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Examining the role of cognitive ability and individual thinking dispositions in moral judgment

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Examining the Role of Cognitive Ability and Individual Thinking Dispositions in Moral

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Abstract

The current study examined the relation between individual cognitive ability (SAT total score), thinking dispositions (Stanovich's (2008) Master Rationality Motive, Cacioppo et al.'s (1984) Need for Cognition, Stanovich & West's (1997) Actively Open-minded Thinking scales), and moral judgment. The relation between these individual differences and moral judgment was examined across multiple contexts. First, the expression of myside bias was examined within a medical ethics scenario in which a limited number of organs must be allocated between two groups of people with differential transplant survival rates. Second, the role of individual differences was examined in moral reasoning across differential presentation of moral dilemma scenarios. The findings of the current study suggest that individual difference variables such as cognitive ability and thinking dispositions do not relate to moral judgment in the same manner across both experimental scenarios. Further investigation and replication is needed in order to draw definitive conclusions regarding the relation between individual cognitive ability, thinking dispositions, and moral judgment.

CHAPTER 1

Introduction

An extensive body of research examining the role of heuristics and biases in human judgment and decision making suggests that our judgment often diverges from normative models and is prone to error. Research has only recently begun to examine the role of individual differences in susceptibility to suboptimal reliance on heuristics that may result in expression of biases. Although our understanding of the influences of these individual differences are still emerging, this research has indicated that individual differences such as actively open-minded thinking and need for cognition may explain systematic variance in participant judgment across various cognitive tasks (Stanovich & West, 1999). Surprisingly, this very research has also indicated that individual susceptibility to many common heuristics and biases may be independent of cognitive ability (Stanovich & West, 2007, 2008). More specifically, Stanovich and West (2007, 2008) suggested that individuals of differing cognitive ability do not differ significantly on a series of tasks meant to evaluate individual bias. Conclusions from research examining individual differences suggests that there may be important aspects of cognition that play a role in what is considered to be good judgment that are inadequately assessed by existing psychometric measures of intelligence. These findings have strong implications for individual decision making, judgment, and reasoning, as these inadequately measured aspects of cognition may influence and provide further insight into individual cognitive processes and expression of biases. This research further examines the relation between individually differing cognitive ability, thinking

dispositions, and common cognitive short-comings, such as biases, poor judgment, decision making, and irrationality in an effort to replicate and advance research.

A fundamental aspect of bias is the individual inability to objectively assess situations. The expression of biases in decision making exhibits an apparent reluctance or inability to decouple pre-existing beliefs or perceptions when presented with new information. In light of research that suggests expression of these heuristics and biases are largely independent of cognitive ability (Stanovich & West, 1998, 2000, 2007, 2008) we look to other aspects of cognition. Thus research examining the relation between individual characteristics such as actively open-minded thinking, need for cognition, and expression of biases seems to suggest that aspects such as these, not cognitive ability, may be the key to understanding differences in decision making. These conclusions lead to more research questions concerning different situational contexts and other characteristics that may account for individual variability in biased decision making.

Purpose of the Current Study

The current study seeks to examine the relation between individual differences such as cognitive ability and thinking dispositions on the expression of myside bias and moral judgment. This study will focus on two distinct aspects of this multifarious domain of human decision making. First, the relation between individual differences and the expression of myside bias will be examined within a medical ethics scenario in which a limited number of organs must be allocated between two groups of people. Second, the role of individual differences will be examined in moral reasoning across differential presentation of moral dilemma scenarios. Both the organ transplant and moral dilemma

scenarios may be seen as a way to examine moral judgment across different situational contexts. The organ transplant scenario presents participants with a more commonplace, real-world moral dilemma situation in which only a limited number of livers are available to distribute amongst two groups of patients in need of transplant whereas the trolley dilemma scenario presents participants with a more abstract, hypothetical situation in which they may either divert or stop a runaway trolley car by sacrificing one person's life to save five others. Despite contextual differences, both scenarios provide an opportunity to examine the relation between participant cognitive ability, thinking dispositions, and moral judgment.

CHAPTER 2

Review of the Literature

Cognitive Ability and Thinking Dispositions

Research in the field of cognitive science has posited distinct levels of human cognition which can be linked to various aspects of analytical thinking (Anderson, 1990, 1991; Bermudez, 2001; Davies, 2000; Dennett, 1978, 1987; Horgan & Tienson, 1993; Levelt, 1995; Marr, 1982; Newell, 1982, 1990; Oaksford & Chater, 1995; Pylyshyn, 1984; Sloman, 1993; Sterelny, 1990, 2001). These levels include what has been referred to as the "intentional level", the "algorithmic level", and the "autonomous level" (Stanovich & West, 2007, 2008). Algorithmic level processes refer to "computational processes and information-processing operations necessary to carry out a task" (*p*. 130, Stanovich & West, 2008). Intentional level processes have been described as decisions based upon "goals of the system's computations and its knowledge structure" (*p*. 131, Stanovich & West, 2008). Stanovich and West (2007) link the three levels of human cognition to dual process theory, positing that both autonomous and intentional level processes reflect more deliberate, controlled Type 2 processes whereas autonomous level processes reflect, more intuitive, heuristic Type 1 processes. Research further delineates the two levels of cogniton associated with Type 2 processes by suggesting a link between cognitive ability and algorithmic level processes, individual thinking dispositions and intentional level processes, respectively (Stanovich & West, 2007). Most cognitive science research has focused on the role of algorithmic level processes in human decision making. Only recently have researchers begun to further examine and expand upon the role of intentional level processes in human decision making. The instruments most

widely used in research that has examined the role of individual thinking dispositions in decision making include Cacioppo, Petty, and Kao's (1984) Need for Cognition (NFC) and Stanovich and West's (1997) Actively Open-Minded Thinking scales (AOT). More recently, Stanovich (2008) developed a 13-item measure referred to as the Master Rationality Motive (MRM) created to evaluate another facet of individual thinking dispositions. There has not been much research that incorporates the newly-developed scale. The current study incorporates participant SAT, MRM, NFC, and AOT scores to examine the nature of the relation between characteristics associated with Type 2 processes such as cognitive ability and individual thinking dispositions in moral judgment.

<p align="center">*Myside Bias and Organ Transplant Allocation Strategy*</p>

People tend to actively seek information that is consistent with their current beliefs or perceptions. This tendency is referred to as myside bias and has been established within a number of empirical contexts (Baron, 1991; Klaczynski & Lavallee, 2005; Klaczynski & Robinson, 2000; Sa, Kelley, Ho, & Stanovich, 2005; Stanovich & West, 2007, 2008; Toplak & Stanovich, 2003). Ubel and Loewenstein's research in medical ethics and decision making provides a useful paradigm from which to further examine the relation between individual differences and expression of myside bias (Ubel, 2000; Ubel & Loewenstein, 1995, 1996a, 1996b). Ubel and Loewenstein's research examines participant organ transplant distribution and justifications across various conditions. Participants were presented with a scenario describing 200 children in need of liver transplant. Within the scenario, participants were asked to distribute 100 available

livers amongst two groups of children who differed in transplant survival prognosis based upon results of a blood test. Interestingly, this posed a dilemma for participants as there were 200 children in need of transplant, 100 in each group, but only 100 total livers available for allocation amongst the groups. In order to examine participant organ allocation and their justifications across different contexts, Ubel and Loewenstein manipulated the survival rate discrepancy between the two groups of children across conditions. Differences in survival rates between the groups across conditions were as follows: 80/70, 80/50, 80/20, 40/25, 40/10.

<div style="text-align:center">*Ubel and Loewenstein's Organ Transplant Scenario*</div>

Ubel and Loewenstein (1995) originally began investigating differences in participant allocation strategy by comparing participant responses across two different scenarios. The two different scenarios detailed consistent survival rate discrepancies between the two groups, 70%/30%, but differed in reason for group survival rate discrepancy. The survival rate discrepancy between groups in the first scenario was indicated by a test that revealed either the presence or absence of a particular blood marker, whereas survival rate discrepancy in the second scenario was based upon re-transplant status. Participants allocated a greater number of livers to the better prognostic group in the re-transplant scenario, indicating that they were more likely to consider prognostic information in this condition as opposed to the blood test scenario. However, both groups of respondents across the different scenarios displayed some of the same trends in organ distribution. In both scenarios, the majority of participants failed to maximize the number of lives saved by distributing all of the livers to the better

prognosis group. Some participants chose to distribute the livers 70/30 amongst the groups, essentially matching the number of organs allocated to each group by prognosis (e.g., distributing 70 livers to the group with a 70% chance of survival and 30 livers to the group with a 30% chance of survival). Finally, others chose to equally distribute the livers between the two prognostic groups.

In another study, Ubel and Loewenstein (1996a) further examined participant liver transplant allocation across different prognostic conditions (80/70, 80/50, 80/20, 40/25, 40/10) based upon alleged results of a blood test. The majority of participants failed to maximize the number of lives saved; in fact, the most common participant response was to distribute the 100 available livers equally amongst the two groups. Maximization was the second most common participant organ distribution strategy across conditions, followed by a kind of probability matching approach in which participants allocated greater proportions of the available livers according to the increasing gap between survival rates amongst groups. Participant tendency to allocate livers equally amongst the groups despite differential prognostic information across conditions, suggested a preference for ignoring prognostic information in such decision-making processes. The tendency of participants to distribute livers according to increasing gaps between survival rates across scenarios suggests that participants were probability matching, and, possibly, incorrectly believing that they were actually maximizing the lives saved in each scenario by doing so. Interestingly, although a majority of participants did not maximize the number of lives saved by allocating all 100 livers to the better prognosis group across conditions this was the second most likely participant distribution

strategy. This raises the question of whether or not participants who probability matched (e.g., participants in the 70/30 prognostic difference condition, allocating approximately 70 livers to the group with 70% survival rate and 30 livers to the group with the 30% survival rate) simply did not know that their distribution strategy did not maximize the number of lives saved. In attempts to investigate this possibility, Ubel and Loewenstein added another question after the scenario following participant liver allocation response that prompted participants to reveal the liver distribution strategy they believed resulted in the maximization of lives saved. Surprisingly, a majority of the participants did not know which distribution strategy that would maximize the number of lives saved in their scenario.

