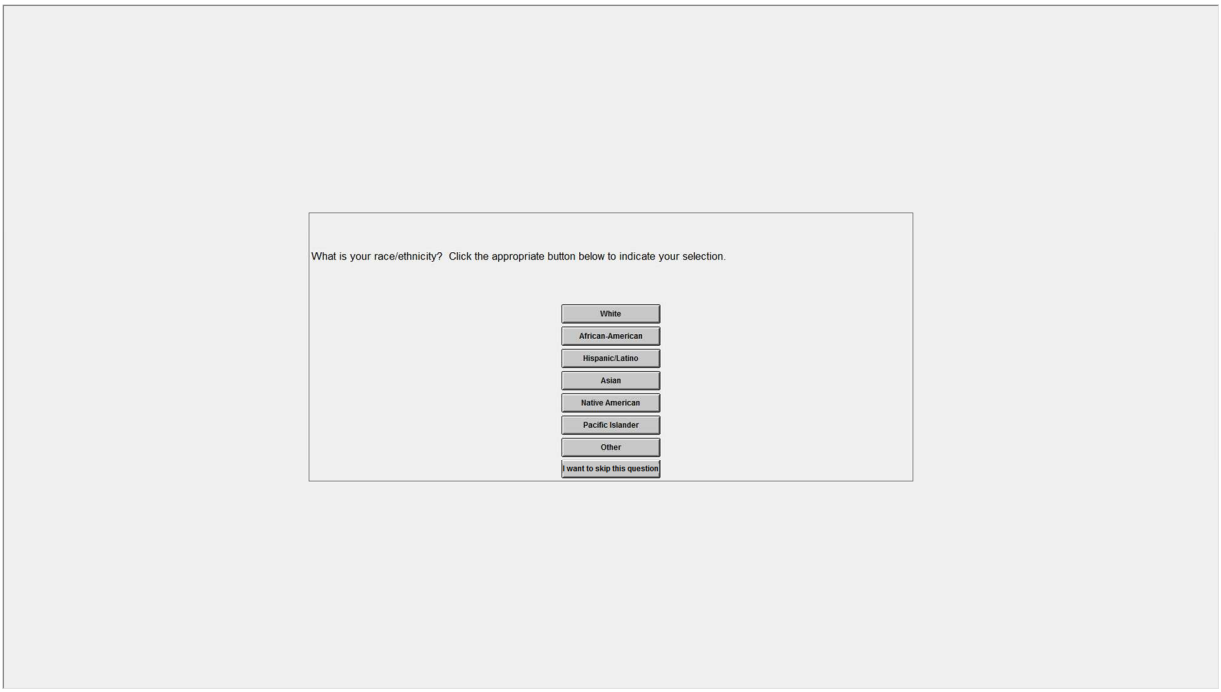
Questionnairre

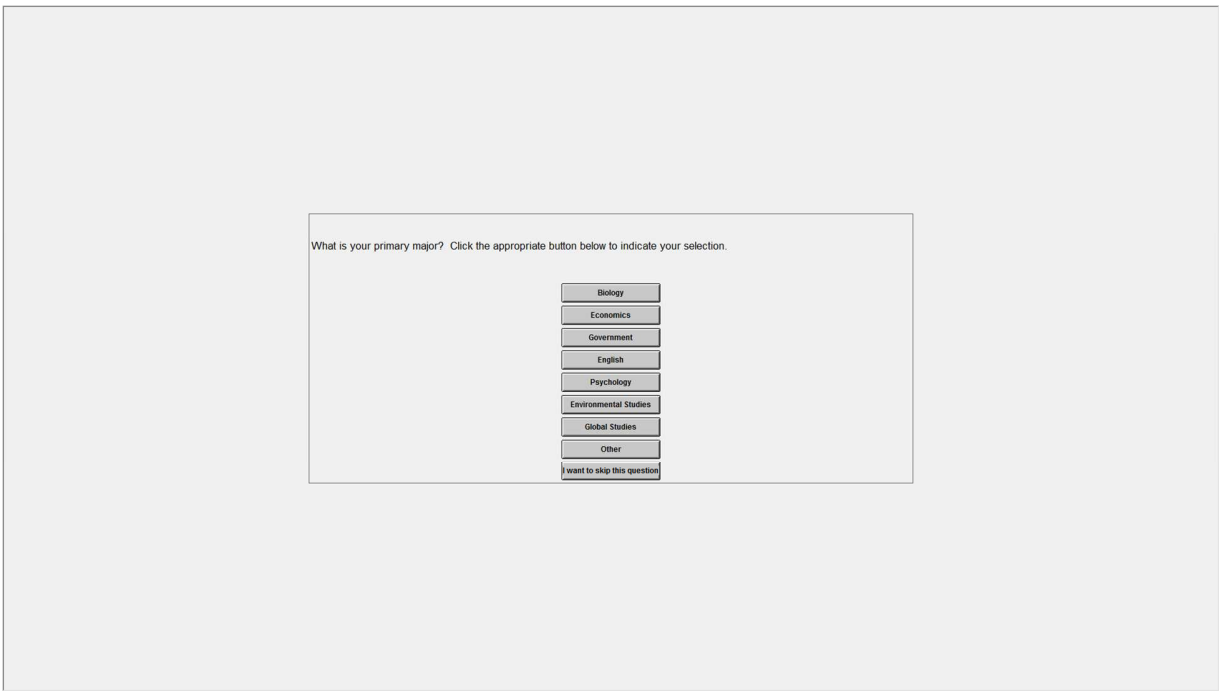
In this next part of the experiment, you will be asked to answer a series of questions about yourself. You will not be compensated for your answers in this portion of the experiment. However, we ask that you answer truthfully as your responses will be important to us in interpreting the results. We will also use this opportunity to remind you that all of your decisions and responses in this experiment will remain confidential; only aggregated data will be presented in our research, preventing the ability of others to identify participants. Following this short questionnairre, the computer will act out your lottery choices, aggregate your earnings, and compute your payoff (in both experimental currency units and US dollars). **Click the "Continue" button below to begin the questionnairre.**

