Favorable Interpretations of Ambiguity and Unstable Preferences for Fairness

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Abstract

We show that people manipulate their attitudes towards ambiguity when doing so allows them to behave more self-interestedly. In a “dictator” decision subject chose between a “fair” and an “unfair” choice. By choosing the latter, dictators increase their own allocation by decreasing the allocation to the recipient and making the recipient’s allocation dependent on a $p = 0.5$ lottery. More unfair allocations were made when the lottery was ambiguous than when it involved simple risk. Overestimation of the expected value of allocations to recipients was higher in ambiguity, indicating that dictators believe the ambiguous lottery to be more attractive. These results are extinguished if dictators are constrained from adopting a favorable attitude towards ambiguity. These findings suggest that the relationship between ambiguity and unfairness results from a self-serving bias involving the adoption of a favorable view of ambiguity, counter to the typical unfavorable view (ambiguity aversion). We also conducted a contextualized dictator game experiment involving hypothetical managerial decisions. In line with the above findings, participants made more unfair decisions when the consequences of their decisions were ambiguous compared to when they involved simple risk, even though they prefer simple risk over ambiguity when there is no conflict between self-interest and social concerns.
I. Introduction

Much research aims to uncover the extent to which concerns for fairness influence economic behavior. Ample evidence indicates that people do not strive only to maximize their own monetary payoffs. However, people do not display an abundance of behavior that can be described as purely altruistic (i.e. behavior that prioritizes fairness above self-interest). To complicate this issue, people demonstrate inconsistent preferences for and conceptions of fairness. As a result, understanding fair behavior may be more easily tackled by addressing the question, “under what conditions will people behave fairly or unfairly?” rather than asking “how fair are people?” The current study addresses the former question by proposing that fair behavior will be influenced by the degree of subjective uncertainty or ambiguity surrounding the consequences of one’s decisions. Specifically, we test whether ambiguity – which is typically viewed as unfavorable – is regarded favorably when it determines to the consequences for another of individuals’ self-interested actions.

A. Fairness and self-serving biases

Economic actors’ behavior often indicates that they value fairness as they would any consumption good. People seem to be willing to sacrifice monetary gain to “purchase” fairness. They display non-reward maximizing altruistic behavior, such as allocating money in dictator games and donating to public goods (Dawes & Thaler 1988, Forsythe et al 1994; Andreoni & Miller, 2002), and non-reward maximizing behavior to punish those who do not behave fairly (Fehr et al 2002, Kahneman et al 1986). People show dissatisfaction not only with disadvantageous inequality, but also with advantageous inequality (Loewenstein et al 1989).
Although most people’s behavior reveals an apparent concern for fairness, it is unclear whether this behavior truly results from a stable and consistent preference for fairness. In the dictator game paradigm, Andreoni & Miller (2002) found that participants’ allocation decisions adhered to revealed preference axioms, indicating that fair outcomes are valued much like any other “good.” Several recent economic models of fair behavior (e.g., Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000) incorporate preferences for fair outcomes directly into utility functions.

However, other research demonstrates that preferences for fairness vary significantly, depending on the context and on factors that should not influence a stable preference. For instance, Schweitzer & Hsee (2002) demonstrated that people show decreased concerns for fairness when there is greater uncertainty – specifically, they communicate more deceitful information when the range of possible states of the world is larger, even if the expected value is unchanged. Recent research by Dana et al. (2004) using a version of the dictator game found that preferences for fairness are decreased when the payoff to the recipient is uncertain, even if dictators can easily and costlessly resolve this uncertainty. Dictators kept the consequences of their decisions uncertain, presumably to justify choosing the unfair allocation that is most beneficial to them. Oberholzer-Gee and Eichenberger (2003) found that when dictators were given the option to play an unattractive lottery instead of the dictator game, many subjects chose to play the lottery (even though few did in a control decision without a dictator game) and the degree of fair behavior diminished significantly.

The above results suggest that uncertainty may be viewed favorably by subjects faced with tradeoffs between self-interest and fairness. Unfair behavior may be easier to justify when there is greater uncertainty about outcomes. A complementary explanation is that uncertainty
produces perception (e.g., about what outcomes might result) that are biased in line with self-interests. Decreased preferences for fairness may be due to distorted perceptions about the likelihood of outcomes that are disadvantageous to others. Previous research indicates that people display “self-serving biases” of fairness, their perceptions about states of the world or about what is fair tend to be biased in the direction of their self-interests (Diekmann et al 1997, Messick & Sentis 1979). For example, when people are assigned a role in a legal dispute, they are unable to give an unbiased estimate of a fair settlement, even with incentives to be unbiased (Babcock et al 1995). Knowledge of one’s interests when evaluating information seems to create perceptual illusions of the true state of the world. Kunda (1990) proposed that biased perception and reasoning result when self-interests activate cognitive processes and perceptual representations that allow people to justify desired conclusions with an “illusion of objectivity.” People attempt to construct justifications, consciously or unconsciously, that would persuade a dispassionate observer and in the process manage to persuade themselves. With respect to the above results, it is possible that greater uncertainty affords more flexible perception of which actions or outcomes are fair, which facilitates arriving at justifications for self-interested behavior.

**B. Ambiguity and self-serving biases**

The current study examines the negative relationship between uncertainty and fair behavior and exposes errors in perception about risk that underlie this relationship. In line with previous research, we expect that increasing uncertainty about decision consequences will produce more self-interested behavior – even if the underlying aspects of the decision are unchanged. We propose a specific mechanism for the relationship between uncertainty and self-
interested behavior: A biased perception of risk, motivated by and resulting from a self-serving desire to justify unfair choices.

Unlike previous research, the degree of uncertainty in our experiment is objectively unchanged. We only manipulate uncertainty through the distinction between simple risk and ambiguity. Simple risk refers to a situation in which the underlying probability distribution is known. Specific probabilities can be easily associated with each possible outcome. Ambiguity increases uncertainty by decreasing the knowledge of the precise probability distribution that determines outcomes (Curley et al 1986, Fox & Tversky 1995, Keren & Gerritsen 1999). In an ambiguous situation, the precise probabilities underlying random processes are less transparent.

We implement the distinction between simple risk and ambiguity in a straightforward manner (cf. Sarin & Weber 1993). Under simple risk, subjects face a lottery in which a chip is drawn from a bag containing 10 red chips and 10 blue chips. Under ambiguity, the bag contains an unknown number of red chips and an unknown number of blue chips, totaling 20 chips, and the actual composition of the bag is determined by drawing a random number from 0 to 20. In both cases, the subject gets to specify which color corresponds to a “win.”