Finally, Ubel and Loewenstein (1996b) delved deeper into participant justification of transplant allocation by prompting participants to construct open-ended responses detailing their thought processes and reasoning behind their liver allocation strategy amongst groups with differing prognostic information. The researchers inquired about what additional information participants might find helpful in making their distribution decisions. These findings mirrored those of Ubel and Loewenstein's (1996a) earlier research with the most common participant organ allocation strategy being the equal distribution of the available livers across the five conditions of differing survival rate (80/70, 80/50, 80/20, 40/25, 40/10) and the second most common distribution strategy involving participants maximizing number of lives saved, allocating all 100 livers to the better prognosis group. Participants' written responses concerning their justification for allocation decisions were categorized into five general categories, presented in rank order

of most commonly cited, including "improve survival, deserve a chance, prognosis unpredictable, good prognosis, and other" (Ubel & Loewenstein, 1996b, p. 1051). Additional information not included in the scenario that participants noted they would have found helpful in their allocation decision-making process, presented in rank order of most commonly cited, included, "additional prognostic variables," "urgency of illness," "length of illness/waiting time," "patient's age," and "level of family support" (Ubel & Loewenstein, 1996b, *p*. 1052). Although this list does not encompass all of the information participants mentioned they may find helpful, they are representative of the majority of participant response.

Ubel and Loewenstein's (1995, 1996a, 1996b) work has several implications for the area of research. Their results showed that most participants ultimately failed to maximize lives saved in the scenario across conditions. Instead, the most common participant organ allocation strategy was to distribute the organs 50/50 between the prognosis groups, perhaps suggesting that participants were unwilling to abandon members of the worse prognosis group in each scenario. The failure of participants to maximize lives saved across differing survival rate conditions could also indicate that participants do not realize how to distribute the organs amongst the groups in order to maximize lives saved (Ubel & Loewenstein, 1995, 1996a). Upon further examination of participant organ distribution justification, Ubel and Loewenstein (1996a, 1996b) established that while fairness was a popular and reoccurring justification for organ distribution, a majority of participants were mistaken as how to allocate organs between the two groups in order to maximize the number of lives saved. Reoccurring themes

across all of Ubel and Loewenstein's research suggested, perhaps counterintuitively, that the concept of fairness, not life maximization, played a vital role in participant decision making across transplant scenario conditions with different survival rate prognoses for each group. Although this trend of decision-making seems irrational, it raises the question of whether cognitive error or considerations of fairness are to blame. The fact that the majority of participants in Ubel and Loewenstein's (1996a) study failed to realize which distribution strategy would maximize the total number of lives saved implies that many participants may have wished to distribute the livers in a way that maximized the number of lives saved, but simply misunderstood the correct distribution strategy to achieve this goal. If this were the case, a basic misunderstanding of statistical probability, and thus corresponding ignorance of the maximizing distribution strategy, may have been the driving force behind these participant allocation strategies, and not the consideration of fairness. These findings beg the question: Could participant cognitive ability and/or thinking disposition variables influence their response to the organ transplant scenario? For example, are participants who are aware of the organ allocation maximization strategy systematically higher in cognitive ability and/or other thinking disposition variables than participants who are unaware of organ allocation maximization strategy? Ubel and Loewenstein's (1996a) research paradigm also provides an opportunity to further examine the effects of myside biases, participant cognitive ability, and thinking disposition variables in decision making.

Individual Differences and Moral Judgment

Research in the area of moral judgment and reasoning has recently suggested a link between dual process theory and human moral judgment (Bartels, 2008; Greene, 2007; Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008; Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Greene, Nystrom, Engell, Darley, & Cohen, 2004; Moore, Clark, Kane, 2008; Valdesolo & Desteno, 2006). Dual process theory classifies cognitive processes into two distinct "systems", or "types" (Kahneman, 2003; Lapsley & Hill, 2008; Stanovich, 2010; Stanovich & West, 2000). These types are associated with specific cognitive characteristics that underlie human decisions. Type 1 processes are typically associated with rapid, intuitive, automatic thinking. These Type 1 processes, or tasks that have become automatic, require less cognitive effort in comparison to Type 2 processes. The distinction between types has even been linked to conscious versus unconscious cognitive processing, with Type 1 processes associated with unconscious and Type 2 with conscious processes, respectively. Type 2 cognitive processes are characteristically more effortful, deliberate, and controlled. Type 1 processes are hypothesized to be most prevalent in everyday judgment and decision making. Some research has referred to characteristic Type 1 thinking as heuristic processing (Stanovich, 2010). Although such heuristic processing has been associated with instances of poor judgment in cognitive tasks, it can be quite accurate and efficient (Khaneman, 2003; Stanovich, 2010). Research indicates that controlled processes associated with Type 2 are selectively engaged to override our more automatic thinking processes (Greene et al., 2001, 2004, 2007, 2008; Stanovich, 2010; Stanovich & West, 2000).

Variations of moral dilemma scenarios seem to cause participants to respond inconsistently and sometimes irrationally. The trolley dilemma is a moral dilemma scenario commonly cited in the research. In one scenario, a trolley car is barreling down tracks towards five unsuspecting track workers. If the trolley car continues on its current path it will kill all five workers. The trolley car can be diverted to another track where one worker is located by pulling a switch. If the trolley is diverted, the five workers will live but the one worker will die. In another comparable scenario, a trolley car is quickly approaching five track workers. If the trolley car continues on its current path, it will kill all five workers. There is a large man standing on a footbridge that overlooks the trolley tracks. The man can be pushed off the overlook, blocking the path of the trolley and saving the lives of the five workers. If the man is pushed in front of the trolley, he will die, but the five workers will live. Participants have been asked to respond whether action is appropriate in both versions of the trolley dilemma. Interestingly, research has revealed that participants are significantly more likely to deem pulling the switch in the first version of the scenario more appropriate in comparison to pushing the man off of the footbridge in the second (Hauser, Cushman, Young, Kang-Xing, & Mikhail, 2007). Systematic differences in responses across scenarios led researchers to examine the bases for these differences in participant responses across various scenarios.

In accordance with dual-process theory, Greene and colleagues suggested that moral judgment is a function of both emotion and reason. Greene et al. (2001) used functional magnetic resonance imaging (fMRI) to observe participant neural activation when presented with different moral dilemma scenarios. Greene and colleagues

hypothesized that differences in participant responses across moral dilemma scenarios such as the trolley dilemma were due to differing levels of emotional engagement. The researchers further posited that this heightened emotional engagement in scenarios such as the footbridge version of the trolley dilemma would cause participants to respond in a more emotional or intuitive manner in comparison to the original switch version of the trolley dilemma. Participants were presented with various moral dilemma situations that varied in emotional salience while observed in an fMRI machine. Greene et al. (2001) categorized the moral dilemma scenarios into three different categories, "moral-personal", "moral-impersonal", and "non-moral" (p. 2106). Moral-personal and impersonal dilemmas were categorized as such based upon perceived emotional salience. Moral dilemmas perceived by raters to evoke a more emotional response, such as the footbridge version of the trolley dilemma, were labeled moral-personal, whereas dilemmas with a moral aspect but less emotional salience were conversely labeled moral-impersonal (e.g., the switch in the trolley scenario).

　　As hypothesized, results indicated higher activation in areas of the brain associated with emotional processes when participants were presented with moral-personal dilemmas in comparison to both moral-impersonal and non-moral scenarios. Interestingly, areas of the brain believed to be associated with working memory tasks were significantly less active for the moral-personal condition than either the moral-impersonal or non-moral conditions (Greene et al., 2001). Areas of the brain associated with working memory tasks are also associated with Type 2 processes. Thus suggesting

dual activation of cognitive processes associated with Type 1 and 2, but Type 1 dominance in emotionally salient conditions.

These findings supported Greene's (2001) dual-process theory within moral judgment indicating that both intuitive/emotional and deliberative/controlled processes are at work and often conflict in human moral reasoning. Furthermore, differences in brain region activation across conditions were consistent with differences in emotional salience (e.g., brain regions associated with intuitive, emotional responses were significantly more active in the moral-personal condition in comparison to other conditions). Greene et al. (2001) also recorded and examined participant response times across conditions. They discovered that participants responding that action was appropriate in the moral-personal condition (e.g., participants indicating appropriateness of pushing the man off the footbridge or other similar moral-personal dilemmas) had significantly longer response times in comparison to participants responding that action was inappropriate in the condition. These results further supported Greene's (2001) moral reasoning dual-process theory, indicating that those participants classifying action as appropriate in moral-personal scenarios experienced more Type 1 and Type 2 process conflict.

Other research in the area of human moral judgment and decision making seems to support the hypothesized application of dual-process theory in moral reasoning. For instance, research indicates that patients with frontal lobe damage consistently respond in a more utilitarian manner (e.g., responding that action is appropriate within moral dilemma scenarios) when compared to non-patients, suggesting that ventromedial frontal

cortex damage somehow affects emotional processing (Greene & Haidt, 2002).

