

STATE AND TRAIT ANXIETY EFFECTS ON DECISION-MAKING: PREDICTING  
HEURISTIC VERSUS ANALYTIC STRATEGY ADOPTION

BY

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Submitted to the graduate degree program in Psychology and the Graduate Faculty of the University of Kansas in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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## Acknowledgements

I'd like to give the most thanks to my parents, Richard and Merry O'Hare, you have been boundless sources of love and support. You raised me to believe that I was capable of anything and have valuable contributions to make to the world, and this has carried me through all the good times and the difficult. To my brother, Scott O'Hare, thank you for being a great source of my personal strength. Your determination and unbendable will to do right and succeed in life has always inspired me to keep my head up and persevere.

To my boyfriend, Scott McCauley, you should receive a medal for sticking with me through the process of getting my PhD. While not always immediately appreciated, your sense of fun and humor has always kept me tied to the real world rather than adrift in the altered reality that is academia. I'll admit, you do a lot of the programming for my studies and if I have an image or graph that looks really good in a presentation, it's because you made it for me. You are the best RA I have. I'd also like to thank your family for their support; they have become an important part of my life. I love you.

To my first graduate advisor, Dr. Joseph Dien, you taught me to embrace my nerddom and own it. You also instilled in me the ability to work like a wildcat, and I owe a great deal of my productivity to you. You have become a trusted colleague and good friend. To my second graduate advisor, Dr. Ruth Ann Atchley, you elevated me to become an independent researcher and thinker. You have always respected my ideas and opinions and encouraged me to take them to the next level. As excited as I am to move on to my postdoctoral position, I regret not having more time to continue to learn from you, so you can expect plenty of emails, calls, and visits when I'm in need of further advising.

To Dr. Paul Atchley, you helped me become a ring-leader among my peers, and I greatly enjoyed working with you to make things happen within the program and its students. It has been so helpful to have a program head that we are comfortable talking to and working with. Thank you so much for that. I'd also like to thank my committee members, Dr. Paul Atchley, Dr. Omri Gillath, Dr. Dan Bernstein, and Dr. Mohamed El-Hodiri for their contributions to my research. Your insights and suggestions have greatly helped the development of my own thinking about data, theory, and model-based approaches.

Now to the people who kept me sane within the walls of Fraser Hall. I had several great mentors and friends who showed me the ropes of graduate school. Lauren Waterson, Dr. Jennifer Ivie-Barth, and Dr. Jeff Dressel. You are cherished friends and confidants. Thank you for creating the wake that I was able to ride out of here. I work with an amazing group of students (graduate and undergraduate) within the cognitive program and my lab; thank you to all of you for making grad school fun and putting up with my shenanigans. To Keith Young, for a while you were all I had left! Thank you for the friendship and great memories. Here's to many more. To Linzi Gibson, you are my best friend, and I do not know how I am going to survive without the half you contribute to the brain we share! I take full credit for the amazing scientist you have become and trust you to keep the lab in tip-top shape. Keith and Linzi, I am so excited for what our futures bring. We will take the psychology world by storm!

Final thanks go to my furry family – our dog, Nutmeg, and our two cats, Freckle and Sashimi. You're always there for snorgling when I need it, and keep me constantly entertained at home. Smoochies.

## Abstract

The impact of mood states on decision-making behavior has revealed two styles of decision making: heuristic and analytic (Fiedler, 1991). When the limited research on anxious moods and decision-making style is considered, conflicting results are found with support for both analytic (Raghunathan and Pham, 1999) and heuristic (Berns, et al., 2006) decision making existing in the literature. The current study attempts to better describe how anxious mood influences decision-making style by applying a dual-anxiety framework (Heller & Nitschke, 1997) and to broaden the scope of how mood and decision making is examined by looking at the interaction between state and trait anxiety with emotional and non-emotional decision contexts. Additionally, a fast/slow information-processing model for dual-anxiety is proposed by the author that would parallel the predictions for heuristic and analytic decision-making styles for the two different anxiety types. Results support trait anxious apprehension being associated with analytic decision-making and state anxious arousal being associated with heuristic decision making, however, the fast/slow model may provide a more accurate dichotomy for describing the impact of dual anxiety on cognition. Additionally, the impact of anxiety type on decision-making style is found to be strongest in non-emotional decision contexts. The implications of these findings have direct applications for experimental design and decision framing when working with individuals high in anxiety.

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Despite the fact that decisions are never made in an affect-free environment, the majority of research on decision-making strategies is built around non-emotional tasks (i.e. Isen & Means, 1983; Kahneman & Tversky, 1979). Work that has been done to consider affective components of decision making has either focused on the affective content of the decision stimuli (i.e. Fischhoff, Gonzalez, Lerner, & Small, 2005; Lerner, Gonzalez, Small, & Fischhoff, 2003) or has induced a state mood in the decision actor that is unrelated to the decision task (for a review see Isen, 2008). Nearly no work has been done that considers trait individual differences in mood and the processing of emotional stimuli that are relevant to the decision task. While the state effects of positive, sad and angry moods on decision-making behaviors have been fairly well vetted; little research has been done regarding the effect of either state or trait anxiety on decision-making behavior. Further, what research has been done on anxiety and decision making has shown inconsistent results. The current study seeks to investigate the main effects of trait and state anxiety as well as how they interact with non-affective and affective decision contexts to influence decision-making styles. Such research contributes to the development of more descriptive models of human decision-making behavior that can account for both individual differences in processing information and situational differences in the context of information.

#### Mood and Decision-Making Style

Cognitive science has greatly contributed to moving the study of decision making away from normative models to descriptive models (e.g. Kahneman & Tversky, 1979) that consider the idiosyncrasies of human judgment and likelihood estimations. One vein of these efforts has been in the study of mood and decision making, where specific

decision styles have been associated with each of the major mood states (e.g. Davis, 2009; Leith & Baumeister, 1996; Schwarz & Bless, 1991). Summarizing the literature, two over-arching decision styles can be observed: heuristic and analytic (also referred to as automatic and controlled in some contexts, for a review see Sanfey & Chang, 2008). These two styles make up what is commonly referred to as the dual-processing model of cognition (Fiedler, 1991). Heuristic decision styles are characterized as open, creative, spontaneous and quick with the avoidance of demanding, systematic processing of information (see Chaiken & Trope, 1999; Eagly & Chaiken, 1993; Petty & Caccioppo, 1986 for reviews). Analytic decision styles are characterized as closed, thorough, detailed and careful with specific and deliberative information processing (De Vries, Holland, & Witteman, 2008; Russ, 1993; Schwarz & Bless, 1991). Further, the motivation for adopting one decision-making style over another has been proposed to be either mood maintenance and enhancement (Isen, 1984; 1987; Isen & Geva, 1987; Isen, Nygren, & Ashby, 1988) or mood repair (Isen & Geva, 1987; Isen, et al., 1988; Roghunathan & Corfman, 2004). Thus mood directly dictates decision-making behavior in that whichever style is most adaptive for either maintaining a positive mood or improving a negative mood is the most likely style to be adopted.

Typically, research on mood and decision making has dichotomized mood states as being either positive or negative. In these investigations, positive moods have been consistently linked to heuristic decision-making styles (see Davis, 2009 for a review). The adoption of this decision style is predicted to maintain or enhance the positive mood state, as the avoidance of effortful processing also avoids a decline in overall mood (e.g., Ashby, Isen, & Turken, 1999). Individuals in a positive mood have been found to make

more intrusion errors for items that fit a schema (Bless, et al., 1996), give small losses more weight (Isen, et al., 1988), be equally persuaded by strong and weak arguments (Bless, Bohner, Schwarz, & Stack, 1990; Bless, Mackie, & Schwarz, 1992; Bless & Schwarz, 1999; Forgas, 1994), make complex decisions more quickly and with less consideration of information (Isen & Means, 1983; Isen, Rosenzweig, & Young, 1991), and show more creativity during a decision (Green & Noice, 1988; Hirt, et al., 1996; Isen, 1984; Isen & Daubman, 1984; Isen, Johnson, Mertz, & Robinson, 1985; see Isen, 2008 for a review) than individuals in neutral or negative moods. All of these characteristics are demonstrative of a heuristic decision-making style. As positive moods have so consistently been found to correspond with heuristic decision-making styles, it was at first thought that negative moods would always result in analytic decision-making styles, making a clean dichotomy. However as each negative mood state has been studied individually this has not been the case (i.e. Leith & Baumeister, 1996). Therefore, when considering the impact of negative mood on decision-making, one must divide negative mood into its subtypes: sad/dysphoric, angry, and anxious/fearful to fully account for all the findings.

Following induction of a sad mood, individuals have been found to display the previously predicted analytic decision-making style (De Vries, Holland, & Witteman, 2008; Dijksterhuis, Bos, Nordgren, & Van Baaren, 2006; Schwarz & Bless, 1991; Shiv, et al., 2005). Additionally, the proposed motivation for adopting this style while in a sad mood is in order to repair one's current mood state, as it is more beneficial to put effort into making a good decision when in a sad mood as the outcome of a good decision may improve one's emotional state (Isen & Geva, 1987; Isen, et al., 1988; Roghunathan &

Corfman, 2004). These individuals have been found to make slower decisions and consider more information during the decision (Dijksterhuis, 2004; Dijksterhuis, et al., 2006; Wilson, 2002), be less persuaded by weak arguments (Bless, Bohner, Schwarz, & Strack, 1990), and prefer high-risk/high-reward decisions to low-risk/low-reward ones, as the mood increase from the high reward associated with a high risk outweighs the possible mood decrease associated with a high loss (Raghunathan & Pham, 1999). All of these characteristics are demonstrative of analytical decision-making styles.

When the decision-making style of individuals in angry moods is examined, an entirely different style is observed. Individuals in angry moods have been found to adopt a heuristic decision-making style similar to that adopted by individuals in positive moods but with more willingness to take risk (Leith & Baumeister, 1996; Lerner & Tiedens, 2006). Again, the motivation behind adopting a heuristic decision style when in an angry mood is thought to be mood repair, as immediate action typically relieves anger (Bushman, Baumeister, & Phillips, 2001). Individuals in an angry mood have been found to select any option that contains a maximum gain, no matter how unlikely (Leith & Baumeister, 1996), be more persuaded by angry than sad arguments and thus rely on schema-congruent information (DeSteno, Petty, Rucker, Wegener, & Braverman, 2004), and make more intrusion errors for information that fits an angry schema (Tiedens, 2001).

While sad moods have been consistently associated with analytic decision-making styles and angry moods have been consistently associated with heuristic decision-making styles, the decision-making style associated with anxious moods has not been consistent, partially due to the limited research on the topic. Generally, individuals in anxious moods

have been found to adopt an analytic decision-making style (Fischhoff, Gonzalez, Lerner, & Small, 2005; Lerner, Gonzalez, Small, & Fischhoff, 2003; Mittal & Ross, 1998; Raghunathan & Corfman, 2004; Raghunathan & Pham, 1999; Tiedens & Linton, 2001; Wray & Stone, 2005). Some of the most thorough work on studying anxious mood effects on decision making is in a set of studies by Raghunathan and Pham (1999) where individuals in anxious moods were found to prefer low-risk/low-reward options to high-risk/high-reward ones. When given the two options of a 6/10 chance of winning \$5 versus a 3/10 chance of winning \$10, anxious individuals selected the more likely/lower reward option of a 6/10 chance of \$5. This decision-making style generalized to job preferences, as these same individuals are found to prefer low-pay/high-security jobs to high-pay/low-security jobs as well. Note that this analytic decision-making style, while still slower and more thorough as in sad moods, results in a different risk preference than sad moods. Going back to the definition of analytical decision making used above: analytic decision styles are characterized as closed, thorough, detailed and careful with specific and deliberative information processing (De Vries, Holland, & Witteman, 2008; Russ, 1993; Schwarz & Bless, 1991), these results mostly focus on the characteristic of being careful when using an analytic decision-making style.

This less risky decision style is thought to be driven by the motivation to reduce uncertainty in the anxious individuals, as evidenced by it only being consistent when anxious individuals are making decisions for themselves and not for others (Wray & Stone, 2005). The reduction of uncertainty in an anxious individual would subsequently serve to repair mood, as uncertainty is believed to be the most common source of anxiety (Mittal & Ross, 1998; Raghunathan & Corfman, 2004; Raghunathan & Pham, 1999;

Tiedens & Linton, 2001; Wray & Stone, 2005). Nonetheless, when the actual context of the decision to be made induces anxiety, different decision styles have been found in high anxiety individuals from that reported above.

In a study investigating the neurological basis of dread, participants were given the choice between immediate and delayed cutaneous shocks (Berns, et al., 2006). It was found that “high dreaders” (likened to fearful or anxious individuals) would choose to receive a more severe shock immediately than wait for a lesser shock. Further, these individuals were identifiable via the increased rate of activity in areas of the cortical pain matrix even when no decision was required (i.e., forced to wait for a shock rather than given a choice), which suggests that their hasty decision-making style may stem from a trait difference in reacting to threats. These individuals appear to be using their affective somatic responses to inform their decision-making, resulting in quick, suboptimal decisions rather than low risk ones. The hypothesis that these individuals seek to reduce uncertainty can still account for these results; however, as choosing a larger negative outcome that happens immediately has no uncertainty component. Going back to the definition of heuristic decision making used above: heuristic decision styles are characterized as open, creative, spontaneous and quick with the avoidance of demanding, systematic processing of information (see Chaiken & Trope, 1999; Eagly & Chaiken, 1993; Petty & Caccioppo, 1986 for reviews), choosing immediate, higher risk options over delayed, lower risk options may describe being spontaneous, but risky decision making does not necessarily denote being heuristic. Thus, while individuals high in anxiety have been found to be careful or risky depending upon the decision context, direct support for one being analytic and the other being heuristic is not provided.

Thus, in the examination of the influence of anxiety on decision making, individuals experiencing high anxiety have been found to perform analytically, or carefully, in neutral, non-threatening decision scenarios (Raghunathan and Pham, 1999) and heuristically, or hastily, in threatening decision scenarios (Berns, et al., 2006). Whether or not this is evidence of high anxiety leading to the adoption of two different decision-making strategies still needs to be determined. The question of what causes an anxious individual to adopt one decision style over the other remains unexplored. There is some neural evidence to suggest that these two different decision styles may be the result of trait differences in the individuals, which would imply two different types of trait anxiety; however, the possibility of a single trait anxiety that responds differently to the state context of a scenario also exists.

#### The Dual-Anxiety Model: Anxious Apprehension and Anxious Arousal

A dual model of anxiety may be able to account for both heuristic and analytic decision making styles when an individual is experiencing an anxious mood. It has been proposed by a number of researchers that there are actually two types or aspects of anxiety with distinct properties: apprehension, anticipatory frustration, and worry versus fear and stress (Barlow, 1988; 1996; Dien, 1999; Gray & McNaughton, 2000; Heller, Nitschke, Etienne, & Miller, 1997, O'Hare & Dien, 2008). The dual-anxiety model developed by Heller and colleagues (1997) articulates these different types of anxiety as anxious apprehension and anxious arousal, with anxious apprehension being typified by worry and verbal rumination (Barlow, 1991) about perceived threats in the immediate or distant future (Engels, et al., 2007), and anxious arousal being typified by somatic tension and physiological hyper-arousal due to perceived threats in the immediate future

(Nitschke, Heller, Palmieri, & Miller, 1999). These two types of anxiety may be able to simultaneously account for the different effects of anxiety on decision-making style previously discussed.

According to this model, these aspects of anxiety occur to varying degrees in an individual and often co-occur, as anxious arousal has been induced in individuals high in anxious apprehension via emotional narratives (Heller, et al, 1997), but also has been measured as a separate trait construct with separate neural correlates and behavioral outcomes (Dien, 1999; Engels, et al., 2007; O'Hare & Dien, 2008). Thus, differences in anxiety type have been measured via state manipulations, as well as trait measures. Behaviorally, individuals high in anxious apprehension have been shown to have slower responses during stimulus discrimination and widened attentional scopes (Dien, 1999), this may be due to an inefficient attentional disengagement system (Posner & Petersen, 1990) that struggles with disambiguating potential threats from benign stimuli (Fox, et al., 2001; 2002). On-the-other-hand, individuals high in anxious arousal have been found to be faster at discriminating between stimuli and have narrowed attentional focus (Dien, 1999), this may be due to anxious arousal resulting in hyper-activation of the fight-or-flight system (Cannon, 1927), which has been associated with rapid detection and action in the face of a threat (Hansen & Hansen , 1988; Ohman, Dimberg, & Ost, 1985; Ohman, Flykt, & Esteves, 2001).