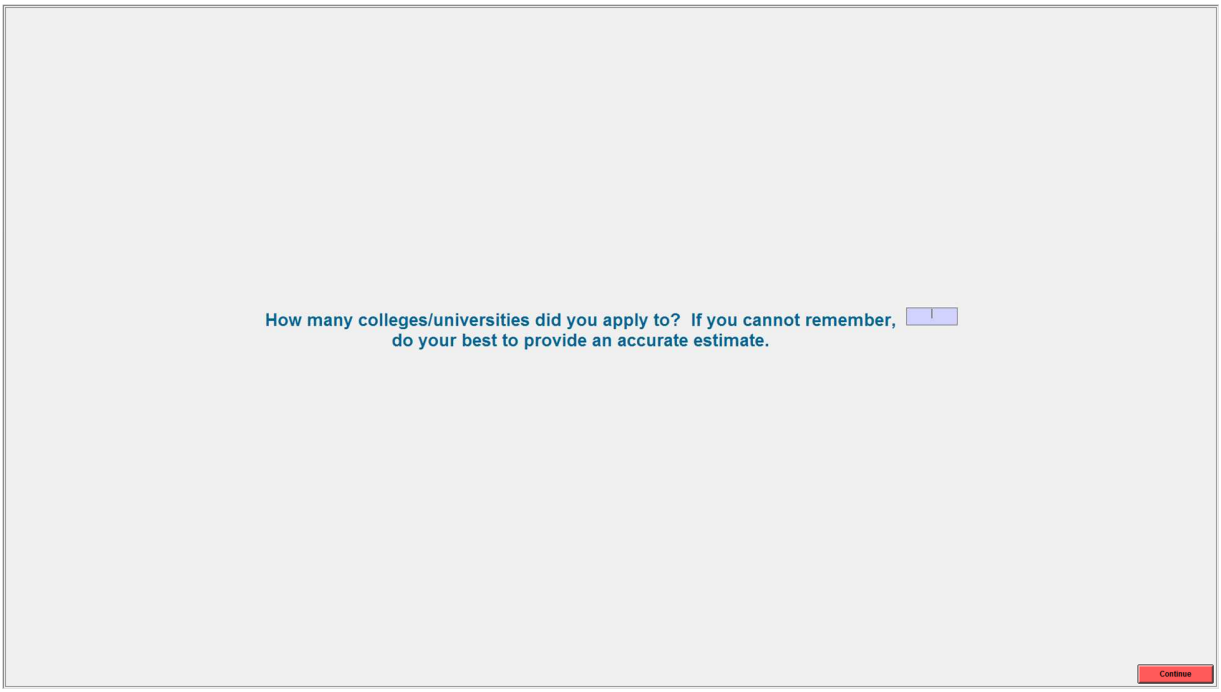
Continue

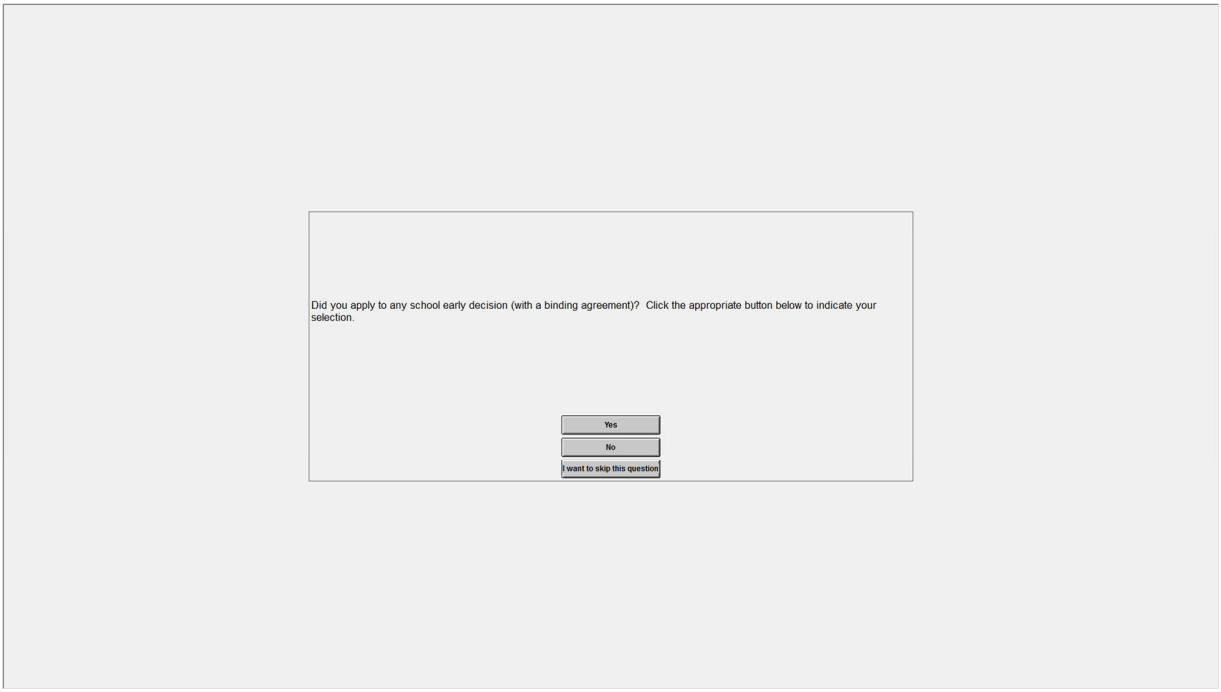

What is your age?
Continue


Which gender do you identify as? Click the appropriate button below to indicate your selection.
Female
Male
I want to skip this question


