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Matt Hayes
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"Risky Decision, Affect, and Cognitive Load: Does Multi-Tasking Reduce Affective Biases?"

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Risky Decisions, Affect, and Cognitive Load: Does Multi-Tasking Reduce Affective Biases?

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Abstract

This paper examines the effects of cognitive load on risky choices in a capital budgeting setting. Research by Moreno et al. (2002) demonstrated that affective reactions to a choice can alter risk-taking tendencies. Their control participants' decisions were influenced by the framing effects of prospect theory. However, once affective cues were introduced, participants' reactions to these cues dominated the framing effect, leading to prospect theory inconsistent choices. Some studies of cognitive load show that high cognitive load leads to greater reliance on affective cues (Shiv and Fedorikhin 1999). Other research has shown high cognitive load may impair processing of affective information (Hoerger et al. 2010; Sevdalis and Harvey 2009). In this paper I am able to replicate the original finding in Moreno et al. (2002), but find that cognitive load moderates the affect-risk-taking relationship. Specifically, in a gain setting, cognitive load versus no load participants were more likely to make prospect theory consistent choices, despite the presence of affective cues. These findings suggest that cognitive load may inhibit processing of affective information, and is an important consideration when studying decision making in managerial accounting. Future accounting experiments on the effects of biases and heuristics should also consider the moderating effects of cognitive load.

1. Introduction

Prospect theory explains the seemingly irrational decision behavior of individuals. It predicts that individuals will be risk averse (seeking) in gain (loss) frames (Kahneman and Tversky 1979). These reactions are caused by a tendency to overweight the value of certainty. In a gain frame, individuals prefer a less lucrative, certain gain over a more lucrative, uncertain gain. In a loss frame, individuals prefer the chance to avoid a large loss over the certainty of a smaller loss. Prior research suggests that affective reactions can also influence decisions. Moreno et al. (2002) demonstrate that affective reactions to non-qualitative information about decision choices cause individuals to make prospect theory inconsistent choices. In that study, affective cues induced risk seeking (averse) behavior in a gain (loss) context when managers were making capital budgeting decisions.

There is a vein of psychology literature that has examined the effects of cognitive load on decision making. This research finds that high cognitive load can lead to increased reliance on affective reactions in consumer decisions (Shiv and Fedorikhin 1999), but have little to no effect on risk aversion in monetary gambles (Whitney et al. 2008). Other studies have found cognitive load impairs affective responses (Hinson et al. 2002, 2003), or the processing of affective information (Hoerger et al. 2010; Sevdalis and Harvey 2009). High levels of cognitive load are reflective of a more realistic decision making environment for capital budgeting decisions. The managers tasked with these choices are frequently required to multi-task. It is an open empirical question as to how cognitive load will interact with affective reactions to influence decision making in a capital budgeting setting. Given that prior literature on cognitive load suggests that high load may impede affective responses (Hinson et al. 2002, 2003), or inhibit the processing of affective information (Hoerger et al. 2010; Sevdalis and Harvey 2009), I propose that

introducing cognitive load into a capital budgeting context will neutralize affective reactions and prevent them from influencing risky decisions.

Under no cognitive load, decision makers should react as previously observed in Moreno et al. (2002). When presented with affective cues, they will be expected to rely on their reaction to this information, and these reactions will become the major determinants of their behavior. The framing effect that induces prospect theory behavior will become secondary or even ignored completely. In Moreno et al. (2002), this led to risk seeking (aversion) in gain (loss) situations, the exact opposite of predictions based on prospect theory. However, under cognitive load, I predict that affective reactions will be ignored, and decision makers will make prospect theory consistent decisions. That is to say, they will be risk averse (seeking) in gain (loss) frames, even when affect is present.

Moreno et al. (2002) suggest that the framing effect that causes risk aversion (seeking) in gains (losses) is a "default strategy". Without influences such as affective cues, or cognitive constraints, individuals' decisions are more consistent with prospect theory than expected utility theory. Some of the literature on affect and cognitive load suggest that cognitive load causes "processing degradation" (Sevdalis and Harvey 2009). This can lead to individuals defaulting to choices that "minimizes cognitive effort" (Whitney et al. 2008), which in this case would be prospect theory consistent choices.

I use an experimental setting to investigate my hypotheses. Borrowing from Moreno et al. (2002), I use a capital budgeting decision to examine risky choice. I manipulate load by having all participants first complete a separate judgment task (an inventory obsolescence decision). Those in the cognitive load conditions are asked to retain information relative to the task for future recall. My results show some support for cognitive load moderating the affect-choice

relationship. In a gain setting, participants under no cognitive load were risk seeking when affective cues were present, replicating Moreno et al. (2002). However, when gain setting participants were put under cognitive load, they exhibited risk averse tendencies, even when presented with affective cues. Results were not obtained in the loss manipulation. All participants in the loss condition, regardless of cognitive load or affect treatment, displayed risk averse behavior. This is most likely due to the failure of the loss manipulation.