Additionally, differential hemispheric lateralization for anxious apprehension and anxious arousal using resting electroencephalography (EEG) asymmetry (Heller, et al., 1997) has been established. It was found that high anxious apprehension individuals have more brain activity over the left frontal lobe than the right; however, when a state of

anxious arousal is induced via emotional narratives, more activity is recorded over the right posterior cortex than the left. Left frontal and right posterior activity for anxious apprehension and anxious arousal, respectively, has been supported by research using event-related potentials (ERPs; Dien, 1999; O'Hare & Dien, 2008) and changes in the blood-oxygen level dependent (BOLD) response using functional magnetic resonance imaging (fMRI; Engels, et al., 2007).

Thus, when taking the neuroscience evidence into consideration, these two different types of anxiety and their respective brain activation patterns could account for the two different decision styles seen in mood and decision-making research. Areas of the left prefrontal cortex (PFC) have been found to be involved in controlled response selection (Eshel, Nelson, Blair, Pine & Ernst, 2007; Ernst & Paulus, 2005; Goghari & MacDonald, 2009). The heightened left PFC activity observed in high anxious apprehension individuals may reflect additional resources being allocated to choice selection during a decision task, and this activity may reflect the thoughtful, analytic decision style commonly reported for individuals high in anxiety.

Further, areas of the posterior occipito-parietal cortex have been implicated in early, automatic selection processes (Bradley, et al., 2003; Eshel, et al., 2007; Schupp, et al., 2004) with the right hemisphere having more involvement in attentional selection of salient information (Mevora, Humphreys & Shalev, 2009) than the left. The heightened right posterior activity observed in high anxious arousal individuals may reflect speeded attentional selection for salient information, such as threatening choice options, and this activity may reflect the hurried, heuristic decision style reported for high anxiety individuals when dealing with a choice that involves a direct threat.

It is important to note that while Heller and colleagues, among other dual-anxiety theorists, dichotomize anxious apprehension and anxious arousal as two trait anxieties, others categorize anxious arousal as only a state anxiety, as the cognitive effects of anxious arousal are typically only observed when a threatening context is present (Endler & Kocovski, 2001). Indeed even in the neuroimaging data described above, different activation patterns in the posterior parietal cortex for individuals high in anxious arousal scores were only present in the context of negative words in an emotional Stroop task (Engels, et al., 2007). Nonetheless, even when a threatening context is needed to induce information-processing patterns associated with anxious arousal, the cognitive effects of such patterns have been found to generalize to non-threatening, neutral contexts.

In a recent study (Pacheco-Unguetti, et al., 2010), individuals high in trait anxiety, as indexed by the trait subscale of the Spielberger State-Trait Anxiety Inventory (STAI; Spielberger, 1983), were found to have decreased executive attentional control during a neutral Attention Network Task (ANT, Callejas, et al., 2004), while individuals low in trait anxiety but high in state anxiety, as indexed by the state subscale of the STAI, following exposure to negative images and text were found to have increased attentional alerting and orienting during the same task. These findings, that trait and state anxiety can differentially impact various stages of attention, led to the conclusion that trait anxiety is likely manifested by a top-down network in which malfunctions in executive control lead to strategies and attitudes that make it difficult to inhibit distracting information in the absence of situational triggers (which can lead to worry), while state anxiety is likely a result of a bottom-up network in which early attentional sensitivities make one more vigilant and responsive to information in general, especially if it is negatively valenced.

The insinuation that trait anxiety can interfere with executive control has been supported by fMRI data in which individuals high in trait anxiety had decreased prefrontal recruitment during a non-emotional Flanker task that corresponded with their decreased ability to inhibit non-emotional distracters (Bishop, 2009).

If the behavioral and cognitive effects of anxious arousal can only be observed following a negative mood induction, even if the task itself is non-emotional, then the debate over whether or not the dual-anxiety model dichotomizes anxiety as trait/trait or trait/state between anxious apprehension and anxious arousal is somewhat of a moot point, as both would dictate that without some sort of situational trigger, the information-processing patterns associated with anxious arousal will not be activated. This debate between a trait/trait or trait/state dichotomy reflects a much broader debate that has transpired in personality research. As such, trait theorists studying individual differences have argued for trait moods dictating personality (see Eysenck, 1991 for a review), and others have argued that traits are not consistent across situations thus environmental context must be considered in personality as well (see Delphine, et al., 2008 for a review). Most agree now that personality is a result of both person and situation variables, which is termed the interaction model of personality (Dreger, 1985; Endler, 1983, 1997; Spielberger, 1985). Indeed, this seems to be the most parsimonious approach for applying dual-anxiety models to the existing data on the effects of anxiety type on cognition.

The two functional systems proposed for anxious apprehension, disambiguating threats and non-threats, and anxious arousal, quickly identifying and responding to threats, also reflect two distinct scenarios that have been identified in the decision-

making literature, uncertainty and risk (e.g., Edwards, 1954; Ranyard, Crozier, & Svenson, 1997). According to decision-making theory, when the likelihood of an outcome is unknown and the decision-actor is ill-informed one is making a decision under a situation of uncertainty (Mukherjee, 2010). This situation is distinct from when one is making a decision with known possible undesirable outcomes, which denotes a situation of risk (Teigen & Brun, 1997). For the current study, a link between making decisions under conditions of uncertainty and increases in anxious apprehension and its hypothesized analytical decision-making style is being drawn, as uncertainty does not necessarily include a situational trigger for threat. Additionally, a link between making decisions under conditions of risk and increases in anxious arousal and its hypothesized heuristic decision-making style is also being drawn, as knowledge of a risk should activate attentional systems for threat. To date, despite the insinuations that trait anxiety/anxious apprehension impacts executive/top-down processes, research on the cognitive implications of such systems have not gone beyond basic cognitive paradigms, such as the emotional Stroop, ANT, and flanker tasks, which access very early, rapid cognitions. Thus, the application of the dual-anxiety model to even higher level cognitions, such as multiple-step decision making is an important expansion in the literature.

The cognitive research that has been conducted on the dual-anxiety model does draw important parallels to two other characteristics of analytic and heuristic decision-making styles: slow versus fast processing. While these attentional paradigms do not entail multi-step, complex decision processes that are typically of interest in the field of decision science, they do still involve more basic forms of decision making, such as

stimulus discrimination and response selection. These earlier, simpler decisions perhaps provide better insight into how anxious apprehension and anxious arousal are related to the dual-process cognitions.

Previous work by the author has shown that individuals high in anxious arousal show a global attentional sensitivity to stimuli in their environment, as indexed by an event-related potential (ERP) belonging to the attentional P300 complex, while individuals high in anxious apprehension do not (O'Hare & Dien, 2008). This effect has also been found to be specific for negatively valenced words in an emotional version of the Stroop task (O'Hare, Dien, Gillath, Canterbury, & Stetler, 2010). Thus, at the very first stage of attentional selection, individuals high in anxious arousal seem primed to quickly detect stimuli. On the other hand, other research has shown that individuals high in anxious apprehension show no advantages for early detection of stimuli, but rather, show difficulty disengaging attention from anxiety-relevant stimuli, such as angry faces, once they have been detected (Fox, et al., 2001; 2002). Thus, again at the earliest stages of attentional processing, individuals high in anxious apprehension seem to have slowed processing of information via difficulty disengaging and shifting attention away from negative information.

Further down the cognitive stream, individuals high in anxious arousal and anxious apprehension have also been found to differ in cognitive control (O'Hare, Gillath, Dien, Canterbury, & Stetler, 2009; O'Hare, Gillath, Dien, Canterbury, Lang & Stetler, 2009). In an emotional version of the Flanker task, in which emotionally valenced primes were presented prior to the Flanker stimulus, individuals were found to have decreased interference effects from the incongruent flanker trials following neutral

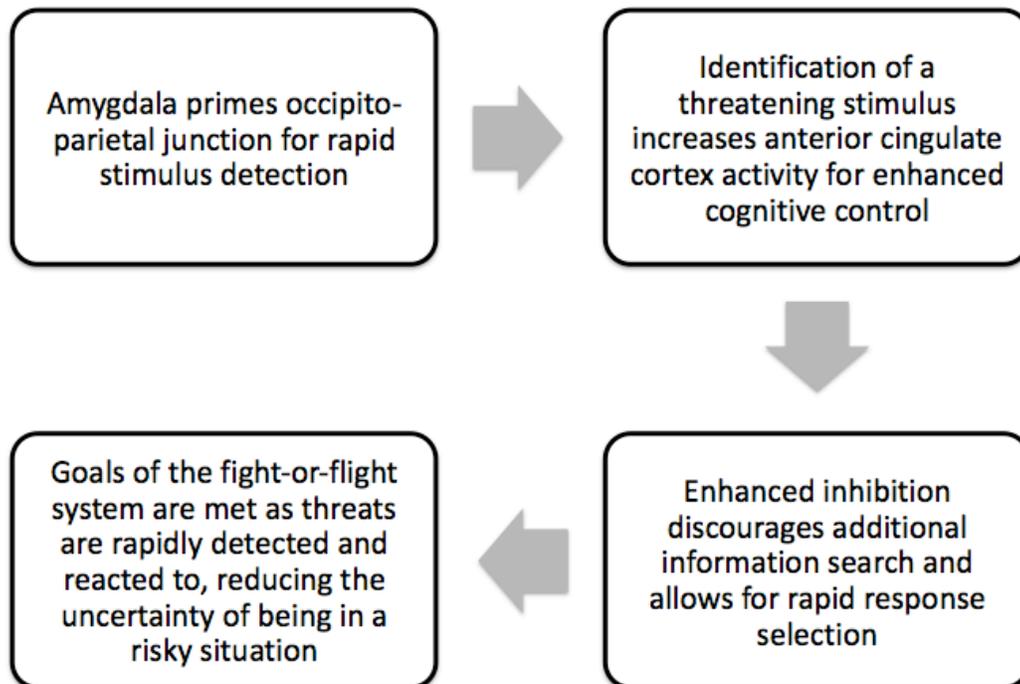
primes the higher they scored in anxious apprehension but lose this advantage following negative primes, while individuals were found to have decreased interference from incongruent flanker trials following negative primes the higher they scored in anxious arousal but show no advantage following neutral primes. This findings were consistent across both behavioral (O'Hare, et al., 2009a) and neurological (O'Hare, et al., 2009b) measures. Thus, as an individual increases in anxious arousal, their speed of processing increases following negative information, allowing them to better inhibit distracting information and make correct response selections. On the other hand, the higher and individual scores in anxious apprehension the better their cognitive control in neutral settings, but the slower their information processing following negative information, resulting in difficulty inhibiting distracting information and consequently, slower response time.

Summarizing the previous work on the attentional implications of anxious arousal versus anxious apprehension by the author, these two types of anxiety appear to start diverging into heuristic versus analytic information processing, respectively, very early in the information-processing stream via differences in information-processing speed. Across multiple paradigms it has been found that as an individual increases in anxious arousal their information-processing speed experiences increased facilitation by the presence of a negative stimulus, however, as an individual increases in anxious apprehension their information-processing speed experiences increased hinderance by the presence of a negative stimulus. Thus, it seems plausible that this dissociation in information-processing styles would continue to matriculate up to how information is processed during a complex, multi-step decision. A formulation for the author's proposed

model of dual-anxiety processing in the brain across multiple domains of cognition is provided in Figure 1.

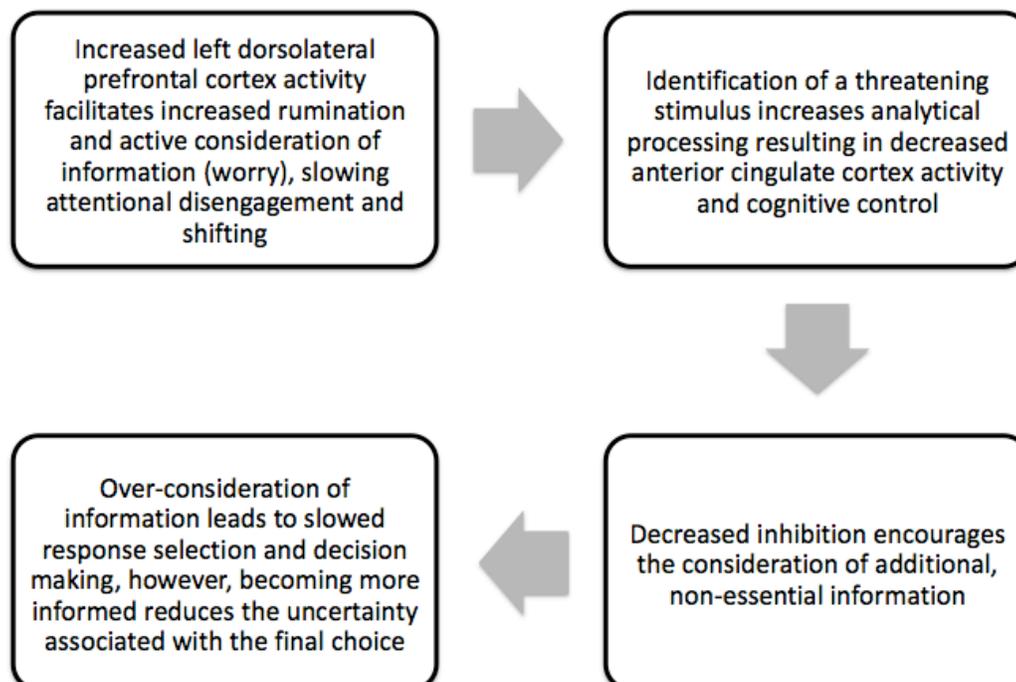
a.

**Anxious Arousal – Fast Information Processing**



b.

## Anxious Apprehension – Slow Information Processing



*Figure 1.* A possible model for the cascade of a) fast information processing that is seen in anxious arousal and b) slow information processing that is seen in anxious apprehension across multiple domains of cognition.

## Multiple Attribute Decision Making (MADM) and Process Theory

The decision-making paradigm for the current study comes from MADM research. MADM paradigms are designed to examine decision-making behavior when the choices to be made have multiple attributes to be considered (Xu, 2007) and are typically analyzed using process theory techniques (Payne, 1976; Svenson, 1979). Process theory emphasizes information search and combinations during decision processing rather than

before (input) and after (output) variables, thus providing insight into the different decision strategies that can lead to the same choice outcome.

One technique for studying decision-making processes within the framework of process theory utilizes information boards. In such studies, participants have to actively seek out the attribute information to make the decision by flipping over cards or pressing buttons on a computerized version of the task (Payne, 1976), which is how the decision-making paradigm is modeled for the current study. In this way, the order in which and how much information is considered can be tracked. Nonetheless, different decision strategies may lead to the same search patterns, so different search patterns can be interpreted as reflecting different strategies, but a specific search pattern does not necessarily reflect a single decision strategy.

In application to the study of mood and decision making, the MADM approach has successfully been used before to discriminate between decision-making styles when in a positive versus neutral mood (Isen & Means, 1983). In a study demonstrating the quick decisions made in a positive mood, subjects were given the choice between six cars, each with nine dimensions on which they were ranked. Subjects were asked to think aloud as they considered the information in selecting the best car. Post-decision, subjects gave their own ratings for the importance of each of the nine dimensions to provide each individual's subjective utility that could be compared to their ultimate decision behavior. Individuals in a positive mood were not found to differ in the ultimate decision outcomes from individuals in a neutral mood; however, they were found to come to the decision outcome more quickly, with less likelihood of reviewing information at which they had

already looked, and with more likelihood of ignoring information considered unimportant.

The time it takes to complete a decision when using process tracing techniques can put the applicability of the decision findings into question. In studies utilizing process theory techniques participants are typically presented with only one or two decision situations, thus there is a need for repeated measures research on this topic. Additionally, the length of the trials in these studies often leads to between-subjects designs. A repeated measures design in which participants served as their own controls would be highly informative because it would control for individual differences; however, this is not without the increased possibility of the decisions becoming routine and causing order effects in the decision behavior. Additionally, having the state moods induced come from the actual context of the decision to be made would increase the ecological validity of any findings, thus the current study utilizes decision scenarios which are neutral, uncertain, and threatening in context to induce mood, rather than unrelated emotional stimuli.

### Summary

There is compelling evidence to support the influence of mood on decision-making style (Anderson, 1974, 1981; Damasio, Tranel, & Damasio, 1991; Fiedler, 1991; Lerner & Keltner, 2000, 2001). One area that still needs clarification is regarding the influence of anxious moods on decision-making style, as current research has reported two different decision styles associated with anxiety (Berns, et al., 2006; Raghunathan and Pham, 1999). If these differences in decision-making style in individuals high in anxiety are due to situational or intrapersonal factors or the interaction between the two is

unknown. MADM paradigms and process theory techniques can be utilized to better discern the nature of how anxiety and decision contexts influence decision-making style. Further, measuring the different types of anxieties as continuous, individual difference variables rather than as categorical grouping variables will allow for a more descriptive exploration of the nature of the effects of anxiety on information processing and decision-making style.