What is your race/ethnicity? Click the appropriate button below to indicate your selection.
White
African-American
Hispanic/Latino
Asian
Native American
Pacific Islander
Other
I want to skip this question


What is your primary major? Click the appropriate button below to indicate your selection.
Biology
Economics
Government
English
Psychology
Environmental Studies
Global Studies
Other
I want to skip this question


How many colleges/universities did you apply to? If you cannot remember, do your best to provide an accurate estimate.
Continue


Did you apply to any school early decision (with a binding agreement)? Click the appropriate button below to indicate your selection.
Yes
No
I want to skip this question

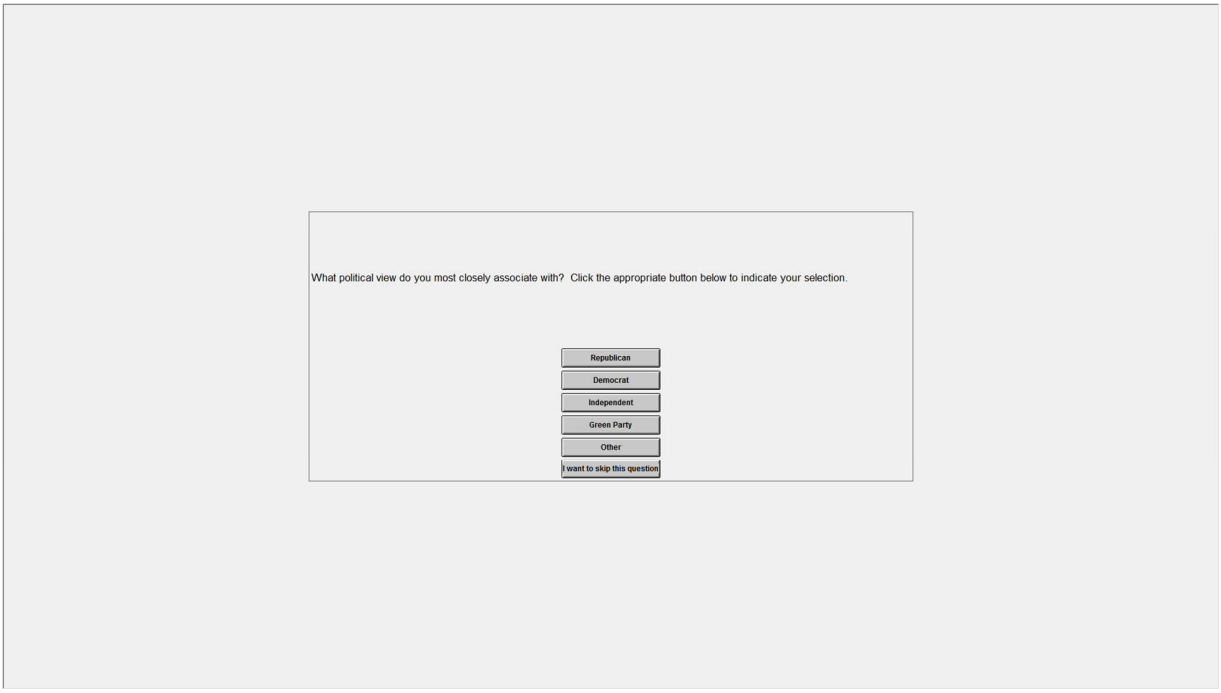

Do/did you play a varsity sport while in college? Click the appropriate button below to indicate your selection.
Yes
No
I want to skip this question