Ciaramelli, Muccioli, Ladavas, and di Pellegrino (2007) studied moral reasoning amongst patients with ventromedial prefrontal cortex damage, comparing patient moral dilemma response with controls. Patients with ventromedial prefrontal cortex damage were more likely to respond in a utilitarian manner than controls. Also, controls expressed differences in response time across various moral dilemma scenarios (e.g., longer response time in moral-personal dilemmas as compared to moral-impersonal dilemmas) whereas patients did not exhibit significant response time discrepancy across dilemma (Ciaramelli et al., 2007). More research conducted in order to investigate the effects of ventromedial prefrontal cortex damage replicates findings established by Ciaramelli and colleagues, concluding that patients with damage in this specific area of the brain exhibit less emotional responses in moral reasoning, ultimately increasing their utilitarian judgment (Koenigs et al., 2007). Greene (2007) revisited research that examined moral reasoning in patients with ventromedial prefrontal cortex damage. As previously reported, these patients exhibited significantly greater levels of utilitarian response across moral dilemmas, both personal and impersonal, as compared to those without frontal lobe damage (Greene, 2007). Greene (2007) explained that this finding was consistent with his research and dual process theory of human moral reasoning. He noted that as a result of patient ventromedial prefrontal cortex damage and thus emotional processing deficit, it is easier for more deliberate, controlled Type 2 processes to prevail in the participant cognitive conflict.

If conflicting cognitive processes of dual process theory can explain systematic differences in individual moral judgment and decision making across moral dilemma scenarios, then individual differences associated with each of the human cognitive systems should be able to further explain trends in human moral reasoning. As mentioned previously, Type 2 processes have been associated with more deliberate and controlled cognitive processes that, in theory, conflict with more intuitive, emotional processes associated with Type 1 processes. An adapted version of the trolley dilemma scenario allows the researchers to examine the role of participant cognitive ability and thinking disposition variables within a moral decision making framework.

Purpose of the Current Study

Organ Transplant Scenario

As mentioned previously, the expression of myside bias has been observed within a number of empirical contexts (see Baron, 1991; Klaczynski & Lavallee, 2005; Klaczynski & Robinson, 2000; Sa, Kelley, Ho, & Stanovich, 2005; Stanovich & West, 2007, 2008; Toplak & Stanovich, 2003). We hypothesized that this finding would be replicated within the present study with both male and female participants expressing myside bias in their allocation of organs amongst groups within the transplant scenario. More specifically, we posited that both men and women would be more likely to employ a life maximization allocation strategy when their own sex was the better prognostic group within the condition and less likely to do so when their own sex was the worse prognostic group. This pattern of organ allocation strategy would suggest that male and

female participants would employ different organ allocation strategies across conditions, resulting in a significant interaction effect of organ transplant scenario condition and participant sex. We further hypothesized that participant cognitive ability and thinking disposition variables would moderate this interaction such that participants with higher levels of cognitive ability (total SAT) and thinking disposition variables (Master Rationality Motive, Need for Cognition, Actively Open-Minded Thinking) would be less likely to express myside bias.

Trolley Dilemma Scenario

Research conducted by Green and colleagues (2001) suggests that participant consequentialist responses to moral-personal dilemmas are hindered by conflicting Type 1 and Type 2 processes. Overall, we hypothesized that previous moral dilemma research results would be replicated within our study with participants being more likely to indicate that action was appropriate in the switch trolley dilemma scenario than in the footbridge trolley dilemma scenario. In other words, we posited that participants would be more likely to make a consequentialist decision by indicating action appropriateness in response to the switch trolley dilemma scenario as opposed to the footbridge trolley dilemma scenario. As mentioned previously, prior research conducted by Green and colleagues (2001) attributes contradictory participant response concerning the appropriateness to act in either moral-impersonal (e.g., switch trolley dilemma scenario) or moral-personal dilemma scenarios (e.g., the footbridge trolley dilemma scenario) to an increase in emotional salience present within the moral-personal dilemma. The increase in emotional salience for participants increases conflict between Type 1 and Type 2

processes. In turn, this conflict hinders consequentialist decision-making in response to the moral-personal dilemma as compared to moral-impersonal dilemmas.

We further posited that participants across conditions would be affected by presentation of differential trolley dilemma scenarios. One group of participants responded to the footbridge trolley dilemma scenario first, then to the switch trolley dilemma, and, finally, to a second presentation of the footbridge trolley dilemma scenario. Conversely, another group of participants responded to the switch trolley dilemma scenario first, then to the footbridge trolley dilemma, and, finally, to a second presentation of the switch trolley dilemma scenario. We hypothesized that participant difference in response from the first presentation of the trolley dilemma scenario to the second presentation of the same trolley dilemma scenario would be systematically affected by differential trolley dilemma scenario presented in between the repeat presentations. More specifically, participants in the first group were hypothesized to be more likely to indicate appropriateness to act in the second presentation of the footbridge trolley dilemma scenario than in the first, influenced by their response to the switch trolley dilemma scenario presented between the repeated presentations of the footbridge trolley dilemma scenario. This effect was hypothesized to be reversed for the second group of participants as participant indication of appropriateness to act was hypothesized to decrease from the first switch trolley dilemma scenario presentation to the second switch trolley dilemma scenario presentation.

Finally, we hypothesized that participant cognitive ability and thinking disposition variables would affect differential participant response from the first trolley dilemma

scenario to the second presentation of the trolley dilemma scenario. More specifically, we posited that participant Master Rationality Motive score (MRM) would account for a significant amount of variance in response difference from participants' first trolley dilemma scenario response to the second presentation of the same trolley dilemma scenario. Stanovich's (2008) 13-item Master Rationality Motive (MRM) was developed to evaluate individual desire to synthesize rationality in cognitive processes. Participants higher in MRM should be more likely to respond differentially from first trolley dilemma scenario presentation to the second presentation of the same scenario than those participants lower in MRM because of the influence of their second moral dilemma scenario response and their desire to be more logically consistent from the second version of the trolley dilemma to the second presentation of the first trolley dilemma scenario.

CHAPTER 3

Methods

Procedure

Undergraduate research assistants conducted hour-long testing sessions with 4 participants at a time. Participants completed a series of tasks, including general demographic information (e.g., sex, age, ethnicity, residence, total SAT, SAT verbal, and SAT math scores), organ transplant scenario, moral dilemma scenario, and various thinking disposition measures via Qualtrics Survey Software. See Appendices A - E for respective survey stimuli.

Participants

A total of 439 undergraduate students (133 males and 306 females) from a mid-sized university participated in the current study. These participants were recruited through an introductory level psychology course subject pool and were awarded course credit for their participation. The majority of the participants were Caucasian ($N = 372$), 24 participants responded "other", indicating that they did not fall into any of the ethnic categories provided (e.g., Asian American, African American, Mexican American, Puerto Rican, Caucasian), 22 participants categorized themselves as Asian American, 18 as African American, 2 as Puerto Rican, and 1 as Mexican American. Average participant age was 19.00 years ($SD = 1.42$).

Tasks and Variables

Demographic Information. Participants were asked to provide general demographic information at the beginning of the survey. These questions prompted

participants to provide information such as sex, age, year in college, religious affiliation, and coursework completed. See Appendix A for demographic information items.

Cognitive Ability. Participants' self-reported total SAT scores (SAT verbal and quantitative scores combined) were used as indicators of cognitive ability within the present study. The SAT is a high-stakes, standardized test that provides reliable scores that correlate highly with psychometric measures of intelligence (Frey & Detterman, 2004; Unsworth & Engle, 2007). Research indicates that self-reported SAT scores correlate with validated SAT scores reporting correlations in the range of .80-.90 (Cassady, 2001; Kuncel, Crede, & Thomas, 2005; Mayer et al., 2007). Participants from the current study had a mean total SAT score of 1078.09 (*SD* = 168.16).

Thinking Dispositions. Participants completed a battery of measures developed to evaluate individual thinking dispositions. Each of the measures was included to assess a different characteristic of cognition, including Actively Open-Minded Thinking (Stanovich & West, 1997), Need for Cognition (Cacioppo, Petty, & Kao, 1984), and Master Rationality Motive (Stanovich, 2008). Stanovich and West's (1997) 41-item Actively Open-Minded Thinking scale (AOT) evaluates individual propensity to engage in open-minded thinking practices such as flexible thinking, the expression of openness to ideas and values, while avoiding absolute, dogmatic, and categorical thinking. In order to evaluate individual levels of Actively Open-Minded thinking, participants were asked to indicate their levels of agreement or disagreement on a Likert scale ("Disagree Strongly" to "Agree Strongly) in response to statements such as, "I tend to classify people as for or against me" and "A person should always consider new possibilities"

(Stanovich & West, 1997). Higher scores on this measure indicated higher levels of participant Actively Open-Minded Thinking. Cronbach's alpha for the 41 AOT items within the current sample was .85.Cacioppo et al.'s (1984) 18-item version of the Need for Cognition scale (NFC) was also included in the assessment of participant thinking dispositions. Participants were asked to indicate their levels of agreement or disagreement with a series of statements such as, "It's enough for me that something gets the job done; I don't care how or why it works" and "I really enjoy a task that involves coming up with new solutions to problems" (Cacioppo et al., 1984). Higher scores on the Need for Cognition scale indicated higher levels of participant need for cognition or propensity to engage in intellectually stimulating activities. Cronbach's alpha for the 18 NFC items within the current sample was .85.

Stanovich's (2008) 13-item Master Rationality Motive (MRM) was included within the current study to evaluate individual desire to synthesize rationality in cognitive processes. Participants were again asked to indicate their level of agreement with each Master Rationality Motive scale statement such as, "It is more important to me than most people to behave in a logical way." Higher scores indicated higher participant propensity for rationalization in cognitive processes. Cronbach's alpha for the 13 MRM items within the current sample was .74. See Apendices D - F for respective thinking disposition items.