#### Theoretical and Empirical Predictions

##### Main Effects for trait anxiety

If decision style is influenced strictly by trait mood effects, then there are predictable patterns of behavior for individuals high in anxious apprehension versus individuals high in anxious arousal. Individuals high in anxious apprehension have been proposed to adopt an analytic decision-making style. This style would result in longer times to make decisions and more information considered per decision in general, as well as more consideration of information rated as unimportant. Specifically, the more uncertain an anxious apprehension individual is the slower and more analytic they should become in the different decision scenarios. Individuals high in anxious arousal have been proposed to adopt a hasty, heuristic decision-making style. This style would result in shorter times to make decisions and less information considered per decision in general. Specifically, the more threatened an anxious arousal individual is the faster and more heuristic they should become in the decision scenarios.

##### Main effects for context-dependent mood

If decision style is influenced strictly by state mood effects, then there are predictable patterns of behavior for the three decision scenarios. Uncertain decision

scenarios should induce an increase in state anxious apprehension in all participants, which again, is characterized by symptoms of worry and rumination. This should result in a temporary analytic decision-making style regardless of trait anxiety scores. Threatening decision scenarios should induce an increase in state anxious arousal, which is characterized by the somatic symptoms of anxiety. This should result in a temporary heuristic decision-making style regardless of trait anxiety scores.

#### Interaction between trait and state mood

Finally, it is possible that the decision-making styles proposed to be associated with anxious apprehension and anxious arousal will only become dominant when it is primed by the context of the immediate decision to be made. In this manner, individuals high in anxious apprehension would show an increase in analytical decision-making style following an uncertain or threatening decision scenario. Correspondingly, individuals high in anxious arousal would show an increase in heuristic decision-making style following a threatening decision scenario. As the state context of the decision scenarios interacting with the trait individual differences of anxiety type is most congruent with the interaction model of personality (Endler & Kocovski, 2001), this is predicted to be the most likely outcome. As states of anxious arousal have been induced in trait anxious apprehension individuals before (Heller, et al., 1997), it is also possible that anxious apprehension individuals will adopt an analytic decision-making style during the uncertain decision scenario and will switch to a heuristic decision-making style during the threatening decision scenario after having experienced an increase in state anxious arousal, creating a full context by anxiety type interaction for the measure of anxious apprehension.

## Methods

### Participants

Ninety-three [62 females,  $M_{\text{age}} = 18.89$  ( $SD = .97$ )] undergraduate participants from the University of Kansas participant pool received course credit for their participation. All participants had normal or corrected-to-normal vision, were native English speakers, and gave written consent prior to any experimental proceedings.

### Materials

#### Experimental Stimuli

Three different types (TYPE) of decision scenarios were created (classroom performance, president of student government, and romantic relationship), each with three different contexts (CONTEXT: neutral, uncertain, and threatening; see Appendix A). The decision scenarios each described a different situation with which undergraduate students should have familiarity. The manipulation of mood by the decision scenarios was tested via a pilot study in which 14 participants from a convenience sample rated their current mood following reading each of the nine possible scenario variations. Pilot participants rated how much each of a series of adjectives from the Positive Affect Negative Affect Schedule (PANAS-X) negative, positive and fear subscales (Watson & Clark, 1991) and the Beck Anxiety Inventory (Beck & Steer, 1990) described their current mood on a 5-point Likert scale. The adjectives chosen depicted four mood categories: positive, general negative, uncertainty, and fear (see Appendix B). There was a significant TYPE by CONTEXT interaction on mood ratings,  $F(4, 52) = 5.12$ ,  $p = .002$ , such that the “President of student government” scenario had significantly higher ratings for positive mood ( $M = 2.56$ ,  $SD = .16$ ) than the “Classroom performance” ( $M = 2.05$ ,

SD = .16) and the “Romantic relationship” (M = 1.94, SD = .14) scenario types.

Nonetheless, scenarios with a threatening context (M = 2.81, SD = .17) were found to have significantly higher ratings of fearful mood than uncertainty (M = 2.46, SD = .21) or neutral (M = 1.49, SD = .10) contexts; scenarios with a threatening (M = 3.22, SD = .14) or an uncertainty (M = 3.02, SD = .18) context were found to have significantly higher ratings of uncertain mood than neutral contexts (M = 1.80, SD = .14); and scenarios with a neutral context (M = 2.71, SD = .20) were found to have significantly higher ratings of positive mood than threatening (M = 1.91, SD = .11) or uncertainty (M = 1.93, SD = .16) contexts.

Eight, two-choice decisions were created for each decision scenario. Each choice option was accompanied by four attributes that could be examined for further information regarding each choice. These four attributes provided additional information related to each choice in terms of social effects, personal success effects, personal happiness effects, and academic effects. The two-choice pairings included options that were social, information-gathering, threat-avoidant, or unrelated actions (see Appendix A). Two of each option type was paired together for each decision (e.g. social/social, threat-avoidant/threat-avoidant, etc.), to encourage attribute consideration. Each option type pairing occurred twice per decision.

### Psychometrics

To obtain a measurement of anxious apprehension, participants completed a computerized version of the Spielberger State-Trait Anxiety Inventory (STAI-S and STAI-T, respectively; see Appendix C; Spielberger, 1983). The STAI-T is commonly used as an experimental measure of trait anxiety as it measures a number of cognitive,

behavioral, and affective symptoms of anxiety. The STAI-T directly addresses aspects of worry, which is thought to best characterize anxious apprehension. The STAI-S is a common measure of state anxiety. This subscale of the STAI measures similar constructs as the STAI-T; however, asks the rater to respond how much the symptoms represent their current, immediate feelings rather than how they feel in general. As it has been used by others (Pacheco-Unguetti, et al., 2010) the STAI-S will be used as a state measure of anxious arousal here. To obtain a measurement of trait anxious arousal, participants completed a computerized version of the Fear Survey Schedule (FSS) (Braun & Reynolds, 1969; see Appendix C). The FSS is commonly used to measure trait fearfulness. The version used for this study (Temple Fear Survey Inventory, TFSI) assesses fear of 100 common phobic stimuli. Feelings of fear are thought to be similar, if not equivalent to anxious arousal.

#### Apparatus

All experiment materials were presented via E-prime version 1.1 experiment presentation scripts (Schneider, Eschman, & Zuccolotto, 2002) and presented on a Dell Dimension 8300 PC.

#### Experimental Design and Procedure

Upon entering the lab, each participant gave written consent and provided basic demographic information before beginning the experimental procedure. Each participant experienced each of the three decision scenario types (classroom performance, president of student government, and romantic relationship), one of each context type (neutral, uncertain or threatening). Order of decision scenario type and valence was fully counterbalanced across participants (36 different possible orders in all). Participants were

presented with instructions asking them to imagine themselves in the position the given decision scenario posits (see Appendix D). Following the decision scenario, participants were presented with a series of two-choice decisions regarding the scenario. Participants were instructed to select a choice after they had considered enough information to do so (see Appendix E). Presentation order of two-choice pairings was randomized. Following all two-choice decisions for a scenario participants reported their current mood in the same manner as was done in the pilot study. Following completion of the manipulation check, participants again were instructed to place themselves in the position of that posited by the second decision scenario, again followed by eight two-choice decisions and a manipulation check. The same procedure continued for the third decision scenario.

Selections were made during the two-choice decisions via a button press on the mouse. The four attributes that accompanied each choice option could be viewed via a button press on the mouse. Selecting to view an attribute took the participant to a different screen where only the information for that attribute for that choice option was displayed. Upon reading the attribute information, participants were directed back to the main two-choice selection page. In this manner, order and amount of attribute information considered during each two-choice decision was recorded. A screenshot of the two-choice selection page can be viewed in Figure 2.

[OptionA]	[OptionB]
Social Implications A	Social Implications B
Success Implications A	Success Implications B
Happiness Implications A	Happiness Implications B
Academic Implications A	Academic Implications B

*Figure 2.* Participants could select option A or option B for each two-choice decision by clicking in either of their rectangles. The actual text of the choices (e.g. “Send your significant other an email asking them to tell you what’s on their mind”) was displayed where “[OptionA]” and “[OptionB]” are displayed here. Participants could seek out additional information about each choice by clicking in the rectangles for any of the attributes.

Upon completion of all three decision scenarios participants ranked the four different attribute types for each choice option on how important they were for making their decisions on a 5-point Likert scale. Order of attribute type presentation for ranking was randomized. Finally, participants completed computerized versions of the STAI and FSS. Presentation of anxiety survey was counterbalanced across subjects. After completing the anxiety surveys, participants were given a written debriefing statement and had the opportunity to ask any questions before leaving the lab.

## Decision Style Measurement

Heuristic decision-making style was characterized by less time to make a decision during the two-choice decisions, less consideration of information prior to making decisions, and less likelihood to consider information that has been rated as unimportant prior to making decisions. Analytic decision-making style was characterized by more time to make a decision during the two-choice decisions, more consideration of information prior to making decisions, and higher likelihood to consider information that has been rated as unimportant prior to making decisions.

### Time to make decisions

Time to make a decision was measured as the difference in seconds between the onset of a two-choice decision and the offset of selecting one of the two choices. This variable was dependent upon how many choice attributes were examined during each decision period and the amount of time that was spent considering each choice.

### Amount of information considered per decision

Total amount of information considered per decision was measured as the number of attributes that was looked at during each two-choice decision. Each time an attribute was looked at before making the final decision was counted as an additional piece of information considered.

### Likelihood to consider information rated as important

Following completion of all decision scenarios and choices, participants were giving the instructions to rate “how important was this type of information to your choices” on a 5-point Likert scale for each of the attribute types. The ratings of how important each attribute type was to making a decision were used to determine if

participants were more likely to consider attributes rated as important. Likelihood is measured as the number of times looking at each type of attribute.

## Results

### Psychometrics

To check for shared covariance (colinearity) among the state ( $M = 38.97$ ,  $SD = 10.62$ ) and trait ( $M = 40.92$ ,  $SD = 9.24$ ) subscales of the STAI and the FSS ( $M = 279.15$ ,  $SD = 69.62$ ), Pearson's correlations were conducted between each. The state and trait subscales of the STAI were found to have a strong positive correlation,  $r = .51$ ,  $p < .01$ , as were the trait subscale of the STAI and the FSS,  $r = .44$ ,  $p < .01$ . The state subscale of the STAI and the FSS were not found to share a significant relationship,  $r = .17$ ,  $p = .12$ . The significant correlations between the state and trait subscales of the STAI and the trait subscale of the STAI and the FSS indicate that there is shared covariance between these anxiety surveys. To keep this colinearity from inflating any effects in the analyses, hierarchical regressions will be used.

### Mood Manipulation Check

The mood ratings were not found to significantly differ between the decision scenario types nor the decision scenario contexts, despite the scenarios showing different elicitations of uncertain and fearful moods in the pilot study. Compared to baseline mood ratings, all scenario types were found to only have significantly lower ratings of positive mood,  $t(92) = 6.56$ ,  $p < .001$  (neutral scenarios),  $t(92) = 7.70$ ,  $p < .001$  (uncertain scenarios), and  $t(92) = 7.51$ ,  $p < .001$ , following a Bonferroni correction for multiple comparisons. No differences in general negative, uncertainty or fearful mood were found. Since the mood manipulation data cannot be used to distinguish between the different

scenarios, they will not be considered further in this analysis. Means and standard deviations for the different mood manipulation checks can be found in Table 1.

Table 1.

*Means and standard deviations for mood ratings following each decision scenario.*

	Positive	General Negative	Uncertainty	Fearful
Baseline	3.17 (.77)	1.33 (.50)	1.67 (.61)	1.42 (.55)
Neutral Scenarios	2.68 (.99)	1.29 (.51)	1.50 (.60)	1.32 (.52)
Uncertain Scenarios	2.63 (.83)	1.31 (.48)	1.59 (.68)	1.36 (.54)
Threatening Scenarios	2.69 (.97)	1.30 (.51)	1.61 (.69)	1.34 (.53)

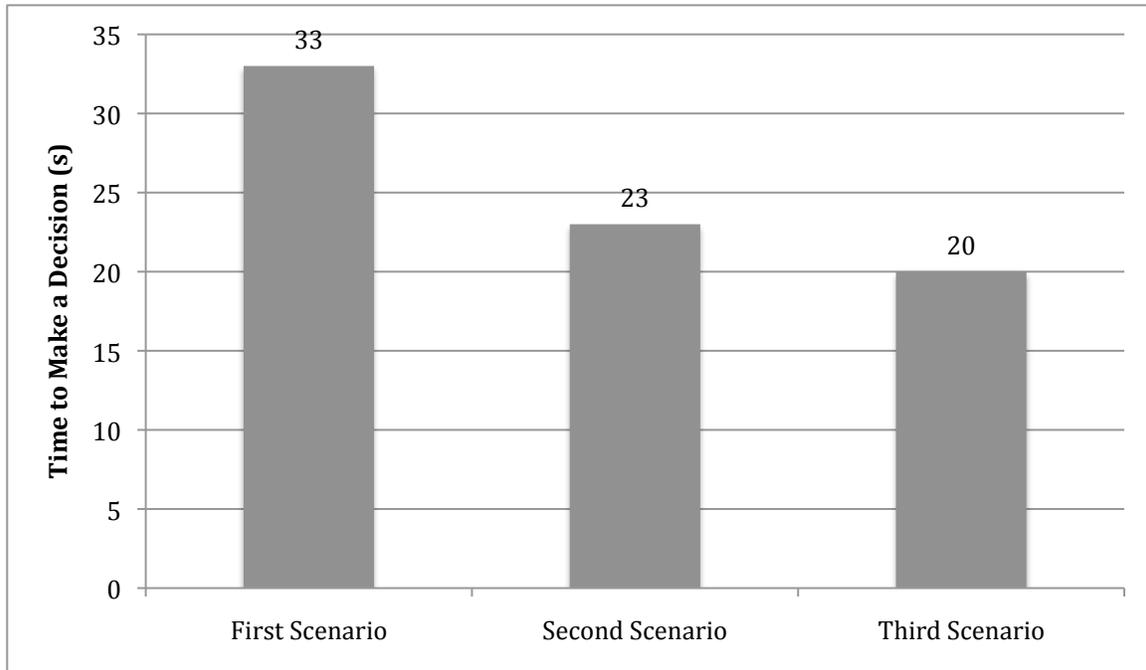
As it is possible that completing three decision scenarios in a row may have washed out the effects of the mood manipulations over time, the mood ratings for the first decision scenario were examined independently. Mood ratings for the first decision scenario were not found to significantly differ for the different decision scenario types. For each mood rating category (positive, general negative, uncertainty, and fearful) a 3 (decision scenario context) way within groups ANOVA was run. Ratings of positive,  $F(2, 90) = 3.36, p = .04$ , and general negative,  $F(2, 90) = 7.15, p < .01$ , mood were found to significantly differ between the different decision scenario contexts. Bonferroni posthoc analyses revealed that none of these differences remain significant for positive mood ratings; however, for general negative mood ratings threatening decision contexts ( $M = 1.48, SD = .66$ ) were found to have significantly higher ratings than neutral decision contexts ( $M = .98, SD = .57$ ), as were uncertain decision contexts ( $M = 1.51, SD = .68$ ). Nonetheless, when general negative mood ratings were used a predictor of decision

behavior via regression models, it was not found to significantly predict time to make a decision,  $F(2, 90) = 2.29$ ,  $p = .11$ , nor amount of information considered prior to a decision,  $F(2, 90) = 2.13$ ,  $p = .13$ . Thus, none of the mood ratings will be considered further as predictors of decision-making style.

### Time to Make a Decision

#### Order effects

Despite full counterbalancing, both order of scenario type and order of scenario context were examined via 3 (TYPE order) by 3 (CONTEXT order) by 3 (CONTEXT) within-group analyses of variance (ANOVAs). No significant effect of order of scenario type was found on time to make a decision,  $F(10, 116) = .85$ ,  $p = .58$ ; however scenario context was found to have a large effect on time to make a decision,  $F(10, 116) = 6.25$ ,  $p < .01$ ,  $\eta^2 = .35$ . The nature of this effect is such that regardless of which context is presented first, the first decision scenario ( $M = 33$ ,  $SD = 25$ ) always has significantly longer times to make a decision than the second ( $M = 23$ ,  $SD = 20$ ) or third ( $M = 20$ ,  $SD = 17$ ) scenarios (see Figure 3). To ensure that this order effect is not driving any of the results, each of the chronological decision scenarios were analyzed separately and the results from these analyses are included in Appendix F. No main effect of scenario context alone was found on overall time to make a decision,  $F(2, 116) = .17$ ,  $p = .84$ .



*Figure 3.* An order effect was found for order of decision scenario context on time to make a decision, such that regardless of context, the first scenario had significantly longer decisions than the second or third.