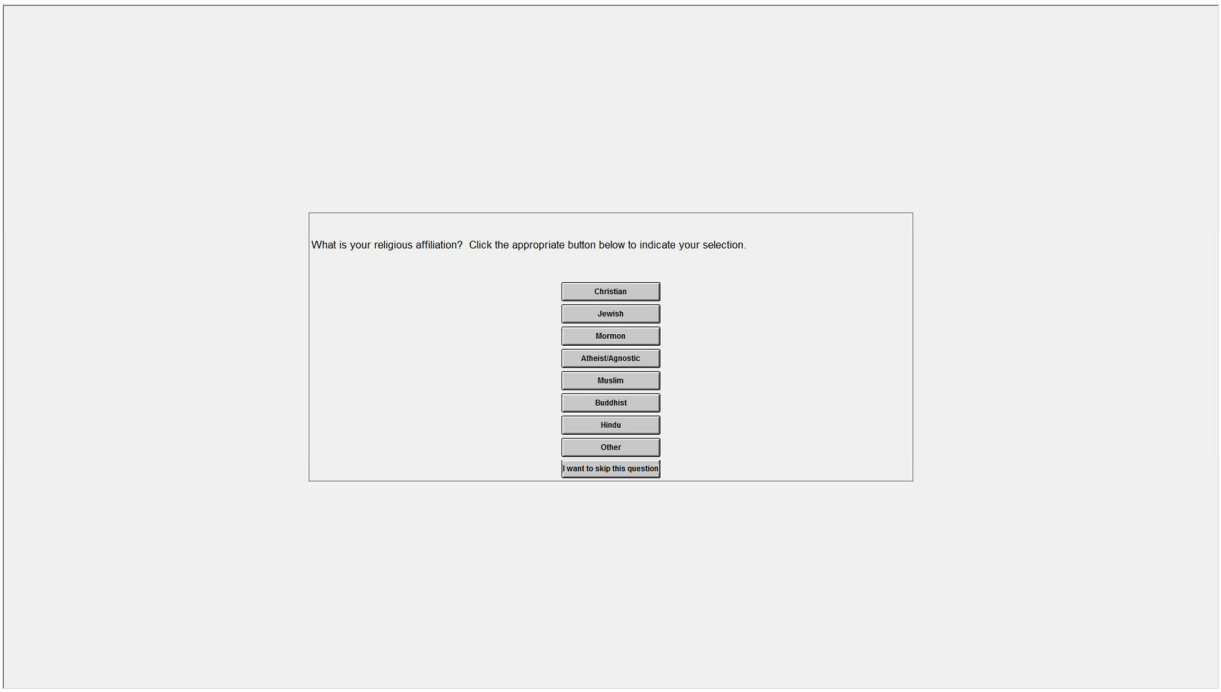

Are/were you a captain or co-captain? Click the appropriate button below to indicate your selection.
Yes
No
I did not play a varsity sport
I want to skip this question

