THE EFFECT OF DILIBERATING DILEMMAS ON DECISION-MAKING AS MEASURED BY THE IOWA GAMBLING TASK

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TABLE OF CONTENTS

ABSTRACT

Decision-making research using the Iowa Gambling Task (IGT) has uncovered gender differences in performance. Men's scores on the IGT are significantly higher than women's scores. Previous research established that reading Personal Moral dilemmas during performance of the IGT increased women's scores equal to that of men. The proposed research looks to answer the questions; will women's performance increase when the Personal Moral dilemmas are read prior to performing the IGT and will Non Moral dilemmas also increase performance? Gender differences are eliminated in all conditions. Women's scores on the IGT are increased in all conditions when dilemmas are read prior to the IGT.

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Special thanks go to my husband and family who have been endlessly supportive and patient throughout this process and to my fellow graduate students who have become like a second family to me.

DEDICATION

I would like to dedicate this thesis to my parents, Paula and Michael Boettcher, whose continued support and encouragement throughout my entire educational career has meant more to me than they will ever know.

LIST OF FIGURES

INTRODUCTION

Iowa Gambling Task

The Iowa Gambling Task (IGT) has been widely used to measure decision making (Bechara, Damasio, Tranel, & Damasio, 1997; Bolla, Eldreth, Matochik & Cadet, 2004; Clark, Manes, Antoun, Sahakian, & Robins, 2003; Overman, Frassrand, Ansel, Trawalter, Bies, & Redmond, 2004; Overman, Graham, Redmond, Eubank, Boettcher, Samplawski, & Walsh, 2006). The IGT mimics the uncertainty and consequences of real-life decision making. Certain populations that make poor life decisions (i.e. brain damaged patients, drug abusers, children and adolescents) also perform poorly on this card task (Bolla et al., 2004; Overman et al., 2004). The IGT consists of four decks of cards, each of which is a different color (red, green, yellow, and blue). Cards in two of the decks (red and green) yield lower rewards ($50), and sometimes lower sporadic penalties. For example, each card rewards $50 and some cards also carry sporadic low losses. Overall, the red and green decks (advantageous decks) will have a net gain of $250 per 10 cards drawn. Each card in the other two decks (yellow and blue) yield of higher rewards ($100) accompanied by higher sporadic penalties. For example, each card rewards $100 and some cards also carry sporadic high losses. Overall the yellow and blue decks (disadvantageous decks) will have a net loss of $250 per 10 cards drawn. In the long run, choosing lower rewards (advantageous decks) throughout the task earns the subject more money than choosing the high rewards (disadvantageous decks). This task measures an individual's ability to inhibit the temptation to choose high immediate rewards in order to receive the high pay off in the long run (smaller immediate reward). Over 100-200 trials, normal populations gradually learn the advantageous strategy and

choose more red and green cards (advantageous) than yellow and blue cards (disadvantageous) (Bechara et al., 1997).

Specific areas of the brain are critical in performing the IGT by looking at brain damaged patient's performance. In contrast to normal populations, patients with damage to the orbital frontal cortex (OFC) (Bechara, 2004) and/or the right dorsal lateral prefrontal cortex (DLPFC) (Bechara, Damasio, Tranel, & Anderson, 1998) show deficits when performing the IGT (Fellows and Farah, 2005; Bunge, Wallis, Parker, Brass, Crone, Hoshi, & Salai, 2005). Both areas appear to be important in this type of decision making but for different reasons. The OFC appears to be important for reversal learning (Fellows and Farah, 2005; Bunge et al., 2005; Overman et al., 2006). For example, patients with lesions to the OFC establish early in the game that a deck is advantageous and can not reverse their thinking when penalties are encountered later in the game.

Patients with damage to the right DLPFC also show deficits on the IGT (Bechara et al., 1998). This deficit is due to a breakdown in working memory or cognitive control (Bechara et al., 1998). Bunge et al. (2005) described it as a two step process that 1) first, information enters the OFC and initial reward decisions are encountered 2) second, the DLPFC acts as a cognitive control for behaviors. Both areas appear to be important for optimal decision making, but perhaps for different reasons.

Further, Clark et al. (2003) tested patients with lesions on the right and left ventral prefrontal cortex (PFC) along with healthy control subjects on a battery of decision making tasks. They found that patients with lateralized right lesions performed significantly lower (i.e. chose less red and green cards) than the healthy controls and patients with lateralized left lesions. Additionally, patients with left lateralized lesions

scored significantly lower than healthy controls. Further analysis showed that behavior changed throughout the task for healthy controls (i.e. picking more advantageous cards) and for patients with lateralized left lesions (i.e. behavior began similar to healthy controls then behaved erratically towards the end of the task). Behavior did not significantly change for patients with lateralized right lesions. In conclusion, the right and left ventral PFC appeared to affect performance. However, lateralized right lesions led to more drastic performance deficits on the IGT (Clark et al., 2003).

In addition, although normal populations learn this task over trials, a number of experiments have shown that men, as groups, score higher (i.e. percentage of red and green (advantageous) cards selected) on the IGT than women (Bolla et al., 2004; Overman et al., 2004; Overman et al., 2006). This effect has been shown in children and adolescents (Crone, Bunge, Latenstein, & Heleen, 2005), as well as young adults (Overman et al., 2004; Overman et al. 2006) and older adults (Reavis & Overman, 2001). This leads to the question of why men, at all different age groups, score higher on the IGT than women.

Gender Differences on Gambling Task

Performance Differences between males and females

While both males and females learn the IGT (i.e. they learn to select more advantageous than disadvantageous cards during the task), women select a higher number of yellow cards than do men during the task. The yellow card is distinctive in that it rewards $100 (high reward) on each card and only has one penalty card per 10 cards drawn (-$1250) (i.e., on nine out of 10 cards drawn there is no penalty). Female's

continued selection of the yellow card (disadvantageous) lowers their overall performance compared to males (Figure 1).

Previous experiments completed in our lab have ruled out a few possibilities as explanations for women's performance. First, a report tested whether men performed better than women because they had superior math abilities and therefore were more easily able to calculate total net gains and losses (Overman et al., 2006). In that experiment, a new version of the card task was used. Instead of all cards carrying wins and only some cards carrying penalties, the new cards all carried both a win and a penalty. By requiring math calculations for every card, the possibility that one could make accurate decisions (i.e., calculate precisely) about which cards were advantageous is greatly reduced. If women's lower scores are explained by inferior mathematical ability then women's scores should be lower on the new version of the task. In addition women's scores should be lower than men's scores. Males and Females did not show significant differences in red and green cards selected. However, the difference was approaching significance ($F(1, 60) = 3.12$, $p = .08$) (Overman et al., 2006). Men chose more red and green cards (advantageous decks) then women. In addition, by the end of the task women were choosing almost twice as many yellow cards (disadvantageous deck) as men. Even without significant finding as to total red and green cards selected, we see that differential mathematical ability does not provide an explanation for these differences.

Another possibility for the gender differences is that men and women have differential response perseveration. This topic was tested because previous research has shown sex differences in perseveration for male and female infant nonhuman primates. Females

perseverated significantly more on reversal tasks than males (Overman et al., 2006). The reasoning is as follows, the first yellow penalty card (-$1250) is not encountered until relatively late in the task. The first yellow penalty card is the ninth card in this deck and on average, the first yellow penalty card is encountered after 25-30 cards have been drawn (Overman et al., 2006). Perhaps women have more difficulty reversing their response after establishing the yellow card as a "good deck". Fellows and Farah (2005) found that patients with ventral medial prefrontal cortex (VMPFC) lesions performed significantly lower than normal control subjects on the IGT. By creating a new version of the IGT with the penalty cards placed earlier in the decks, VMPFC patients no longer performed lower then normal control subjects. It follows that abnormal perseveration explains these lesion patients poorer performance. To test the hypothesis that women may choose more yellow cards (disadvantageous) because of differential preservation, the yellow (-$1250) penalty cards were placed at the beginning of the decks, increasing the likelihood that these penalties would be encountered early in the game. If differential response preservation was the reason that women's performance was lower than men's, one would expect to see equal performances for men and women in this version of the task.

Results showed no change in gender differences. Men still chose significantly more red and green (advantageous) cards than women, and women still chose significantly more yellow cards than men (Overman et al., 2006). Differential response preservation is not adequate to account for gender differences on the task.

Differences in Brain Activation for Males and Females

Research conducted by Bolla et al. (2004) suggested that men and women do not activate the same areas of the brain when performing the IGT. PET scans showed that "men showed increased activity in the right lateral orbital frontal cortex and right dorsal lateral prefrontal cortex, as well as the left lateral orbital frontal cortex, while women showed increased activity in the left medial orbital frontal cortex" (Bolla et al., 2004 p. 1). A look at the specific functions of these brain areas allows the formulation of an interesting hypothesis for why gender differences in decision-making may occur.

Function of the Orbital Frontal Cortex (OFC)

Rolls (1999) and Elliott, Dolan, & Frith, (2000) demonstrated in monkeys that the orbital frontal cortex (OFC) receives information and allows judgments based on the rewards and punishers involved in making a decision. It would appear that this area is a sort of balance, weighing the positive versus the negative in order to make a decision. However, somewhat separate sections of the OFC are responsible for processing the rewards and punishers (Elliott et al., 2000).

The medial portion of the OFC (the portion that showed active increases in women in the study by Bolla et al. (2004)) is associated with learning the overall reward associated with a decision (Elliott et al., 2000; Bunge et al., 2005). This may explain why women select a higher percentage of $100 yellow cards (disadvantageous deck) on the IGT. Perhaps, women are only processing the large rewards associated with the + $100 yellow card without processing the long-term penalties.

In contrast, the lateral portion of the OFC (the portion that men activated in the study by Bolla et al. (2004)) is related to the penalties associated with a decision (Elliot et al.,

2000). Perhaps this different activation could predict why men are not selecting the + $100 yellow card (disadvantageous) during the task. While women perceive the high reward, men may be focused on the negative (-$1250) outcome of the selection of this card. This suggests different fundamental processing mechanisms that lead to different decision outcomes.

As a whole Greene, & Haidt (2002) and Greene, Nystrom, Engel, Darley, & Cohen (2004) say that increases in activation of the OFC is associated with more automatic emotional processes. This will be explained further later in the paper.

Function of the Dorsal Lateral Prefrontal Cortex (DLPFC)

Two regions of the right dorsal lateral prefrontal cortex (BA 46) are activated in males during the IGT but not in females (Bolla et al., 2004). This is particularly interesting for several reasons. 1)First, the right hemisphere is of greater importance than the left hemisphere in this approach and 2)Second, this region is thought to be involved in cognitive reasoning and working memory (Greene et al., 2002; Greene et al., 2004; Sanfey, Rilling, Aronson, 2003; Bunge et al., 2005). In this region of the brain Greene et al. (2004) found increased activity when making utilitarian decisions, that is, decisions to benefit the greater good. Greene et al. (2004) says that "the DLPFC (BA 46) (the area men activate) plays an important role in the regulation of potentially counterproductive emotions in the context of social decision making" (p. 396). Perhaps male's activation of this area during the IGT (DLPFC) helps regulate decisions that might otherwise be made using a primarily emotional area (OFC) of the brain. Females do not normally activate the right DLPFC during the IGT (Bolla et al., 2004); this may be why they do not gain the same benefits of emotional regulation and show lower performance. To tentatively

test the theory that the DLPFC was the cognitive reasoning center that was critical for optimal decision making, it was hypothesized that if we could putatively activate this area using some secondary source, then improved decision making should follow.

How to Activate the DLPFC

Greene et al. (2001) used fMRIs to look at brain activation during contemplation of Personal Moral, Non-Personal Moral, and Non-Moral Dilemmas. According to Greene et al. (2004) a Personal Moral dilemma must meet three criteria:

> First, the violation must be likely to cause serious bodily harm. Second, this harm must befall a particular person or set of persons. Third, the harm must not result from the deflection of an existing threat onto a different party. One can think of these three criteria in terms of as "me hurt you" (Greene et al., 2004, p. 389).