As shown in Appendix F, the regression weights for each of the chronological decision scenarios for each of the anxiety predictors are similar, thus it is clear that the order of decision context is not driving the effects of anxiety type on time to make a decision. For this reason, it is valid to examine the predictive validity of the anxiety measures on the time to make a decision for the decision scenario contexts overall. Overall means and standard deviations for time to make a decision can be found in Table 2. Hierarchical multiple regressions were conducted using STAI-S, STAI-T, and FSS scores as predictors for time to make a decision for each decision context. For each analysis, STAI-S (state anxious arousal) scores were entered in the first step, followed by STAI-T (trait anxious apprehension) scores in the second and FSS (trait anxious arousal) scores in the

third (this order was chosen after each possible order was ran and all were found to yield the same results, which supports the following findings being true findings and not type I errors due to inflation from colinearity). Hierarchical regressions further help to control for colinearity by including all shared covariance with the first entered predictor, leaving subsequent predictors unique.

Table 2.

*Means and standard deviations for time to make a decision for each of the decision scenario contexts.*

	Mean Time in Seconds (SD)
Neutral Scenarios	26 (24)
Uncertain Scenarios	24 (19)
Threatening Scenarios	27 (22)

For neutral contexts, all three steps of the regression model were found to be significant: Step 1,  $F(1, 91) = 11.96, p < .01, R^2 = .11$ ; Step 2,  $F(2, 90) = 10.19, p < .01, R^2 = .17$ ; and Step 3,  $F(3, 89) = 6.87, p < .01, R^2 = .16$ . This was driven by STAI-S scores predicting faster decision times and STAI-T scores predicting slower decision times, thus as a person scores higher in state anxious arousal, as measured by the STAI-S, they make faster and faster decisions, yet as a person scores higher in trait anxious apprehension, as measured by the STAI-T, they make slower and slower decisions. For uncertain contexts, none of the steps of the regression model were found to be significant: Step 1,  $F(1, 91) = 1.40, p = .24, R^2 = .00$ ; Step 2,  $F(2, 90) = .89, p = .42, R^2 = .00$ ; and Step 3,  $F(3, 89) = .42, R^2 = -.01$ . Lastly, for threatening contexts, all three steps of the regression model

were found to be significant: Step 1,  $F(1, 91) = 3.37, p = .07, R^2 = .03$ ; Step 2,  $F(2, 90) = 4.37, p = .02, R^2 = .07$ ; and Step 3,  $F(3, 89) = 3.03, p = .03, R^2 = .06$ . Again, the effects for this model mirror those found for the neutral context model. Trait anxious arousal scores, as measured by the FSS, were not found to reliably predict time to make a decision for any of the decision contexts, and in fact, was found to decrease the reliable predictability of the regression models as seen via the decreased values in adjusted  $R^2$  statistics following its inclusion in the models (Step 3). Unstandardized and standardized slopes for these models can be found in Table 3.

Table 3.

*Unstandardized slopes for the regression model predicting time to make a decision from anxiety type for each decision scenario contexts with standardized betas in parentheses.*

	<u>Neutral*</u>	<u>Uncertain</u>	<u>Threatening*</u>
Intercept	41	25	24
STAI-S	-1 (-.50)**	-.3 (-.15) <sup>ns</sup>	-.7 (-.32)**
STAI-T	.9 (.34)**	.06 (.03) <sup>ns</sup>	.5 (.23) <sup>†</sup>
FSS	-.02 (-.07) <sup>ns</sup>	.03 (.10) <sup>ns</sup>	.02 (.07) <sup>ns</sup>

\*\* indicates significance at the  $\alpha = .01$  level

\* indicates significance at the  $\alpha = .05$  level

<sup>†</sup> indicates a statistical trend ( $p = .08$ )

To ensure that the above results are valid and not being driven by possible confounds within the study design, scenario type and gender were checked for third-variable influences. Overall scenario type was examined for a main effect on time to make a decision via a 3(TYPE) within-groups ANOVA. A significant effect of scenario type was found,  $F(2, 184) = 7.20, p < .01, \eta^2 = .07$ . Bonferroni post-hoc comparisons

revealed that the nature of this effect is such that the PRESIDENT scenario ( $M = 30$ ,  $SD = 2$ ) is associated with significantly greater times to make a decision than the CLASSROOM ( $M = 23$ ,  $SD = 2$ ) and RELATIONSHIP ( $M = 24$ ,  $SD = 2$ ) scenarios, which do not significantly differ from each other.

To ensure that the scenario type effect found in the original ANCOVA does not interfere with the anxiety type by scenario context effects reported above, hierarchical regressions were run for each scenario type by scenario context combination (i.e. classroom-neutral, classroom-uncertain, classroom-threatening, etc). Out of all nine models (one for each type by context combination) only the model predicting time to make a decision from anxiety type for the neutral president of student government scenario was significant. For this scenario, all three steps of the regression model were found to be significant,  $F(3, 8) = 11.67$ ,  $p < .01$ ,  $R^2 = .74$ . The pattern of anxiety type effects were the same as was found for the overall scenario context analyses, such that STAI-S scores reliably predict faster times to make a decision, and STAI-T scores reliably predict longer times to make a decision. Unstandardized and standardized slopes for this model can be found in Table 4. Since the nature of the effects of anxiety type on time to make a decision do not differ here from what is found in the analyses for the different decision contexts, the effect of the president of student body scenario resulting in longer times to make a decision does not qualitatively change the impact of anxiety type on decision time within different contexts. Thus, the effect of the decision-scenario types will not be considered further for the time to make a decision analysis.

Table 4.

*Unstandardized slopes for the regression model predicting time to make a decision from anxiety type for the neutral president of student body scenario.*

	<u>President of Student Government</u>
Intercept	48
STAI-S	-5**
STAI-T	4**
FSS	-.03 <sup>ns</sup>

\*\* indicates significant at the  $\alpha = .01$  level

\* indicates significant at the  $\alpha = .05$  level

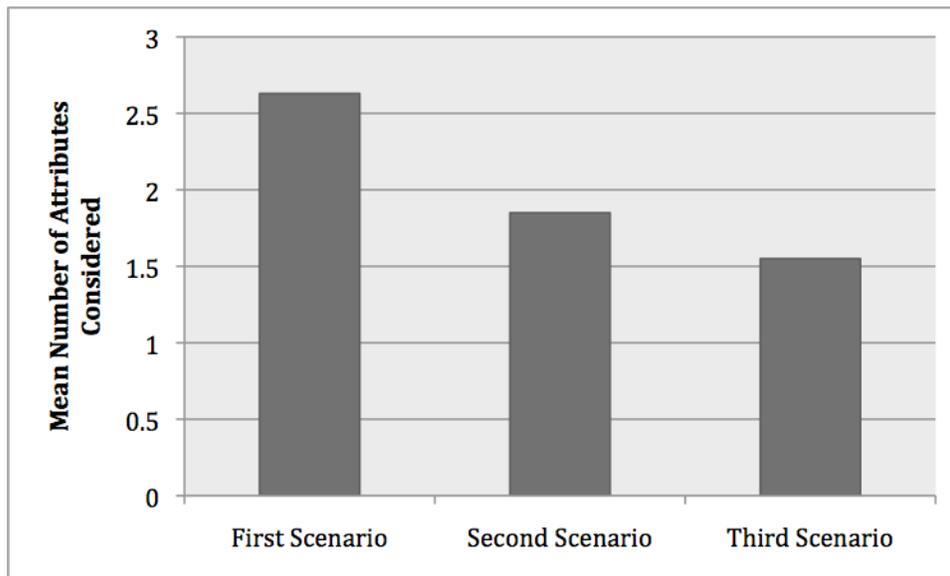
Effects of gender on anxiety levels or time to make a decision were examined via a 2 (gender) between by 3 (CONTEXT) within mixed analysis of covariance (ANCOVA) using STAI-S, STAI-T, and FSS scores as covariates. No significant interactions or main effects of gender on time to make a decision were found, thus gender was not further considered in the time to make a decision analyses.

#### Amount of Information Considered per Decision

##### Order Effects

Again, both order of scenario type and order of scenario context were examined via 3 (TYPE order) by 3 (CONTEXT order) by 3 (CONTEXT) within-group analyses of variance (ANOVAs). No significant effect of decision type order was found on number of attributes considered,  $F(10, 116) = .76$ ,  $p = .66$ ; however decision context order was found to have a large effect on number of attributes considered,  $F(10, 116) = 4.05$ ,  $p < .01$ ,  $\eta^2 = .26$ . Again, the nature of this effect is such that regardless of which context is presented first, the first decision scenario ( $M = 2.63$ ,  $SD = 2.62$ ) always has significantly

more number of attributes considered than the second ( $M = 1.85$ ,  $SD = 2.34$ ) or third ( $M = 1.55$ ,  $SD = 2.18$ ) scenarios (see Figure 4). To ensure that this order effect is not driving any of the results, each of the chronological decision scenarios were analyzed separately and the results of these analyses can be found in Appendix G. No main effect of context alone was found on amount of attributes considered prior to making a decision,  $F(2, 116) = 1.38$ ,  $p = .26$ .



*Figure 4.* An order effect was found for order of decision scenario context on number of attributes considered per decision, such that regardless of context, the first scenario had significantly more attributes considered than the second or third.

As is shown in Appendix G, the regression weights for each of the chronological decision scenarios for each of the anxiety predictors are similar, thus it is clear that the order of decision context is not driving the effects. For this reason, it is valid to examine the predictive validity of the anxiety measures on the number of attributes considered prior to a decision for the different decision scenario contexts overall. Hierarchical

multiple regressions were conducted using STAI-S, STAI-T, and FSS scores as predictors for number of attributes considered for each decision scenario context. For each analysis, STAI-S scores were entered in the first step, followed by STAI-T scores in the second and FSS scores in the third (this order was chosen for the same reasons as mentioned in the time to make a decision analyses). Overall means and standard deviations for amount of information considered per decision can be found in Table 5.

Table 5.

*Means and standard deviations for the number of attributes considered per decision for each decision-scenario context.*

	Mean Number of Attributes Considered per Decision
Neutral Scenarios	1.87 (2.39)
Uncertain Scenarios	1.96 (2.32)
Threatening Scenarios	2.20 (2.55)

For neutral contexts, all three steps of the regression model were found to be significant: Step 1,  $F(1, 91) = 9.14, p < .01, R^2 = .08$ ; Step 2,  $F(2, 90) = 4.94, p < .01, R^2 = .08$ ; and Step 3,  $F(3, 89) = 3.32, p = .02, R^2 = .07$ . This is primarily driven by STAI-S scores predicting less consideration of attributes prior to a decision, thus as a person scores higher in state anxious arousal, as measured by the STAI-S, the less and less information they consider prior to making a decision. Neither trait anxious apprehension, as measured by the STAI-T, nor trait anxious arousal, as measured by the FSS, was found to reliably predict amount of information considered prior to a decision. For uncertain (Step 1,  $F(1, 91) = 1.80, p = .18, R^2 = .01$ ; Step 2,  $F(2, 90) = 1.00, p = .37, R^2 = .00$ ; and

Step 3,  $F(3, 89) = 1.08$ ,  $p = .36$ ,  $R^2 = .00$ ) and threatening contexts (Step 1,  $F(1, 91) = 1.91$ ,  $p = .17$ ,  $R^2 = .01$ ; Step 2,  $F(2, 90) = 1.88$ ,  $p = .16$ ,  $R^2 = .02$ ; and Step 3,  $F(3, 89) = 1.50$ ,  $p = .22$ ,  $R^2 = .02$ ), none of the steps of the regression model were found to be significant, thus none of the measures of anxiety were found to reliably predict the amount of information considered for these two contexts. Unstandardized and standardized slopes for these models can be found in Table 6.

Table 6.

*Unstandardized slopes for the regression model predicting amount of information considered per decision from anxiety type for each decision scenario type with standardized betas in parentheses.*

	<u>Neutral*</u>	<u>Uncertain</u>	<u>Threatening</u>
Intercept	4.14	2.17	1.93
STAI-S	-.08 (.36)**	-.04 (-.16) <sup>ns</sup>	-.05 (-.22) <sup>†</sup>
STAI-T	.03 (.13) <sup>ns</sup>	-.001 (-.006) <sup>ns</sup>	.03 (.12) <sup>ns</sup>
FSS	-.002 (-.05) <sup>ns</sup>	.004 (.13) <sup>ns</sup>	.004 (.10) <sup>ns</sup>

\*\* indicates significance at the  $\alpha = .01$  level

<sup>†</sup> indicates a statistical trend ( $p = .07$ )

Again, scenario type and participant gender were checked for possible third-variable effects on amount of information considered prior to a decision. Overall scenario type was examined for a main effect on number of attributes considered via a 3(TYPE) within-groups ANOVA. No significant effect of scenario type was found, and thus will not be considered for the number of attributes considered analysis.

Effects of gender on anxiety levels on amount of information considered per decision were examined via the same ANCOVA as was used for time to make a decision.

No significant interactions or main effects of gender on number of attributes considered were found, thus gender was not further considered in the number of attributes considered analyses either.

When comparing the findings for time to make a decision and amount of information considered per decision to each other it can be determined that the different types of anxiety have a larger effect on time to make a decision than amount of information considered per decision via examination of the standardized regression slopes for these predictors. Thus, as an individual increases in state anxious arousal (STAI-S scores) their decision making becomes faster and faster more because of their overall speed of making a decision than their tendency to consider less and less information per decision. Conversely, as an individual increases in trait anxious apprehension (STAI-T scores) their decision making becomes slower and slower more because of their overall slowness in making a decision than their tendency to consider more information per decision.

#### Likelihood to Consider Information Rated as Important

To examine if anxiety type would increase or decrease the likelihood of examining attributes that were rated as important, a hierarchical regression was used. Means and standard deviations of importance ratings for each attribute type can be found in Table 7. For this hierarchical regression, the ratings for the attributes' importance was averaged and entered in the first step, STAI-S, STAI-T, and FSS scores were entered in the second step, and anxiety-by-rating interaction terms were entered in the third step. Interaction terms were created by z-score transforming both the mean attribute rating

scores and the anxiety scales and then calculating the product of the z-scored variables (i.e. z-ratings x z-STAI-s, etc).

Table 7.

*Means and standard deviations for how important for making a decision each attribute type was rated by participants.*

	<u>Mean (SD)</u>
Social	3.19 (.99)
Success	3.81 (.97)
Happiness	3.43 (.96)
Academic	3.58 (.99)

None of the steps predicting likelihood to look at attributes were significant,  $F(7, 85) = 1.71, p = .12$ . Unstandardized slopes for this model can be found in Table 8.

Table 8.

*Unstandardized slopes for the regression model predicting likelihood to look at attributes from attribute importance ratings, anxiety type, and their interaction.*

	<u>Unstandardized Slopes</u>
Intercept	.71 <sup>ns</sup>
Mean Rating	.07 <sup>ns</sup>
STAI-S	-.01 <sup>ns</sup>
STAI-T	.01 <sup>ns</sup>
FSS	.00 <sup>ns</sup>
Rating x STAI-S	.08 <sup>ns</sup>
Rating x STAI-T	.13 <sup>ns</sup>
Rating x FSS	-.06 <sup>ns</sup>

Since the effects of anxiety type on decision-making style were found to be strongest in the first decision scenario for the other dependent variables, the interaction between anxiety type and importance rating on likelihood to look at the attributes was examined for the first decision scenario alone using the same hierarchical regression. None of the model steps were found to significantly fit the data,  $F(7, 38) = .92, p = .51$ . Thus, no overall effect of anxiety type and importance rating on likelihood to look at the attributes was found for even the first decision scenario.

As no overall effects of attribute importance rating and anxiety were found on likelihood to look at attributes, post-hoc exploratory analyses were conducted looking at the importance rating and hit rate for each attribute type individually. The same

hierarchical regression as above was used for these analyses. For the social and happiness attributes, none of the steps of the regression model significantly predicted the likelihood of looking at those attributes, meaning that none of the importance ratings, anxiety types, nor their interactions were found to reliably predict how often an individual would look at the social or happiness attributes. For the success attribute, all three steps of the model were significant: Step 1,  $F(1, 91) = 8.37, p < .01, R^2 = .08$ ; Step 2,  $F(4, 88) = 3.16, p = .02, R^2 = .09$ ; and Step 3,  $F(7, 85) = 2.57, p = .02, R^2 = .11$ . It was found that the overall rating of how important the success attribute was for making a decision reliably predicted increased likelihood to look at the success attribute. Additionally, the interaction between success attribute rating and STAI-T scores was found to reliably predict increased likelihood to look at the success attribute, meaning that as a person scores higher in trait anxious apprehension, as measured by the STAI-T, the more likely they are to look at the success attributes if they also rated those attributes as important for making a decision. For the academic attribute, only the first step of the regression model was significant,  $F(1, 91) = 4.40, p = .04, R^2 = .05$ . It was found that the overall rating of how important the academic attribute was for making a decision reliably predicted increased likelihood to look at the academic attribute; however, this increase in likelihood was not found to interact with any anxiety type. Unstandardized slopes for these models can be found in Table 9.