Although the ambiguous lottery described above might appear subjectively more uncertain than the lottery involving simple risk, if money were wagered on a particular color the expected value of a wager on the two lotteries should normatively be identical. The probability of drawing either a red or a blue chip is 0.5 in both kinds of lotteries. However, people typically display preferences for simple risk over ambiguity (i.e., “ambiguity aversion”) despite equivalent chances of a favorable outcome. Furthermore, people will often pay an ambiguity premium to avoid ambiguity. This phenomenon has been demonstrated in numerous settings, such as laboratory choice experiments (e.g. Curley et al 1986), market experiments (Sarin & Weber
Favorable Interpretations of Ambiguity

1993), and in contextualized decision contexts (e.g. Ho et al 2002). Ambiguity aversion is one of the most prominent violations of expected utility theory (Camerer & Weber 1992).

An interesting feature of ambiguity aversion is that people are ambiguity averse for gambling on both gains and losses at moderate to high probability levels (Curley & Yates 1985). The implication of this finding is that although ambiguity is viewed as unfavorable in both cases, it may be modeled as a decrease in subjective probability of outcomes involving gains and an increase in subjective probability of outcomes involving losses (Einhorn & Hogarth 1986, Sarin & Wakker 1998). In other words, people show preferences consistent with the belief that the chances of an outcome arising in a lottery decrease with ambiguity if the outcome is favorable and the belief that the chances of an outcome arising increase with ambiguity if the outcome is unfavorable. Additionally, subjects show preferences consistent with the belief that ambiguity is favorable when the probability of winning is small (less than $p = 0.25$) or when the probability of losing is high (greater than $p = 0.75$) (Curley & Yates 1989).

Synthesizing the above findings, it appears that the influence of ambiguity on the perceived subjective probability of events can either be positive (increased subjective probability) or negative (decreased subjective probability). Moreover, ambiguity can be perceived as favorable or unfavorable depending on the probability range. Thus, the effects of ambiguity on perceptions of subjective probability are not constant, but instead vary depending on the decision context.

This flexibility of attitudes towards ambiguity along with the apparent instability of preferences for fairness in contexts involving uncertainty may enable people to justify more selfish behavior when the consequences of decisions are based on ambiguity instead of simple risk. Specifically, we propose that a self-serving bias will lead people to manipulate their
subjective probability distributions in situations involving ambiguity to distributions that are favorable for the recipient. Therefore, we predict that people will feel more comfortable making self-interested, and less fair, choices when the consequences for the recipient are ambiguous. We also expect that estimations of decision consequences will reflect self-serving biases to a greater extent when decisions are made under ambiguity than simple risk.

We present two studies in which we test whether people manipulate their attitudes towards ambiguity in order to behave more self-interestedly at the expense of another. In the first experiment, dictators make a series of choices between unfair allocations that involve a lottery for the recipient and fair ones that do not. We manipulate whether the lottery involves ambiguity or simple risk. We find that selfish choices increase under ambiguity, and that dictators significantly overestimate recipients’ payoffs under ambiguity. We also find that the above difference is extinguished when dictators initially make a choice reflecting their attitude towards ambiguity in a context not involving fairness, demonstrating that favorable attitudes towards ambiguity are constrained by previously expressed attitudes.

In a second experiment we extend the results of the first experiment to a managerial context, presenting non-university subjects with hypothetical choices. The results replicate those of experiment 1 – subjects are more likely to behave self-interestedly when the consequences for the recipient involve ambiguity than when they involve simple risk.

II. Experiment 1

We modified the standard dictator game into a decision involving a binary choice. Subjects in our experiment made four such binary choices (see Table 1 in section II.B). We also introduced uncertainty by having some outcomes depend on the resolution of lotteries. In this
modified game, one subject in each pair chooses between a “fair” allocation and an “unfair” allocation. In the fair allocation, the payoff to the dictator and the recipient are somewhat equitable and both payoffs are guaranteed. By choosing the unfair allocation the dictator can increase his or her payoff by decreasing the payoff to the recipient. Additionally, in the unfair allocation the payoff to the recipient depends on a lottery with a $p = 0.5$ chance of success. This is considered the unfair allocation because it increases the inequity between the payoffs to the dictator and the recipient even if the outcome of the lottery produces a “win” for the recipient.

Ambiguity is manipulated through the use of different lotteries. In the simple risk condition outcomes are decided by lotteries in which the experimenter draws from a bag containing 10 red chips and 10 blue chips. In the ambiguity condition the bag contains 20 blue and red chips in unknown proportions.

We conducted two kinds of sessions, which varied in the extent to which initial choices constrained subjects’ attitudes towards ambiguity. In the “Unconstrained” treatment subjects made four dictator decisions like those described above, estimated the expected value of the amount to be received by the recipient, completed a brief questionnaire, and then chose whether to play an ambiguous or simple risk lottery for themselves. Our main hypothesis is that in this treatment – in which subjects attitudes towards ambiguity are not constrained by previous choices – subjects will be more likely to choose selfishly when the lotteries for the recipient are ambiguous and will also produce higher estimates of the expected amount to be received by the recipient under ambiguity than under simple risk.

We also conducted a different treatment to see if having subjects initially develop attitudes towards ambiguity in a context not involving fairness – when there is no need for motivated reasoning to view ambiguity as favorable – would extinguish the above effect. In the
“Constrained” treatment, subjects first made four choices between lotteries and certain amounts for themselves (similar to the amounts used for the recipient in the modified dictator game) either under ambiguity or simple risk. They then chose whether to play an ambiguous or simple risk lottery for themselves. They then made four dictator choices and estimates as in the Unconstrained treatment. Our hypothesis here is that the initial experience of making choices involving ambiguity for one’s self will restrict the extent to which subjects can engage in the motivated reasoning that makes ambiguity subjectively attractive in the Unconstrained treatment. Therefore, we expect that dictators in the Constrained treatment will not be more likely to choose the selfish option under ambiguity and will not provide higher estimates of recipients’ payoffs under ambiguity. The initial four choices in this treatment also serve as a control to ensure that subjects are ambiguity averse (or at least not ambiguity seeking) for lotteries similar to those received by recipients.

A. Design and Hypotheses

1. Unconstrained treatment

The primary hypothesis of this study is that ambiguity facilitates motivated reasoning, allowing dictators to manipulate their beliefs of the subjective probability of recipients’ winning lotteries associated with the unfair choice. This means we expect a positive relationship between ambiguity and selfish behavior.