Organ Transplant Scenario. Individual expression of myside bias was examined by presenting participants with an adapted version of the Ubel and Loewenstein (1996b) organ allocation scenario. Participants were randomly assigned to one of two possible

organ transplant scenario conditions in which two groups of patients, 100 males and 100 females, awaiting transplant differed in survival prognosis. Participants were asked to allocate 100 available livers amongst 200 young adults in need of transplant. These 200 young adults were separated into two groups based upon sex (e.g., male or female). Participants were instructed to imagine that sex differences between the groups influenced transplant patient survival rates. In condition 1, females were the better-prognosis group (Males (M): 50%, Females (F): 80%), whereas in condition 2, males were the better-prognosis group (M: 80%, F: 50%). Participants across both conditions were asked how they would allocate the 100 available livers amongst the 200 patients (e.g., "How many of the 100 livers do you think should go to each group?"), the organ allocation strategy amongst the two groups that would maximize the number of lives saved (e.g., "What distribution of the 100 organs amongst the young adults do you think would save the most lives?"), and whether they thought prognostic information should be ignored in organ allocation across the two groups (e.g., "Suppose that one option we have is to ignore these survival rate differences and distribute the organs randomly to 100 young adults regardless of gender. Should we do so?"). Conditions were counterbalanced between participants. See Appendix B for Organ Transplant Scenario stimuli.

Trolley Dilemma Scenario. In order to investigate differences in participant response across moral dilemma scenarios, we presented the participants with different versions of the trolley dilemma as adapted from a version used by Greene et al. (2001). In one version of the scenario, participants were presented with a speeding trolley headed towards five unsuspecting track workers. If the trolley continued on its current path, all

five trolley workers would be killed. However, if a nearby switch were to be pulled, the path of the trolley could be diverted to another track towards one track worker instead. In another scenario, the trolley path could be obstructed by pushing a large man off a footbridge in front of the trolley, killing one man versus five. Participants were asked to indicate the appropriateness of action (e.g., either pulling the switch or pushing the man) in each scenario on a Likert scale ranging from "Very Inappropriate" to "Very Appropriate." The different versions of the trolley dilemma were presented back to back within participants. For example, some participants received the original trolley version first, then the footbridge dilemma, and then the original trolley dilemma again, whereas others received the footbridge version first, then the original trolley dilemma, and finally, the footbridge version again. The three scenarios were presented consecutively in order to examine the influence of type of dilemma first presented to the participant and participant response consistency across scenarios. The sequence of scenarios was counterbalanced between participants. See Appendix C for Moral Dilemma Scenario stimuli.

CHAPTER 4

Results

Correlation Analyses. Participant cognitive ability (SAT total, SAT verbal, SAT math scores) and thinking disposition (MRM, NFC, AOT) variables were correlated to determine whether any significant relations emerged. As can be seen in Table 1, the three SAT scores yielded similar correlation patterns with other variables thus total SAT scores will be the primary ability measure discussed in the analyses. Total SAT was significantly correlated with NFC and AOT scores (Table 1 displays Pearson correlation coefficients). SAT verbal score was significantly correlated with, MRM, NFC, and AOT scores. Finally, participant SAT math score was significantly correlated with NFC scores (see Table 1). It should also be noted that participant MRM, NFC, and AOT scores were significantly, positively related to one another (see Table 1).

Organ Transplant Scenario Correlation Analyses. Participant organ transplant scenario response, cognitive ability, and thinking disposition variables were correlated to determine whether any significant relations emerged. As participant organ distribution to the better-prognostic group increased, participant organ distribution to the better-prognostic group thought to maximize the number of lives saved, and participant SAT math score increased significantly (Table 2 displays Pearson correlation coefficients). Also, as participant organ distribution to the better-prognostic group thought to maximize the number of lives saved increased, participant SAT total and AOT scores increased significantly (see Table 2).

Participant Organ Transplant Scenario Allocation Strategies. Table 3 displays participant allocation strategy to the better-prognosis group across condition, by

participant gender. Overall, participants' most common organ allocation strategy was to allocate the available livers 50/50 amongst the two groups (see Table 3). The next most common allocation strategy was to distribute between 60-70% of the livers to the better prognostic group.

Regardless of participant sex or condition, the majority of participants failed to maximize the number of lives saved by distributing all 100 available livers to the better prognostic group. More specifically, in condition 1 (M: 50%, F: 80%), only 1 male participant maximized the number of lives saved by distributing all of the 100 available livers to the better prognostic group. In condition 2 (M: 80%, F: 50%), 3 male participants maximized the number of lives saved by distributing all of the 100 available livers to the better prognostic group. No female participants, across both organ transplant scenarios, maximized by allocating all 100 available livers to the better-prognostic group.

Organ Transplant Scenario ANOVA. A 2x2 between-subjects ANOVA was conducted in order to determine whether organ transplant scenario condition (M: 50%, F: 80%; M: 80%, F: 50%) and participant sex (male or female) interacted to systematically affect participant organ allocation strategy. Contrary to our predictions, organ transplant scenario condition and participant sex failed to interact (see Table 4). The main effect of organ transplant scenario condition failed to reach significance as well. However, the main effect of participant sex was significant, $F(1, 435) = 8.00, p = .01$, indicating that although participant sex did have an effect on organ distribution to the better prognostic condition, these effects were not differential across conditions.

Organ Transplant Scenario Chi-Square Analyses. Chi-square analyses were

conducted in order to determine whether the proportion of male ($N = 53$) and female ($N =$

35) participants who were aware of organ distribution maximization strategy significantly

differed from male ($N = 80$) and female ($N = 271$) participants who were unaware of

organ distribution maximization strategy. A significantly larger proportion of male

participants compared to female participants knew how to distribute the livers amongst

the groups to maximize the number of lives saved (see Table 5), but a significantly larger

proportion of female participants compared to male participants were unaware of the

correct organ distribution strategy that would maximize the number of lives saved (see

Table 5).

Organ Transplant Scenario Independent t-test Analyses. A series of independent

t-tests were conducted in order to determine whether participants who were aware of

organ distribution maximization strategy (referred to as "Maximizers" in Table 6)

differed significantly from participants who were unaware of organ distribution

maximization (referred to as "Non-maximizers" in Table 6) on cognitive ability (e.g.,

total SAT) and thinking disposition variables (e.g., MRM, NFC, AOT). Mean total SAT,

AOT scores, and organ distribution to the better prognostic group were significantly

greater for participants who were aware of organ distribution maximization strategy than

those who were not (see Table 6). However, MRM and NFC scores of participants who

were aware of organ distribution maximization strategy were not significantly greater

than MRM and NFC scores for participants that were unaware of the organ distribution

maximization strategy (see Table 6).

Effect sizes (Cohen's *d*) were calculated in order to further quantify magnitude of the differences between the two groups. Cohen's (1988) guidelines for effect size interpretation suggest that values of 0.20 are indicative of small effects, 0.50 indicative of medium effects, and 0.80 indicative of large effects. Effect sizes (*d*) reported in conjunction with significant between-group differences in cognitive ability, thinking dispositions, and participant better prognostic group organ distribution ranged from small to medium (0.20 to 0.56) (see Table 6).

Organ Transplant Scenario "Maximizer" ANOVA. Table 7 displays the results of a replication of the 2x2 between-subjects ANOVA conducted in order to determine whether organ transplant scenario condition (M: 50%, F: 80%; M: 80%, F: 50%) and participant sex (male or female) interacted to systematically affect participant organ allocation strategy. This ANOVA replication was conducted in order to determine whether organ transplant scenario condition (M: 50%, F: 80%; M: 80%, F: 50%) and participant sex (male or female) interacted to systematically affect organ allocation strategy of participants aware of organ distribution maximization strategy ("Maximizers"). There was no significant interaction between organ transplant scenario and participant sex (see Table 7). Furthermore, there were no main effects of organ transplant scenario condition or participant sex.

Trolley Dilemma Scenario Correlation Analyses. Tables 8 and 9 display results of correlation analyses for moral dilemma scenario condition 1 and condition 2, respectively. In moral dilemma scenario condition 1, participant appropriateness to act response for the trial 1 footbridge scenario was moderately, positively correlated with

trial 2 switch scenario and trial 3 footbridge scenario responses (see Table 8). As participant appropriateness to act response for the trial 1 footbridge scenario increased, total SAT score increased significantly (see Table 8). Participant appropriateness to act response for the trial 2 switch scenario correlated significantly with SAT math score (see Table 8). Counterintuitively, as participant MRM and AOT scores significantly decreased, participant appropriateness to act in response to the trial 1 footbridge scenario increased (see Table 8). This significant, negative relation between participant appropriateness to act response and MRM score was mirrored across moral dilemma scenario trials 2 (switch scenario) and 3 (repeated footbridge scenario). The significant, negative relation between participant appropriateness to act response and AOT score was present in only for the first trial footbridge scenario and the third trial footbridge scenario.

In moral dilemma scenario condition 2, participant appropriateness to act response for the trial 1 switch scenario was moderately, positively correlated with responses to trial 2 switch scenario and trial 3 footbridge scenario (see Table 9). There were no other significant relations established between participant appropriateness to act response and cognitive ability or thinking disposition variables (see Table 9).

Trolley Dilemma Dependent t-test Analyses. A series of dependent t-tests were conducted in order to determine whether moral dilemma scenario condition systematically affected difference in participant response from the first version of the trolley dilemma scenario to the third, repeated version of the trolley dilemma scenario. Participant difference scores were calculated by subtracting their first moral dilemma scenario response from their response to the second presentation of the same version.