An example of a Personal Moral dilemma is as follows (Appendix A: All dilemmas):

> Footbridge Example: A runaway trolley is heading down the tracks toward five workmen who will be killed if the trolley proceeds on its present course. You are on a footbridge over the tracks, in between the approaching trolley and the five workmen. Next to you on this footbridge is a stranger who happens to be very large. The only way to save the lives of the five workmen is to push this stranger off the bridge and onto the tracks below where his large body will stop the trolley. The stranger will die if you do this, but the five workmen will be saved. Is it appropriate for you to push the stranger on to the tracks in order to save the five workmen?

A Non-Personal Moral dilemma is defined as a dilemma that does not meet one of these three stated criteria (Greene et al., 2004). An example of a Non-Personal Moral dilemma is as follows:

> Standard Trolley Example: You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a single railway workman. If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to avoid the deaths of these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right, causing the death of

> the single workman. Is it appropriate for you to hit the switch in order to avoid the deaths of the five workmen?

Non-Moral dilemmas were used as a control. An example of a Non-Moral dilemma is as follows:

> Standard Turnips Example: You are a farm worker driving a turnip-harvesting machine. You are approaching two diverging paths. By choosing the path on the left you will harvest ten bushels of turnips. By choosing the path on the right you will harvest twenty bushels of turnips. If you do nothing your turnip-harvesting machine will turn to the left. Is it appropriate for you to turn your turnip-picking machine to the right in order to harvest twenty bushels of turnips instead of ten?

The fMRI data of Greene et al. (2001) showed that while contemplating Personal Moral dilemmas the following brain areas were significantly more active than when contemplating Non-Personal Moral dilemmas: the medial portions of Brodmann's Areas (BA) 9 and 10 (medial frontal gyrus), BA 31 (posterior cingulated gyrus), and BA 39 (angular gyrus, bilateral). Greene et al. (2001) asserts that these areas are more associated with emotional processes. In contrast, areas associated with less activation during contemplation of Personal Moral dilemmas as compared to Non-Personal Moral dilemmas and Non-Moral dilemmas were: BA 39 (bilateral), BA 46, and BA 7/40 (bilateral). These brain areas have been associated with working memory and more cognitive processes. If these cognitive processes are optimal for decision making (e.g. Bolla et al., 2004), then when activating these areas of the brain, one would expect to find increased scores on the IGT.

Previous Iowa Gambling Task Experiments In Our Laboratory

A previous experiment in this series tested the hypothesis that both male's and female's scores would increase if provided with a secondary stimulus to putatively

increase activation in the critical "decision making" areas of the brain (Overman et al., 2006). The hypothesis was that contemplation of Non-Personal Moral dilemmas would activate cognitive processes in the brain and increase female's scores on the IGT as per Greene et al. (2004). Because the DLPFC should have already been activated in men during the IGT (Bolla et al., 2004), it was unclear what additional activation would occur and how performance would be effected. Subjects were tested on the IGT while contemplating Personal Moral, or Non-Personal Moral, or Non-Moral dilemmas every 10 trials during the IGT.

METHOD

Participants and Procedures

> A total of 200 participants were administered the IGT exactly as we have reported previously (Overman et al., 2004), with the exception that every 10 trials, when participants were asked which two decks they thought were advantageous, they silently read a PM dilemma (Group PM; 32 women and 33 men), an Non Personal Moral dilemma (Group NPM; 36 women and 34 men), or a Non Moral (NM) dilemma (Group NM; 33 women and 32 men). There were 20 dilemmas for each group. These dilemmas were exactly the ones used by Greene et al. (2001). A given participant deliberated only one type of dilemma, a different one occurring at 10-trial intervals during the 200-trial IGT. Deliberation was not timed, and at the end of each deliberation, the participant marked the answer sheet as "appropriate" or "inappropriate."
>
> Measures were taken of percentage of advantageous cards (red plus green) and disadvantageous cards (yellow plus blue) per block of 50 trials and across 200 trials as well as percentage of red, blue, yellow, and green cards chosen per block of 50 trials and across 200 trials. Measures were also taken regarding the answers to the dilemmas (P. 82).

Although no effect was found in the Non-Personal Moral or Non-Moral dilemma groups, women's scores in the Personal Moral dilemma group were significantly raised, equal to men's scores (figure 2). Men's scores were not significantly affected in any of the conditions (Overman et al., 2006).

In summary these results did not meet our predictions in that there were no increases in decision making performance when deliberating Non Personal Moral dilemmas which should have activated the DLPFC (as per the study by Greene et al., 2001). Rather we found significant enhancement in decision making performance when Personal Moral dilemmas were deliberated during performance of the IGT, at least in females.

It is still possible, however that deliberation of Personal Moral dilemmas, could have activated the DLPFC. This is because in a recent study, Greene et al (2004) has subdivided his original Personal Moral dilemmas into ones that are "easy" versus ones that are "hard" (i.e. required longer reaction times for subjects to decide whether the answer was appropriate or not appropriate). Greene et al. (2004) attributed the longer reaction time to the competing roles of emotional response and higher cognitive reasoning of those particular "hard" dilemmas. He further compared this to the cognitive control found in the Stroop task. For example the increased time to give a response that is incongruent with a more automatic response. Greene applied this to "hard" Personal Moral dilemmas because the automatic response is to deem the Personal Moral dilemmas as inappropriate (to smother your child); however, when making utilitarian decisions (for the greater good) the subject must evoke cognitive control and override the automatic response, and respond as "appropriate" (to smother your child).

This extra processing for "hard" Personal Moral dilemmas, as operationalized by increased reaction time, increased activation in the DLPFC, the area seen by Bolla et al. (2004) to be involved in IGT processing in males not females.

Thus, it is possible that in the study by Overman et al (2006), contemplation of Personal Moral dilemmas during performance of the IGT activated the DLPFC and that

this was the neural basis for increased decisional performance in women. However, without imaging data this can only be speculation.

What is known at this point is that contemplation of "hard" Personal Moral dilemmas leads to longer reaction times and further brain activations. First, activation of the more automatic emotional processes, then activation of the cognitive reasoning process in the brain (J. D. Greene et al., 2004). This more complex process predicts that emotional and cognitive processes are both important in decision making. Reaction times were not observed in the current research, however, because 20 Personal Moral dilemmas were used in the decision making research it is assumed that a fair number of these dilemmas were considered "hard" by subjects.

It would appear that both the OFC and the DLPFC are critical in optimal decision making. Perhaps, individuals must consider the initial reward or punishments involved and then cognitively process the long term consequences of these decisions. Research has shown that these activations are not "hard wired," but with the appropriate stimulus we can manipulate the regions used in decision making, and we have reason to hypothesize that the same can be done for "high risk" populations (i.e. drug abusers and adolescents).

Current Research

Although much speculation can be made as to what areas of the brain are crucial for optimal decision making, the goal of the current research is to establish whether contemplation of Personal Moral dilemmas or Non-Personal Moral dilemmas will have a lasting effect on decision making. Without FMRI data the current research can not say for certain what is occurring at a neural level, however, behaviorally we have seen

significant changes in decision making. The proposed research hopes to ensure that some lasting effect exists prior to completing more difficult experiments that will require subjects to read the dilemmas, leave for some period of time, and return to perform the IGT. This initial step will test the Personal Moral dilemma's and Non-Personal Moral dilemma's strength at maintaining this increased performance when all 20 dilemmas are read consecutively and prior to performance of the IGT, as opposed to intermittently throughout the IGT as in the first experiments. The proposed research hypothesizes that women's scores will increase in the Personal Moral condition but not in the other two conditions. The research looks to answer the questions; will women's performance increase when the Personal Moral dilemmas are read prior to performing the IGT and will Non Moral dilemmas increase performance?

METHOD

Participants

One hundred and eighty participants (92 women, 88 men) were used in the experiment. Participants came from various undergraduate Psychology 105 sections at the University of North Carolina Wilmington (UNCW). Participants were randomly assigned to one of three groups, a Non-Moral group (control), a Non-Personal Moral group, or a Personal Moral group after being divided based on gender. Groups consisted of approximately 30 males and 30 females (30 FPM, 30 FNPM, 32 FNM, 30 MPM, 30 MNPM, and 28 MNM). Participants participated for a course requirement and all approval was obtained from the IRB.

Materials

All groups met individually with one of three experimenters to be tested. Testing took place in a small lab room located on the second floor of the Social and Behavioral building at UNCW. Each subject signed a consent form prior to beginning. A drug history survey was filled out. Subjects were provided with a book of "passages" and a corresponding answer sheet to fill out: "appropriate" or "not appropriate". For the IGT, subjects were placed in front of four laminated paper decks of cards (red, green, blue, and yellow). A computer screen located directly behind the decks had electronic decks corresponding to the paper decks. The paper decks and computer decks were identical. SPSS, excel, and Vassar stats were used to sort data, calculate means, create graphs, and run t-tests and ANOVAs.

Procedure

Subjects and experimenters were matched according to appointment times scheduled by subjects and availability of the experimenters. All experimenters were certified according to the required research certification training provided by the Institutional Review Board (IRB) at the University of North Carolina Wilmington. The following requirements were met:

1. All research staff read the IRB protocol prior to initiation.
2. All research staff was properly trained to perform the procedures of the protocol with the subject population.
3. All key personnel and individuals who implement the informed consent process were identified on the protocol form and their training certificates were filed in OSP prior to conducting any human subjects research (UNCW IRB Compliance Monitoring Form).

Subjects sat at a desk in front of the four decks of cards. For each new subject, the computer randomized the position of the decks to rule out the possibility that the position of the decks could influence the subject's choice of which cards to pick. Subjects in all conditions were given the same forms and verbal instructions. The only difference was which binder was used in the experiment. Each binder contained either 20 Non-Moral dilemmas (Control), 20 Non-Personal Moral dilemmas, or 20 Personal Moral dilemmas.

First, the consent form was read aloud by the experimenter. This form included a brief summary of the tests that followed. Both the subject and experimenter signed and dated the form. Next, the subjects filled out a confidential personal information questionnaire requiring such information as birthday and alcohol and drug history. No names were attached to this questionnaire, only code numbers to ensure confidentiality. Third, subjects were given the binder corresponding to the predetermined condition (Non-Moral, Non-Personal Moral, or Personal Moral). The following directions were read aloud:

> Please read each of the 20 passages. For each passage read mark either yes or no on the answer sheet provided next to the number corresponding to the number of the passage, as to whether or not it is appropriate for you to do.

After all passages were read and answered, the following instructions were read aloud by the experimenter for the IGT:

> You are to select cards from any of the four decks, one at a time, in any order you choose. As you turn the card over, tell me the color of the card so I can click on that color card on the computer, because the computer keeps score for us. I will tell you your

total after every card is turned and you can look at the computer at anytime to see your total. You are free to switch from one deck to another at any time as often as you like. Remember that you can reuse the decks when you run out of cards. You will continue to select cards until I tell you to stop. Each time you pick a card you will win some money. On some cards you will win some money and lose some money. The goal of the game is to win as much money as possible and to loose as little as possible (remember that you are not playing for real money). There are two kinds of decks in this game 'good decks' and 'bad decks'. If you constantly pick from the good decks you will win more money than you lose. If you constantly pick from the bad decks you will lose more money than you win. So your job is to figure out which are the good decks and which are the bad decks. The good and bad decks never change. The same two decks are always the good decks and the other two are always the bad decks.

After each set of ten cards are drawn, subjects were asked to guess which two decks are the "good decks".

The experimenter recorded these answers on a selection form for data collection.

After all trials were finished, the data for each subject was calculated into average scores of money won and penalty cards chosen. The data for each individual was transferred to SPSS where differences, t-tests, and ANOVAs were calculated.

Data Analysis

The dependent variable measured was the percent of red and green cards selected on the IGT. The independent variable was whether the subject read Non-Moral, Non-Personal Moral, or Personal Moral passages prior to taking the IGT. Scoring was divided

into four blocks, each containing 50 card choices (trials) (i.e. Block 1 = trials 1-50, Block 2 = trials 51-100, Block 3 = trials 101-150, and Block 4 = trials 151- 200). Average scores for men and women in each condition were compared based on total percent of advantageous $50 Red and $50 Green cards selected in each of the blocks and in total for all blocks combined.