Hypothesis 1a: Dictators will make more unfair allocation decisions in the ambiguity condition than in the simple risk condition.
While dictators make allocation decisions with real consequences for the recipients, the recipients simultaneously make identical hypothetical decisions. Recipients were instructed that their decisions would not have consequences for themselves or for the person they are matched with. We hypothesize that since recipients’ decisions are hypothetical, they will not engage in motivated reasoning. Thus, we expect there will not be a positive relationship between ambiguity and unfairness for the recipients.

**Hypothesis 1b:** For recipients, the number of unfair decisions made in the ambiguity condition will not be significantly different from the number of unfair decisions made in the simple risk condition.

We propose that the mechanism underlying the relationship between unfair choices and ambiguity is a biased perception of the distribution of lottery outcomes under ambiguity that increases the perceived equity of an unfair choice. Specifically, we hypothesize that when dictators are motivated to make unfair choices out of self-interest they will focus on the possibility of a favorable probability distribution for the ambiguous lottery associated with an unfair allocation. Thus, dictators will overestimate the expected value of unfair allocations to the recipient. In order to test this hypothesis, we asked participants to estimate the expected value of the payoff to be received by the recipient based on the four allocation decisions. Participants were motivated to give accurate estimates by giving them a $1 incentive for estimates within $0.10 of the correct value.
**Hypothesis 2a:** Dictators will overestimate the expected value of their allocation decisions more in the ambiguous condition than in the simple risk condition.

This hypothesis runs counter to previous research on ambiguity aversion, which indicates that for gains at $p = 0.5$, people demonstrate behavior consistent with an underestimation of the expected value of ambiguous lotteries compared to simple risk lotteries (Camerer & Weber 1992). Hypothesis 2a predicts that motivated reasoning will swamp or overwhelm the tendency for people to understate the value of ambiguous lotteries, resulting in the adoption of a favorable view of ambiguity.

Recall that recipients also made four hypothetical dictator decisions. Recipients were also asked to estimate the expected value that the hypothetical recipient would have received based on these four choices. For these subjects there is no motivation to use ambiguity to justify unfair decisions. Thus, they should not overestimate the expected value of ambiguous lotteries.

**Hypothesis 2b:** Recipients will not overestimate the expected value of their hypothetical allocation decisions more in the ambiguous condition than in the simple risk condition.

We also asked subjects five questions regarding the degree of fairness of the choices they had just made and their overall perceptions of how fair they view themselves. We believe that a favorable interpretation of ambiguity will allow subjects to view each selfish choice as less unfair under ambiguity (because of the inflating subjective probability for the lottery) than under simple risk.
Hypothesis 3: Controlling for the number of unfair choices made, a subject will perceive their behavior and themselves as more fair under ambiguity than under simple risk.

2. Constrained treatment: Extinguishing the effect

Essential to Kunda’s (1990) description of motivated reasoning is that beliefs are selectively formed that serve one’s motivations or self-interests, but that these beliefs must be constrained by what is plausible and must not contradict other previously-held beliefs. We conducted an additional treatment to test whether positive attitudes towards ambiguity would not arise when subjects first developed attitudes towards the two lotteries in a context not involving fairness. Thus, participants first made four binary decisions in which they chose between receiving a lottery for some dollar amount or the expected value of that lottery for certain (see Table 2 in section II.B). Fairness was not an issue in these choices. In a between subjects design, participants made these decisions under either simple risk or ambiguity. Participants then estimated the expected value of their payoffs based on these four decisions.

Since the four initial choices involve similar dollar amounts to those received by recipients in the modified dictator game, this treatment also serves as a control to ensure that subjects are not ambiguity seeking over these kinds of lotteries. Otherwise, our hypothesized result of more selfish behavior under ambiguity could be consistent with recipients’ actually preferring ambiguity for these amounts and probabilities. Therefore, for these four choices, we expect that decisions will reflect the belief that ambiguous lotteries are worth less than or are equivalent to simple risk lotteries (a neutral or unfavorable view of ambiguity).
Hypothesis 4a: For the four initial choices not involving fairness, subjects will not choose the ambiguous lotteries more frequently than the simple risk lotteries.

Hypothesis 4b: For the four initial choices not involving fairness, subjects will not overestimate the value of their four choices more under ambiguity than under simple risk.

In the Unconstrained treatment, we hypothesize that increased selfish choices under ambiguity result from motivated reasoning. Dictators are motivated to serve their self-interests and to view their behavior as fair (or not unfair). Adoption of a favorable view of ambiguity reconciles these competing tensions by allowing dictators to perceive self-interested decision as more fair (i.e., more generous to the recipients). We therefore expect that when subjects initially adopt an unfavorable (or neutral) view of ambiguity, it will be difficult to then subsequently adopt a favorable view. In the Constrained treatment, subjects begin by making the four choices that involve lotteries but do not involve fairness. They then stated whether they preferred playing either an ambiguous or simple risk lottery for $5, and were told that one subject would be randomly selected at the end of the experiment to actually play the lottery specified. In line with previous research on ambiguity aversion, we expected most participants to prefer the simple risk lottery, demonstrating behavior consistent with an unfavorable view of the ambiguous lottery. We then expect that they would be unable to adopt a favorable view of ambiguity in their “dictator” choices. That is, we expect the effect in Hypothesis 1a to disappear.
Hypothesis 5: In the Constrained treatment there will not be a difference in the number of self-interested choices between dictators’ in the ambiguous condition and in the simple risk condition.

We also expect that the unfavorable view of ambiguity will no longer mean that dictators can alter their subjective beliefs about the likelihood of the lottery being a “win.” Therefore, we expect that their estimates of the recipients’ payoffs in the Constrained treatment will be unaffected by ambiguity versus simple risk.

Hypothesis 6: In the Constrained treatment there will not be a significant difference between dictators’ estimates of the expected value of the allocation to the recipients in the ambiguous condition compared to the simple risk condition.

B. Methods

1. Participants

Participants were recruited from a subject pool of undergraduate business students. Participants received extra credit in one of their business courses in exchange for participation in an hour long experiment. In addition, subjects received their cash earnings privately at the end of the experiment. In the Unconstrained treatment, we used 33 pairs of dictators and recipients (16 under simple risk, 17 under ambiguity). In the Constrained treatment, we used 36 pairs (19 under simple risk, 17 under ambiguity).