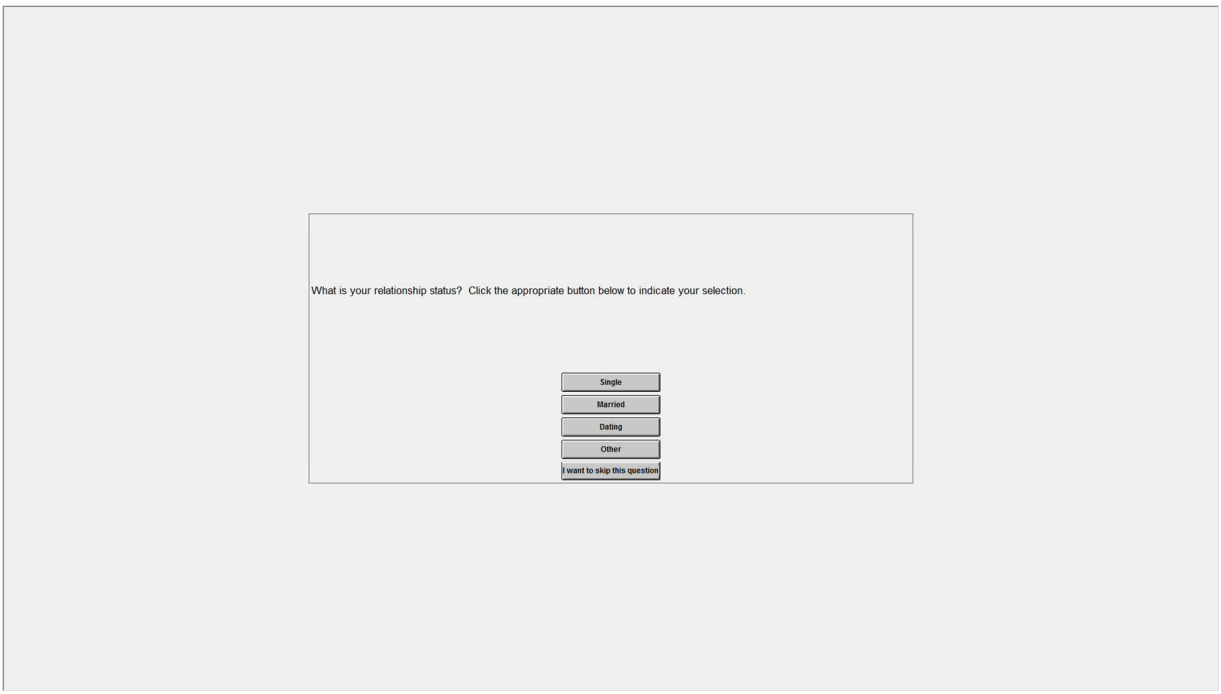

Have you ever been a COOT leader? Click the appropriate button below to indicate your selection.
Yes
No
I want to skip this question


Are you currently on financial aid? Click the appropriate button below to indicate your selection.
Yes
No
I want to skip this question


Are you a US citizen? Click the appropriate button below to indicate your selection.
Yes
No
I want to skip this question


What political view do you most closely associate with? Click the appropriate button below to indicate your selection.
Republican
Democrat
Independent
Green Party
Other
I want to skip this question


What is your religious affiliation? Click the appropriate button below to indicate your selection.
Christian
Jewish
Mormon
Atheist/Agnostic
Muslim
Buddhist
Hindu
Other
I want to skip this question


What is your relationship status? Click the appropriate button below to indicate your selection.
Single
Married
Dating
Other
I want to skip this question


How would you characterize yourself when it comes to taking risks? To answer this, consider a scale from 1 to 5 where 1 represents that you are not at all willing to take risks and 5 represents that you are very willing to take risks. Click the appropriate button below to indicate your selection.
1: Not at all willing to take risks
2: I try to avoid risks
3: I am uncomfortable taking risks
4: I enjoy taking risks
5: I seek out risky situations
I want to skip this question