RESULTS

Results are first shown in Figure 1 as percentage of advantageous $50 red plus $50 green cards selected by males and females in each of the three conditions (Personal Moral (PM), Non-Personal Moral (NPM), and Non-Moral (NM)). Percentage of $50 advantageous red plus $50 green cards and conditions (PM, NPM, and NM) were entered into a 2 (gender: male/female) X 3 (condition: PM/NPM/NM) mixed-design analysis of variance (ANOVA). The results revealed no differences in selection of advantageous cards for gender, $F(1, 174) = 0.192$, $p = 0.66$, or deliberation condition, $F(2, 174) = 1.983$, $p = .141$, nor was the gender X condition interaction significant, $F(2,174) = 0.596$, $p = 0.552$. In this study women's performance was elevated to the level of men's in all conditions. Figure 1 shows the average percentage of advantageous $50 red plus $50 green cards chosen by men and women in the three deliberation conditions.

Previous research showed an effect of type of dilemma and selection on type of card chosen (disadvantageous $100 yellow or $100 blue or advantageous $50 red or $50 green cards). Consequently, a 2 (gender: male/female) X 3 (condition: PM/NPM/NM) ANOVA was run for each card type. Percentage of disadvantageous $100 yellow cards and conditions (PM, NPM, or NM) were entered into a (gender: male/female) X 3 (condition: PM/NPM/NM) mixed-design analysis of variance (ANOVA). Results

showed no main effect for gender F (1,174) = 1.677, p = 0.197, but a significant effect for condition, F (2,174) = 3.441, p = .034, and no significant gender X condition interaction, F (2,174) = 0.335, p = 0.716. LSD post hoc analysis, as shown in Figure 2, revealed that subjects in the Non-Personal Moral condition chose significantly fewer disadvantageous $100 yellow cards (M = 16.37, SD = 9.399) than subjects in the Non-Moral condition (M = 20.95, SD = 10.232) or subjects in the Personal Moral condition (M = 19.86, SD = 9.924), p = 0.012 and p = 0.05, respectively.

$100 Blue Card

Percentage of disadvantageous $100 blue cards and conditions (PM, NPM, or NM) were entered into a 2 (gender) X 3 (condition) mixed-design analysis of variance (ANOVA). Results showed no main effects for gender F (1,174) = 0.024, p = 0.876, or condition, F (2,174) = 0.408, p = 0.665, and no significant gender X condition interaction, F (2,174) = 0.299, p = 0.742.

$50 Red Card

Percentage of advantageous $50 red cards and conditions (PM, NPM, or NM) were entered into a 2 (gender) X 3 (condition) mixed-design analysis of variance (ANOVA). Results showed no main effects for gender F (1,174) = 0.41, p = 0.841, or condition, F (2,174) = 0.105, p = 0.901, and no significant gender X condition interaction, F (2,174) = 0.421, p = 0.657.

$50 Green Card

Percentage of advantageous $50 green cards and conditions (PM, NPM, or NM) were entered into a 2 (gender) X 3 (condition) mixed-design analysis of variance (ANOVA). Results showed no main effect for gender F (1,174) = 0.938, p = 0.334, or condition,

F (2,174) = 0.659, p = 0.519, and no significant gender X condition interaction, F (2,174) = 0.816, p = 0.444.

Next, block effects were calculated for men and women in every deliberation condition, to show that both groups learned to choose advantageous cards as they progressed through the task. Percentage of advantageous $50 red plus $50 green cards were entered into a 3 (condition: PM/NPM/NM) X 4 (block: 1/2/3/4) analysis of variance (ANOVA) for women. Results revealed no main effect for condition, F (2,267) = 2.35, p = 0.101, and no block X condition interaction, F (6,267) = 1.04, p =.3996. As shown in Figure 3, a significant main effect for block was found, showing that women in all three conditions learned the task (i.e. they chose more advantageous $50 red plus $50 green cards as the task progressed), F (3,267) = 28.52, p < 0.0001.

Percentage of advantageous $50 red plus $50 green cards were entered into a 3 (condition) X 4 (block) analysis of variance (ANOVA) for men. Results revealed no main effect for condition, F (2,264) = 0.63, p = 0.535, and no block X condition interaction, F (6,264) = 0.39, p =0.885. A significant main effect for block was found, showing that men in all three conditions learned the task (i.e. they chose more advantageous $50 red plus $50 green cards as the task progressed), F (3,264) = 44.61, p < 0.0001. Figure 4 shows block effects for men.

Thus, both groups learned across the 200 trials unlike various patient groups (Bolla et al., 2004; Overman et al., 2004). Figure 5 shows the block effects for men and women.

Forth, the results of the current experiment in which dilemmas were read prior to the IGT were compared to the results from a previous experiment in our lab in which dilemmas were read throughout the IGT.

Women's scores (i.e. percentage of advantageous $50 red plus $50 green cards selected) in the current experiment were equal in each condition (PM, NPM, and NM), thus, women's scores in all three conditions were combined into a single group and compared with the scores in the previous experiment's combined Control condition (both NPM and NM) in which dilemmas had been read throughout the task to determine if dilemmas read prior to the IGT changed performance.

A t-test was performed on advantageous $50 red plus $50 green cards between the Prior group (read dilemmas prior to task) and the Throughout group (read dilemmas throughout task).

Women's percentage of advantageous $50 red plus $50 green cards selected was divided into four blocks (Block 1 = cards 1-50, Block 2 = cards 51-100, Block 3 = cards 101-150, and Block 4 = cards 151-200). A 2 (Condition: Prior/Throughout) X 4 (Block: 1/2/3/4) repeated measures analysis of variance (ANOVA) was run comparing percentage of advantageous $50 red plus $50 green cards selected in each block for women who read dilemmas prior to the IGT and women who read dilemmas throughout the IGT as shown in Figure 6. The findings revealed significant main effects for condition, women in the prior group chose significantly more advantageous $50 red plus $50 green cards ($M = 61.1$) than women in the throughout group ($M = 67.2$), $F(1, 483) = 6.84$, $p = .0097$), and

for blocks, $F(3,483) = 46.12$, $p < .0001$, again showing that women learned the task. The condition X block interaction was not significant, $F(3,483) = 1.24$, $p = 0.294$.

Men's scores (i.e. percentage of advantageous $50 red plus $50 green cards selected) in the current experiment were equal in each condition (PM, NPM, and NM), thus, men's scores in all three conditions were combined into a single group and compared with the scores in the combined Control condition (PM, NM and NPM) from the previous data (Overman et al., 2006) collected to determine if reading dilemmas prior to the IGT changed performance.

Men's percentage of advantageous $50 red plus $50 green cards selected was divided into four blocks (blk 1 = cards 1-50, blk 2 = cards 51-100, blk 3 = cards 101-150, and blk 4 = cards 151-200). A 2 (Condition: Prior/Throughout) X 4 (Block: 1/2/3/4) repeated measures analysis of variance (ANOVA) was run comparing percentage of advantageous $50 red plus $50 green cards selected in each block for men who read dilemmas prior to the IGT and men who read dilemmas throughout the IGT. The findings revealed no main effect for condition, men in the prior group did not chose significantly more advantageous $50 red plus $50 green cards ($M = 68.55$) than men in the throughout group ($M = 68.89$), $F(1, 558) = 0.03$, $p = 0.862$, and the condition X block interaction was not significant, $F(3,558) = 0.35$, $p = 0.789$. A significant block effect was shown, $F(3,558) = 105.42$, $p < 0.0001$, again showing that subjects in both conditions learned the task.

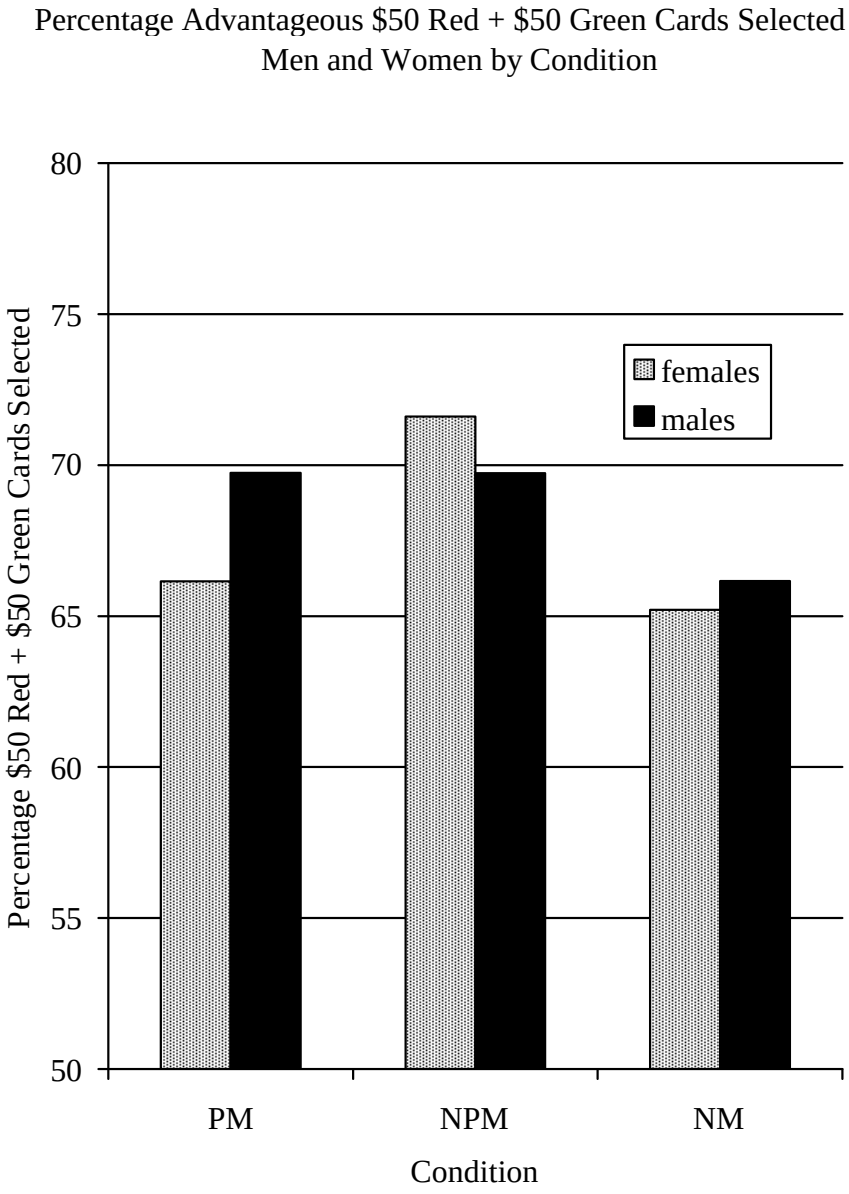

Figure 1. Percentage of advantageous $50 cards chosen across 200 trials of the Iowa Gambling Task by men and women after deliberating 20 non-moral dilemmas, non-personal moral dilemmas, or personal moral dilemmas