2. Procedures
Table A1 in the appendix describes the procedures, in sequence, for each of the two treatments.

\textit{a. Lotteries}

Every session involved lotteries with either known (simple risk) or unknown (ambiguity) probabilities. At the beginning of the session, subjects were informed that they would be making decisions involving lotteries. The distinction between the simple risk lottery (termed “Lottery 1”) and the ambiguous lottery (termed “Lottery 2”) was then explained. Lottery 1 involved a bag containing 10 red chips and 10 blue chips. Lottery 2 involved a bag containing an unknown combination of the two colors totaling 20 chips. Participants were informed that the contents of Lottery 2 were determined by selecting a new random number every time the lottery was played. For each allocation decision the dictator chose the winning color. Next it was revealed which lottery that session had been assigned to play.\footnote{The rationale for describing both lotteries to each session was based on empirical evidence that ambiguity is only perceived in a comparative context (Fox & Tversky 1995).}

\textit{b. Allocation decisions and estimates}

Participants were then instructed about the first set of decisions they would be making. In the Unconstrained treatment, this was the modified dictator game. Participants were randomly assigned to the role “A” (dictators) or “B” (recipients) and paired with a participant in the opposite role. Participants were assured that their identity and the identity of the person they were matched with would be kept anonymous. It was explained that A participants would make decisions with consequences for themselves and for the B participant they were matched with, involving lotteries that would be played at the conclusion of the experiment. B participants
would be making similar decisions, but their decisions would be hypothetical in that they would not be played. A’s and B’s were moved to opposite sides of the room following role assignment.

| Allocation Decision | Fair Choice | | Unfair Choice | |
|---------------------|-------------|---|---------------|---|
|                     | Dictator    | Recipient | Dictator      | Recipient |
| 1                   | $1.50       | $1.00     | $2.25         | $0.50 lottery |
| 2                   | $2.00       | $1.75     | $3.00         | $0.50 lottery |
| 3                   | $2.00       | $1.50     | $2.25         | $1.00 lottery |
| 4                   | $1.00       | $0.75     | $1.50         | $0.50 lottery |

Table 1: Experiment 1 payoffs to the dictator and the recipient for each allocation decision made by the dictators.

Table 1 lists the payoff structure for each allocation decision. The following is the format that participants saw for allocation decision 1:

Please select one of the following:

   __ You receive $1.50 for certain and the person you are matched with receives $1 for certain
     OR
   __ You receive $2.25 for certain and the person you are matched with wins $0.50 if a winning chip is drawn in his/her lottery

Subjects received a stack of four sheets, each of which contained a decision like the one presented above. Subjects were told to go through each sheet one by one, and to not return to previous sheets. Decisions were collected and another response sheet was distributed, asking participants to estimate the expected dollar amount that the recipient of the previous four choices

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2 The order of decisions was counterbalanced, with roughly one half of the sessions receiving the decisions in the opposite order.
would receive after the resolution of the four lotteries.\textsuperscript{3} They were told that for estimates within $0.10 of the expected value they would receive a $1 bonus.

c. \textit{Fairness questionnaire}

Subjects then received a brief questionnaire in which they responded to five questions concerning the fairness of their own choices and how fair they viewed themselves more generally. Each question asked subjects to rate their response on a 9-point scale. The five questions were:

1. How fair were your choices?
2. How fair were your choices compared to the average participant?
3. How do you think your choices will be viewed by the recipient?
4. In general, how important is being fair to you?
5. In general, do you think you are a fair person?

d. \textit{Ambiguity aversion control}

Subjects then made a decision in which they chose which kind of lottery (1 or 2) they would like to play for $5. Participants were also asked to pick a winning color. Participants were informed that one participant would be selected at the end of the session at random to play the lottery. This was done to test whether these subjects exhibited ambiguity aversion in a context not involving fairness.

f. \textit{Constrained treatment: Extinguishing the effect}

The Constrained treatment was identical to the Unconstrained treatment, except that subjects first made decisions with no conflict between self-interest and social concerns. After

\footnote{\textsuperscript{3} We explicitly asked subjects for the “expected value.” To illustrate the concept of expected value, we also informed participants that for every combination of choices there is a correct estimate, based on the laws of probability, and this is the best guess one could make given that the outcomes of the lotteries are not yet known.}
the explanation of lotteries in the Constrained treatment, subjects were told that they would each make decisions involving payoffs for themselves. Table 2 lists the payoff structure for each decision. The following is the format that the participants viewed for decision 1:

Please select **one** of the following:

__ You receive **$0.75** for certain

OR

__ You receive **$1.50** if a winning chip is drawn in a lottery

| Decision | Choice 1 | Choice 2          |
|----------|----------|-------------------|
| 1        | $.75     | $1.50 lottery     |
| 2        | $.50     | $1.00 lottery     |
| 3        | $1.00    | $2.00 lottery     |
| 4        | $.25     | $.50 lottery      |

Table 2: Initial choices in Constrained treatment (made either under simple risk or ambiguity).

Subjects received a stack of sheets containing the four decisions and were instructed to go through them one at a time. After the experimenter collected the choices, subjects received a sheet asking them to estimate the expected value of their own payoff.

Subjects in the Constrained treatment then completed the ambiguity aversion control, described above, regarding the choice of Lottery 1 or Lottery 2 to be played for $5. They indicated a choice of lottery and a winning color.

The Constrained treatment then proceeded identically to the Unconstrained treatment, beginning with random assignment to the role of A (dictator) or B (recipient) and instructions regarding the modified dictator game.

C. Results
Table 3 presents the number of unfair choices in the four allocation decisions by condition (ambiguity vs. simple risk) and treatment (Unconstrained vs. Constrained) for both real dictators (A participants) and hypothetical dictators (B participants). In general, the results appear to support our main hypothesis. The highest frequency of unfair choices is made by real dictators under ambiguity in the Unconstrained treatment. To more carefully test our prediction, we consider the separate hypotheses presented earlier.

|                              | Unconstrained | Constrained |
|------------------------------|---------------|-------------|
| **Real dictators** (A participants) |               |             |
| Simple risk                  | 2.25 (56%)    | 2.32 (58%)  |
| Ambiguity                    | 3.06 (77%)    | 2.18 (55%)  |
| **Hypothetical dictators** (B participants) |       |             |
| Simple risk                  | 2.56 (64%)    | 2.11 (53%)  |
| Ambiguity                    | 2.41 (60%)    | 2.35 (59%)  |

Table 3: Number of unfair choices (corresponding percentage) by treatment, condition, and role

1. Unconstrained treatment

a. Allocation decisions

Hypothesis 1a predicted that dictators in the Unconstrained treatment would make more unfair choices in the ambiguous condition compared to the simple risk condition. This hypothesis was confirmed. Dictators in the simple risk condition made an average of 2.25 unfair decisions (56%, n=16), while dictators in the ambiguous condition made an average of 3.06 unfair decisions (77%, n=17). Comparing the mean number of unfair decisions of each individual (treating the individual as the unit of observation), we find that this difference is statistically significant (t(31)=1.87, p=.04, one-tailed).