Larger difference scores indicate a greater disparity between participant response from the first trolley dilemma scenario trial to the third. Positive participant difference scores indicate that participant response was greater in the trial 3, repeated version of the trolley dilemma scenario than in the first trial version. Negative difference scores indicate that participant response was greater in the first trial version of the trolley dilemma than in the third trial version.

Table 10 displays participant mean response to trolley dilemma scenario trials across condition, participant difference scores from first trial to third, and results of participant difference score dependent t-tests. Participant difference score from the first trial version of the trolley dilemma scenario to the third trial version was significant across both conditions. In condition 1, participant mean response to the third trial footbridge version of the trolley dilemma was significantly larger than participant mean response to the first footbridge trial (see Table 10). Conversely, in condition 2, participant mean response to the third trial switch version of the trolley dilemma was significantly smaller than participant mean response to the first switch version (see Table 10).

Trolley Dilemma ANOVA Analyses. Table 11 displays results for a series of four 2X2X2 mixed ANOVAs (Trolley Dilemma Condition (between-subjects variable): Condition 1 versus Condition 2 by Trolley Dilemma Trial Response (within-subjects variable): scenario 1 response versus repeated scenario 3 response by SAT Total score (between-subjects variable): Low versus High/MRM Total score (between-subjects variable): Low versus High/NFC Total score (between-subjects variable): Low versus High/AOT Total score (between-subjects variable): Low versus High). These series of

ANOVAs were conducted in order to examine whether trolley dilemma scenario condition, trial response, and SAT total/MRM total/NFC total/AOT total scores interacted to systematically affect participant trolley dilemma scenario response. ANOVA 1 (Trolley Dilemma Condition (between-subjects variable): Condition 1 versus Condition 2 by Trolley Dilemma Trial Response (within-subjects variable): scenario 1 response versus repeated scenario 3 response by SAT Total score (between-subjects variable): Low versus High) results yielded a significant interaction effect between trolley dilemma scenario response and trolley dilemma condition, $F(1, 435) = 41.34$, $p = .001$, indicating that participant trolley dilemma scenario response was significantly different across trolley dilemma scenario condition (see Table 12 for Means). ANOVA 2 (Trolley Dilemma Condition (between-subjects variable): Condition 1 versus Condition 2 by Trolley Dilemma Trial Response (within-subjects variable): scenario 1 response versus repeated scenario 3 response by MRM Total score (between-subjects variable): Low versus High) results yielded a significant interaction between trolley dilemma scenario condition and MRM total score, $F(1, 435) = 6.33$, $p = .01$, indicating differential participant response to trolley dilemma scenario trial 1 and trial 3 for those participants categorized as low versus high MRM (see Table 13 for Means). ANOVA 2 results also yielded a significant interaction effect between trolley dilemma scenario response and trolley dilemma condition, $F(1, 435) = 40.85$, $p = .001$, indicating that participant trolley dilemma scenario response was significantly different across trolley dilemma scenario condition (see Table 13 for Means). ANOVA 3 (Trolley Dilemma Condition (between-subjects variable): Condition 1 versus Condition 2 by Trolley

Dilemma Trial Response (within-subjects variable): scenario 1 response versus repeated

scenario 3 response by NFC Total score (between-subjects variable): Low versus High)

results yielded a significant interaction effect between trolley dilemma scenario response

and trolley dilemma condition, $F(1, 435) = 41.16$, $p = .001$, indicating that participant

trolley dilemma scenario response was significantly different across trolley dilemma

scenario condition (see Table 14 for Means). Finally, ANOVA 4 (Trolley Dilemma

Condition (between-subjects variable): Condition 1 versus Condition 2 by Trolley

Dilemma Trial Response (within-subjects variable): scenario 1 response versus repeated

scenario 3 response by AOT Total score (between-subjects variable): Low versus High)

results yielded a significant interaction between trolley dilemma scenario condition and

AOT total score, $F(1, 435) = 5.01$, $p = .03$, indicating differential participant response to

trolley dilemma scenario trial 1 and trial 3 for those participants categorized as low

versus high AOT (see Table 15 for Means). ANOVA 4 results also yielded a significant

interaction effect between trolley dilemma scenario response and trolley dilemma

condition, $F(1, 435) = 38.93$, $p = .001$, indicating that participant trolley dilemma

scenario response was significantly different across trolley dilemma scenario condition

(see Table 15 for Means).

CHAPTER 5

Discussion

Organ Transplant Scenario. In general, as participant cognitive ability scores

increased, so too did the proportion of organs they thought should be distributed to the

better-prognostic group in order to maximize the number of lives saved. This particular

relation suggests that participants with higher levels of cognitive ability were more aware

of maximization strategy than other participants. As participant AOT score increased, the

proportion of organs participants thought should be distributed to the better-prognostic

group to maximize the number of lives saved also increased significantly. However,

significant relations amongst other organ transplant scenario variables, cognitive ability,

and thinking disposition variables were not present.

Most common participant better-prognostic group organ allocation strategies did

not replicate those established within Ubel and Loewenstein (1996a, 1996b) research.

Consistent with Ubel and Loewenstein's (1996a, 1996b) findings, the most common

participant organ allocation strategy was to split the 100 available livers 50/50 amongst

the two groups. However, contrary to Ubel and Loewenstein's (1996a, 1996b) findings,

the next most common participant better-prognostic group organ allocation strategy was a

kind of probability matching strategy where they distributed approximately 60-70% of

the available livers to the better prognostic group across condition. As noted above, the

most common Ubel and Loewenstein (1996a, 1996b) participant organ allocation strategy

across prognostic conditions was to split the available livers 50/50 amongst the groups.

However, the next most common Ubel and Loewenstein participant organ allocation

response was to maximize the number of lives saved by allocating all 100 available livers

to the better-prognostic group. Our findings could differ from those established by Ubel and Loewenstein for a number of reasons including sample differences, organ transplant scenario revisions, and the subtle effects of myside bias as expressed by the reluctance of participants to completely abandon members of their own sex within the scenario.

Contrary to our hypothesis, there was no reliable evidence to support that participants expressed myside bias within our version of the organ transplant scenario. Analyses revealed that the hypothesized interaction effect between participant sex and organ transplant scenario condition was not significant; however, there was a significant main effect for participant sex. Overall, female participants allocated approximately 55% of the livers to the better prognostic group across conditions, whereas, male participants allocated approximately 57% of the available livers to the better prognostic group in condition 1 and 60% of the available livers to the better prognostic group in condition 2. Originally, we hypothesized that if a participant sex and organ transplant scenario interaction were significant, participant cognitive ability and thinking disposition variables may moderate this myside bias effect. However, these analyses were not conducted due to the non-significant interaction effect.

Organ transplant scenario chi-square analyses revealed that there were a significantly larger proportion of males who were aware of better-prognostic group organ allocation that would result in maximization of lives saved as compared to females. These analyses also revealed that a significantly larger proportion of female participants comprised the group of participants that were unaware of organ allocation maximization strategy as compared to males. This particular finding is not entirely surprising as previous research has indicated that females appear to be more likely to employ

probability matching strategies than males, even after statistically controlling for cognitive ability (West & Stanovich, 2003).

We conducted a series of independent *t*-tests in order to further investigate participant differences in cognitive ability and thinking disposition variables. More specifically, we examined differences in cognitive ability and thinking dispositions of those participants aware of organ allocation maximization strategy and those that were unaware of organ allocation maximization strategy. Interestingly, participants who were aware of organ allocation maximization strategy had significantly higher levels of cognitive ability (total SAT, SAT verbal, and SAT math), AOT scores, and organ distribution to the better-prognostic group. The corresponding effect sizes indicate that these between-group differences are substantial. This particular finding suggests that participants aware of organ allocation maximization strategy systematically differ on these variables from participants who are unaware of organ allocation maximization strategy and warrants more in-depth study.

A replication of the original organ transplant scenario 2x2 between-subjects ANOVA was conducted in order to examine whether organ transplant scenario condition (M: 50%, F: 80%; M: 80%, F: 50%) and participant sex (male or female) interacted to systematically affect organ allocation strategy of participants aware of organ distribution maximization strategy ("Maximizers"). There was no significant interaction between organ transplant scenario and participant sex. Furthermore, there were no main effects of organ transplant scenario condition or participant sex.

Trolley Dilemma Scenario. Results indicate that trolley moral dilemma scenario trial responses significantly relate to other trolley moral dilemma scenario trial responses

across both conditions. In condition 1, participant MRM and AOT scores are significantly, negatively correlated with participant appropriateness to act response for the trial 1 footbridge dilemma scenario and the trial 3 footbridge dilemma scenarios. This particular finding seems counter intuitive. Both MRM and AOT are reported to tap into constructs that one may think would relate positively to consequentialist decision making. However, this was not the case. Perhaps the measures need to be revisited and further validated or MRM and AOT scores may truly not be individual disposition variables that factor into moral decision making. Only participant MRM score was significantly, negatively correlated with participant appropriateness to act response for the trial 2 switch dilemma scenario. Interestingly, participant cognitive ability and thinking disposition variables did not significantly relate to moral dilemma scenario condition 2 trolley dilemma scenario response variables.

Our hypotheses regarding differences in participant response from the first trolley dilemma scenario trial to the third, repeated trolley dilemma trial were supported across both conditions. In condition 1, participant mean response to the second presentation of the footbridge trolley dilemma scenario was significantly greater than their mean response to the first presentation of the footbridge trolley dilemma. Conversely, in condition 2, participant mean response to the second presentation of the switch trolley dilemma scenario was significantly lower than their mean response to the first presentation of the switch trolley dilemma. These findings suggest that moral dilemma scenario condition systematically affected participant difference scores from the first scenario response to the third, repeated scenario response. These significant difference scores reflect the differential affects of moral dilemma scenario trial presentation. More

specifically, it was hypothesized that the switch trolley dilemma presented between the first presentation of the footbridge trolley dilemma scenario and the second presentation would increase participant appropriateness to act response in the second footbridge trolley dilemma scenario. We posited that participants would notice the logical consistency between the first footbridge trolley dilemma scenario and the switch trolley dilemma scenario that followed, thus increasing their likelihood of indicating appropriateness to act in the second presentation of the footbridge trolley dilemma scenario.