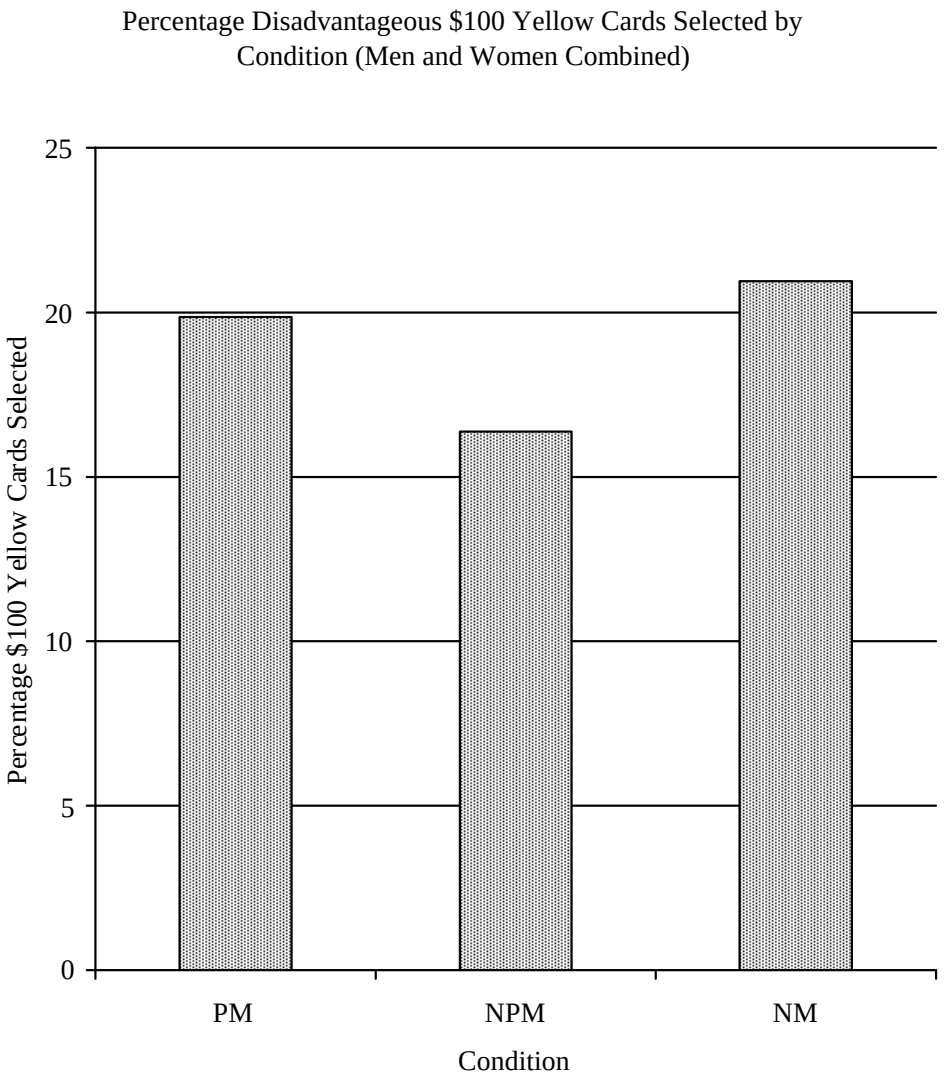

Figure 2. Average percentage of disadvantageous $100 yellow cards chosen by men and women (combined) after deliberating either personal moral (PM) dilemmas, non-personal moral (NPM) dilemmas, or non-moral (NM) dilemmas.

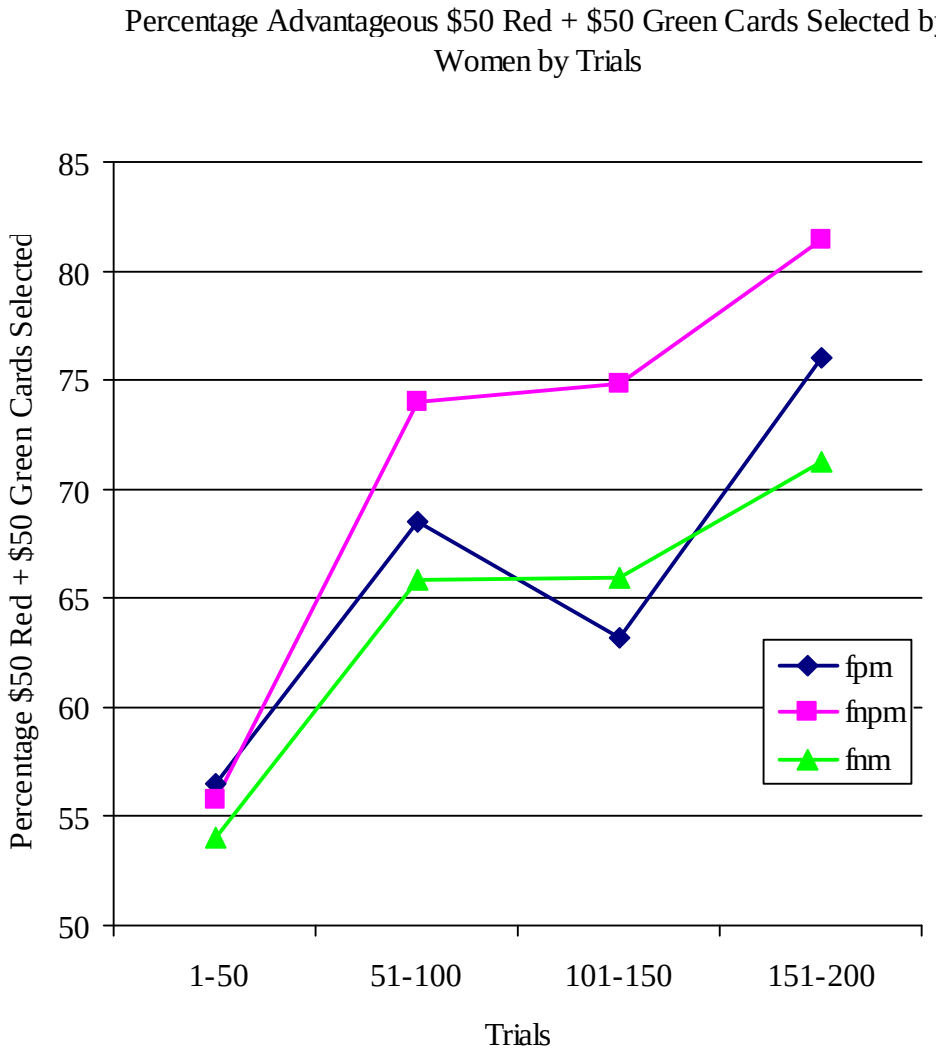

Figure 3. Average percentage of advantageous $50 cards chosen by women in each block of 50 trials after deliberating either personal moral (PM) dilemmas, non-personal moral (NPM) dilemmas, or non-moral (NM) dilemmas.

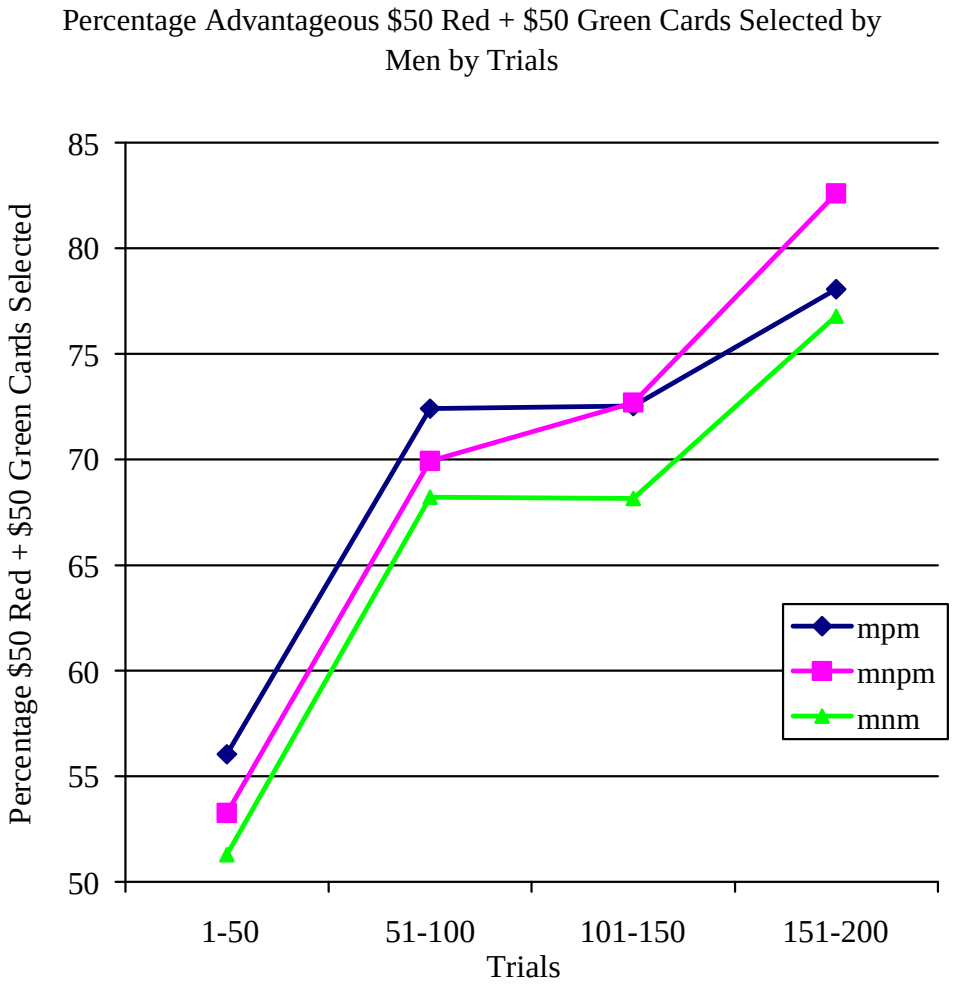

Figure 4. Average percentage of advantageous $50 cards chosen by men in each block of 50 trials after deliberating either personal moral (PM) dilemmas, non-personal moral (NPM) dilemmas, or non-moral (NM) dilemmas.

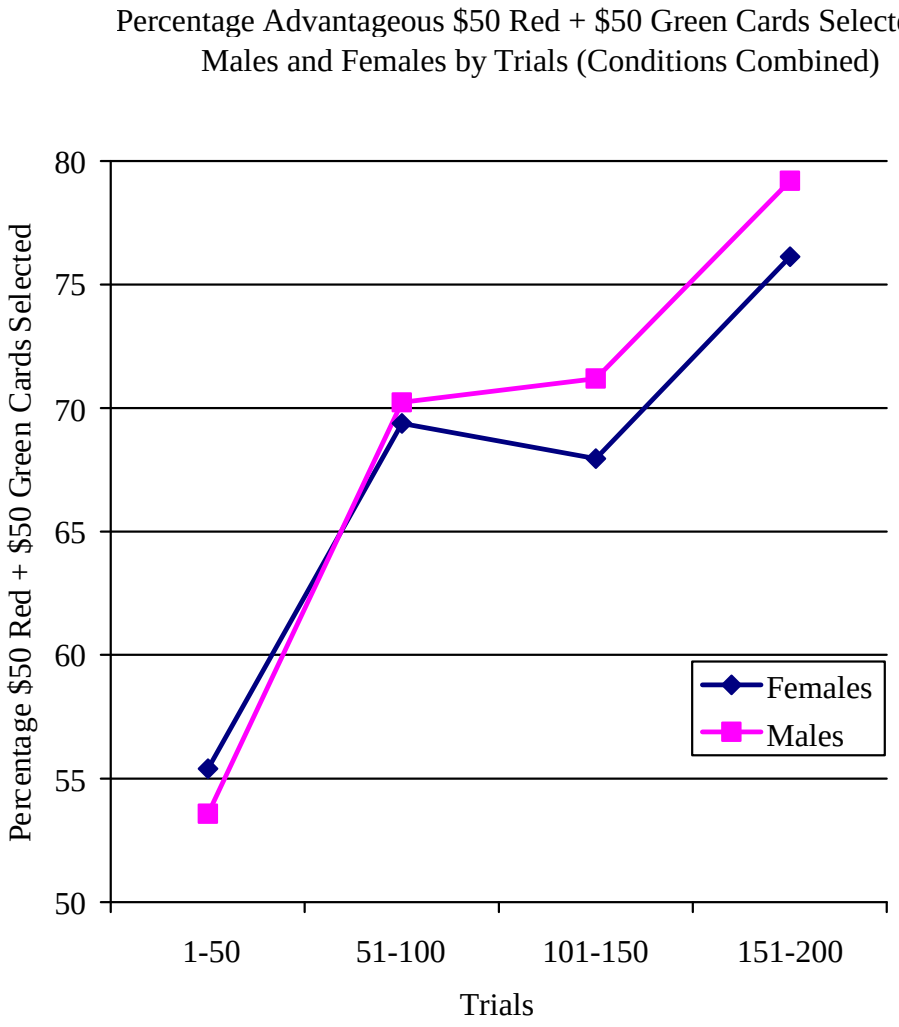

Figure 5. Average percentage of advantageous $50 cards chosen by men and women in each block of 50 trials after deliberating dilemmas (personal moral (PM) dilemmas, non-personal moral (NPM) dilemmas, or non-moral (NM) dilemmas were combined for men and women).