Table 9.

*Unstandardized slopes for the regression model predicting likelihood to look at attributes from attribute importance ratings, anxiety type, and their interaction for each attribute type with standardized betas in parentheses.*

	<u>Social</u>	<u>Success</u>	<u>Happiness</u>	<u>Academic</u>
Intercept	1.08	.34	.49	.23
Rating	.03 (.04)	.24 (.32)**	.00 (.00)	.13 (.19)*
STAI-S	-.005 (-.08)	-.01 (-.19)	-.02 (-.22)	-.01 (-.16)
STAI-T	.02 (.22)	.007 (.09)	.01 (.18)	.01 (.14)
FSS	-.002 (-.17)	.00 (-.007)	.001 (.12)	.00 (.02)
Rating x STAI-S	.15 (.19)	-.06 (-.09)	.09 (.11)	-.02 (-.03)
Rating x STAI-T	.08 (.11)	.20 (.28)*	.05 (.08)	.18 (.24) <sup>†</sup>
Rating x FSS	-.07 (-.11)	-.11 (-.14)	-.09 (-.11)	-.04 (-.05)

\*\* indicates significant at the  $\alpha = .01$  level

\* indicates significant at the  $\alpha = .05$  level

<sup>†</sup> indicates a statistical trend ( $p = .06$ )

A summary of the results can be found in Table 10.

Table 10. *Summary of the predictive relationships between the different measures of anxiety and the three dependent variables measured to assess decision-making behavior.*

	<u>Time to Make a Decision</u>	<u>Amount of Information Considered</u>	<u>Considering Information Rated as Important</u>
STAI-S (state anxious arousal)	Negative	Negative	None
STAI-T (trait anxious apprehension)	Positive	None	None Overall Positive for Success Attribute Only
FSS (trait anxious arousal)	None	None	None

## Discussion

### Support for Hypotheses

The current study supported the hypothesis that anxiety type would differentially affect decision-making style. Specifically, support was found for anxious apprehension (as measured by the STAI-T) being associated with more analytic, or slow, decision making, while conversely, support was found for anxious arousal (as measured by the STAI-S) being associated with more heuristic, or rapid and less informed, decision making. Despite significant order effects, these patterns of decision making were supported by both measurements of time to make a decision and amount of information considered prior to making a decision at every stage of the experiment. However, no reliable effects were found with the variable of likelihood of considering information rated as important overall. These findings support the predictions of the fast/slow information-processing model of dual-anxiety proposed by the author.

Additionally, while both anxious apprehension and anxious arousal have been considered to be trait anxiety types by numerous researchers, the current results support a trait/state dichotomy of dual anxiety. This is derived by the trait scale used to measure anxious arousal, the FSS, never once being found to reliably predict decision-making behavior. Instead the state scale for anxiety, which has also been utilized to measure state anxious arousal, the STAI-S, was consistently found to be the strongest predictor of decision-making behavior. Though this outcome will be discussed in greater detail below, generally this means that the insinuations that the cognitive effects of anxious arousal can only be observed in reaction to situational triggers is supported in this data.

While the scenario contexts (neutral, uncertain, and threatening) were not found to have a main effect on decision-making style, anxiety type was found to interact with scenario context. Originally, it was predicted that the threatening decision contexts would elicit the strongest effects from the both anxiety types. Surprisingly, it was instead found that the predicted decision behaviors for anxious apprehension and anxious arousal were strongest in the neutral decision contexts. The same predicted behaviors were found in the threatening context, but at reduced effect sizes and often only for anxious arousal, and while the directions of the slopes matched predictions for the uncertain scenarios they never once were found to be significant predictors of decision-making behavior. The implications for these findings will be discussed.

#### Measuring Different Types of Anxiety

In this study, the trait subscale of the STAI was used to measure trait anxious apprehension. This scale was found to reliably predict individuals taking more time to make a decision because the higher they scored in trait anxious apprehension on the STAI the longer overall decision time elapsed, as was predicted. Interestingly, this increase in time to make a decision was not found to correspond with consideration of more information during a decision. This suggests that rather than try to become more informed prior to making a decision in order to reduce uncertainty, individuals high in trait anxious apprehension are instead just spending more time on the same amount of information as individuals low in trait anxious apprehension. This pattern of decision making is characteristic of the difficulty in disengaging and shifting attention that has previously been reported for this anxiety type (Fox, et al., 2001; 2002).

The FSS, on the other hand, was intended to measure trait anxious arousal. In the current data, this scale was never found to reliably predict decision-making style via any of the dependent variables assessed. Since there has been a substantial amount of research showing that anxious arousal can be reliably measured as a trait personality construct, rather than interpreting the lack of findings for the FSS as evidence for anxious arousal only being a state anxiety type here, it is instead more likely that the FSS is not a sensitive enough measure for this anxiety type. Indeed, while some anxiety researchers do not disambiguate trait fearfulness from trait anxiety in their research (Dien, 1999; O'Hare & Dien, 2008; Ohman, et al., 2001). Others have made the claim that these are two different personality constructs (Sass, et al., 2009). The FSS clearly is a better assessment of trait fearfulness than trait anxious arousal when the content of its items are considered. Thus the lack of anxiety-congruent findings for this survey suggests that it may indeed be assessing a separate individual difference construct. Instead, another anxiety survey, the Mood and Anxiety Symptom Questionnaire (MASQ; William, Clark, et al., 1995) anxious arousal subscale has also been successfully used to measure trait anxious arousal. This survey more directly assesses an individual's awareness of physiological symptoms of anxiety and reactivity (startle) to threatening stimuli rather than an overall measure of fearfulness, so perhaps is a more appropriate measure to use in future endeavors. In future studies a different measure of anxious arousal should be used to test this post-hoc hypothesis.

State anxiety has also been treated as a measure of state anxious arousal (Pacheco-Unguetti, et al., 2010). Indeed, the state subscale of the STAI was found to consistently predict heuristic decision-making styles via shorter times to make a decision

and less consideration of information the higher an individual scored in state anxious arousal. Since these are the a priori, predicted decision-making patterns for anxious arousal, it seems most parsimonious to conclude that the state subscale of the STAI is truly assessing state anxious arousal here. This is intriguing as the trait and state subscales of the STAI share a number of items in common and mostly differ only on their directions [answer how you generally feel (trait) versus how you feel right now (state)]. Despite these similarities between the two subscales and their strong, positive correlation, opposite behavioral effects were found for each. This suggests that while there is some shared variance between the two, there is also some unique variance that is able to better discriminate between anxious apprehension and anxious arousal.

The state anxious arousal that the STAI-S is believed to be assessing in this study is different from the state anxiety that was predicted to come from the uncertain and threatening decision scenario contexts. Originally, it was predicted that these different contexts, especially the uncertain and threatening contexts, would elicit varying levels of state anxious arousal and anxious apprehension on their own. Instead, no main effects of decision scenario context were found, and neutral contexts were found to elicit the strongest anxiety effects on decision-making style. This lack of main effect of scenario context is also reflected in the lack of differences in the mood manipulation checks that followed each decision scenario. Based on the current data, the state anxious arousal effects found here seem more global than the individual decision scenarios and possibly reflect the increase in anxious arousal experienced from the overall experiment situation. As the actual experience of being in a laboratory and completing the decision tasks is

more ecologically valid than the attempt to put oneself in the different scenarios, this result is not surprising.

#### Neutral versus Threatening versus Uncertain Scenarios

Again, there was an unexpected interaction between anxiety type and decision scenario context such that neutral scenarios elicited the strongest effects followed by threatening scenarios, while no effects were found for uncertain scenarios. The neutral decision scenarios differed from the threatening and uncertain in that only basic, factual information was provided for each neutral scenario (e.g. The class takes place in the early afternoon in a building that is in the center of campus.”), leaving out any information regarding how the individual him or herself was doing in that scenario [e.g. Your class has just taken a stressful midterm, and you are afraid that you did not do well at all (threatening).]. In retrospect, this complete lack of personal performance information could have created a situation of heightened uncertainty for individuals high in anxious apprehension and anxious arousal, resulting in an increase in their different information-processing styles compared to the threatening and uncertain scenarios, where personal performance context was provided.

Another possible explanation for why anxiety effects were strongest in the neutral scenarios comes from research on anxiety and cognitive load (Bishop, Jenkins & Lawrence, 2007). In a non-emotional task, no differences in brain activation patterns were found for individuals high in trait anxiety versus state anxiety when under a high cognitive load. However, when the cognitive load was reduced, individuals high in trait anxiety were found to show a reduction in recruitment of the prefrontal cortex, and individuals high in state anxiety were found to show an increase in recruitment of the

amygdala. Applying this finding to the current study, it is possible that the threatening and uncertain contexts created higher cognitive and emotional loads for individuals high in anxious apprehension (trait anxiety) and anxious arousal (state anxiety), as they were better able to engage the material and invest themselves in the scenarios. This additional recruitment of resources elicited by the more personal context of these scenarios may have in turn washed out any of the anxiety-type specific effects predicted for decision-making style. Conversely, the lack of personal context in the neutral scenarios may have kept participants from thoroughly engaging the material, resulting in a lower cognitive load than the other scenarios. In turn, this lower-load situation allowed for the predicted differences in decision-making style between anxious apprehension and anxious arousal to be observed.

#### Likelihood to Consider Information Rated as Important

In previous MADM studies on mood and decision-making style (Isen & Means, 1983), heuristic decision making was associated with a decrease in likelihood to consider information that had been rated as unimportant, while analytic decision making was found to lead to an increased likelihood to consider all information, regardless of importance. Importance ratings and anxiety types were not found to easily predict likelihood to consider information in this study. Overall, neither was found to significantly predict how often an individual would look at the attributes. When each of the four attribute types was analyzed individually, trait anxious apprehension and importance ratings were found to interact to predict an increase in consideration of the success attribute. Thus, the higher an individual scored in trait anxious apprehension, the more likely they were to consider the success attribute if they had also rated it as

important to their overall decision outcome. While this finding is congruent with the increased time to make a decision also associated with trait anxious apprehension, it does not address the likelihood to consider information considered important in the same way as was intended.

The importance of an attribute in making an overall decision was rated for each attribute type individually on a 5-point Likert scale. Admittedly, assessing this variable in this manner failed to have the participants directly compare the different attribute types to each other, and thus the original logistic regression that was planned for this analysis was not possible. It would have been more appropriate to have the participants rank the four attribute types in order of importance to more properly assess changes in the likelihood to look at more important information versus less by creating the categories of first, second, third, and fourth ranked types of attributes that are considered important for making a decision.

#### Dual-Anxiety and Information Processing Patterns

Traditionally, the cognitive impact of anxious apprehension and anxious arousal has been studied and described within the context of early differences in attentional engagement and basic attentional control (e.g. Dien, 1999; Engel, et al., 2008; 2010; MacLeod, Mathews & Tata, 1986). Overall, individuals high in anxious apprehension are found to have a slower information-processing style that results in difficulty disengaging attention from distracting stimuli and making response selections, while individuals high in anxious arousal are found to have a faster information-processing style that results in speeded engagement of attention to stimuli, better inhibition of distracting stimuli, and consequently more rapid response selection. The author has summarized these findings in

a proposes fast/slow information-processing model for dual-anxiety, in which increases in anxious arousal are generally associated with increases in speed of information processing, particularly when in the presence of a negative stimulus, and increases in anxious apprehension are associated with decreases in speed of information processing, again, particularly when in the presence of a negative stimulus. While brain imaging data suggests that different anxiety types should differentially impact higher-order cognitive processes (Bishop, Jenkins & Lawrence, 2007; Engels, et al., 2010), this has never been directly tested.

The current study's findings suggested that the slower information-processing styles associated with anxious apprehension and the faster information-processing styles associated with anxious arousal matriculate further down the cognitive stream than attention and inhibition processes that occur within a few hundred milliseconds to multi-step, complex cognitive processes typically thought to be carried out by more top-down networks. Since the increase in slower decision making predicted from increases in anxious apprehension found in this study did not correspond with increases in the amount of information considered per decision, it could be argued that increases in anxious apprehension do not predict increases in analytical decision-making styles (the processes of becoming better informed), but rather, decreases in the speed of information processing in general. Thus, the dichotomy of fast versus slow information processing associated with anxious arousal and anxious apprehension proposed by the author may be a more accurate way to describe the impact of dual-anxiety on decision-making behavior than the dichotomy of heuristic versus analytic styles. This finding opens up a wealth of

areas to investigate the full nature to which anxious apprehension and anxious arousal differentially impact executive functioning.

#### Directions for Further Study

Since this is the first study to integrate repeated-measures of decision context in a multi-attribute design with individual difference measurement of anxiety, replication is needed for the current results. The question as to whether or not the state mood manipulation caused by the emotional context of a decision can induce a temporary state of anxious apprehension or anxious arousal and their associated decision-making styles could not be fully answered by this study. This is due to the scenario contexts not eliciting strong changes in mood. Thus, it still could be possible that a decision that is uncertain in context could temporarily increase analytic decision-making in individuals who are not high in trait anxious apprehension to begin with. Additionally, it still could be possible that a decision that is threatening in context could temporarily increase heuristic decision-making in individuals who are not high in anxious arousal. There are three different approaches that could be used individually or in combination to address this issue. First, more salient mood inductions could be used, as has been done in the majority of the mood and decision-making literature. These more salient mood inductions could include imagery and narratives that have been found to reliably induce negative emotions, such as the International Affective Picture Scale (IAPS; Lang, Bradley, & Cuthbert, 2005) images and/or threat of shock or punishment to induce the physiological responses to immediate stress. While removing the mood induction from the decision context itself loses some of the ecological validity of the findings, it may gain the desired state mood effects. Second, a different set of decision scenarios could be developed that

more reliably influence an individual's state mood. Thirdly, despite increasing the amount of noise from individual difference variables that are not of interest, a between-groups design could be used rather than within to see if the mood influences of the different scenario contexts are more salient when they are experienced in isolation rather than one after the other.

Nonetheless, despite not finding evidence for the decision scenario contexts manipulating state mood in this study, there were still differences in the magnitude of the effects of anxiety type on decision-making style for the three contexts. As has already been discussed, these differences could come from the lack of personal information or cognitive load associated with the neutral scenarios. This finding may provide support for not needing elaborate emotional stimuli for the investigation of dual-anxiety impacts on higher-order cognition, as the increased load from the emotional context may in fact drown out the differences between the two anxiety types. Not needing to develop emotional stimuli could greatly reduce the confounds that are introduced to a study when individuals are asked to interpret and react to different emotional stimuli, as what one individual considers threatening versus another can greatly differ.

Another promising area of future investigation is on the actual cost and benefit of each of the decision-making styles associated with each of the anxiety types. While it is tempting to conclude that heuristic decision-making styles are more adaptive than analytical in the current paradigm, the actual decision outcomes were irrelevant for the purposes of this study. It is possible that had there been choice options that were more desirable than others, individuals utilizing heuristic decision-making styles would have made less beneficial decisions by not considering all the information associated with a

choice. On the other hand, it is also possible that individuals utilizing an analytic decision-making style could become overwhelmed by the amount of information available and end up making sub-optimal decisions based on irrelevant information (Dijksterhuis, et al., 2006). Thus, a follow-up study in which the choice options in the forced two-choice decisions were weighted in such a way that one actually was a more desirable choice would be highly informative. Additionally, varying the amount of information available for the different decisions could possibly reveal a threshold for which one decision-making style becomes more adaptive than the other, i.e. the point at which there is too much information to consider it analytically and heuristic, “gut” choices become more optimal.

#### Implications

In this study, anxious apprehension and anxious arousal are found to reliably predict information-processing patterns in a complex, multi-step task, and the effects of these two anxiety types are found to be strongest following neutral contexts. This finding supports an interactive approach to studying cognition as has been done in personality research. As such, truly descriptive cognitive models would need to be able to account for varying levels of individual differences, such as anxiety types, different contexts in which those individual will be acting, such as neutral versus threatening, and the interaction between the individual differences and the environment before being considered complete. While this requires much more complex versions of cognitive models, it also provides for models that will better account for the effects seen when applied across different individuals and settings.