A series of trolley dilemma scenario mixed ANOVAs yielded differential results. ANOVAs 1 and 3 yielded a significant interaction effect between trolley dilemma scenario response and trolley dilemma condition (see Table 11). Whereas, ANOVAs 2 and 4 yielded two different significant interaction effects between trolley dilemma scenario condition and MRM/AOT total score and trolley dilemma scenario response and trolley dilemma condition (see Table 11). These findings suggest that trolley dilemma scenario condition systematically affected differences in participant response from the first scenario response to the third, repeated scenario. Participants categorized as having either low or high MRM/AOT scores differed in their trial responses across conditions. Counterintuitively, participants categorized as low MRM/AOT indicated greater or the approximately the same levels of appropriateness to act in the trolley dilemma scenario than participants categorized as high MRM across conditions (see Tables 13 and 15).

Limitations of the Current Study

The current study utilized self-report measures for cognitive ability and individual thinking dispositions. Although research suggests that the SAT provides reliable scores that correlate highly with psychometric measures of intelligence and with validated SAT scores, validity evidence for all individual difference measures could be bolstered by including other, direct measures (Cassady, 2001; Frey & Detterman, 2004; Kuncel et al., 2005; Mayer et al., 2007; Unsworth & Engle, 2007).

The current study was conducted using a college student population. This utilization of this sample presents a couple of issues. First, the findings of the current study cannot be generalized to the general public, because the sample is restricted to undergraduate college students. Restriction of range in SAT scores may be another confounding variable within the study as the university application process is competitive. The majority of students accepted to the university have moderate to high SAT total scores. This particular issue can potentially mask relations between cognitive ability and other experimental variables.

Directions for Future Research

Future research should attempt to replicate and expand upon the findings of the current study by examining the relation between cognitive ability, thinking disposition variables, and moral judgment with a more diverse sample. Results may differentiate within a less homogenous sample of participants.

Differences in participant response to the same trolley dilemma scenarios across experimental conditions also warrant further examination. More specifically, future research should examine whether differences in responses to the same trolley dilemma scenario across condition are significant and attempt to explain why participant responses

to the footbridge and switch trolley dilemma situations differ across conditions. This particular study would allow the researcher an opportunity to further examine the relation between participant cognitive ability, thinking disposition variables, and differential response across trolley dilemma scenario conditions.

Conclusion

In summary, the findings of the current study suggest that individual difference variables such as cognitive ability and thinking dispositions do not relate to moral judgment in the same manner across both experimental scenarios. Within the organ transplant scenario, participant total SAT and AOT scores correlated significantly with their distribution of available livers to the better prognostic group; that is, as participant total SAT and AOT score increased, so too did the proportion of livers participants allocated to the better prognostic group across conditions. Interestingly, there was no significant interaction effect between participant sex and organ transplant scenario condition, indicating that participants did not exhibit myside bias. Participants who were aware of the organ allocation strategy that would maximize the number of lives saved had significantly higher total SAT/AOT total scores and distributed a significantly larger number of available livers to the better prognostic group across conditions.

Participant measures of cognitive ability and thinking dispositions related to trolley dilemma scenario responses differentially across both conditions. Furthermore, a series of trolley dilemma scenario mixed ANOVAs yielded differential results. ANOVAs 1 and 3 yielded a significant interaction effect between trolley dilemma scenario response and trolley dilemma condition. Whereas, ANOVAs 2 and 4 yielded two different

significant interaction effects between trolley dilemma scenario condition and MRM/AOT total score and trolley dilemma scenario response and trolley dilemma condition. These findings suggest that trolley dilemma scenario condition systematically affected differences in participant response from the first scenario response to the third, repeated scenario. However, participant cognitive ability and NFC variables did not interact with trolley dilemma scenario condition in the same manner as MRM and AOT. Interestingly, participants categorized as low MRM/AOT indicated greater or the approximately the same levels of appropriateness to act in the trolley dilemma scenario than participants categorized as high MRM across conditions. In conclusion, these findings suggest that more research and replication is needed in order to establish the relation between individual cognitive ability, thinking dispositions, and moral judgment.

Table1. *Cognitive Ability and Thinking Disposition Variable Correlations*

Variable	SAT Total	SAT Verbal	SAT Math	MRM	NFC	AOT
SAT Total	1					
SAT Verbal	.85**	1				
SAT Math	.89**	.56**	1			
MRM	.08	.11*	-.01	1		
NFC	.25**	.26**	.17**	.40**	1	
AOT	.18**	.23**	.07	.18**	.28**	1

Note. $N = 439$ *denotes $p < .05$ **denotes $p < .001$. Master Rationality Motive: MRM. Need For Cognition: NFC. Actively Open-Minded Thinking: AOT.

Table 2. *Organ Transplant Scenario Response, Cognitive Ability, and Thinking Disposition Variable Correlations*

Variable	Distribution to Better Prognostic Group	Distribution to Better Prognostic Group to Maximize
Distribution to Better Prognostic Group	1	
Distribution to Better Prognostic Group to Maximize	.35**	1
SAT Total	.05	.27**
SAT Verbal	.04	.24**
SAT Math	.10*	.26**
MRM	0	.03
NFC	.05	.04
AOT	.01	.11*

Note. $N = 439$ *denotes $p < .05$ **denotes $p < .001$. Distribution to the Better Prognostic Group: number of organs participants distributed to the better prognostic group. Distribution to Better Prognostic Group to Maximize: number of organs participants thought should be distributed to the better prognostic group to maximize the number of lives saved. Master Rationality Motive: MRM. Need For Cognition: NFC. Actively Open-Minded Thinking: AOT.

Table 3. *Allocation Decisions: Percent of Organs Male and Female Participants Allocated to the Better Prognostic Group Across Condition*

	Male Participants (*N*=133)		Female Participants (*N*=306)	
Organs Allocated to the better prognostic group (%)	Condition 1 (M:50% F:80%) (*N*=75)	Condition 2 (M:80% F:50%) (*N*=58)	Condition 1 (M:50% F:80%) (*N*=137)	Condition 2 (M:80% F:50%) (*N*=169)
1-49	6 (8%)	3 (5%)	10 (7%)	12 (7%)
50	31 (41%)	24 (41%)	55 (40%)	78 (46%)
51-59	3 (4%)	0 (0%)	5 (4%)	4 (2%)
60-70	28 (37%)	24 (41%)	62 (45%)	70 (41%)
71-99	6 (8%)	4 (7%)	5 (4%)	5 (3%)
100	1 (1%)	3 (5%)	0 (0%)	0 (0%)

Note. Total *N* = 439.

Table 4. *ANOVA and Mean Allocation to Better Prognostic Group as a Function of Condition and Sex*

Organ Transplant Scenario

	F		Condition 1 (M:50% F:80%)	Condition 2 (M:80% F:50%)
Participant Sex	8.00*		Mean (*SD*)	Mean (*SD*)
Organ Transplant Scenario Condition	1.51	Males	56.80 (12.10)	60.17 (13.67)
Participant Sex X Organ Transplant Condition	3.21	Females	55.64 (10.12)	55.01 (9.18)

Note. *N* = 439 *denotes *p* < .05 **denotes *p* < .001.

Table 5. *Chi-Square Analysis of Sex of Maximizers versus Non-Maximizers*

	N	Males	Females	Chi-Square
Maixmizers	88	53 (40%)	35 (11%)	< .001
Non-Maximizers	351	80 (60%)	271 (89%)	< .05

Note. $N = 439$. Maximizers: participants who were aware of the organ allocation strategy that would maximize the number of lives saved within the organ transplant scenario. Non-maximizers: participants who were unaware of the organ allocation strategy that would maximize the number of lives saved within the organ transplant scenario.

Table 6. *Organ Transplant Scenario Independent t-tests for Maximizers and Non-maximizers*

Variable	Mean (*SD*) Maximizers (*N* = 88)	Mean (*SD*) Non-Maximizers (*N* = 351)	Difference	*t*	*p*	Effect Size (*d*)
Total SAT	1168.41(145.72)	1055.44(165.96)	112.97	5.84**	< .001	0.56
SAT Verbal	575.68(77.03)	528.26(86.77)	47.42	4.68**	< .001	0.45
SAT Math	592.73(82.22)	531.72(93.61)	61.01	5.59**	< .001	0.54
MRM	52.80(6.66)	52.78(7.04)	0.02	0.01	.99	0
NFC	69.35(10.07)	66.99(10.90)	2.36	1.84	.07	0.18
AOT	174.25(18.84)	169.71(17.81)	4.54	2.11*	.04	0.20
Distribution to Better Prognostic Group	59.03 (12.66)	55.48 (10.14)	3.55	2.79*	.01	0.27

Note. * denotes *p* < .05 ** denotes *p* < .001. Master Rationality Motive: MRM. Need For Cognition: NFC. Actively Open-Minded Thinking: AOT. Distribution to Better Prognostic Group: number of organs participants distributed to the better prognostic group.

Table 7. *Maximizer ANOVA and Mean Allocation to Better Prognostic Group as a Function of Condition and Sex Organ Transplant Scenario*

	F		Condition 1 (M:50% F:80%)	Condition 2 (M:80% F:50%)
Participant Sex	2.61		Mean (*SD*)	Mean (*SD*)
Organ Transplant Scenario Condition	1.04	Males	59.40 (12.62)	61.96 (15.89)
Participant Sex X Organ Transplant Condition	0.01	Females	54.67 (7.43)	57.75 (10.06)

Note. $N = 88$ *denotes $p < .05$ **denotes $p < .001$.