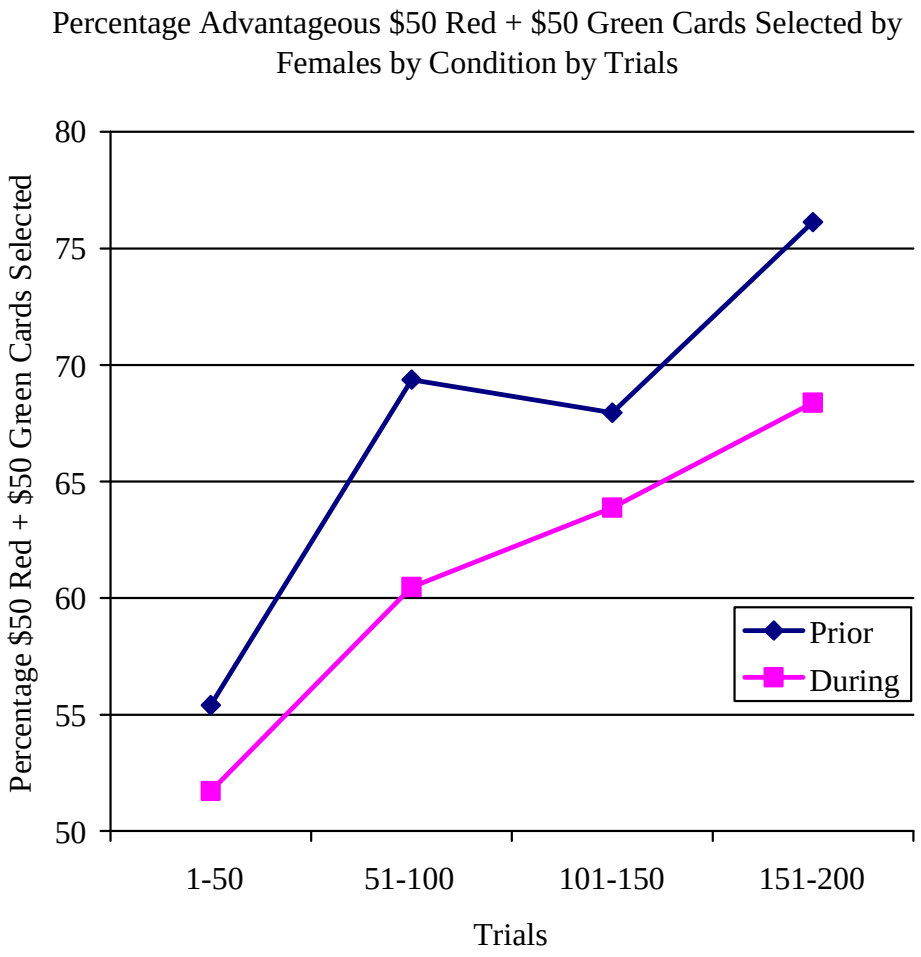

Figure 6. Average percentages of advantageous $50 cards chosen by women in each block of 50 trials after deliberating dilemmas either prior to the IGT or intermittently throughout the IGT.

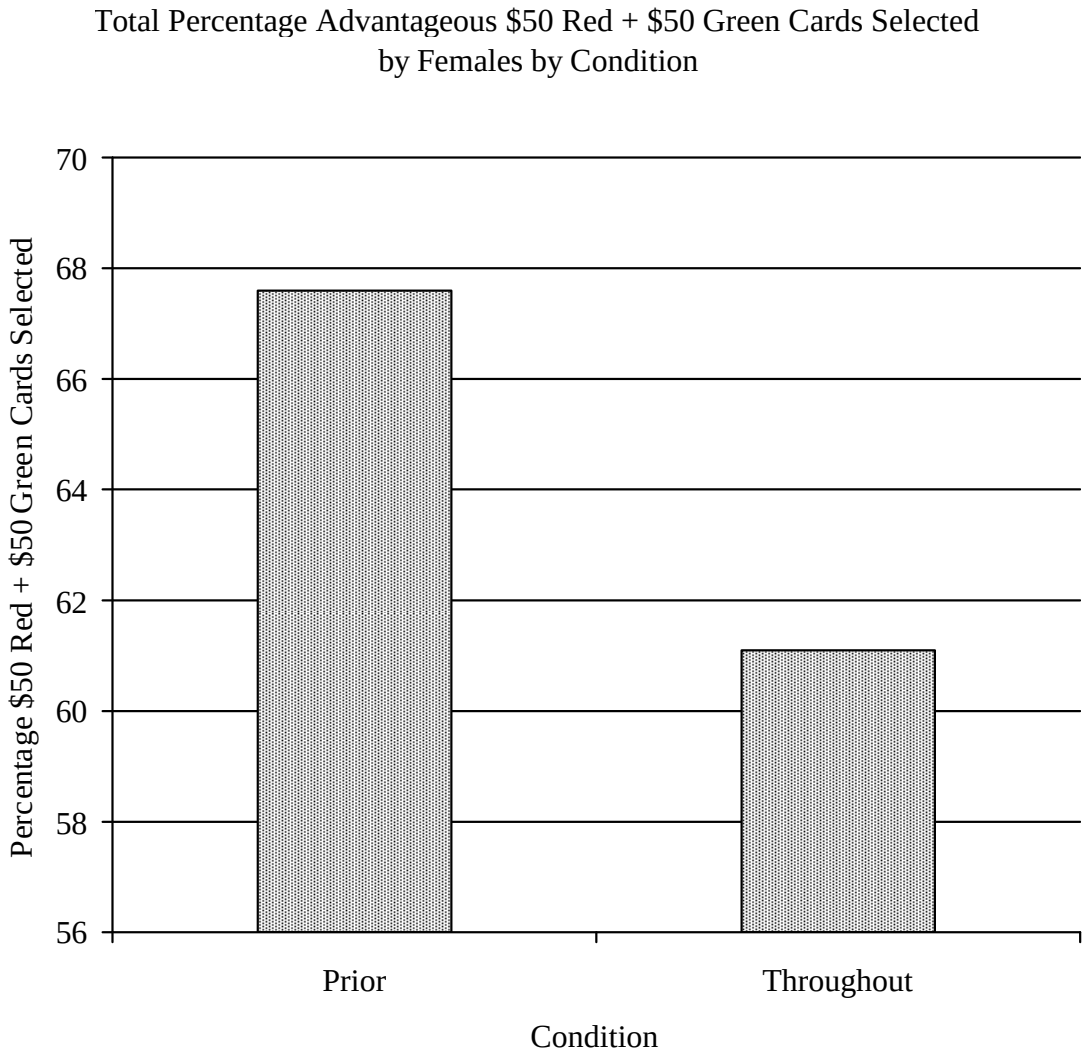

Figure 7. Total percentage of advantageous $50 cards (red and green) chosen across 200 trials of the Iowa Gambling Task by women after deliberating 20 dilemmas either prior to the IGT or intermittently throughout the IGT

DISCUSSION

Previous research has shown that males, as groups, score higher (i.e. chose more advantageous $50 red plus $50 green cards) than females on the IGT (Bolla et al., 2004; Overman et al., 2004; Overman et al., 2006). This effect has been shown in children and adolescents (Crone, Bunge, Latenstein, & Heleen, 2005), young adults (Overman et al., 2004; Overman et al. 2006) and older adults (Reavis & Overman, 2001). Overman et al. (2006) showed that when contemplating Personal Moral dilemmas intermittently throughout the IGT, females' scores were significantly raised to scores equivalent to the males' scores. Reading the Personal Moral dilemmas did not affect the males' scores. In all other conditions neither males' nor females' scores improved.

Following this finding, it was hypothesized in the present study that females' scores on the IGT would be equal to males' scores when they read Personal Moral dilemmas prior to the IGT. The finding of Overman et al. (2006), that contemplating Personal Moral dilemmas intermittently throughout the IGT increased females' scores to become equivalent to the males' scores, was a departure from their original hypothesis. The original hypothesis in Overman et al. (2006) predicted that females' scores would increase in the Non-Personal Moral (NPM) condition because dilemmas of this nature were shown to increase activations of brain areas associated with working memory and cognitive reasoning (Greene et al., 2001). This departure was explained by assuming that a number of the Personal Moral dilemmas were "hard", in that the reaction times were comparatively longer for those dilemmas. This extra processing for "hard" dilemmas increased activation in the DLPFC, which is the area involved in IGT processing in males not females, (Bolla et al., 2004). Overman et al. (2006) speculated that this unique

combination of increased emotional activation plus increased cognitive activation led to higher scores on the IGT. Because reaction times could not be calculated for either study (Overman et al., 2006 and the current study) we can not be sure that the previous findings were due to the "hard" nature of the Personal Moral dilemmas.

In the current study, it was hypothesized that males' scores in all three conditions (Personal Moral (PM), Non-Personal Moral (NPM), and Non-Moral (NM)) as well as females' scores in the Non-Personal Moral (NPM) and Non-Moral (NM) conditions would not be affected by reading the dilemmas prior to the IGT.

As currently hypothesized, females' scores did increase equal to males' scores in the Personal Moral condition. However, females' scores increased in the other two conditions (NPM and NM) as well. Males and females performed equally well (i.e. chose approximately the same number of advantageous $50 red plus $50 green cards) on the IGT.

In the current experiment all gender differences on the IGT were eliminated. As expected in the current experiment both males and females learned the task (i.e. they learned to choose the advantageous $50 red and $50 green cards as the task progressed). This is different from brain damaged patients who do not learn to choose the advantageous cards as the task progresses (Bolla et al., 2004; Overman et al., 2004). Further, when females read dilemmas (PM, NPM, or NM) prior to performing the IGT they later chose the advantageous $50 red plus $50 green decks as often as males in every condition. The analysis showed that males and females chose approximately the same number of each card (advantageous $50 red and $50 green as well as disadvantageous

$100 blue and $100 yellow) throughout the IGT. No gender differences were seen for any card choice.

The research predicted that females' scores on the IGT would increase only in the Personal Moral condition because reading "hard" Personal Moral dilemmas was speculated to increase activation; first, of the more automatic emotional processes, then of the cognitive reasoning processes in the brain (Greene et al., 2004).

Although the research did not find the expected results of an increase in females' scores in the Personal Moral condition alone, females' scores in all conditions did increase with respect to previous data collected (Overman et al., 2006). This is an important step to uncovering the cause of a possible enhancement for decision making.

There is a common thread that ties these three types of dilemmas together. When subjects contemplated dilemmas, Greene et al. (2001) found that the DLPFC is more highly activated in subjects while reading the Non-Personal Moral dilemmas as well as the Non-Moral dilemmas when compared to Personal Moral dilemmas. However, as previously mentioned in a more recent study, Greene et al. (2004) found that when subjects contemplated "hard" Personal Moral dilemmas the DLPFC is also activated. It is possible that reading dilemmas (PM, NPM, or NM) activated the DLPFC and that this was the neural basis for increased decisional performance in females.

A limitation of this explanation is that it does not account for females' lower scores in the Non-Personal Moral (NPM) and Non-Moral (NM) conditions when these dilemmas were read intermittently throughout the IGT (Overman et al., 2006). Greene et al. (2001) examined brain activations when dilemmas were contemplated consecutively, rather than intermittently with another task. However, with out imaging equipment, it is unclear

what affect resulted from reading the dilemmas intermittently throughout the IGT as in Overman et al. (2006). It may be the case that reading dilemmas while engaged in another task had additional separate and distinct affects on decision-making. Reading dilemmas consecutively prior to the IGT, as was done in the current experiment, is a closer replication of Greene et al.'s (2001) study and is therefore more likely to have more comparable increases in brain activations.

Although the findings were not significant, trends in the data show that specific dilemmas had an effect on decision-making. These trends provide support for the theory that increased activation in the DLPFC was the neural basis for improved scores on the IGT. In Greene et al. (2001), increased activation in the BA 39 (bilateral), BA 46, and BA 7/40 (bilateral) was seen when subjects contemplated Non-Personal Moral dilemmas. According to Bolla et al. (2004), men showed increased activity in the right lateral orbital frontal cortex and right dorsal lateral prefrontal cortex, as well as the left lateral orbital frontal cortex. Each of these brain areas has been associated with working memory as well as additional cognitive processes. If these cognitive processes are optimal for decision making (i.e. Bolla et al., 2004), then when activating these areas of the brain, one would expect to find increased scores on the IGT. Although it was not significant, women in the Non-Personal Moral (NPM) condition did experience increased scores. Females in the Non-Personal Moral condition (M = 71.6) had the highest overall mean for advantageous $50 red and $50 green cards when compared to females in the Personal Moral condition (M = 66.15) and females in the Non-Moral condition(M = 65.2) (Figure 1).