Additionally, the finding that the effects of anxiety on decision-making style are strongest in neutral contexts suggests two things. First, that the development of emotional stimuli to disambiguate the cognitive and behavioral effects of anxious apprehension and anxious arousal may be unnecessary. Secondly, and more importantly, that while it is a common assumption that using your emotions rather than your cold, hard reasoning to make decisions will lead to better decision outcomes, having emotion involved in the decision-making context might actually lead to more adaptive decision behavior. This suggestion is in line with the Somatic Marker Hypothesis (Damasio, Tranel and Damasio, 1991). This hypothesis has shown that early, emotional responses to information inform decision-making strategies towards more optimal outcomes. Thus, if extreme heuristic and analytic decision-making styles can be maladaptive in high-anxiety individuals, and emotional decision contexts tend to bring both of these styles towards the middle, than it is actually in non-emotional decision contexts in which decision behavior becomes suboptimal.

One application of this work is that knowing how an individual may behave in different decision contexts due to their individual levels of anxious apprehension and anxious arousal can also lead to the development of better decision contexts. For instance, if an individual is known to be high in anxious apprehension, one might want to limit the amount of information provided and the importance of the information provided to that individual when they need to make a decision to keep their analytic decision-making style from completely overwhelming them during the decision process. Conversely, if an individual is known to be high in anxious arousal, one might want to force that individual to consider the important aspects of the available options involved in

a decision before they can make a choice, to help them avoid letting their heuristic decision-making style make them hasty and ill-informed decision makers. Such individualized settings for how information is presented when a decision needs to be made can help professionals such as physicians, lawyers, and insurance agents guide their patients and clients through making information-heavy decisions in as adaptive a manner as possible.

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## Appendix A

### Decision Scenarios, Two-Choice Options, and Attributes

#### Scenario 1: Classroom Performance

##### Neutral Condition.

It is halfway through the semester. You are enrolled in a class that is in your major. Your instructor is new, as is your textbook. So far, you have covered six chapters worth of material and just had your midterm exam. The class takes place in the early afternoon in a building that is in the center of campus.

##### Uncertain Condition.

It is halfway through the semester. You are enrolled in a class that is a requirement for your major. Your instructor is known to be tough, but you have friends that have passed the class in the past. You have to read from a dense, complicated textbook on which you're quizzed regularly. Your class has just finished the midterm exam, and you do not know how you did. The instructor has indicated that the grades on the exam are not good, but is still deciding whether or not to curve them.

##### Threatening Condition.

It is halfway through the semester. You are enrolled in a class that you hate, but it is a requirement for your major. Your instructor is incredibly tough and has very high performance requirements in order to succeed in this class. You have tried to read the textbook to help your learning, but it is a nightmare, and you often don't understand it. Your class has just taken a stressful midterm, and you are afraid that you did not do well at all. Failing this class would result in you being kicked-out of your major and being put on academic probation. What's worse, if you were unable to pass the class after retaking it, you would be in danger of losing your scholarship.

#### 1. Social choice pair 1:

- a. Choice A: "Attend a friend's house party this weekend"
  - i. Social attribute: You will get to spend some time with a group of good friends that you really enjoy and probably will meet some new people.
  - ii. Personal success attribute: Your next exam in class isn't for a while, but you will miss out on preparing for class ahead of time, which ultimately would have helped you learn the next section much better.
  - iii. Personal happiness attribute: You really need to blow off some steam and hanging out with this group of friends is usually fun and drama-free.
  - iv. Academic attribute: Attending the party in no way improves your grade for this course. If anything, you miss out on precious time to keep up to speed on class material.
- b. Choice B: "Take in a movie with your roommate this weekend"
  - i. Social attribute: Your friend would feel snubbed if you didn't attend the party, and you'd miss out on meeting new people. You'll probably also be made fun of for being a stick-in-the-mud by your other friends.
  - ii. Personal success attribute: Only seeing a movie this weekend would still allow you time to do some reading for

class, which would put you ahead for the upcoming week, and make the new section easier to learn.

- iii. Personal happiness attribute: You would get to relax for a little bit, but you'll feel regret for not going to the party. Despite getting time to relax and work over the weekend, you'll feel self-pity for having missed out on all the fun.
- iv. Academic attribute: Having some extra time to work on stuff for class would really help you get through this next section. Being prepared for class the next week would also improve your relationship with your instructor, which would make things go easier in class for you.

2. Social choice pair 2:

- a. Choice A: "go on an all-day shopping trip with friends"
  - i. Social attribute: You will have a great time hanging out with your friends and will start forming some stronger bonds with them as you have more and more experiences together.
  - ii. Personal success attribute: Not only do you miss out on precious studying time for class, but you spend more money than you should have, which adds additional stress to the rest of your semester.
  - iii. Personal happiness attribute: You feel relaxed and gratified by the enjoyable time spent with your friends. You also buy some new electronics that keep you well entertained, and other people stop by your room to play with them.
  - iv. Academic attribute: Your class performance slightly decreases as you get behind in your reading and end up spending some of your studying time playing with your new electronics. Also, the new stress of being in a financial pinch does not help your focus during class.
- b. Choice B: "spend the weekend talking on the phone with friends from high school"
  - i. Social attribute: You enjoy catching up with some of your friends that you no longer get to see now that you're in college, and you make plans to meet up with them during the next break. However, you alienate yourself a bit from your new friends by not spending time with them.
  - ii. Personal success attribute: Since you spend most of the weekend in your room on the phone, you do manage to squeeze in some study time between calls. This isn't enough to really make you ready for class the next week, but you at least have a general idea of what topics you'll be discussing.
  - iii. Personal happiness attribute: Talking with old friends makes you a bit homesick and lonely. You are reminded of how easy and carefree life used to be and start feeling a bit

down about your new responsibilities and their stressors in college.

- iv. Academic attribute: Spending your time studying instead of on the phone never hurts your class grade, but one weekend of light studying doesn't really hurt you too badly. The class remains just as demanding as it was for you before.

3. Information-gathering pair 1:

- a. Choice A: "Set up a meeting with your instructor to discuss the class"

- i. Social attribute: Some of your friends respect you for taking your course seriously and being proactive in trying to improve your performance. Other friends think that you're being kind of lame and a teacher's pet.
- ii. Personal success attribute: Your instructor helps you to better understand some of the class concepts with which you were struggling and gives you some tips on how to better prepare for the next exam. This will inevitably help out your performance on the next exam.
- iii. Personal happiness attribute: It becomes pretty obvious during your meeting that you're not doing as well as you had hoped in the class. This means that you're in for a lot of hard work in order to get a good grade for the semester. Your stress levels are going to be way up.
- iv. Academic attribute: Meeting with the instructor does start to improve your grade, as you have a better understanding of what you need to do to succeed in this class.

- b. Choice B: "Look through the book to check the answers you think you missed"

- i. Social attribute: It doesn't take long to get a good idea of where you stand on the midterm exam. This leaves you plenty of time to still hang out with your friends and relax.
- ii. Personal success attribute: While you now realize where you made mistakes on your midterm, there is nothing you can do about them now except try not to repeat them on the final exam.
- iii. Personal happiness attribute: You realize that you may have done better than you expected on the exam. This lifts your spirits and you become more optimistic about your final grade for this course.
- iv. Academic attribute: One of the best ways to learn material is to go back and see where you've made mistakes and why. Taking the time to do this on the midterm will help your understanding of the material for the rest of the class.

4. Information-gathering pair 2:

- a. Choice A: "Meet with a classmate to go over the exam"

- i. Social attribute: You at least now know someone in your class a little better, but while the two of you are comparing notes to see where you may have made mistakes on the midterm your real friends are out enjoying themselves.
    - ii. Personal success attribute: Meeting with another student from class just makes you realize how much you're not understanding of the course material. This helps motivate you to start studying harder for the final exam.
    - iii. Personal happiness attribute: Having another student help you find where you made mistakes is stressful and now you're really worried about what your final grade will be for this class.
    - iv. Academic attribute: Spending time going over the material with another student is a good way to relearn the topics on which you were confused. This new understanding will help you out as the class moves on to material that builds on the old stuff.
  - b. Choice B: "Email your TA about topics you still don't understand"
    - i. Social attribute: You spend the evening going back and forth with your TA over email and don't get to spend any time with your friends.
    - ii. Personal success attribute: Being proactive about your performance in class helps motivate you to study harder for the next exam. You also get to understanding some of the course material better than you would had if you had only relied on yourself to learn them.
    - iii. Personal happiness attribute: You feel better about yourself and more confident in your ability to get a good grade in this class, but you also realize how much work it's going to take, which keeps you pretty stressed out.
    - iv. Academic attribute: You start to do better in class and are understanding the information better and better as the TA helps you with some of the trickier material.
- 5. Threat reducing pair 1:
  - a. Choice A: "Join a study group for your class"
    - i. Social attribute: You get to know some of your classmates better, which makes actually attending class more fun as well. However, you do have to miss out on a lot of evenings with your friends.
    - ii. Personal success attribute: The study group provides several different ways of learning the class material, which means that you are starting to get the hang of concepts that were confusing for you before.
    - iii. Personal happiness attribute: The study group takes a lot of your personal time, so you are unable to do things that you

really enjoy, like going to the gym and hanging out with friends. You start to feel kind of lonely.

- iv. Academic attribute: Your learning class concepts in much more depth and detail, which is paying off in class. You're able to readily answer most of the instructor's questions during lecture, and you're feeling certain that you'll do better on the next exam.
- b. Choice B: "Hire a tutor to help you with the class"
  - i. Social attribute: The tutor is only available on the weekends, so that is how you now get to spend your Saturday and Sunday afternoons. This means that you're not really getting to go out with friends at all.
  - ii. Personal success attribute: You are really starting to understand the course material well. As far as the classroom goes, you feel confident and excited about what else your major has to offer.
  - iii. Personal happiness attribute: Your self-satisfaction with your performance in class is a trade off for your self-satisfaction as a person. You're spending a lot of your time studying and not much time having any fun.
  - iv. Academic attribute: Seeing a tutor will definitely pay off in the end. You are doing homework without too much effort and are having an easier time reading the book. You're feeling pretty good about the next exam.
- 6. Threat reducing pair 2:
  - a. Choice A: "Start seeing your TA on a regular basis for help with class work"
    - i. Social attribute: Seeing a TA does nothing for your social status. You end up having to cancel on plans with your friends pretty frequently so that you can keep meetings with your TA.
    - ii. Personal success attribute: You start to understand the course material much better, although your TA doesn't know all the concepts as well as you'd hoped. There are still some things that you just can't seem to grasp.
    - iii. Personal happiness attribute: Your TA isn't a very social person and spending time with them isn't very enjoyable. This and sometimes they confuse you even worse than before, so class can feel a lot more stressful.
    - iv. Academic attribute: Overall you seem to be performing in class better. You're pretty sure that you'll improve on the next exam.
  - b. Choice B: "Start spending all of your free time studying for this course"
    - i. Social attribute: This will be at the cost of your social life. You'll lose contact with a lot of your friends and rarely

have time to hang out and have fun. Your relationship with your roommate will also deteriorate, as they have to constantly be keeping your room a study environment.

- ii. Personal success attribute: You are starting to feel more confident about your understanding of the course material, but you're getting less sleep than usual which is affecting how well you can pay attention during class.
- iii. Personal happiness attribute: All the studying makes you pretty miserable. You're stressed out about class and getting enough sleep all the time. You also rarely take a break to have fun.
- iv. Academic attribute: All the studying really pays off. You do really well on the next homework assignment, and your comprehension while reading the textbook has really improved. You will definitely be getting a higher grade on the final exam.

7. No action pair 1:

a. Choice A: "Apply to live off campus next year"

- i. Social attribute: All of your friends are excited at the prospect of having somewhere to hangout without campus rules and resident assistants telling you what to do. You'll be moving with a friend you made when you first got to college, and the experience will be sure to make you friends for life.
- ii. Personal success attribute: Your study habits and performance in class will pretty much stay the same as before. You'll have to factor the additional time it will take you to get to class in to your schedule, but maybe you can get some reading done while riding the bus.
- iii. Personal happiness attribute: The prospect of really being on your own and responsible for your life is very exciting. You can't wait to get to decorate your own space and have no one else to whom you have to answer.
- iv. Academic attribute: Living off of campus would also mean removing yourself from the academic environment. You'll have to be even more responsible and self-motivated to make sure that you get your coursework done and make it to class regularly.

b. Choice B: "Apply to move to a nicer dorm next year"

- i. Social attribute: You know a lot of the people that already live in the nicer dorm, so you'll be closer to your friends. Your current roommate is applying to move with you, so you don't run the risk of getting assigned to someone with whom you don't get along.
- ii. Personal success attribute: Staying on campus makes it easier to attend classes, get to computer labs, and study in

the library. Also, the study restrictions that come with the dorms make it socially acceptable for you to be spending time with your books every night.

- iii. Personal happiness attribute: Staying on campus does mean that there are still a lot of noise regulations and rules regarding who you can have in your room. Your resident assistant can often cut your fun short when it starts to get late.
  - iv. Academic attribute: As you really sink in to the routine of living on campus, your performance as a student goes up a bit. You have your spot in the library where you study, know when your dorm's computer lab isn't busy, and can get up fifteen minutes before class starts and still make it.
8. No action pair 2:
- a. Choice A: "Spend the afternoon in a new coffee shop in town"
    - i. Social attribute: You discover a great new place to hang out. Hopefully your friends like it too.
    - ii. Personal success attribute: While not even intending to, all the down time in the coffee shop leads you to do some reading for class, so now you're a bit ahead of the game for next week.
    - iii. Personal happiness attribute: It's good to spend some time relaxing, and you'll be able to approach classes tomorrow with some renewed energy.
    - iv. Academic attribute: While this coffee shop may make a good place to stay caffeinated and study, one afternoon there is not really going to affect how you're doing in classes.
  - b. Choice B: "Go for a walk around campus"
    - i. Social attribute: Having a little alone time never hurt, but your friends think it's kind of weird that you decided to just wander around alone.
    - ii. Personal success attribute: You find a shorter route for getting between two of your classes. This should help keep you from showing up late for the second one.
    - iii. Personal happiness attribute: Getting a chance to clear your mind and get a little exercise makes you feel better about life in general. You start to think that you'll be able to get through this semester okay.
    - iv. Academic attribute: Taking an afternoon off doesn't really impact your grade in your class. You obviously can't do this too often, or you will start to get behind.

#### Scenario 2: Student Government President

##### Neutral Condition.

You are the current acting student body president. You have to allocate the annual budget to the different student groups and activities on campus for the year. Your budget

and the funds that groups are requesting are identical to the previous year. There are new student senate members, but they hold similar positions to last year's members. The kinds of groups requesting funds include honors societies, Greek societies, ethnic societies, and special interest societies.

Uncertain Condition.

You are the current acting student body president. You have to allocate the annual budget to the different student groups and activities on campus for the year. The state's senate, who votes on how much money will be given to student governments of state schools, has not yet voted on how much to allow this year. Yet, you need to start allocating money immediately. Additionally, your school has a new chancellor who has voiced his dislike of students getting to make any decisions about university money. You are worried that if you do not make good decisions, he may take away your right to distribute money to student groups.

Threatening Condition.

You are the current acting student body president. You have to allocate the annual budget to the different student groups and activities on campus for the year. The requests for funding are much more than what is available. If certain student groups don't get the money they need, they will not survive, which could cause a war in the student senate. The chancellor is considering you for an internship, but will base his decision on your performance as a student leader. If you fail, the career path you have set out on will be destroyed.