The results suggest that cognitive load should be considered when studying managerial decision behavior. Affect is present in many decisions, thus it is appropriate to consider its impact on decision makers. The same can be said for cognitive load. Most professionals' attention is divided by multiple professional and personal concerns on a daily basis. It is important to consider how restricted processing resources may influence managerial decision making, especially as it interacts with other cognitive biases and heuristics.

This paper proceeds as follows. Section 2 contains a review of prior literature in prospect theory, affect and cognitive load, as well as hypothesis generation. Section 3 is a discussion of methodology, and experimental design. Section 4 presents an analysis of the results. Final conclusions and suggestions for future research are in Section 5.

2. Related Literature

2.1 Decision Making Under Risk

Over the past thirty years, prospect theory (Kahneman and Tversky 1979) has replaced expected utility theory (Von Neumann and Morgenstern 1947) as the descriptive model of choice for risky decision making in behavioral economics. Expected utility theory describes "rational", utility maximizing behavior. However, there has long been a discrepancy between how people should behave, and their actual behavior. Prospect theory attempts to explain this seemingly

irrational behavior. A hallmark of prospect theory is the concept of a reference point, which creates a framing effect (Tversky et al. 1981). The framing effect is a cognitive bias where an individual's reaction to a risky choice is predicated on whether it is presented in a gain or loss context. Specifically, in a gain (loss) context, individuals tend to be risk averse (seeking), even to the point of choosing the option with a lower expected value. This "irrational" pattern of behavior has been corroborated in numerous settings and diverse research fields. Supporting evidence includes monetary gambles (Kahneman and Tversky 1979), saving lives (Tversky and Kahneman 1986), stock holdings (Shefrin and Statman 1985), asset prices (Barberis et al. 2001), and earnings management opportunities (Shen and Chih 2005).

Accounting research has provided similar results. For instance, tax preparers are more willing to take risks when clients are expected to owe taxes (a loss frame) (Schisler 1994). Similarly, audit managers are more aggressive when they may lose an existing client than when they are courting new clients (Cohen and Trompeter 1998). Prospect theory tendencies have also been found in managerial behavior. Managers are less willing to make additional investments when existing capital assets would be sold at a loss (Jackson et al. 2009). Additionally, managers' risk aversion is positively related to the payoff magnitude of investments (Baird et al. 2008), as well as to personal wealth levels, vis-à-vis stock options (Sawers et al. 2011).

2.2 Affect and Risk

Affect describes moods and emotions felt at a given time, and has historically been divided into positive and negative components (Watson et al. 1988)[1]. These instances of affect are not strictly opposite, or negatively correlated measures, rather they are orthogonal. That is to

[1] Affect is widely studied in psychology. Generally, moods are considered long-term, general states, not attached to events/objects, while emotions are more short-term reactions to specific stimuli (Russell 2003; Russell and Barrett 1999). For the purpose of this paper, I manipulate and discuss affect in terms of an emotional reaction to specific characteristics of a decision.

say, different dimensions of positive and negative affect are capable of being felt at the same time; for example, one can simultaneously feel determined (positive) and hostile (negative). Much of the recent literature has distinguished between differential effects of emotions of the same valence (Druckman and McDermott 2008; Lerner and Keltner 2000; Schwarz and Clore 2003). This research focuses on passive versus active emotions. For example anger (active) is negatively associated with perceived risk, and leads to more optimism in uncertain situations, while fear (passive) is positively associated with perceived risk, and leads to more pessimism in the face of uncertainty (Lerner and Keltner 2000). The manipulation used in this research is designed to elicit active, negative affect (frustration and anger).

It is well established that affective reactions play an important role in decision making under risk. Affective reactions are governed by a separate system from cognitive processes (Zajonc 1980). This "dual process theory" posits a rational system where analytical and deliberate thought occur, and an intuitive system, where affective, emotional reactions, and rapid processing takes place (Epstein 1994). Affect and cognition do not necessarily oppose each other. In fact, the absence of an affective reaction in certain situations has been documented to lead to irrational behavior (Damasio 2005; LeDoux 1998; Loewenstein et al. 2001; Slovic et al. 2007).