The dictator’s decision had real consequences for the recipients they were matched with, meaning they were motivated to find justifications for unfair choices, such as viewing ambiguity as favorable. In contrast, the recipients’ decisions were only hypothetical and thus they were not
motivated to use ambiguity as a justification for unfair decisions. Hypothesis 1b predicted that there would not be a significant difference between the numbers of unfair hypothetical decisions made in ambiguity compared to simple risk for the recipients. This hypothesis was confirmed. In the simple risk condition recipients (“hypothetical dictators”) made an average of 2.56 (64%, n=16) unfair decisions, while in the ambiguous condition this number was 2.41 (60%, n=17).

b. Estimates of allocations to recipient

The degree of overestimation of the combined expected value of one’s allocations to the recipient represents an overestimation of one’s generosity. Consistent with Hypothesis 2a dictators in the Unconstrained treatment overestimated the expected value of their allocations to the recipient more in ambiguity than in simple risk. In the simple risk condition, dictators underestimated the expected value of their four allocations to the recipient by $0.17 (n=11), while in the ambiguous condition, dictators overestimated the value of the expected value of their allocations by $1.37 (n=17). This comparison is represented by the two leftmost bars in Figure 1. This difference is statistically significant (t(26)=2.35, p=.01, one-tailed).

As predicted by Hypothesis 2b, we did not find greater overestimation in the ambiguous condition compared to the simple risk condition for the recipients, whose decisions upon which the estimates were based were hypothetical (though the recipients could also earn money based on the accuracy of their predictions). Under simple risk, the mean overestimate was $0.14

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4 This difference is not statistically significant (t(31)=0.31, p=0.76, two-tailed).
5 Interestingly, across all conditions overestimation increases as the number of unfair decisions increases. That is, participants overestimate their generosity more the less generous they actually are. This result held across conditions (ambiguity and simple risk) for both the dictators’ estimates based on their real decisions (F(1,26)=12.27, p<.01), and the recipients’ estimates based on their hypothetical decisions (F(1,26)=6.97, p=.01).
6 Five observations were lost due to incorrect initial question phrasing. The way we worded the question for the first session led participants to estimate the expected value of a single decision, instead of the expected value of the 4 decisions in total. Since this produces even more underestimation (which we predict for simple risk relative to ambiguity), including these estimates would only strengthen our result (though for the wrong reason).
(n=11), while under ambiguity it was $0.25 (n=17) and this difference was not significant (t(26)=.23, \( p=0.82 \), two-tailed test). This difference is represented by the second set of two bars in Figure 1.

![Figure 1: Degree of overestimation of expected payoff (estimate – actual) across four decisions.](image)

All bars reflect estimates of the expected payoff of four allocations to recipient, except for “initial choices” which represent the estimate of expected payoffs to self from four decisions in Constrained treatment

c. Questionnaire responses

After making their choices, subjects answered five questions regarding the fairness of their behavior and their own disposition to behave fairly. Hypothesis 3 predicted that their responses to these questions would reflect a belief that selfish choices made under ambiguity were less unfair that those made under simple risk.
Table 3 presents the results of regressions with responses to the five questionnaire items as dependent variables and three dependent variables: number of unfair choices, a binary variable indicating the subject’s choices involved ambiguity (1) or simple risk (0), and an interaction term between unfair choices and ambiguity. Hypothesis 3 predicted that the perceptions of one’s own fairness would be less negatively influenced by making unfair choices under ambiguity than under simple risk (i.e., the coefficient on the interaction term would be positive).

| Dependent variable (all measured on a 9-point scale) | Item1 | Item2 | Item3 | Item4 | Item5 |
|-----------------------------------------------------|-------|-------|-------|-------|-------|
| **S.I. choices**                                    | -0.76 (0.34)** | -0.70 (0.20)** | -1.58 (0.24)** | -0.28 (0.29) | -0.44 (0.19)** |
| **Ambiguity**                                       | 2.76 (2.02) | 0.09 (1.16) | -1.69 (1.44) | -1.23 (1.73) | -0.99 (1.13) |
| **Amb. x SIch**                                     | -0.67 (0.66) | 0.07 (0.38) | 0.72 (0.47) | 0.24 (0.57) | 0.64 (0.37)** |
| **Constant**                                         | 6.08 (0.92)** | 6.95 (0.53)** | 7.36 (0.66)** | 7.81 (0.79)** | 7.79 (0.52)** |
| **N**                                               | 33 | 33 | 33 | 33 | 33 |
| **R-squared**                                        | 0.280 | 0.367 | 0.625 | 0.073 | 0.213 |

- p < 0.1; ** - p < 0.05; *** - p < 0.01; * - one-tailed

Table 3. Regressions of perceptions of fairness on condition and behavior

As the results in Table 3 indicate, dictators recognize the unfairness of self-interested choices (row 1). The analysis reveals mixed support for the hypothesis that self-interested behavior under ambiguity would not be viewed as unfair as under simple risk (italicized row). Specifically, for Item 3 ambiguity appears to decrease the effect of unfair choices on rated fairness by about one-half (p = 0.07, one-tailed), while for Item 5 it appears to eliminate almost all the effect (p = 0.05, one-tailed). However, the other effects are small, and the sign of the

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7 The analysis includes only subjects in the role of real dictators.
coefficient for Item 1 is the opposite of what we hypothesized. Therefore, there is only modest support for Hypothesis 3.\(^8\)

2. Constrained treatment

a. Initial choices

In the Constrained treatment, subjects started off by making four choices that did not involve allocations to another. The roles of dictator and recipient had not been explained yet, so every subject made this choice.\(^9\) In each of these choices, a subject chose between some certain amount and a lottery (see Table 2). Hypothesis 4a predicted that subjects would choose the lottery under simple risk at least as frequently as they would under ambiguity. This hypothesis is confirmed. Subjects in the simple risk condition chose the lottery on average in 2.89 of the 4 choices they made (72%, n=38), while subjects in the ambiguity condition did so in 2.91 of the 4 choices (73%, n=34). Since the two proportions are almost identical, we can reject the possible confound that for this level of stakes and probability, the ambiguous lotteries are actually more attractive to recipients than those involving simple risk, though we don’t find great degrees of risk aversion, either.