Previously, females' lower scores on the IGT were due to choosing a high percentage of disadvantageous $100 yellow cards (Overman et al., 2006). In the current experiment, males and females did not choose significantly different percentages of the disadvantageous $100 yellow card in any of the conditions. Further, a significant difference was found for condition. Overall, subjects in the Non-Personal Moral condition (males and females combined) chose significantly fewer disadvantageous $100 yellow cards than subjects in the Personal Moral and the Non-Moral conditions. No differences were found in card choices for any of the other cards (neither disadvantageous $100 blue cards nor advantageous $50 red or $50 green cards).

This trend is particularly interesting because we see increases in females' scores when Personal Moral dilemmas and Non-Moral dilemmas were contemplated; however, these increases were lower than the increase seen in the Non-Personal Moral condition. Greene et al. (2001) found that Non-Personal Moral dilemmas were more similar to Non-Moral dilemmas than to Personal Moral dilemmas in that contemplation of either increased activation of BA 39 (bilateral), BA 46, and BA 7/40 (bilateral) (cognitive areas). This means that increases in activations of the same areas were also seen when subjects contemplated Non-Moral dilemmas, but not to the same degree. This may explain why females' scores were the highest in the Non-Personal Moral condition (more activation of the DLPFC) yet smaller increases were also seen in the other two conditions (PM and NM activation of the DLPFC was the key to increased decision-making).

Another possible explanation for females' lower scores in the PM condition compared to the NPM condition is that subjects may have experienced some sort of fatigue from contemplating dilemmas of this emotional context prior to performing the IGT.

Limitations and Alternative Explanations

Our lab is not equipped with imaging equipment which limits our explanation of results. We have seen important behavioral effects through performance on the IGT, but it is critical to replicate these findings with imaging data. This will confirm our results and provide additional information on which brain areas are more highly activated during the contemplation of each type of dilemma as well as during the task. Greene et al. (2001) used fMRIs while subjects contemplated dilemmas, however, gender differences in activations were not examined. If males and females increased activation of different brain areas during the IGT (Bolla et al., 2004), it is also possible that they increased activation of different brain areas while contemplating dilemmas.

Further, this paper has made an assumption about why the results from the previous research (Overman et al., 2006) do not coincide with the current research. Dilemmas in Overman et al. (2006) were read intermittently throughout the IGT; where as, the current study more closely replicated Greene et al.'s (2001) study in that dilemmas were read consecutively. Without imaging equipment to observe the differences in deliberating dilemmas consecutively and deliberating dilemmas intermittently throughout the IGT one can not know if increases in brain activations are the same.

Another question that arises is why males are seemingly not affected by dilemmas of any type. Males and females may perceive the dilemmas differently or be emotionally affected in different ways by contemplating them. Gender differences in brain activations while deliberating dilemmas should be examined along with some measure of how stressful or emotional they thought the task was.

Bolla et al. (2004) found that women more highly activate BA 11 (left OFC) when performing the IGT. This area has been associated with anxiety (Liddle, 2001). Perhaps, increases in activation of the DLPFC from contemplating the dilemmas regulated this anxiety and that is the reason that their performance increased on the IGT. Greene et al. (2004) says that "the DLPFC (BA 46) (the area men activate according to Bolla et al., 2004) plays an important role in the regulation of potentially counterproductive emotions in the context of social decision making" (p. 396). Perhaps this area was regulating females' emotional anxiety and therefore helping performance. This would explain why men's scores are not increasing; they are not activating the brain areas associated with anxiety, and therefore regulation of these emotions is not as necessary. Another possibility is that males more highly activate the DLPFC when performing the IGT; therefore, emotional anxiety is already regulated during this task.

Importance and Future Research

It is critical to see what is causing this improved decision making for females. In addition to imaging studies, other tasks should be performed along with the IGT to see their effects on decision-making. The original hypothesis speculated that increased scores on the IGT were due to increased activation of both the emotional areas of the brain as well as the cognitive areas. Because the current experiments' results support a higher importance on the DLPFC (cognitive areas), it is important to further investigate how other tasks effect performance on the IGT.

Now that it has been established that reading dilemmas (PM, NPM, or NM) immediately prior to the IGT improves performance in females, it is critical to take further steps to see exactly how long this "increased decision making" will last. This

process would start by testing subjects one hour before, and if that produced desirable results, subjects would read dilemmas one day before completing the task. The purpose of this testing would be to see how long the decision making enhancement would last.

In the current experiment, the reason for sticking exclusively to gender differences in the beginning was primarily for ease of testing. We have an abundance of subjects participating from the Psychology department in order to receive class credit. In the future we hope to establish this effect across other populations. May J. M., Delgado M. R., Dahl R. E., Stenger V. A., Ryan N. D., Fiez J. A., & C. S. Carter (2004) found that children and adolescents had increased activity in the OFC during a reward related task and seemed to respond more to having a greater amount of positive rewards rather than a lesser amount of negatives. This pattern of activation appears to be similar to females' activation on the IGT and provides further evidence that adolescents may function in a similar way in terms of OFC activity. Once a lasting effect can be shown in females, it will be critical to test "at risk" groups (i.e. adolescents and substance abusers) to see if the findings generalize across populations.

The length of the effect may have huge potential to benefit poor decision makers. If contemplation of dilemmas can improve performance on the IGT, there is the potential that they could also be used to improve real life decision making for "at risk" populations. Information gathered from this research could be used as the foundation for cognitive therapies designed to increase the brain's ability to balance emotional response with higher cognitive reasoning. This may allow "higher cognitive" reasoning to mediate decisions when these populations are, for example, being offered drugs or deciding whether to do homework or go out with friends. At this time we are unsure about the

extent to which the effect will last, but we have high hopes that our results will become a crucial step in developing a treatment for “at risk” populations.

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APPENDIX

Appendix A. Dilemmas.

Non-Moral Dilemmas:

1. Standard Turnips

You are a farm worker driving a turnip-harvesting machine. You are approaching two diverging paths.

By choosing the path on the left you will harvest ten bushels of turnips. By choosing the path on the right you will harvest twenty bushels of turnips. If you do nothing your turnip-harvesting machine will turn to the left

Is it appropriate for you to turn your turnip-picking machine to the right in order to harvest twenty bushels of turnips instead of ten?

2. Plant Transport

You are bringing home a number of plants from a store that is about two miles from your home. The trunk of your car, which you've lined with plastic to catch the mud from the plants, will hold most of the plants you've purchased.

You could bring all the plants home in one trip, but this would require putting some of the plants in the back seat as well as in the trunk. By putting some of the plants in the back seat you will ruin your fine leather upholstery which would cost thousands of dollars to replace.

Is it appropriate for you to make two trips home in order to avoid ruining the upholstery of your car?

3. Scheduling

You are in charge of scheduling appointments in a dentist's office. Two people, Mr. Morris and Mrs. Santiago have called to make appointments for next Monday. The only available times for next Monday are at 10:00 AM and at 3:00 PM.

Mr. Morris's schedule is rather flexible. He can have his appointment either at 10:00 AM or at 3:00 PM. Mrs. Santiago's schedule is less flexible. She can only have her appointment at 10:00 AM.

Is it appropriate for you to schedule Mr. Morris for 3:00 PM so that both he and Mrs. Santiago can have their appointments next Monday?

4. Generic Brand

You have a headache. You go to the pharmacy with the intention of buying a particular name-brand headache medicine. When you get there you discover that the pharmacy is out of the brand you were looking for.

The pharmacist, whom you've known for a long time and in whom you have a great deal of trust, tells you that he has in stock a generic product which is, in his words, "exactly the same" as the product you had originally intended to buy.

Is it appropriate for you to purchase the generic brand instead of searching further for the name-brand product you were looking for?

5. Brownies

You have decided to make a batch of brownies for yourself. You open your recipe book and find a recipe for brownies.

The recipe calls for a cup of chopped walnuts. You don't like walnuts, but you do like macadamia nuts. As it happens, you have both kinds of nuts available to you. Is it appropriate for you to substitute macadamia nuts for walnuts in order to avoid eating walnuts?

6. Train or Bus

You need to travel from New York to Boston in order to attend a meeting that starts at 2:00 PM. You can take either the train or the bus.

The train will get you there just in time for your meeting no matter what. The bus is scheduled to arrive an hour before your meeting, but the bus is occasionally several hours late because of traffic. It would be nice to have an extra hour before the meeting, but you cannot afford to be late.

Is it appropriate for you to take the train instead of the bus in order to ensure your not being late for your meeting?

7. Computer

You are looking to buy a new computer. At the moment the computer that you want costs $1000. A friend who knows the computer industry has told you that this computer's price will drop to $500 next month.

If you wait until next month to buy your new computer you will have to use your old computer for a few weeks longer than you would like to. Nevertheless you will be able to do everything you need to do using your old computer during that time.

Is it appropriate for you to use your old computer for a few more weeks in order to save $500 on the purchase of a new computer?

8. Survey

A representative of a reputable, national survey organization calls you at your home while you are having a quiet dinner by yourself.

The representative explains that if you are willing to spend a half an hour answering questions about a variety of topics her organization will send you a check for $200.

Is it appropriate for you to interrupt your dinner in order to earn $200?

9. Coupons

You have gone to a bookstore to buy $50 worth of books. You have with you two coupons.

One of these coupons gives you 30% off of your purchase price. This coupon expires tomorrow. The other coupon gives you 25% off your purchase price, and this coupon does not expire for another year.

Is it appropriate for you to use the 30%-off coupon for your present purchase so that you will have another coupon to use during the coming year?

10. Scenic Route

An old friend has invited you to spend the weekend with him at his summer home some ways up the coast from where you are. You intend to travel there by car, and there are two routes that you can take: the highway and the coastal road.

The highway will get you to your friend's house in about three hours, but the scenery along the highway is very boring. The coastal route will get you to your friend's house in about three hours and fifteen minutes, and the scenery along the coastal road is breathtakingly beautiful.

Is it appropriate for you to take the coastal route in order to observe the beautiful scenery as you drive?

11 Reversed Turnips

You are a farm worker driving a turnip-harvesting machine. You are approaching two diverging paths.

By choosing the path on the left you will harvest thirty bushels of turnips. By choosing the path on the right you will harvest fifteen bushels of turnips. If you do nothing your turnip-picking machine will turn to the left.

Is it appropriate for you to turn your turnip-harvesting machine to the right in order to harvest fifteen bushels of turnips instead of thirty?

12. Investment Offer

You are at home one day when the mail arrives. You receive a letter from a reputable corporation that provides financial services. They have invited you to invest in a mutual fund, beginning with an initial investment of one thousand dollars.

As it happens, you are familiar with this particular mutual fund. It has not performed very well over the past few years, and, based on what you know, there is no reason to think that it will perform any better in the future.

Is it appropriate for you to invest a thousand dollars in this mutual fund in order to make money?

13. Broken VCR

You have brought your broken VCR to the local repair shop. The woman working at the shop tells you that it will cost you about $100 to have it fixed.

You noticed in the paper that morning that the electronics shop next door is having a sale on VCR's and that a certain new VCR which is slightly better than your old one is on sale for $100.

Is it appropriate for you have your old VCR fixed in order to avoid spending money on a new one?

14. Choosing Classes

You are beginning your senior year of college. In order to fulfill your graduation requirements you need to take a history class and a science class by the end of the year.

During the fall term, the history class you want to take is scheduled at the same time as the science class you want to take. During the spring term the same history class is offered, but the science class is not.

Is it appropriate for you to take the history class during the fall term in order to help you fulfill your graduation requirements?

15. Raffle

You've decided to buy a raffle ticket to support a local charity. They are separately raffling off two different cars: Car A and Car B. You have decided to buy one raffle ticket. You are a serious and knowledgeable car enthusiast, and you think that these two cars are equally good.

Because there have been a lot of adds for Car B on TV recently, many more people have chosen to buy tickets for the Car B raffle. Since more people have bought tickets for the Car B raffle, your chances of winning are better in the Car A raffle than in the Car B raffle.

Is it appropriate for you to buy a ticket for the Car B raffle in order to win a car?

16. Jogging

You intend to accomplish two things this afternoon: going for a jog and doing some paperwork. In general you prefer to get your work done before you exercise.