1. Social choice pair 1:

- a. Choice A: "Set up an informal student dinner where members from student groups can discuss funding needs"
  - i. Social attribute: Meeting a bunch of members of student groups face-to-face will really improve your image as an active and concerned student leader, regardless of the funding decisions you make later. This will certainly increase your popularity on campus.
  - ii. Personal success attribute: Every student group seems to have a legitimate reason for requesting funding from the student government. Meeting them all in person is not going to help make your decisions any easier this year, and now that they personally know you they won't hesitate to contact you all the time for help.
  - iii. Personal happiness attribute: You can tell that people are impressed at your ability to organize events on campus. This makes you even more confident in your ability to succeed this year.
  - iv. Academic attribute: The extra time you have to put in to organizing and hosting the dinner really cuts in to time that should be spent studying for classes. You need to do well as a student leader, but you also can't let your class grades start to fall.
- b. Choice B: "Start an online discussion board forum for members of student groups to state their cases for needing funding"

- i. Social attribute: You get to hear from a lot more student group members, but you don't meet any of them personally. Your social status does not really change as a result.
  - ii. Personal success attribute: People are a lot more articulate at expressing their needs when they have time to sit down and think about what they're going to say. You are much better informed on the specific needs of each group, which should help you better allocate the funding.
  - iii. Personal happiness attribute: The discussion board is updated frequently, so you have to spend a lot of time checking up on it to keep abreast of all the groups' concerns. You do this mostly by yourself, and it can be dull and tedious work.
  - iv. Academic attribute: The time taken to give each contribution to the discussion board a fair amount of consideration is cutting in to your study time. You have to be careful to not let your aspirations as a student leader hinder your performance in the classroom.
2. Social choice pair 2:
- a. Choice A: "Fund the student groups that you know have a lot of social influence"
    - i. Social attribute: This will make you a hit with some of the larger, more powerful groups on campus, such as the Greek communities. Your popularity on campus will increase in general, but you will also make some enemies out of the lesser-supported groups, such as the percussion or law clubs.
    - ii. Personal success attribute: Giving such influential groups what they want helps you out with your internship with the chancellor, as they can pressure him too about hiring you. However, several student government members who were advocating for the smaller student groups are now causing you problems with other things you'd like to accomplish with the student government.
    - iii. Personal happiness attribute: While it feels good to have a large group of people on campus happy with you, you do have guilt about only funding groups that could help you through their social influence.
    - iv. Academic attribute: Making the funding decision doesn't have a direct impact on your academic performance. You're just glad the decision is over with so that you can refocus some energy on class.
  - b. Choice B: "Fund the student groups of which your friends and yourself are members"

- i. Social attribute: This will make you wildly popular in all of the student groups for which you have a membership. You make your existing friends happy with the decision and will be bound to make a lot more friends within these groups.
  - ii. Personal success attribute: The chancellor is fully aware that you are a member of all the groups funded and is not happy with this decision. What he sees as an abuse of power will influence his decision on whether or not to give you an internship.
  - iii. Personal happiness attribute: This makes your time spent with your friends and personal student groups great, as you are popular and you have the funds to do whatever you like. However, members of the student government are very annoyed with you and leading them is becoming a miserable experience.
  - iv. Academic attribute: This doesn't really impact your academic performance. You're just hoping that you can attend class without hearing a member from an unfunded group complain.
3. Information-gathering pair 1:
- a. Choice A: "Form a student senate committee to compile all the information on funding requests and prioritize them"
    - i. Social attribute: Delegating some of the funding decision responsibilities to other student senate members gives you some more time to hang out with your friends and have a bit of a social life.
    - ii. Personal success attribute: While top priorities are easily pulled out of the list of funding requests, there are a lot of requests that fall within the same priority. You'll be able to make the initial funding decisions easily, but after that they will be very hard to choose between.
    - iii. Personal happiness attribute: You're very pleased with how you handled the responsibility, and think that you are doing a great job delegating within the student senate.
    - iv. Academic attribute: This takes some of the pressure off of you during the funding decision process, allowing you to have more time to focus on classes. It can be very difficult to juggle the responsibilities of student government and class at the same time.
  - b. Choice B: "Create a database of funding student groups have received in the past and what they did with them"
    - i. Social attribute: This is a very time-consuming project that takes up all your free time for days. Your friends begin to worry that you will have no time for them as student government president.

- ii. Personal success attribute: This allows you to become very well informed on how the groups requesting funds will likely spend them. You are able to form a rough list of which groups do the best with the funds they are given and which do the worst, and this knowledge should help make the funding decision a bit smoother.
  - iii. Personal happiness attribute: This will take a lot of time and effort on your part, which will be exhausting. You're going to be stressed and irritable until this funding decision is over.
  - iv. Academic attribute: This will greatly detract from your ability to study and prepare for your classes. You will probably get behind on your coursework, and you'll just have to hope that you have time to catch up after the funding decision is over.
4. Information-gathering pair 2:
- a. Choice A: "Attend a state senate meeting to get a feel for how they make funding decisions"
    - i. Social attribute: While other student senate members admire you for taking such initiative, this action goes generally unnoticed by the rest of the student body. Your popularity on campus is relatively unaffected.
    - ii. Personal success attribute: The state senate hearings are even longer and less productive than your own student senate meetings. You don't really gain any insight into how to make your own funding decisions.
    - iii. Personal happiness attribute: Seeing how a state senate struggles with such decisions just further frustrates you with your own. You're exasperated with the task and wondering if this is really the career path you want to pursue.
    - iv. Academic attribute: During some of the slower parts of the senate meeting you're able to sneak in some reading for class, so you manage not to get behind despite taking the extra time to do this.
  - b. Choice B: "Ask the chancellor to meet with you to discuss funding options"
    - i. Social attribute: The majority of student senate does not want to give up any of their autonomy to the chancellor. They see this move as you sucking up and having the chancellor make decisions for you.
    - ii. Personal success attribute: This increases the chancellor's opinion of you highly, and makes him even more willing to give you an internship in his office. It also makes the funding decision much easier for you.

- iii. Personal happiness attribute: The discontented student senate is making you feel guilty about your decision. You're not sure if you're going to enjoy leading them after this.
    - iv. Academic attribute: Sharing the decision process with the chancellor gives you more time to focus on class. You can stay on top of your coursework and get the funding allocated this way.
- 5. Threat reducing pair 1:
  - a. Choice A: "Put all funding decisions to a senate vote"
    - i. Social attribute: This makes you more popular in the senate, as you seem to be less of a control freak.
    - ii. Personal success attribute: Letting the entire senate have a vote means that individuals can push for the student groups that they are involved in. This may lead to some unfair funding decisions.
    - iii. Personal happiness attribute: This option takes a lot of the burden off of your shoulders. This leaves you more time to concentrate on other duties, but also makes you feel like you shrugged-off some of your responsibilities.
    - iv. Academic attribute: This gives you a lot more time to study and be a student. Your performance in class would benefit from this.
  - b. Choice B: "Decide to fund only the largest student organizations"
    - i. Social attribute: This makes you very popular among the bigger groups on campus, but creates an uprising in the smaller groups that feel unfairly treated. They can do a lot to hurt your appearance on campus.
    - ii. Personal success attribute: The groups that get funded are the ones that have the best alumni base and hold the most sway on campus. They can really help you look good in front of the chancellor and other possible employers.
    - iii. Personal happiness attribute: You feel pretty lousy about making decisions based on popularity rather than need. You do not enjoy how angry you've made the smaller groups on campus.
    - iv. Academic attribute: Getting the decision over with gives you more time to focus in class, and you have a lot more study-mates with all the new friends from the larger student groups.
- 6. Threat reducing pair 2:
  - a. Choice A: "Start a student-senate ran fundraiser that can contribute to this year's budget"
    - i. Social attribute: Running the fundraiser would put you out in the eye of the student body more frequently. More face time with them means more popularity for you, regardless of the funding decisions you make.

- ii. Personal success attribute: The ability to come up with ways to fund the groups that rely on you is considered very desirable in the political arena. This makes you much more likely to get the internship you've for which you've been gunning.
    - iii. Personal happiness attribute: The fundraising work is rewarding and every penny you raise takes some of the stress out of the funding decisions you have to make. It is time-consuming work, however.
    - iv. Academic attribute: Now you have to squeeze in a couple extra hours every day for the fundraiser on top of your other duties as student body president, classes, and homework time. Staying current with your classes will get more and more difficult.
  - b. Choice B: "Start an alumni donation campaign to supplement this year's budget"
    - i. Social attribute: You spend most of your free time talking to alumni rather than your peers. While you're doing good things for your student organizations, you're not having much of a social life.
    - ii. Personal success attribute: You meet a lot of influential alumni as you contact them for donations. A few of them take an interest in you and put in a few good words with the chancellor. This greatly helps your chances of getting the internship you want.
    - iii. Personal happiness attribute: You're thrilled that the more money you can get donated the less difficult funding decisions you'll have to make. You're also very excited about the networking opportunities with alums.
    - iv. Academic attribute: Spending all your time visiting or on the phone with potential donors is really costing you in the classroom. You're behind on all your course reading and occasionally have to miss class to make donor meetings.
- 7. No action pair 1:
  - a. Choice A: "Start a new student senate social committee"
    - i. Social attribute: This results in there being more social events arranged for members of the student senate. As you get to spend more time with them, you begin to make some very good friends.
    - ii. Personal success attribute: This does nothing to help make your funding decisions any easier. It also doesn't contribute to how successful of a student leader you are seen as.
    - iii. Personal happiness attribute: Being more social with the other student government members with whom you have to work makes the overall experience of student body president more enjoyable for you.

- iv. Academic attribute: Spending more time socializing with student senate members detracts a bit from your class work, but not in a very remarkable way.
- b. Choice B: “Rework your campaign slogan to accompany your electronic email signature”
  - i. Social attribute: This does not do anything to increase your popularity as a student leader.
  - ii. Personal success attribute: While the catchy slogan is easily recalled by all who read your emails, you really haven’t done anything to represent what the slogan claims.
  - iii. Personal happiness attribute: This is a fun and amusing activity for you and adds some personal pride to the emails you send out.
  - iv. Academic attribute: This is a quick task and doesn’t impact your academic performance in the least.
- 8. No action pair 2:
  - a. Choice A: “Arrange for the student senate to have group photos taken”
    - i. Social attribute: Other student senate members are excited to have something by which they can remember this time in their lives. The rest of the student body views it as somewhat vain and a waste of senate funds.
    - ii. Personal success attribute: Having photos taken of you with the senate you oversee is not something that is going to help you progress in the political arena.
    - iii. Personal happiness attribute: You are very proud of your accomplishments and truly cherish the keepsake. You also greatly enjoy walking by the images in the Union every day.
    - iv. Academic attribute: Taking photos with the student senate is a pretty quick affair, leaving you plenty of time to tend to your daily coursework and studying.
  - b. Choice B: “Start a Facebook group account for the student senate”
    - i. Social attribute: This makes it much easier for the rest of the student body to make commentary on how they think the student senate and yourself are performing, however, this brings out the praisers and the haters alike.
    - ii. Personal success attribute: The chancellor likes that you’re opening up the student senate on a public forum. The ability to adapt more modern networking tools to student leadership activities seems like a good attribute for an intern.
    - iii. Personal happiness attribute: While others seem to like this idea, you are the one in charge of updating and checking the account. This ends up being more of a chore than you intended and becomes a weekly frustration for you.

- iv. Academic attribute: More time on Facebook means less time studying. There are definitely better things you could be doing with your time.

### Scenario 3: Romantic Relationship

#### Neutral Condition.

You and your significant other have been together for several months. You met on campus and live in adjacent dormitories. You have several mutual friends with which you hang out. You are in different majors and come from different hometowns. You do a lot of things together, including going to the movies, attending sporting events, and studying. Your significant other has asked you to meet them for a talk this evening.

#### Uncertain Condition.

You and your significant other have been together for several months. You have not been able to see a lot of each other lately due to your busy schedules. You've heard through mutual friends that he/she has been unhappy with your relationship; however, he/she has also just experienced the death of a grandparent. Your significant other has asked you to meet them for a talk this evening.

#### Threatening Condition.

You and your significant other have been together for several months. You had a horrible fight recently and haven't spoken for a couple of days. He/she has been spending a lot of time with a new friend that you haven't met yet, and you feel threatened and betrayed. You are afraid that if you break up you will lose all of the mutual friends that you share, and this has you very stressed. You are still in love and would like to work things out, but your explosion may have ruined your chances. Your significant other has asked you to meet them for a talk this evening.

#### 1. Social choice pair 1:

- a. Choice A: "Break up with your significant other to make it impossible to get dumped"
  - i. Social attribute: Your mutual friends would see this as a hasty move, and most of them would side with your significant other in the breakup. You're going to have to start from scratch as far as finding a group of people to hang out with again.
  - ii. Personal success attribute: You don't have to suffer the humiliation of getting dumped, but you're viewed as an idiot for not trying to work out your relationship more beforehand.
  - iii. Personal happiness attribute: You would end up feeling lonely for quite some time. Not only are you out of a relationship, but you don't have many friends left.
  - iv. Academic attribute: To avoid having to deal with your emotions or lack of social life, you would spend all your time focusing on your schoolwork. You're overall class performance actually improves as a result.
- b. Choice B: "Go out on the town to see how your other dating prospects look"
  - i. Social attribute: While you would meet some new people and get flirted with while you're out, the mutual friends

you share with your significant other don't think that this is a good idea at all.

- ii. Personal success attribute: If your significant other hears that you're checking out your other options, you'll probably get dumped for sure.
- iii. Personal happiness attribute: You would get a sense of renewed confidence in your desirability as a partner. This makes you feel better about yourself.
- iv. Academic attribute: You would find that you like the attention and sense of control when going out on your own. This is going to detract from your schoolwork, as you spend more and more time focusing on how you look.

2. Social choice pair 2:

- a. Choice A: "Don't discuss your relationship with your mutual friends"
  - i. Social attribute: While your friends think that you're being prudish about your relationship your significant other is grateful that you don't gossip about such things.
  - ii. Personal success attribute: Your significant other acknowledges that you're trying to protect your relationship, so also tries to work on it.
  - iii. Personal happiness attribute: It would be really nice to have a confidant that you could share your thoughts and fears with, especially since you and your significant other are communicating very openly. Hopefully you will be able to stop feeling like such a loner soon.
  - iv. Academic attribute: Dealing with all of your emotional baggage on your own can be very stressful and distracting. You would find yourself not paying attention in class or getting homework done on time.
- b. Choice B: "Openly vent about your relationship to your mutual friends"
  - i. Social attribute: This would make some of your friends understand your side of the relationship better. You would start to feel that if you and your significant other break up you would still have some friends left.
  - ii. Personal success attribute: Your significant other would see this as a violation of their privacy. The odds that they will break up with you increase.
  - iii. Personal happiness attribute: While it feels good to get all your emotional baggage off your chest and have some people that sympathize with your situation, you are feeling awful about how upset your significant other is.
  - iv. Academic attribute: All the additional drama that your friends add to the situation makes it impossible for you to

focus on class or your homework. You would start to fall behind in all your classes.

3. Information-gathering pair 1:
  - a. Choice A: “Ask a mutual friend to ‘feel-out’ your significant other to find out how they are feeling”
    - i. Social attribute: This gets you one friend that feels entrusted, and thus closer to you and keeps the others from being too aware that you’re having any relationship concerns.
    - ii. Personal success attribute: You not coming to your significant other yourself to talk about your relationship concerns does not sit well with them. They are now annoyed and making things worse for the two of you.
    - iii. Personal happiness attribute: You do find out some of the specific issues that your significant other is having a hard time with, and it feels good not to be in the dark, but knowing that you have irritated them has you worried.
    - iv. Academic attribute: Since your friend is doing all the heavy lifting for you in your relationship, you are able to take your mind off of it for a bit and get some work done for class.
  - b. Choice B: “Send your significant other an email asking them to tell you what’s on their mind”
    - i. Social attribute: This puts the ball of dealing with any relationship issues in your significant other’s court, so you will have more time to hang out with friends and avoid the issue.
    - ii. Personal success attribute: Your significant other finds an email an impersonal and cowardly way to try and discuss relationship issues. He/she wants to know why you’re not brave enough to confront him/her in person and is now angry.
    - iii. Personal happiness attribute: You feel like you’ve taken the appropriate steps to try and reach out to your significant other. You’re baffled by them not liking you reaching out by email and feel indignant.
    - iv. Academic attribute: Since all you have to do is wait for your significant other’s reply you have plenty of time to work on stuff for class.
4. Information-gathering pair 2:
  - a. Choice A: “Talk to your significant other’s parents to see if they know anything about your relationship’s status”
    - i. Social attribute: This would help your significant other’s family feel closer to you, which may help you when trying to deal with any relationship problems.

- ii. Personal success attribute: Nobody likes being talked about behind their back, especially to their mother. Your significant other is very unhappy that you went to their parents first.
  - iii. Personal happiness attribute: You find out from your significant other's parents that things are not as bad as they seem, so you're feeling pretty good.
  - iv. Academic attribute: Involving your significant other's parents in your relationship is costing you a lot of time, as now they feel fine emailing and calling often. You really need to spend your nights studying and not talking with them.
- b. Choice B: "Login to your significant other's email to see if you can find out how they're feeling"
- i. Social attribute: You find out that one of your friends is encouraging your significant other to break up with you. While you're trying to hide the fact that you know this, you can't help but be hostile toward this friend, which comes across as you being a jerk. Now your other friends are angry with you too.
  - ii. Personal success attribute: Your significant other doesn't find out that you peeked at their email, and now you know exactly what's bothering them, so next time you talk you'll know exactly what to say to get your relationship back on track.
  - iii. Personal happiness attribute: You feel lousy about violating your significant other's privacy and even more lousy about the kinds of things they were saying to friends about you.
  - iv. Academic attribute: The things you read in your significant other's email get you worrying about things you thought were okay before. Now you're even more distracted and stressed in class.
5. Threat reducing pair 1:
- a. Choice A: "Write a heart-felt letter about your true feelings to your significant other"
    - i. Social attribute: This is done under the radar, so your situation with your friends doesn't change. They still seem to be closer to your significant other than yourself.
    - ii. Personal success attribute: Your significant other is touched by this gesture and agrees to work out any problems that you are having.
    - iii. Personal happiness attribute: It is really scary to expose yourself like that, even to somebody you trust, but your significant other's positive response has made it worth it.