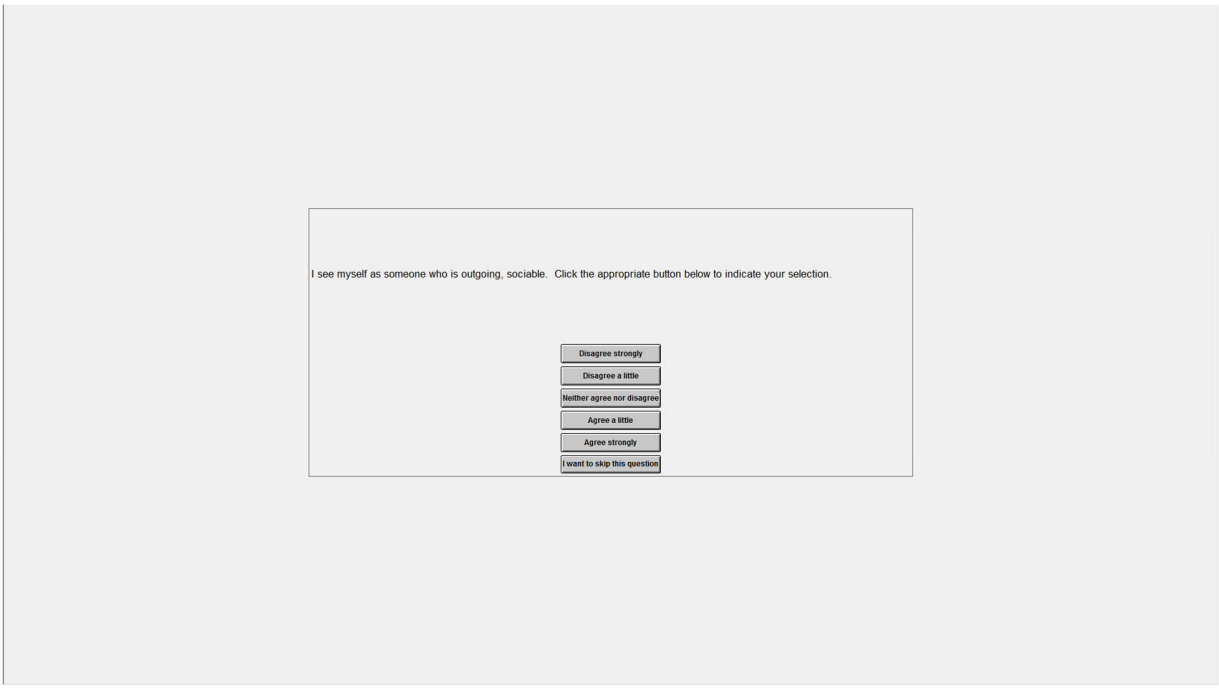

I see myself as someone who is reserved. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who is generally trusting. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who tends to be lazy. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who is relaxed, handles stress well. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who has few artistic interests. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who is outgoing, sociable. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question

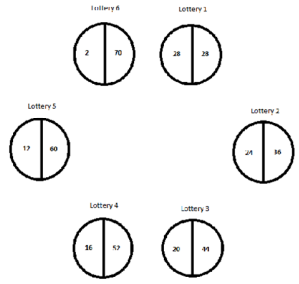

I see myself as someone who tends to find fault with others. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who does a thorough job. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question


I see myself as someone who gets nervous easily. Click the appropriate button below to indicate your selection.
Disagree strongly
Disagree a little
Neither agree nor disagree
Agree a little
Agree strongly
I want to skip this question

I see myself as someone who has an active imagination. Click the appropriate button below to indicate your selection.

- Disagree strongly
- Disagree a little
- Neither agree nor disagree
- Agree a little
- Agree strongly
- I want to skip this question



In Decision 1 you picked lottery number 6

You have a fifty-percent chance of spinning a 2

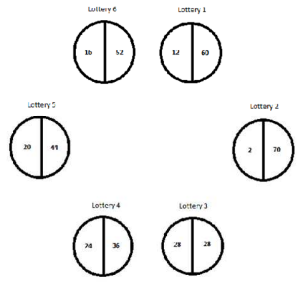
and a fifty-percent chance of spinning a 70

Click the button to see what you spun.

Spin Spinner

Decision 1: The monetary value of your spin is 2

Continue



In Decision 2 you picked lottery number 6

You have a fifty-percent chance of spinning a 16

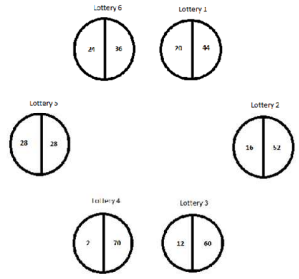
and a fifty-percent chance of spinning a 52

Click the button to see what you spun.

Spin Spinner

Decision 2: The monetary value of your spin is 16

Continue



In Decision 3 you picked lottery number 4

You have a fifty-percent chance of spinning a 2

and a fifty-percent chance of spinning a 70

Click the button to see what you spun.

Spin Spinner

Decision 3: The monetary value of your spin is 2

Continue

Payoff from Decision 1:	2
Payoff from Decision 2:	16
Payoff from Decision 3:	2
Payoff from the word problems:	12
Payoff from the timed questions:	-4
Total payoff from the experiment in experimental currency units:	28
Total payoff from the experiment in US dollars:	2.80
Given the $5 show up fee, you will take home:	7.80

Continue

Please wait for the experiment to continue.