The weather is nice at the moment, but the weather forecast says that in a couple of hours it will start to rain. You very much dislike jogging in the rain, but you don't care what the weather is like while you do paperwork.

Is it appropriate for you to do your paperwork now with the intention of jogging in a couple of hours in order to get your work done before you exercise?

17. Food Prep

You are preparing pasta with fresh vegetables, and you are deciding on the order in which you will do the various things you need to do. You are in a big hurry.

At the moment you have a slight urge to cut vegetables. If you first start the water boiling and then cut the vegetables you will be done in twenty minutes. If you cut the vegetables and then start the water boiling you will be done in forty minutes.

Is it appropriate for you to cut the vegetables first and then start the water boiling in order to satisfy your slight urge to cut vegetables?

18. Shower

You are planning to attend a luncheon this afternoon, and before you go you will need to take a shower. You have some yard work that you would like to do before then, and doing this yard will cause you to perspire a fair amount.

If you shower before you do your yard work you will have to take another shower before the luncheon. At the present time you could enjoy taking a shower. At the same time, you have a very strong commitment to lowering your water bill and to showering no more than once a day.

Is it appropriate for you to shower before doing your yard work in order to enjoy a shower now?

19. Errands

You need to go to the bakery in the morning and the furniture store in the afternoon. You also need to go to the camera shop at some point. You prefer to do most of your errands in the morning, but you very much dislike doing unnecessary driving.

The camera shop is near the furniture store and far from the bakery. As a result you will have to do less driving if you go to the camera shop in the afternoon when you go to the furniture store.

Is it appropriate for you to go to the camera shop in the morning in order to do most of your errands in the morning?

20. New Job

You have been offered employment by two different firms, and you are trying to decide which offer to accept.

Firm A has offered you an annual salary of $100,000 and fourteen days of vacation per year. Firm B has offered you an annual salary of $50,000 and sixteen days of vacation per year. The two firms and the two positions are otherwise very similar.

Is it appropriate for you to take Firm B's offer in order to have two more days of vacation per year?

Non-personal Moral Dilemmas:

1. Standard Trolley

You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a single railway workman.

If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to avoid the deaths of these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right, causing the death of the single workman.

Is it appropriate for you to hit the switch in order to avoid the deaths of the five workmen?

2. Standard Fumes

You are the late-night watchman in a hospital. Due to an accident in the building next door, there are deadly fumes rising up through the hospital's ventilation system. In a certain room of the hospital are three patients. In another room there is a single patient. If you do nothing the fumes will rise up into the room containing the three patients and cause their deaths.

The only way to avoid the deaths of these patients is to hit a certain switch, which will cause the fumes to bypass the room containing the three patients. As a result of doing this the fumes will enter the room containing the single patient, causing his death.

Is it appropriate for you to hit the switch in order to avoid the deaths of the three patients?

3. Donation

You are at home one day when the mail arrives. You receive a letter from a reputable international aid organization. The letter asks you to make a donation of two hundred dollars to their organization.

The letter explains that a two hundred-dollar donation will allow this organization to provide needed medical attention to some poor people in another part of the world.

Is it appropriate for you to not make a donation to this organization in order to save money?

4. Vaccine Policy

You work for the Bureau of Health, a government agency. You are deciding whether or not your agency should encourage the use of a certain recently developed vaccine. The vast majority of people who take the vaccine develop an immunity to a certain deadly

disease, but a very small number of people who take the vaccine will actually get the disease that the vaccine is designed to prevent.

All the available evidence, which is very strong, suggests that the chances of getting the disease due to lack of vaccination are much higher than the chances of getting the disease by taking the vaccine.

Is it appropriate for you to direct your agency to encourage the use of this vaccine in order to promote national health?

5. Environmental Policy

You are a member of a government legislature. The legislature is deciding between two different policies concerning environmental hazards.

Policy A has a 90% chance of causing no deaths at all and has a 10% chance of causing 1000 deaths. Policy B has a 92% chance of causing no deaths and an 8% chance of causing 10,000 deaths.

Is it appropriate for you to vote for Policy A over Policy B?

6. Environmental Policy

You are a member of a government legislature. The legislature is deciding between two different policies concerning environmental hazards.

Policy A has a 90% chance of causing no deaths at all and has a 10% chance of causing 1000 deaths. Policy B has an 88% chance of causing no deaths and a 12% chance of causing 10 deaths.

Is it appropriate for you to vote for Policy B over Policy A?

7. Sculpture

You are visiting the sculpture garden of a wealthy art collector. The garden overlooks a valley containing a set of train tracks. A railway workman is working on the tracks, and an empty runaway trolley is heading down the tracks toward the workman.

The only way to save the workman's life is to push one of the art collector's prized sculptures down into the valley so that it will roll onto the tracks and block the trolley's passage. Doing this will destroy the sculpture.

Is it appropriate for you to destroy the sculpture in order to save this workman's life?

8. Speedboat

While on vacation on a remote island, you are fishing from a seaside dock. You observe a group of tourists board a small boat and set sail for a nearby island. Soon after their departure you hear over the radio that there is a violent storm brewing, a storm that is sure to intercept them.

The only way that you can ensure their safety is to warn them by borrowing a nearby speedboat. The speedboat belongs to a miserly tycoon who would not take kindly to your borrowing his property.

Is it appropriate for you to borrow the speedboat in order to warn the tourists about the storm?

9. Guarded Speedboat

While on vacation on a remote island, you are fishing from a seaside dock. You observe a group of tourists board a small boat and set sail for a nearby island. Soon after their departure you hear over the radio that there is a violent storm brewing, a storm that is sure to intercept them.

The only way that you can ensure their safety is to warn them by borrowing a nearby speedboat. The speedboat belongs to a miserly tycoon who has hired a fiercely loyal guard to make sure that no one uses his boat without permission. To get to the speedboat you will have to lie to the guard.

Is it appropriate for you to lie to the guard in order to borrow the speedboat and warn the tourists about the storm?

10. Five-for-Seven Trolley

You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. On the tracks extending to the left is a group of five railway workmen. On the tracks extending to the right is a group of seven railway workmen.

If you do nothing the trolley will proceed to the left, causing the deaths of the five workmen. The only way to save these workmen is to hit a switch on your dashboard that will cause the trolley to proceed to the right, causing the deaths of the seven workmen on the other side.

Is it appropriate for you to hit the switch in order to avoid the deaths of the five workmen?

11. Three-for-Seven Fumes

You are the late-night watchman in a hospital. Due to an accident in the building next door, there are deadly fumes rising up through the hospital's ventilation system. In a certain room of the hospital are three patients. In another room there are seven patients. If you do nothing the fumes will rise up into the room containing the three patients and cause their deaths.

The only way to save these patients is to hit a certain switch, which will cause the fumes to bypass the room containing the three people. As a result of doing this the fumes will enter the room containing the seven patients, causing their deaths.

Is it appropriate for you to hit the switch in order to avoid the deaths of the three patients?

12. Resume

You have a friend who has been trying to find a job lately without much success. He figured that he would be more likely to get hired if he had a more impressive resume.

He decided to put some false information on his resume in order to make it more impressive. By doing this he ultimately managed to get hired, beating out several candidates who were actually more qualified than he.

Was it appropriate for your friend to put false information on his resume in order to help him find employment?

13. Taxes

You are the owner of a small business trying to make ends meet. It occurs to you that you could lower your taxes by pretending that some of your personal expenses are business expenses.

For example, you could pretend that the stereo in your bedroom is being used in the lounge at the office, or that your dinners out with your wife are dinners with clients.

Is it appropriate for you to pretend that certain personal expenses are business expenses in order to lower your taxes?

14. Environmental Policy

You are a member of a government legislature. The legislature is deciding between two different policies concerning environmental hazards.

Policy A has a 90% chance of causing no deaths at all and has a 10% chance of causing 1000 deaths. Policy B has a 92% chance of causing no deaths and an 8% chance of causing 10,000 deaths.

Is it appropriate for you to vote for Policy B over Policy A?

15. Environmental Policy

You are a member of a government legislature. The legislature is deciding between two different policies concerning environmental hazards.

Policy A has a 90% chance of causing no deaths at all and has a 10% chance of causing 1000 deaths. Policy B has a 88% chance of causing no deaths and a 12% chance of causing 10 deaths.

Is it appropriate for you to vote for Policy A over Policy B?

16. Stock Tip

You are a management consultant working on a case for a large corporate client. You have access to confidential information that would be very useful to investors. You have a friend who plays the stock market. You owe this friend a sizable sum of money.

By providing her with certain confidential information you could help her make a lot of money, considerably more than you owe her. If you did this, she would insist on canceling your debt. Releasing information in this way is strictly forbidden by federal law.

Is it appropriate for you to release this information to your friend so that she will cancel your debt?

17. Illegal Lunch

You are a lawyer working on a big case. The judge presiding over the trial happens to be someone you knew from law school. The two of you were rather friendly back then, but now, decades later, it seems that your old friend barely remembers you.

You're quite sure that if you were to talk to him over lunch, you could jog his memory and he would begin to see you as an old buddy, which would be very good for your work on this case. It's illegal for judges and lawyers working on the same case to meet socially.

Is it appropriate for you to meet with this judge socially in order to help you win your case?

18. Lost Wallet

You are walking down the street when you come across a wallet lying on the ground. You open the wallet and find that it contains several hundred dollars in cash as well the owner's driver's license.

From the credit cards and other items in the wallet it's very clear that the wallet's owner is wealthy. You, on the other hand, have been hit by hard times recently and could really use some extra money. You consider sending the wallet back to the owner without the cash, keeping the cash for yourself.

Is it appropriate for you to keep the money you found in the wallet in order to have more money for yourself?

19. Eyes

In the future, you are a veteran of a war during which both of your eyes were destroyed. Due to recent medical advances, it is now possible to perform eye transplants, but, much to your anger and amazement, there are no willing donors.

A sympathetic black-market surgeon offers to help you. If you hire him, he and his associates will kidnap a randomly selected stranger, carve out one of his eyes, and transfer it to you.

Is it appropriate for you to hire this surgeon to carve out a stranger's eye in order to help restore your vision?

20. Aircraft Carrier

There is a signal officer on an aircraft carrier. A fuel tanker plane is trying to fly in and land on its carrier but the plane is badly damaged. If it lands on the deck it will almost certainly explode and a number of his sailors will be killed and others will be badly burned. If he waves off the tanker, it will land in the ocean, its pilot will eject, but the place will erupt and pollute the ocean with 500,000 gallons of diesel fuel over a delicate, rare coral bed.

Is it appropriate for the signal officer to wave off the plane to avoid the deaths of the sailors of the ship?

Personal-Moral Dilemmas:

1. Transplant

You are a doctor. You have five patients, each of whom is about to die due to a failing organ of some kind. You have another patient who is healthy.

The only way that you can save the lives of the first five patients is to transplant five of this young man's organs (against his will) into the bodies of the other five patients. If you do this, the young man will die, but the other five patients will live.

Is it appropriate for you to perform this transplant in order to save five of your patients?

2. Footbridge

A runaway trolley is heading down the tracks toward five workmen who will be killed if the trolley proceeds on its present course. You are on a footbridge over the tracks, in between the approaching trolley and the five workmen. Next to you on this footbridge is a stranger who happens to be very large.

The only way to save the lives of the five workmen is to push this stranger off the bridge and onto the tracks below where his large body will stop the trolley. The stranger will die if you do this, but the five workmen will be saved.

Is it appropriate for you to push the stranger on to the tracks in order to save the five workmen?

3. Lifeboat

You are on a cruise ship when there is a fire on board, and the ship has to be abandoned. The lifeboats are carrying many more people than they were designed to carry. The lifeboat you're in is sitting dangerously low in the water-a few inches lower and it will sink.

The seas start to get rough, and the boat begins to fill with water. It seems to you that there is only one way to stop the boat from sinking, and that is to start throwing other passengers overboard, starting with old people who are too weak to resist.

Is it appropriate for you to throw some of your fellow passengers overboard in order to save yourself and the remaining passengers?

4. Hard Times

You are the head of a poor household in a developing country. Your crops have failed for the second year in a row, and it appears that you have no way to feed your family. Your

sons, ages eight and ten, are too young to go off to the city where there jobs, but your daughter could fare better.