- iv. Academic attribute: You get so caught up in the emotion of your relationship that you totally blow off preparing for classes for a few days.
- b. Choice B: “Buy your significant other an extravagant gift that they have been wanting”
  - i. Social attribute: All of your friends ooh and ahh over the gesture, which makes you rather popular for a short while.
  - ii. Personal success attribute: This will certainly appease your significant other for a while and get them to ignore any concerns they are having about your relationship.
  - iii. Personal happiness attribute: You are feeling really good about making your significant other happy. You just hope that this will fix things rather than just cover them up for a while.
  - iv. Academic attribute: This puts your relationship worries aside for a short time, so you can really focus on doing well in your classes.
- 6. Threat reducing pair 2:
  - a. Choice A: “Devote all of your free time to making your significant other happy”
    - i. Social attribute: You start being viewed by your friends as more of a partner than a person. Your oozing devotion turns them off and they start spending less and less time with you.
    - ii. Personal success attribute: Your significant other loves the new found attention, and starts to think that any problems they were having with the relationship were just in their head.
    - iii. Personal happiness attribute: You start to feel bitter about not receiving as much attention and affection as you’re receiving, so despite your partner’s improved feelings about your relationship, yours are getting worse.
    - iv. Academic attribute: You spending all your study and class time doting on your significant other, which means that your grades are dropping.
  - b. Choice B: “Call your significant other and convince them to work on your relationship”
    - i. Social attribute: Your friends are aware that you’re trying to work things out with your significant other, so they give you some space so you can do so. This means your not spending much time with them.
    - ii. Personal success attribute: Your significant other appreciates your devotion to your relationship so agrees to keep working on things. You may not have fixed the problems you were having but at least you’ve delayed a breakup.

- iii. Personal happiness attribute: Your feeling very optimistic about your relationship and hope that you can keep convincing your significant other to stay together by sheer force of will.
    - iv. Academic attribute: Your relationship becomes your number one priority, which means that you are not doing well in class.
- 7. No action pair 1:
  - a. Choice A: “Give your significant other some space and let them come to you”
    - i. Social attribute: Giving your significant other space means also isolating yourself from the mutual friends you share, so you’re spending a lot of time alone.
    - ii. Personal success attribute: Your significant other is just as unmotivated to try and work things out as you are. The problems you have are left undealt with and animosity grows between you.
    - iii. Personal happiness attribute: You have no idea how your significant other is feeling now, and you are stress out and worried that they are going to dump you.
    - iv. Academic attribute: To distract yourself from thinking about your relationship you delve into your school work. You actually start to improve in class.
  - b. Choice B: “Actively avoid your significant other hoping the issue will go away”
    - i. Social attribute: Avoiding your significant other means avoiding your mutual friends, which is pretty much all your friends, so you’re spending a lot of time alone.
    - ii. Personal success attribute: While your significant other can’t get you face-to-face to dump you, they are really furious at how hard it is to see you and talk.
    - iii. Personal happiness attribute: You’re feeling pretty desperate about your relationship situation and are almost certain that you’ve caused a breakup.
    - iv. Academic attribute: Not hanging out with your significant other or friends does give you more time to study for class. You actually get a project done ahead of time.
- 8. No action pair 2:
  - a. Choice A: “Make up some excuse for why you can not meet to talk tonight”
    - i. Social attribute: You can’t let any of your mutual friends know that you were lying about not being able to meet, so you have to avoid hanging out with anybody for the evening.

- ii. Personal success attribute: This just delays the inevitable conversation you're going to have to have with your significant other and gets them irritated to boot.
  - iii. Personal happiness attribute: You do not feel good about lying to your significant other and wish that you could be less of a coward when it comes to confronting emotional issues.
  - iv. Academic attribute: You gave your significant other the excuse that you have a paper due in class tomorrow, so you decide to actually go to the library and work anyway. You don't get your term paper done, but you at least get it started.
- b. Choice B: "Intentionally miss meeting with your significant other and tell them you forgot when they ask later on"
- i. Social attribute: This sort of snub is viewed as inconsiderate by all of your mutual friends, who decide to start snubbing you in turn.
  - ii. Personal success attribute: Your significant other is irate that you could simply forget about meeting with them, and the status of your relationship gets way worse.
  - iii. Personal happiness attribute: You managed to avoid having a difficult and emotional conversation, but you've only made things worse for the next conversation.
  - iv. Academic attribute: You're so busy dodging the relationship bullet that you become completely distracted from class. You start falling behind on your course reading.

Appendix B  
Manipulation Check

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now. Use the following scale to record your answers:

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

Positive: determined, enthusiastic, excited, proud, strong

General Negative: ashamed, sad, guilty, upset, hostile

Uncertain: nervous, not in control, having intrusive thoughts, distressed, worried

Fear: afraid, scared, frightened, shaky, jittery

## Appendix C

## Spielberger State-Trait Anxiety Inventory and Fear Survey Schedule

Spielberger State Anxiety Inventory: Spielberger, C. C. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.

A number of statements which people have used to describe themselves are given next. Read each statement and then press the button indicating how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

- I feel calm
- I feel secure
- I am tense
- I feel strained
- I feel at ease
- I feel upset
- I am presently worrying over possible misfortunes
- I feel satisfied
- I feel frightened
- I feel comfortable
- I feel self-confident
- I feel nervous
- I am jittery
- I feel indecisive
- I am relaxed
- I feel content
- I am worried
- I feel confused
- I feel steady
- I feel pleasant

Spielberger Trait Anxiety Inventory: Spielberger, C. C. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press.

A number of statements which people have used to describe themselves follow. Read each statement and then press the appropriate button to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

- I feel pleasant
- I feel nervous and restless
- I feel satisfied with myself
- I wish I could be as happy as others seem to be
- I feel like a failure
- I feel rested
- I am "calm, cool, and collected"
- I feel that difficulties are piling up so that I cannot overcome them
- I worry too much over something that really doesn't matter
- I am happy

I have disturbing thoughts  
 I lack self-confidence  
 I feel secure  
 I make decisions easily  
 I feel inadequate  
 I am content  
 Some unimportant thought runs through my mind and bothers me  
 I take disappointments so keenly that I can't put them out of my mind  
 I am a steady person  
 I get in a state of tension or turmoil as I think over my recent concerns and interests

Fear Survey Schedule: Braun, P. R. & Reynolds, D. J. (1969). A factor analysis of a 100-item fear survey inventory. *Behavior Research Therapy*, 7, 4.

Rate the level of your fear of each of the items following. Describe how you would feel if they actually happened to you or were actually present near you.

Noise of vacuum cleaners  
 Being cut  
 Being alone  
 Speaking before a group  
 Dead bodies  
 Loud noises  
 Being a passenger in a car  
 Driving a car  
 Auto accidents  
 People with deformities  
 Being in a strange place  
 Riding a roller coaster  
 Being in closed places  
 Thunder  
 Falling down  
 One person bullying another  
 Being bullied by someone  
 Loud sirens  
 Doctors  
 High places  
 Being teased  
 Dentists  
 Cemeteries  
 Strangers  
 Being physically assaulted  
 Failing a test  
 Not being a success  
 Losing a job  
 Making mistakes  
 Sharp objects (knives, razor blades, scissors)  
 Death

Death of a loved one  
Worms  
Imaginary creatures  
Dark places  
Strange dogs  
Receiving injections  
Seeing other people injected  
Illness  
Angry people  
Mice and rats  
Fire  
Ugly people  
Snakes  
Lightning  
Sudden noises  
Swimming alone  
Witnessing surgical operations  
Prospect of a surgical operation  
Deep water  
Dead animals  
Blood  
Seeing a fight  
Being in a fight  
Being criticized  
Suffocating  
Looking foolish  
Being a passenger in an airplane  
Arguing with parents  
Meeting someone for the first time  
Being misunderstood  
Crowded places  
Being a leader  
Losing control  
Being with drunks  
Being self-conscious  
People in authority  
People who seem insane  
Boating  
God  
Being with a member of the opposite sex  
Stinging insects  
Crawling insects  
Flying insects  
Crossing streets  
Entering a room where other people are already seated  
Bats

Journeys by train  
Journeys by bus  
Feeling angry  
Dull weather  
Large open spaces  
Cuts  
Tough looking people  
Birds  
Being watched while working  
Guns  
Dirt  
Being in an elevator  
Parting from friends  
Feeling rejected by others  
Odors  
Feeling disapproved of  
Being ignored  
Premature heart beats  
Nude men  
Nude women  
Unclean silverware in restaurants  
Dirty restrooms  
Becoming mentally ill

## Appendix D

### Instructions for Reading the Decision Scenarios

You are about to read a description of a leadership position that is in a certain situation. We would like you to imagine yourself as the person described. Try to mentally image yourself in their position with their concerns and emotions. It is very important that you try to adopt their role as much as possible for the following task. After reading the description, please take a few minutes to imagine yourself as that person in that scenario before continuing.

## Appendix E

### Instructions for Making the Two-Choice Decisions

Maintaining who you are and your current situation, please choose one of the two options below, considering as much information as you need to in order to make the decision.

Appendix F  
Time to Make a Decision Analyses by Order

First Scenario

Hierarchical multiple regressions were conducted using STAI-S, STAI-T, and FSS scores as predictors for time to make a decision for each decision context. For each analysis, STAI-S scores were entered in the first step, followed by STAI-T scores in the second and FSS scores in the third (this order was chosen after each possible order was ran and all were found to yield the same results, which supports the following findings being true findings and not type I errors due to inflation from colinearity). Hierarchical regressions further help to control for colinearity by including all shared covariance with the first entered predictor, leaving subsequent predictors unique.

For neutral contexts, all three steps of the regression model were found to be significant,  $F(3, 31) = 3.18, p = .04, R^2 = .17$ . This was largely driven by STAI-S scores predicting shorter decision times and STAI-T scores predicting longer decision times. For uncertain contexts, none of the steps of the regression model were found to be significant. Lastly, for threatening contexts, only the first two steps of the regression model were found to be significant,  $F(2, 30) = 4.59, p = .02, R^2 = .18$ . The pattern of effects here were the same as for the neutral context scenarios. Unstandardized slopes for these models can be found in Table 11.

Table 11.

*Unstandardized slopes for the regression model predicting time to make a decision from anxiety type for the first decision scenario.*

	<u>Neutral*</u>	<u>Uncertain</u>	<u>Threatening*</u>
Intercept	56	3	29
STAI-S	-1**	-.5 <sup>ns</sup>	-.9*
STAI-T	.1*	.8 <sup>ns</sup>	.9 <sup>†</sup>
FSS	-.07 <sup>ns</sup>	.04 <sup>ns</sup>	.02 <sup>ns</sup>

\*\* indicates significance at the  $\alpha = .01$  level

\* indicates significance at the  $\alpha = .05$  level

† indicates a statistical trend ( $p = .06$ )

Second Scenario

Analyses for the second decision scenario were the same as for the first. For neutral contexts, all three steps of the regression model were found to be significant,  $F(3, 25) = 3.47, p = .03, R^2 = .21$ . This time, only STAI-S scores reliably predicted shorter decision times. For uncertain and threatening contexts, none of the steps of the regression model were found to be significant. Unstandardized slopes for these models can be found in Table 12.

Table 12.

*Unstandardized slopes for the regression model predicting time to make a decision from anxiety type for the second decision scenario.*

	<u>Neutral*</u>	<u>Uncertain</u>	<u>Threatening</u>
Intercept	35	19	25

STAI-S	-1**	-.5 <sup>ns</sup>	.2 <sup>ns</sup>
STAI-T	.04 <sup>ns</sup>	.6 <sup>ns</sup>	.02 <sup>ns</sup>
FSS	.1 <sup>ns</sup>	.001 <sup>ns</sup>	-.03 <sup>ns</sup>

\*\* indicates significance at the  $\alpha = .01$  level

\* indicates significance at the  $\alpha = .05$  level

### Third Scenario

Analyses for the third decision scenario were the same as for the first and second. For all contexts, no steps of the regression models were found to be significant. Unstandardized slopes for these models can be found in Table 13. Overall, statistical trends found for the slopes support what was found in the first and second decision scenarios, despite the overall model fits not being significant.

Table 13.

*Unstandardized slopes for the regression model predicting time to make a decision from anxiety type for the third decision scenario.*

	<u>Neutral</u>	<u>Uncertain</u>	<u>Threatening</u>
Intercept	12	52	34
STAI-S	-.7*	-.3 <sup>ns</sup>	-.8 <sup>†</sup>
STAI-T	.8*	-.6 <sup>ns</sup>	-.03 <sup>ns</sup>
FSS	.002 <sup>ns</sup>	.02 <sup>ns</sup>	.07 <sup>ns</sup>

\* indicates significance at the  $\alpha = .05$  level

† indicates a statistical trend ( $p = .09$ )

## Appendix G

## Number of Attributes Considered Analyses by Order

## First Scenario

Hierarchical multiple regressions were conducted using STAI-S, STAI-T, and FSS scores as predictors for number of attributes considered for each decision scenario context. For each analysis, STAI-S scores were entered in the first step, followed by STAI-T scores in the second and FSS scores in the third (this order was chosen for the same reasons as mentioned in the time to make a decision analyses).

For neutral contexts, all three steps of the regression model were found to be significant,  $F(3, 31) = 3.13$ ,  $p = .04$ ,  $R^2 = .17$ . This model was driven by STAI-S scores predicting less consideration of attributes. For uncertain and threatening contexts, none of the steps of the regression model were found to be significant. Unstandardized slopes for these models can be found in Table 14.

Table 14.

*Unstandardized slopes for the regression model predicting amount of information considered prior to a decision from anxiety type for the first decision scenario.*

	<u>Neutral*</u>	<u>Uncertain</u>	<u>Threatening</u>
Intercept	5.10	-1.15	2.33
STAI-S	-.15**	-.05 <sup>ns</sup>	-.06 <sup>ns</sup>
STAI-T	.11 <sup>ns</sup>	.09 <sup>ns</sup>	.05 <sup>ns</sup>
FSS	-.01 <sup>ns</sup>	.01 <sup>ns</sup>	.003 <sup>ns</sup>

\*\* indicates significance at the  $\alpha = .01$  level

## Second Scenario

Analyses for the second decision scenario were the same as for the first. For neutral contexts, all three steps of the regression model were found to show a statistical trend,  $F(3, 25) = 2.69$ ,  $p = .07$ ,  $R^2 = .15$ . For uncertain context, the first two steps of the regression model were found to show a statistical trend,  $F(2, 29) = 2.86$ ,  $p = .07$ ,  $R^2 = .11$ . This was again driven by STAI-S scores predicting less consideration of attributes per decision and STAI-T scores predicting more. For threatening contexts, none of the steps of the regression model were found to be significant. Unstandardized slopes for these models can be found in Table 15.

Table 15.

*Unstandardized slopes for the regression model predicting amount of information considered prior to a decision from anxiety type for the second decision scenario.*

	<u>Neutral*</u>	<u>Uncertain*</u>	<u>Threatening</u>
Intercept	3.73	2.65	.74
STAI-S	-.03 <sup>ns</sup>	-.11*	.03 <sup>ns</sup>
STAI-T	-.12*	.10 <sup>†</sup>	.02 <sup>ns</sup>
FSS	.02*	-.003 <sup>ns</sup>	.00 <sup>ns</sup>

\* indicates significance at the  $\alpha = .05$  level

† indicates a statistical trend ( $p = .08$ )

## Third Scenario

Analyses for the third decision scenario were the same as for the first and second. For neutral contexts, the first two steps of the regression model showed a statistical trend,  $F(2, 31) = 2.56$ ,  $p = .09$ ,  $R^2 = .09$ . The same pattern of results is reflected here. For uncertain contexts, the model with three steps showed a statistical trend,  $F(3, 29) = 2.34$ ,  $p = .09$ ,  $R^2 = .11$ . Finally, for threatening contexts, only the first step of the regression model showed a statistical trend,  $F(1, 26) = 3.53$ ,  $p = .07$ ,  $R^2 = .09$ . Unstandardized slopes for these models can be found in Table 16.

Table 16.

*Unstandardized slopes for the regression model predicting amount of information considered prior to a decision from anxiety type for the third decision scenario.*

	<u>Neutral*</u>	<u>Uncertain*</u>	<u>Threatening</u>
Intercept	1.23	4.62	3.37
STAI-S	-.09*	-.02 <sup>ns</sup>	-.11 <sup>†</sup>
STAI-T	.09*	-.11*	.003 <sup>ns</sup>
FSS	-.002 <sup>ns</sup>	.01 <sup>ns</sup>	.01 <sup>ns</sup>

\* indicates significance at the  $\alpha = .05$  level

† indicates a statistical trend ( $p = .09$ )