Participants also estimated the expected value of their own payoffs for these decisions. Hypothesis 4b predicted that the degree of overestimation of ambiguous lotteries would be less than or equal to the degree of overestimation for the simple risk lotteries. Counter to Hypothesis 4b, overestimation was slightly higher under ambiguity compared to

\(^8\) One possible reason for this result lies in the payoffs in Table 1. Note that even if the lottery produces a “win” for the recipient (which we argue dictators perceive as more likely under ambiguity), the outcome is still unfair since it produces lower payoffs for the recipient than the fair choice. Therefore, the self-interested option can be seen as unambiguously unfair, independently of the probability of the recipient winning the lottery.

\(^9\) Participants had received ID numbers (1A, 1B, 2A, 2B, 3A, 3B, etc.) but had not yet been told what the letter portion of the ID represented. There are no significant differences by role for these initial choices.
simple risk. The value of payoffs was underestimated slightly in simple risk by $0.04 (n=38) and overestimated in ambiguity by $0.46 (n=34). This difference is statistically significant (t=2.16, \( p=.03 \), two-tailed). These estimates are presented in Figure 1 by the two rightmost bars.

While subjects overestimated their payoffs for these decisions under ambiguity, the degree of overestimation is significantly smaller than for dictators’ estimates of the value of their allocations to recipients under ambiguity in the Unconstrained treatment (t=2.41, \( p=.02 \), two-tailed).\(^{10}\) This means that although there is the tendency to overestimate in ambiguity even for choices not involving fairness, the degree of overestimation is roughly three times as large for decisions that do involve fairness, and this difference is significant.

\( b. \) Allocation decisions

Hypothesis 5 predicted that the relationship between ambiguity and unfair allocation decisions would be Constrained if dictators first make decisions in which they state their own attitudes towards ambiguity in a context not involving fairness. To do this, we first had subjects make the four choices described above and then state a preference for which kind of lottery – involving either simple risk (Lottery 1) or ambiguity (Lottery 2) – they would like to play for $5.

As expected, a majority of subjects exhibited ambiguity aversion in this choice, with 67 percent of the dictators in the ambiguous condition preferring the lottery involving simple risk.

\(^{10}\) There was no comparable difference in the degree of overestimation between the estimates for the four decisions above under simple risk and dictators’ estimates of their allocations to recipients under simple risk in the Unconstrained treatment (t=.32, \( p=.75 \), two-tailed).
(n=72). This is significantly different from 50 percent using a binomial test (p<0.01, one-tailed).11

Subjects then made “binary dictator” allocation decisions in exactly the same way as in the Unconstrained treatment. One half of the subjects (role A) were real dictators making decisions with consequences for themselves and one other participant, while the other half (role B) where the recipients who made identical hypothetical decisions. Hypothesis 5 predicted that there would be no difference between the choices made by real dictators under either ambiguity or simple risk.

We find support for hypothesis 5. In the simple risk condition, dictators made an average of 2.32 unfair choices (58 percent, n=19), while under ambiguity they made an average of 2.18 unfair choices (54 percent, n=17). This difference is not significantly different (t(36)=0.27, p=0.78, two-tailed).

Hypothesis 5 also predicts that dictators under ambiguity in the Unconstrained treatment should be significantly less fair (because they can adopt a favorable view of ambiguity) than dictators under ambiguity in the Constrained treatment (who are constrained by their initial attitudes towards ambiguity). To test this, we compare the average number of unfair choices in the ambiguity condition (2.18, 54 percent) with the number of unfair choices made by dictators under ambiguity in the Unconstrained treatment (3.06, 77 percent). This difference is statistically significant (t(34)=2.03, p=0.03, one-tailed). That is, subjects who were required to state an attitude towards ambiguity earlier in the experiment – in a

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11 Participants in the Unconstrained treatment (n=68) also received the same question near the end of the experiment. For these subjects, 74 percent chose Lottery 1 over Lottery 2 (significant different form 50 percent at p < 0.001). The difference between the Unconstrained and Constrained treatments is not significant. There are also no significant differences (at p < 0.1) for any comparison by role or ambiguity (either pooled or separately for each treatment).
context not involving fairness – are significantly less likely to give ambiguous lotteries to recipients.

c. Estimates of allocations to recipient

We also predicted that dictators in the Constrained treatment would be constrained in the extent to which motivated reasoning would allow them to view ambiguity as favorable, and that this would be reflected in their estimates of the recipient’s payoff. Hypothesis 6 predicted that the degree of overestimation of the recipient’s payoff would be equal under ambiguity and simple risk in the Constrained treatment. Dictators in the simple risk condition underestimated the expected value of the recipients’ payoffs by $0.10 on average (n=19) while dictators in the ambiguity condition overestimated the value by $0.33 on average (n=17). This difference is not significant (t(34)=0.87, p=0.39, two-tailed), confirming Hypothesis 6. This comparison is presented in the middle two bars of Figure 1.

Hypothesis 6 also predicts that the degree of overestimation for dictators under ambiguity in the Constrained treatment ($0.33) will be significantly lower than the degree of overestimation for dictators under ambiguity in the Unconstrained treatment ($1.37). This difference is significant (t(32)=1.96, p=0.03, one-tailed).

D. Discussion

The primary goal of this experiment is to demonstrate that a motivation to behave self-interestedly can allow people to manipulate their attitudes towards ambiguity. Results indicate that unfair decisions increase when decision consequences are dependent on ambiguity compared to simple risk. That is, dictators acted more self-interestedly when the
consequences of their actions for a recipient involved ambiguity rather than simple risk. Moreover, the estimates of the expected value of choices to the recipient results strongly suggest that the mechanism that underlies increased unfairness in ambiguity is a biased subjective probability for subjects who are motivated to view ambiguity as favorable.

The above effects were not found for B participants (“hypothetical dictators”) or for participants who had previously made a choice indicating a negative attitude towards ambiguity. That is, when there is no motivation to view ambiguity as favorable or when that motivation is constrained by one’s own earlier behavior, then it becomes impossible to adopt a favorable attitude towards ambiguity.