You know a man from your village who lives in the city and who makes sexually explicit films featuring small children such as your daughter. He tells you that in one year of working in his studio your daughter could earn enough money to keep your family fed for several growing seasons.

Is it appropriate for you to employ your daughter in the child pornography industry in order to feed your family?

5. Smother for dollars

You are in hospital lounge waiting to visit a sick friend. A young man sitting next to you explains that his father is very ill. The doctors believe that he has a week to live at most. He explains further that his father has a substantial life insurance policy that expires at midnight.

If his father dies before midnight, this young man will receive a very large sum of money. He says that the money would mean a great deal to him and that no good will come from his father's living a few more days. He offers you half a million dollars to go up to his father's room and smother his father with a pillow.

Is it appropriate for you to kill this man's father in order to get money for yourself and this young man?

6. Crying Baby

Enemy soldiers have taken over your village. They have orders to kill all remaining civilians. You and some of your townspeople have sought refuge in the cellar of a large house. Outside you hear the voices of soldiers who have come to search the house for valuables.

Your baby begins to cry loudly. You cover his mouth to block the sound. If you remove your hand from his mouth his crying will summon the attention of the soldiers who will kill you, your child, and the others hiding out in the cellar. To save yourself and the others you must smother your child to death.

Is it appropriate for you to smother your child in order to save yourself and the other townspeople?

7. Plane Crash

Your plane has crashed in the Himalayas. The only survivors are yourself, another man, and a young boy. The three of you travel for days, battling extreme cold and wind. Your only chance at survival is to find your way to small a village on the other side of the mountain, several days away.

The boy has a broken leg and cannot move very quickly. His chances of surviving the journey are essentially zero. Without food, you and the other man will probably die as well. The other man suggests that you sacrifice the boy and eat his remains over the next few days.

Is it appropriate to kill this boy so that you and the other man may survive your journey to safety?

8. Hired Rapist

You have been dissatisfied with your marriage for several years. It is your distinct impression that your wife no longer appreciates you. You remember how she appreciated you years ago when you took care of her after she was mugged. You devise the following plan to regain your wife's affection.

You will hire a man to break into your house while you are away. This man will tie up your wife and rape her. You, upon hearing the horrible news, will return swiftly to her side, to take care of her and comfort her, and she will once again appreciate you.

Is it appropriate for you to hire a man to rape your wife so that she will appreciate you as you comfort her?

9. Grandson

A young boy is visiting his grandmother for the weekend. Usually she gives him a gift of a few dollars when he arrives, but this time she doesn't. He asks her why not and she says something about how he doesn't write her as many letters as he used to. Angered by this, the boy decides to play a trick on her.

While his grandmother is busy cooking he removes a handful of pills from the medicine cabinet and puts them in his grandmother's teapot. Later that night, she makes her tea, and the dissolved pills make her sick. In the morning she is dead.

Was it appropriate for this boy to put pills in his grandmother's teapot in order to play a trick on her?

10. Infanticide

You are a fifteen-year-old girl who has become pregnant. By wearing loose clothing and deliberately putting on weight you have managed to keep your pregnancy a secret. One day, while at school, your water breaks. You run to the girls locker room and hide for several hours while you deliver the baby. You are sure that you are not prepared to care for this baby.

You think to yourself that it would be such a relief to simply clean up the mess you've made in the locker room, wrap the baby in some towels, throw the baby in the dumpster behind the school, and act as if nothing had ever happened.

Is it appropriate for you to throw your baby in the dumpster in order to move on with your life?

11. Modified Preventing the Spread

You are a waiter. You overhear one of your customers say that he is about to go to jail and that in his last forty-eight hours of freedom he plans to infect as many people as possible with HIV. You know him well enough to know that he is telling the truth and that he has access to many potential victims.

You happen to know that he has a very strong allergy to poppy seeds. If he eats even one he will go into convulsions and have to be hospitalized. for at least forty-eight hours.

Is it appropriate for you to cause this man to have a serious allergy attack in order to prevent him from spreading HIV?

12. Modified Safari

You are part of a group of ecologists who live in a remote stretch of jungle. The entire group, which includes eight children, has been taken hostage by a group of paramilitary terrorists. One of the terrorists takes a liking to you. He informs you that his leader intends to kill you and the rest of the hostages the following morning.

He is willing to help you and the children escape, but as an act of good faith he wants you to kill one of your fellow hostages whom he does not like. If you refuse his offer all the hostages including the children and yourself will die. If you accept his offer then the others will die in the morning but you and the eight children will escape..

Is it appropriate for you to kill one of your fellow hostages in order to escape from the terrorists and save the lives of the eight children?

13. Modified Bomb

You are negotiating with a powerful and determined terrorist who is about to set off a bomb in a crowded area. Your one advantage is that you have his teen-age son in your custody.

There is only one thing that you can do to stop him from detonating his bomb, which will kill thousands of people if detonated. To stop him, you must contact him over the satellite hook-up that he has established and, in front of the camera, break one of his son's arms and then threaten to break the other one if he does not give himself up.

Is it appropriate for you to break the terrorist's son's arm in order to prevent the terrorist from killing thousands of people with his bomb?

14. Submarine

You are the captain of a military submarine travelling underneath a large iceberg. An onboard explosion has caused you to lose most of your oxygen supply and has injured one of your crew who is quickly losing blood. The injured crew member is going to die from his wounds no matter what happens.

The remaining oxygen is not sufficient for the entire crew to make it to the surface. The only way to save the other crew members is to shoot dead the injured crew member so that there will be just enough oxygen for the rest of the crew to survive.

Is it appropriate for you to kill the fatally injured crew member in order to save the lives of the remaining crew members?

15. Lawrence of Arabia

You are the leader of a small army that consists of warriors from two tribes, the hill tribe and the river tribe. You belong to neither tribe. During the night a hill tribesman got into an argument with a river tribesman and murdered him. The river tribe will attack the hill tribe unless the murderer is put to death, but the hill tribe refuses to kill one of its own warriors.

The only way for you to avoid a war between the two tribes that will costs hundreds of lives is to publicly execute the murderer by cutting off is head with your sword.

Is it appropriate for you to cut off this man's head in order to prevent the two tribes from fighting a war that will cost hundreds of lives?

16. Sophie's Choice

It is wartime and you and your two children, ages eight and five, are living in a territory that has been occupied by the enemy. At the enemy's headquarters is a doctor who performs painful experiments on humans that inevitably lead to death.

He intends to perform experiments on one of your children, but he will allow you to choose which of your children will be experimented upon. You have twenty-four hours to bring one of your children to his laboratory. If you refuse to bring one of your children to his laboratory he will find them both and experiment on both of them.

Is it appropriate for you to bring one of your children to the laboratory in order to avoid having them both die?

17. Sacrifice

You, your husband, and your four children are crossing a mountain range on your return journey to your homeland. You have inadvertently set up camp on a local clan's sacred burial ground.

The leader of the clan says that according to the local laws, you and your family must be put to death. However, he will let yourself, your husband, and your three other children live if you yourself will kill your oldest son.

Is it appropriate for you to kill your oldest son in order to save your husband and your other three children?

18. Vitamins

You are the leader of a mountaineering expedition that is stranded in the wilderness. Your expedition includes a family of six that has a genetically caused vitamin deficiency. A few people's kidneys contain large amounts of this vitamin.

There is one such person in your party. The only way to save the lives of the six members of this family is to remove one of this man's kidneys so that the necessary vitamins may be extracted from it. The man will not die if you do this, but his health will be compromised. The man is opposed to this plan, but you have the power to do as you see fit.

Is it appropriate for you to forcibly remove this man's kidney in order to save the lives of the six vitamin-deficient people?

19. Vaccine Test

A viral epidemic has spread across the globe killing millions of people. You have developed two substances in your home laboratory. You know that one of them is a vaccine, but you don't know which one. You also know that the other one is deadly.

Once you figure out which substance is the vaccine you can use it to save millions of lives. You have with you two people who are under your care, and the only way to identify the vaccine is to inject each of these people with one of the two substances. One person will live, the other will die, and you will be able to start saving lives with your vaccine.

Is it appropriate for you to kill one of these people with a deadly injection in order to identify a vaccine that will save millions of lives?

20. Euthanasia

You are the leader of a small group of soldiers. You are on your way back from a completed mission deep in enemy territory when one of your men has stepped in trap that has been set by the enemy and is badly injured. The trap is connected to a radio device that by now has alerted the enemy to your presence. They will soon be on their way.

If the enemy finds your injured man they will torture him and kill him. He begs you not to leave him behind, but if you try to take him with you your entire group will be captured. The only way to prevent this injured soldier from being tortured is to shoot him yourself.

Is it appropriate for you to shoot this soldier in order to prevent him from being tortured by the enemy?

Appendix B: Informed Consent

INFORMED CONSENT (UNCW)

You are invited to participate in this research project. Your participation is voluntary and you may stop at any time without penalty.

If you decide to participate, you will be asked to read a series of passages and answer questions about them. Your will also be asked to play a computer decision-making game. The session will take about 40 minutes.

Your name will not be associated with the task in any manner. Only code numbers will be used. We are not interested in the performance of individuals, but only groups of people.

Your participation may provide no immediate benefits to you as an individual; however, the result of the project may provide us with valuable knowledge about the process of decision making.

If you have any questions, please contact Dr. William Overman who is the director of the project at 962-3379, or Dr. Candace Gauthier, who is the chair of the UNCW Institutional Review Board at 962-3558.

I have read and understood this consent form and consent to participate.

_____	_____	_____
Printed name of Participant	Signature	Date

_____	_____	_____
Printed name of Witness	Signature	Date

Appendix C: Personal Information Questionnaire

Confidential Personal Information Questionnaire

Please read and either circle or fill in the space designated with your answers. All your answers will be held in strict confidence and DO NOT PUT YOUR NAME on this form.

1. Gender: Male Female

2. What is your Date of Birth? ____Day ____ Month ____Year

3. How old are you in years and months? ____Yrs ____Months

4. Are you currently taking any prescription medication?
   YES NO

5. If YES, what are you taking? _____

6. How often do you consume alcoholic Beverages?
_____

7. How many drinks do you usually have when you consume alcohol?
_____

8. Do you indulge in recreational drug use? YES NO

9. What recreational drugs have you tried? _____
_____

10. How often do you use recreational drugs? _____

11. Do you smoke cigarettes/ cigars? YES NO How much?____

12. If no, how long has it been since you quit smoking? _____ NEVER

13. Do you play poker? YES NO

14. How often do you play poker? _____

15. Are you right or left handed? _____

Appendix D: Dilemma Answer Sheet

DO NOT PUT YOUR NAME ON THIS SHEET

Passage Instructions/ Answer Sheet

You will be asked to read 20 passages and after reading each passage you will be asked to answer the question “is it appropriate or not for you to do?” On the answer sheet provided, next to the number corresponding to the passage that you read, you are to circle yes or no.

1. YES / NO
2. YES / NO
3. YES / NO
4. YES / NO
5. YES / NO
6. YES / NO
7. YES / NO
8. YES / NO
9. YES / NO
10. YES / NO
11. YES / NO
12. YES / NO
13. YES / NO
14. YES / NO
15. YES / NO
16. YES / NO
17. YES / NO
18. YES / NO
19. YES / NO
20. YES / NO

Appendix E: Iowa Gambling Task Scoring Sheet

Iowa Gambling Task Scoring Sheet

Ten Trials: Block 1: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 2: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 3: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 4: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 5: Y = , B = , R = , G = , Good Deck Guess _____, _____

Trial Block I: Y = , B = , R = , G = ,

Ten Trials: Block 6: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 7: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 8: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 9: Y = , B = , R = , G = , Good Deck Guess _____, _____

Ten Trials: Block 10: Y = , B = , R = , G = , Good Deck Guess _____, ____

Trial Block II: Y = , B = , R = , G = ,

Iowa Gambling Task Scoring Sheet (Continued)

Ten Trials: Block 11: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 12: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 13: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 14: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 15: Y = , B = , R = , G = , Good Deck Guess ____, ____

Trial Block III: Y = , B = , R = , G = ,

Ten Trials: Block 16: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 17: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 18: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 19: Y = , B = , R = , G = , Good Deck Guess ____, ____

Ten Trials: Block 20: Y = , B = , R = , G = , Good Deck Guess ____, ____

Trial Block IV: Y = , B = , R = , G = ,