Table 8. *Condition 1Trolley Dilemma Scenario Response, Cognitive Ability, and Thinking Disposition*

Variable Correlations

Variable	Trial 1 - Footbridge	Trial 2 - Switch	Trial 3 - Footbridge
Trial 1 - Footbridge	1		
Trial 2 - Switch	.53**	1	
Trial 3 - Footbridge	.88**	.56**	1
SAT Total	.15*	.13	.11
SAT Verbal	.09	.04	.06
SAT Math	.16*	.18*	.12
MRM	-.22*	-.14*	-.27**
NFC	.01	-.06	-.05
AOT	-.20*	-.13	-.18*

Note. $N = 208$ *denotes $p < .05$ **denotes $p < .001$. Trial 1 – Footbridge: first presentation of the footbridge trolley dilemma scenario. Trial 2 – Switch: switch trolley dilemma scenario presented between first and second presentation of the footbridge trolley dilemma scenario. Trial 3 – Footbridge: second presentation of the footbridge trolley dilemma scenario presented after the switch trolley dilemma scenario. Master Rationality Motive: MRM. Need For Cognition: NFC. Actively Open-Minded Thinking: AOT. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 9. *Condition 2Trolley Dilemma Scenario Response, Cognitive Ability, and Thinking Disposition*

Variable Correlations

Variable	Trial 1- Switch	Trial 2 - Footbridge	Trial 3 - Switch
Trial 1 - Switch	1		
Trial 2 - Footbridge	.31**	1	
Trial 3 - Switch	.82**	.36**	1
SAT Total	-.07	-.01	0
SAT Verbal	-.04	-.01	0
SAT Math	-.02	.02	.08
MRM	.12	.07	.05
NFC	-.01	.12	.02
AOT	.06	-.03	.05

Note. $N = 231$ *denotes $p < .05$ **denotes $p < .001$. Trial 1 – Switch: first presentation of the switch dilemma scenario. Trial 2 – Footbridge: footbridge trolley dilemma scenario presented between first and second presentation of the switch trolley dilemma scenario. Trial 3 – Switch: second presentation of the switch trolley dilemma scenario presented after the footbridge trolley dilemma scenario. Master Rationality Motive: MRM. Need For Cognition: NFC. Actively Open-Minded Thinking: AOT. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 10. *Trolley Dilemma Scenario Response Dependent t-tests*

	N	Trial 1- Scenario	Trial 2 - Scenario	Trial 3 - Scenario	Mean Difference	Confidence Intervals	t	p
		Means						
Fb1-Sw-Fb2	208	2.45 (1.35)	3.41 (1.40)	2.56 (1.32)	0.11	.20 to .02	2.47*	.01
Sw1-Fb-Sw2	231	4.44 (0.99)	2.77 (1.32)	4.16 (1.09)	-0.28	-.36 to -.19	6.65**	<.001

Note. *denotes *p* < .05 **denotes *p* < .001. Trial 1 – Scenario: first presentation of the trolley dilemma scenario. Trial 2 – Scenario: trolley dilemma scenario presented between first and second presentation of the alternative trolley dilemma scenario. Trial 3 – Scenario: second presentation of the first trolley dilemma scenario presented after the second trolley dilemma scenario. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 11. *Trolley Dilemma Scenario 2X2X2 ANOVAs*

	F			
	ANOVA 1 (SAT Total Low vs. High)	ANOVA 2 (MRM Total Low vs. High)	ANOVA 3 (NFC Total Low vs. High)	ANOVA 4 (AOT Total Low vs. High)
Trolley Dilemma Scenario Trial Response	7.85*	6.96*	6.99*	7.82*
Trolley Dilemma Scenario Condition	270.44**	269.55**	266.42**	264.94**
SAT Total	6.96*			
MRM Total		7.82*		
NFC Total			.64	
AOT Total				1.40
Trial Response X Condition	41.34**	40.85**	41.16**	38.93**
Trial Response X SAT Total	1.59			
Trial Response X MRM Total		3.56		
Trial Response X NFC Total			.98	
Trial Response X AOT Total				1.25
Condition X SAT Total	.45			
Condition X MRM Total		6.33*		
Condition X NFC Total			.09	
Condition X AOT Total				5.01*
Trial Response X Condition X SAT Total	3.01			
Trial Response X Condition X MRM Total		.01		
Trial Response X Condition X NFC Total			1.72	
Trial Response X Condition X AOT Total				.35

Note. *denotes $p < .05$ **denotes $p < .001$. Trolley Dilemma Scenario Trial Response: Participant response to first presentation of the trolley dilemma scenario versus the third, repeated version of the scenario. Trolley Dilemma Scenario Condition: Condition 1 (Fb1-Sw-Fb2) versus Condition 2 (Sw1-Fb-Sw2). Master Rationality Motive Total: MRM Total Low versus High. Need For Cognition Total: NFC Total Low versus High. Actively Open-Minded Thinking Total: AOT Total Low versus High. Low and High categories of cognitive ability and thinking dispositions created by Median split. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 12. *Trolley Dilemma Scenario 2X2X2 SAT Total ANOVA Means Table*

Trolley Dilemma Scenario Condition	SAT Total Category Low vs. High	Trolley Dilemma Trial 1 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.26 (1.11)
	N = 104	
N = 208	High	2.63 (1.53)
	N = 104	
Condition 2 (Sw1-Fb-Sw2)	Low	4.37 (1.02)
	N = 110	
N = 231	High	4.50 (.96)
	N = 121	

	SAT Total Category Low vs. High	Trolley Dilemma Trial 3 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.38 (1.10)
	N = 104	
N = 208	High	2.73 (1.51)
	N = 104	
Condition 2 (Sw1-Fb-Sw2)	Low	4.00 (1.13)
	N = 110	
N = 231	High	4.31 (1.03)
	N = 121	

Note. Trolley Dilemma Scenario Trial Response: Participant response to first presentation of the trolley dilemma scenario versus the third, repeated version of the scenario. Trolley Dilemma Scenario Condition: Condition 1 (Fb1-Sw-Fb2) versus Condition 2 (Sw1-Fb-Sw2). SAT Total Low versus High score categories were created by Median split. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 13. *Trolley Dilemma Scenario 2X2X2 MRM Total ANOVA Means Table*

Trolley Dilemma Scenario Condition	MRM Total Category Low vs. High	Trolley Dilemma Trial 1 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2) N = 208	Low N = 97	2.72 (1.42)
	High N = 111	2.21 (1.24)
Condition 2 (Sw1-Fb-Sw2) N = 231	Low N = 113	4.43 (1.02)
	High N = 118	4.45 (.99)

	MRM Total Category Low vs. High	Trolley Dilemma Trial 3 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2) N = 208	Low N = 97	2.90 (1.41)
	High N = 111	2.26 (1.17)
Condition 2 (Sw1-Fb-Sw2) N = 231	Low N = 113	4.20 (1.12)
	High N = 118	4.12 (1.09)

Note. Trolley Dilemma Scenario Trial Response: Participant response to first presentation of the trolley dilemma scenario versus the third, repeated version of the scenario. Trolley Dilemma Scenario Condition: Condition 1 (Fb1-Sw-Fb2) versus Condition 2 (Sw1-Fb-Sw2). Master Rationality Motive Total: MRM Total Low versus High. MRM Total Low versus High score categories were created by Median split. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 14. *Trolley Dilemma Scenario 2X2X2 NFC Total ANOVA Means Table*

Trolley Dilemma Scenario Condition	NFC Total Category Low vs. High	Trolley Dilemma Trial 1 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.47 (1.30)
	N = 97	
N = 208	High	2.42 (1.40)
	N = 111	
Condition 2 (Sw1-Fb-Sw2)	Low	4.47 (.95)
	N = 115	
N = 231	High	4.41 (1.03)
	N = 116	

	NFC Total Category Low vs. High	Trolley Dilemma Trial 3 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.66 (1.29)
	N = 97	
N = 208	High	2.47 (1.35)
	N = 111	
Condition 2 (Sw1-Fb-Sw2)	Low	4.18 (1.03)
	N = 115	
N = 231	High	4.14 (1.15)
	N = 116	

Note. Trolley Dilemma Scenario Trial Response: Participant response to first presentation of the trolley dilemma scenario versus the third, repeated version of the scenario. Trolley Dilemma Scenario Condition: Condition 1 (Fb1-Sw-Fb2) versus Condition 2 (Sw1-Fb-Sw2). Need For Cognition Total: NFC Total Low versus High. NFC Total Low versus High score categories were created by Median split. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Table 15. *Trolley Dilemma Scenario 2X2X2 AOT Total ANOVA Means Table*

Trolley Dilemma Scenario Condition	AOT Total Category Low vs. High	Trolley Dilemma Trial 1 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.70 (1.40)
	N = 94	
N = 208	High	2.25 (1.28)
	N = 114	
Condition 2 (Sw1-Fb-Sw2)	Low	4.39 (.94)
	N = 116	
N = 231	High	4.49 (1.04)
	N = 115	

	AOT Total Category Low vs. High	Trolley Dilemma Trial 3 Response Mean (*SD*)
Condition 1 (Fb1-Sw-Fb2)	Low	2.73 (1.38)
	N = 94	
N = 208	High	2.41 (1.27)
	N = 114	
Condition 2 (Sw1-Fb-Sw2)	Low	4.10 (1.05)
	N = 116	
N = 231	High	4.23 (1.13)
	N = 115	

Note. Trolley Dilemma Scenario Trial Response: Participant response to first presentation of the trolley dilemma scenario versus the third, repeated version of the scenario. Trolley Dilemma Scenario Condition: Condition 1 (Fb1-Sw-Fb2) versus Condition 2 (Sw1-Fb-Sw2). Actively Open-Minded Thinking Total: AOT Total Low versus High. AOT Total Low versus High score categories were created by Median split. Participant moral dilemma scenario responses were reflected so that higher values indicate more appropriateness of action.