Finally, we also find some evidence that dictators under ambiguity are more able to justify their choices as having been more fair than dictators under simple risk.

The above findings are consistent with previous evidence suggesting that preferences for fairness are unstable and that people will engage in “moral wriggling,” seizing opportunities to behave self-interestedly without explicitly appearing to be doing so (Dana et al 2004, Schweitzer & Hsee 2002). That is, when people are presented with a valid “excuse” for behaving self-interestedly, many who would otherwise have behaved fairly will seize upon it.

Of course, it is important to extend our work to decision contexts that are more like those encountered outside the laboratory. Therefore, we now turn to a study that examines the same behavioral effect of ambiguity, but in a contextualized experiment

III. Experiment 2

A. Design and Hypotheses
In order to show that the relationship between ambiguity and unfairness holds in a contextualized setting, in addition to decontextualized laboratory settings, two versions of an experiment were conducted with contextualized managerial decisions using non-student subjects. Participants were asked to make a binary decision based on a hypothetical situation that mimics the basic structure of the modified dictator game used in experiment 1. One of the two possible choices promoted self-interest at the expense of another and was thus operationalized as the unfair choice. The two contexts were a hiring decision (where the self-interested choice consisted of hiring a friend of unknown quality) and a business strategy decision (where the self-interested choice consisted of a risky strategy potentially producing high earnings but also potential layoffs). Participants made these decisions in a context in which the probabilities of decision consequences were either ambiguous or specifically defined as $p=0.5$ (simple risk).

**Hypothesis 7:** More self-interested decisions will be made in the ambiguous condition than in the simple risk condition.

If unfair decisions increase in ambiguity relative to simple risk, then participants are making decisions consistent with an implicit preference for ambiguity over risk. That is, if unfair decisions are higher in ambiguity compared to risk, then participants must view the chance of a positive consequence in ambiguity as being higher than the chance of a positive consequence in risk. In order to demonstrate that the preference for ambiguity over risk is a result of motivated reasoning aimed at justifying unfair decisions, we also need to demonstrate that participants do not normally prefer ambiguity over simple risk in these contexts. Therefore,
participants also indicated whether they preferred decision consequences to be dependent on ambiguity or simple risk for decisions that had consequences only for themselves.

**Hypothesis 8:** For decisions that only have consequences only for themselves, at least as many participants will prefer consequences dependent on simple risk than ambiguity.

**B. Methods**

1. **Participants**

   People waiting to board planes in airports were approached and asked if they would complete a survey asking them to make hypothetical decisions. For the hiring decision, \( n=39 \) in the simple risk condition, \( n=65 \) in the ambiguous condition, and \( n=25 \) in the ambiguity aversion check. For the strategy decision, \( n=95 \) in the simple risk condition, \( n=72 \) in the ambiguous condition, and \( n=46 \) in the ambiguity aversion check.

2. **Procedures**

   In a between subjects design, participants were given hypothetical decisions either under conditions of ambiguity or simple risk. For each decision, there was a “fair” choice and an “unfair” choice. We used two different decisions with almost identical structures. One decision involved a strategy decision, while the other involved a hiring decision.\(^{12}\)

   The materials for the hiring decision are presented below. Participants decided between hiring someone who appears to be a better candidate or a friend who is slightly less qualified. In

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\(^{12}\) We also initially used a question about whether to reveal negative information about a car one is trying to sell. However, the ambiguity aversion check did not produce ambiguity aversion for this decision (i.e., responses indicated a preference for ambiguity even with decisions not involving fairness), so we discontinued collection and analysis of this question.
the ambiguous condition it was stated that both employees are fresh out of school so it is unclear how they will perform. In the unambiguous condition it was stated that both the employees were of average intelligence and skill, as evidenced by previous work performance. In a between subjects design participants made this decision under conditions of simple risk or ambiguity. The changes that were made for the ambiguity condition are in italics:

Imagine that that as part of your job you have been asked to review applicants and recommend someone for a high paying position. You must decide between the following people to recommend:

___ [“Fair” Choice]: Applicant 1 is the best applicant. He is a current employee who has proven to be a competent employee. [He is a recent graduate fresh out of school.] He seems to be of average intelligence and skill compared to his peers. [He has not had any work experience before so it is not clear how he will perform. He may turn out to be very good or very bad or just average.]

___ [“Unfair” Choice]: Applicant 2 is the next best choice and is a friend of yours. He has also proven to be an adequate employee in previous jobs. [He is a recent graduate of the same school but has slightly lower grades.] He seems to be of average intelligence and skill compared to his peers. [He also does not have any work experience so it is not clear how he will perform. He may turn out to be very good or very bad or just average.]

The following is the ambiguity aversion check for the hiring decision:

Imagine that you must hire someone to work for you. You must decide between the following people to hire:

___ [Simple risk]: Applicant 2 has had past work experience and has proven to be a competent employee. He seems to be of average intelligence and skill compared to his peers.

___ [Ambiguous]: Applicant 1 is fresh out of school. He has not had any work experience before so it is not clear how he will perform. He may turn out to be very good or very bad or just average.

The materials for the strategy decision are reported below. In this decision subjects chose whether or not to increase their chances of getting a promotion at the risk of having to layoff employees if the strategy is not successful. In the ambiguous condition, the strategy was newly
developed so the chance of success is unknown. In the simple risk condition, the strategy was well-tried and it was known that the probability of success is 0.5. In a between subjects design participants made this decision under conditions of simple risk or ambiguity. The simple risk condition is reported with the changes that were made for the ambiguity condition in italics:

Imagine that you are the manager of a division of a company with the power to make decisions about the strategy of your division. You will be coming under review in 6 months and are competitively positioned for a major promotion that would double your power and your salary. In order to increase the likelihood of gaining the promotion you must take steps now to bolster the performance of your division.

___ [“Fair” Choice]: You have the choice of adopting a well-tried [newly developed] business strategy that may increase profits. Past usage of this strategy shows that it has a success rate of 50% [This strategy is new so it is not clear what the success rate of this strategy will be].

___ [“Unfair” Choice]: Alternatively, you may adopt a well-tried [newly developed] business strategy that has the potential for dramatic increases in profits but may result in having to lay-off employees. Past usage of this strategy shows that the chance of success is 50% and the chance of having to lay off employees is 50% [This strategy is also new so there is not yet information available on the chances of success or on the chances of having to lay-off employees].