Appendices

Appendix A

Demographic Items

Please indicate your gender.

Male

Female

I am _____ years old.

Please indicate your ethnic background.

Native-American

Asian-American

Black/African-American

Mexican American

Puerto Rican

White/Caucasian

Other

Please indicate your year in college.

Freshman

Sophomore

Junior

Senior

Grad Student

Post BA continuing

Try to remember, as best you can, your SAT Critical Reading (i.e., SAT Verbal), SAT Math, and SAT Writing scores. Use the pull-down menu to indicate your

SAT Verbal Score

SAT Math Score

SAT Writing score

Please indicate the level of your confidence in your memory for these scores:

Very High Moderately High Somewhat High Low Very Low

SAT Verbal Scores

SAT Math Score

SAT Writing Scores

How many times have you taken the SAT?

I never took it

Once

Twice

Three times

Four or more times

How many times have you taken the PSAT?

I never took it

Once

Twice

Three times

Four or more times

Appendix B

Organ Transplant Scenario Items

Please select the number series that includes the last digit of your personal telephone (cell phone) number?

0 - 4

5 – 9

Condition 1

We are going to ask you about a health issue. There are no "right" or "wrong" answers to these questions. As you may know, there is a shortage of livers available for those who need transplants. This problem is especially bad for young adults. Suppose that **200 young adults** are waiting to receive a liver transplant, none of whom have any other health problems. They need to receive these transplants within one year or they will die. In that time, **only 100 usable livers** will become available. Those who do not receive a transplant will die.

Suppose also that research indicates females are more likely to survive transplant than males. Previous research has not suggested a definitive reason for the difference in survival rates amongst males and females and no other information predicts their outcomes as reliably as gender.

Males: 50% chance of surviving if transplanted

Females: 80% chance of surviving if transplanted

How many of the 100 livers do you think should go to each group?

● Males

● Females

● **Total**

Condition 2

We are going to ask you about a health issue. There are no "right" or "wrong" answers to these questions. As you may know, there is a shortage of livers available for those who need transplants. This problem is especially bad for young adults. Suppose that **200 young adults** are waiting to receive a liver transplant, none of whom have any other health problems. They need to receive these transplants within one year or they will die. In that time, **only 100 usable livers** will become available. Those who do not receive a transplant will die. Suppose also that research indicates males are more likely to survive transplant than females. Previous research has not suggested

a definitive reason for the difference in survival rates amongst males and females and no other information predicts their outcomes as reliably as gender.

Males: 80% chance of surviving if transplanted

Females: 50% chance of surviving if transplanted

How many of the 100 livers do you think should go to each group?

● Males

● Females

● **Total**

What distribution of the 100 organs amongst the young adults do you think would save the most lives?

● Males

● Females

● **Total**

Suppose that one option we have is to ignore these survival rate differences and distribute the organs randomly to 100 young adults regardless of gender. Should we do so?

Yes

No

Appendix C

Moral Dilemma Scenario Items

Please select the number series that includes the last digit of your personal telephone (cell phone) number?

0 - 4

5 – 9

Condition 1

Participants responded to these items using the following scale:

Definitely Yes

Yes

Probably Yes

Probably No

No

Definitely No

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. You are standing on a footbridge spanning the tracks in between the trolley and the five people. A large stranger is leaning over the footbridge and if you *push him over* the railing he will land on the tracks stopping the trolley and saving the five people (and no one will see the push).

Should you *push him over* in order to save five people at the expense of one?

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. The only way to avoid this is for you to *hit a switch* that is nearby. This switching device will send the trolley down an alternative track where there is only one person standing and who will be killed.

Should you *hit the switch* in order to save five people at the expense of one?

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. You

are standing on a footbridge spanning the tracks in between the trolley and the five people. A large stranger is leaning over the footbridge and if you *push him over* the railing he will land on the tracks stopping the trolley and saving the five people (and no one will see the push).

Should you *push him over* in order to save five people at the expense of one?

Condition 2

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. The only way to avoid this is for you to *hit a switch* that is nearby. This switching device will send the trolley down an alternative track where there is only one person standing and who will be killed.

Should you *hit the switch* in order to save five people at the expense of one?

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. You are standing on a footbridge spanning the tracks in between the trolley and the five people. A large stranger is leaning over the footbridge and if you *push him over* the railing he will land on the tracks stopping the trolley and saving the five people (and no one will see the push).

Should you *push him over* in order to save five people at the expense of one?

Imagine you are standing watching a runaway trolley that has lost its brakes and is rolling down a hill toward five people on the tracks below who will certainly be killed by it. The only way to avoid this is for you to *hit a switch* that is nearby. This switching device will send the trolley down an alternative track where there is only one person standing and who will be killed.

Should you *hit the switch* in order to save five people at the expense of one?

Appendix D

Actively Open-Minded Thinking Items

Participants responded to these items using the following scale:

Disagree Strongly

Disagree Moderately

Disagree Slightly

Agree Slightly

Agree Moderately

Agree Strongly

Even though freedom of speech for all groups is a worthwhile goal, it is unfortunately necessary to restrict the freedom of certain political groups.

What beliefs you hold have more to do with your own personal character than the experiences that may have given rise to them.

I tend to classify people as either for me or against me.

A person should always consider new possibilities.

There are two kinds of people in this world: those who are for the truth and those who are against the truth.

Changing your mind is a sign of weakness.

I believe we should look to our religious authorities for decisions on moral issues.

I think there are many wrong ways, but only one right way, to almost anything.

It makes me happy and proud when someone famous holds the same beliefs that I do.

Difficulties can usually be overcome by thinking about the problem, rather than through waiting for good fortune.

There are a number of people I have come to hate because of the things they stand for.

Abandoning a previous belief is a sign of strong character.

No one can talk me out of something I know is right.

Basically, I know everything I need to know about the important things in life.

It is important to persevere in your beliefs even when evidence is brought to bear against them.

Considering too many different opinions often leads to bad decisions.

There are basically two kinds of people in this world, good and bad.

I consider myself broad-minded and tolerant of other people's lifestyles.

Certain beliefs are just too important to abandon no matter how good a case can be made against them.

Most people just don't know what's good for them.

It is a noble thing when someone holds the same beliefs as their parents.

Coming to decisions quickly is a sign of wisdom.

I believe that loyalty to one's ideals and principles is more important than "open-mindedness."

Of all the different philosophies which exist in the world there is probably only one which is correct.

My beliefs would not have been very different if I had been raised by a different set of parents.

If I think longer about a problem I will be more likely to solve it.

I believe that the different ideas of right and wrong that people in other societies have may be valid for them.

Even if my environment (family, neighborhood, schools) had been different, I probably would have the same religious views.

There is nothing wrong with being undecided about many issues.

I believe that laws and social policies should change to reflect the needs of a changing world.

My blood boils over whenever a person stubbornly refuses to admit he's wrong.

I believe that the "new morality" of permissiveness is no morality at all.

One should disregard evidence that conflicts with your established beliefs.

Someone who attacks my beliefs is not insulting me personally.

A group which tolerates too much difference of opinion among its members cannot exist for long.

Often, when people criticize me, they don't have their facts straight.

Beliefs should always be revised in response to new information or evidence.

I think that if people don't know what they believe in by the time they're 25, there's something wrong with them.

I believe letting students hear controversial speakers can only confuse and mislead them.

Intuition is the best guide in making decisions.

People should always take into consideration evidence that goes against their beliefs.

Appendix E

Need for Cognition Items

Participants responded to these items using the following scale:

Disagree Strongly

Disagree Moderately

Disagree Slightly

Agree Slightly

Agree Moderately

Agree Strongly

It's enough for me that something gets the job done; I don't care how or why it works.

I really enjoy a task that involves coming up with new solutions to problems.

I like to have the responsibility of handling a situation that requires a lot of thinking.

I would prefer complex to simple problems.

I try to anticipate and avoid situations where there is a likely chance I will have to think in depth about something.

I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.

I only think as hard as I have to.

Learning new ways to think doesn't excite me very much.

I prefer my life to be filled with puzzles that I must solve.

The notion of thinking abstractly is appealing to me.

I usually end up deliberating about issues even when they do not affect me personally.

I find satisfaction in deliberating hard and for long hours.

The idea of relying on thought to make my way to the top appeals to me.

I feel relief rather than satisfaction after completing a task that required a lot of mental effort.

Thinking is not my idea of fun.

I like tasks that require little thought once I've learned them.

I prefer to think about small, daily projects to long-term ones.

I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.

Appendix F

Master Rationality Motive Items

Participants responded to these items using the following scale:

Disagree Strongly

Disagree Moderately

Disagree Slightly

Agree Slightly

Agree Moderately

Agree Strongly

I always consider the consequences before I take action.

I am only confident of decisions that are made after careful analysis of all available information.

After I make a decision, it is often difficult for me to give logical reasons for it.

It is more important to me than to most people to behave in a logical way.

I like to think that my actions are motivated by sound reasons.

I like to have reasons for what I do.

I believe in following my heart more than my head.

I do not like to be too objective in the way I look at things.

I don't like to have to justify my actions.

If a belief suits me and I am comfortable, it really doesn't matter if the belief is true.

I like to gather many different types of evidence before I decide what to do.

I think things through before coming to a decision.

I don't feel I have to have reasons for what I do.

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