The following is the ambiguity aversion check for the strategy decision:

Imagine that you are the manager of a division of a company with the power to make decisions about the strategy of your division. You will be coming under review in 6 months and are competitively positioned for a major promotion that would double your power and your salary. In order to increase the likelihood of gaining the promotion you must take steps now to bolster the performance of your division.

___ [Simple Risk]: You have the choice of adopting a well-tried business strategy that may increase profits. This strategy has a 50% chance of success.

___ [Ambiguous]: Alternatively, you may try a newly developed business strategy that may increase profits. This strategy is new so there is not yet information available on its success rate.

C. Results

Hypothesis 7 predicts more “unfair” decisions in the ambiguity condition compared to the simple risk condition. Table 4 presents the percentage of subjects choosing each of the two
responses for each decision. Our hypothesis was confirmed for the strategy decision \( (x^2(1,166) = 6.25 \ p = .01) \) and for the hiring decision \( (x^2(1,103) = 8.81, \ p = 0.03) \).

| Ambiguity (% unfair) | Simple Risk (% unfair) | Ambiguity Aversion (% prefer ambiguity) |
|----------------------|------------------------|----------------------------------------|
| Strategy Decision    | 72%                    | 53%                                    | 40%                                    |
| \( x^2(1,166) = 6.25 \ p = 0.01 \) |
| Hiring Decision      | 83%                    | 54%                                    | 24%                                    |
| \( x^2(1,103) = 8.81, \ p = 0.03 \) |

Table 4: Results of experiment 2

The purpose of the ambiguity aversion check was to ensure that participants do not prefer ambiguity over simple risk in the absence of a conflict between self-interest and fairness (i.e., if they are not motivated to do so in order to justify unfair decisions). Hypothesis 8 predicted that participants would either prefer simple risk over ambiguity or there would be no difference in their preferences when decisions did not involve concerns for fairness. For the strategy decision, there was no significant difference between preferences for ambiguity and simple risk (\( p = 0.25 \) using a binomial test), but less than half of the subjects (40 percent) chose the ambiguous option. In the hiring decision, ambiguity aversion was replicated. A large majority of subjects (76 percent) chose the option involving simple risk over the ambiguous one (\( p = 0.01 \) using a binomial test).

**D. Discussion**

These results present further evidence of the positive relationship between ambiguity and unfair behavior. For both decisions, significantly more unfair choices were made when decisions were made under conditions of ambiguity compared to simple risk. These results are consistent
with an overvaluation of choices with ambiguous consequences compared to unambiguous consequences when subjects have a motivation to do so. The ambiguity aversion checks revealed that it was not ambiguity *per se* that subjects found attractive, but rather the interaction between ambiguity and considerations of fairness. As in experiment 1, the results indicate that overestimation of consequences in ambiguity is a result of motivated reasoning.

IV. Conclusion

This study presents strong evidence in support of a positive relationship between ambiguity and unfair behavior. While most people prefer simple risk to ambiguity, we find that ambiguity becomes more attractive when it is the determinant of consequences of our selfish actions for others. That is, we view ambiguity as favorable when it allows us to view what we are doing to others as “not that bad.” We find clear evidence of such manipulation of attitudes towards ambiguity. Subjects are more likely to give low-paying lotteries to others when these lotteries involve ambiguity compared to simple risk, and they subsequently treat these lotteries as more attractive, reflected by the higher value placed on them. In the contextualized experiment, subjects are more likely to take selfish actions with potential negative consequences for others when the consequences are ambiguous rather than uncertain. In experiment 1, we also demonstrate that this bias is not present for people making hypothetical decisions or for people who have initially adopted an attitude towards ambiguity that is not biased by self-interest.

13 There is also additional evidence that ambiguity can be viewed favorable in contexts pitting self-interest against fairness considerations. Following experiment 1, we tested a “pilot experiment” in which subjects first made a hypothetical choice between two “fair” lotteries (roughly equal payoffs for both the subject and a recipient; e.g., $2.00 & $1.75) and “unfair” lotteries (with a higher payoff for the subjects but a lower one for the recipient, e.g., $4.00 & $0.25). Subjects then specified which kind of lottery (Lottery 1 or Lottery 2) they wanted to have determine the payoffs resulting from the choice. We found that subjects chose the ambiguous lottery over twice as often after having chosen unfairly than if they had chosen the fair option.
These results are also inconsistent with the notion that people possess stable preferences for fairness. Preferences for fairness change systematically, depending on features of the decision making context that should be irrelevant. That is, subjects appear to be willing to treat ambiguity as favorable and use it to justify more unfair behavior. Thus, this paper provides additional evidence of the “moral wriggling” found by Dana, et al. (2004). Our results show that when there is a motivation to behave self-interestedly, such “wriggling” will influence the way subjects perceive things such as the attractiveness of lotteries. That such motivated reasoning produces outcomes that are less fair perhaps provides evidence of subjects’ true motivation.
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### Appendix: Table A1. Sequence of procedures by treatment in experiment 1.

| Unconstrained Treatment | Constrained Treatment |
|-------------------------|-----------------------|
| **Lotteries**           | **Lotteries**         |
| • Description of two kinds of lotteries ("Lottery 1" and "Lottery 2"). | • Description of two kinds of lotteries ("Lottery 1" and "Lottery 2") |
| • Subjects told which lottery would be used in experiment | • Subjects told which lottery would be used in experiment |
| **Dictator game**       | **Choices involving risk** |
| • Description of dictator game (Table 1) | • Description of choices between lotteries and certainty equivalents (Table 2) |
| • A participants make 4 real choices | • All participants make 4 choices |
| • B participants make 4 hypothetical choices | |
| **Estimates of expected payoff to recipient based on own (real or hypothetical) choices** | **Estimates of expected payoff to self based on choices** |
| **Fairness questionnaire** | **Choice of Lottery 1 vs. Lottery 2 for $5 (one subject selected at end of experiment to play)** |
| **Choice of Lottery 1 vs. Lottery 2 for $5 (one subject selected at end of experiment to play)** | **Dictator game** |
| • Description of dictator game (Table 1) | • A participants make 4 real choices |
| • B participants make 4 hypothetical choices | • B participants make 4 hypothetical choices |
| **Resolution of all lotteries** | **Estimates of expected payoff to recipient based on own (real or hypothetical) choices** |
| **Unrelated hypothetical choices while waiting for payment calculation** | **Fairness questionnaire** |
| | **Resolution of all lotteries** |
| | **Unrelated hypothetical choices while waiting for payment calculation** |