One of the most well-known affect studies is the Iowa Gambling Task (Bechara et al. 1994), in which patients with damage to their prefrontal cortex were compared to control participants with undamaged brains. Choosing between decks of cards rigged to have different payouts; patients with damaged brains were unable to adapt to pick the rewarding decks, while control participants were able to adjust. Follow up studies developed the somatic marker hypothesis (Bechara et al. 2000). These studies showed that affective associations made with

stimuli produce measurable reactions in one's physiological state. The control participants made unconscious positive associations with the rewarding decks and negative associations with the punitive decks, and gravitated toward the former. In other words people could "feel" that one choice was better, even before they consciously "knew" (Hinson et al. 2006). Bechara and his colleagues demonstrated that damage to the prefrontal cortex inhibited this somatic response.

The focus of the current study is concerned with what happens when the cognitive and intuitive processing systems oppose each other. More specifically, investigating the conditions under which affect is relied upon over reason to make decisions, also known as the affect heuristic (Slovic et al. 2005). The affect heuristic explains why people may choose a more attractive, but less lucrative gamble over a less attractive but higher paying gamble (Slovic et al. 2007; Kida et al. 2001). Favorable feelings toward a risky choice cause an individual to judge the risk as low and the benefit as greater. Unfavorable feelings create the opposite effect, judgments of high risk and low benefit (Slovic et al. 2005).

Affect has been shown to impact auditor decisions. Bhattacharjee and Moreno (2002) gave auditors an inventory obsolescence assessment. Experimental participants were given negative affective cues about the client, designed to create a negative emotional reaction toward the client. Control participants were given no affective cues. Results indicated less experienced auditors provided with the negative affective cues gave higher risk assessments to the client. Similar effects were observed when examining the relationship between the general moods of the auditor. In an experiment by Chung et al. (2008), affect was manipulated by having participants read stories designed to elicit positive/negative/neutral affect. This way, the affect was not directly related to the decision being made. In an unrelated task, participants were provided with

an audit case on an inventory valuation assessment. The authors found that positive affect led to more favorable inventory valuations than negative or neutral affect.

Especially germane to the current study is the Kida et al. (2001) finding that negative affective cues associated with a higher expected value project will lead managers to choose a lower expected value project. This is consistent with other research suggesting negative affect generates an avoidance response, while positive affect results in approach behavior (Chen and Bargh 1999; Elliot and Thrash 2002; Sawers 2005). The follow up to the Kida et al. (2001) capital budgeting study (Moreno et al. 2002) combined affective cues with prospect theory to show conditions under which capital budgeting decisions did not adhere to typical framing effects. In particular, the authors found that without affective cues, managers' cognitions were impacted by the framing effect, and subsequently made prospect theory consistent decisions. However, adding affect made managers reject (accept) projects that elicited negative (positive) affect. This subsequently made them risk seeking (averse) in a gain (loss) situation, which is the exact opposite of prospect theory predictions. This study showed affective reactions dominated the framing effect in managers making capital budgeting decisions.

2.3 Cognitive Load and Choice

In this study I propose that cognitive load may neutralize affective reactions when affective cues are present in capital budgeting decisions. Cognitive load refers to taxing the limited processing ability of short term memory, or working memory. Working memory is the "temporary storage of information in connection with the performance of other cognitive tasks such as reading, problem solving, or learning" (Baddeley 1992). Cognitive load is often tested and manipulated with memory tasks. One of the most popular manipulations involves

participants memorizing strings of numbers or words of varying lengths (Baddeley 1992; Drolet and Luce 2004; Hinson et al. 2002, 2003; Shiv and Fedorikhin 1999).

Several recent works suggest that cognitive load impairs the deliberate, "rational" processing, and results in more reliance on affect. This research includes consumer choice decisions involving enticing versus healthy snack choices (Shiv and Fedorikhin 1999), where cognitive load increased propensity to choose the enticing snack. Further research confirmed that cognitive load leads to increased consumer reliance on emotional responses (Lee et al. 2009). Cognitive load has also been shown to increase generosity in dictator games, where a participant has the option to share as much or as little of an endowment with a counterpart as they choose without repercussions. The authors conclude that individuals under cognitive load rely more on their feelings to make decisions (Schulz et al. 2012). These studies suggest that cognitive load may increase reliance on affective cues. Notably absent from these studies is inherent risk. There were no opportunities for participants to experience loss, only regret.

A number of risk-based studies have been conducted using cognitive load. Whitney et al. (2008) examined how cognitive load influences prospect theory predictions. They found that high versus low cognitive load did not affect participants' risk aversion (seeking) in gain (loss) scenarios. Another highly relevant research area is the effect of cognitive load on the somatic marker hypothesis. Several studies (Hinson et al. 2002, 2003; Pecchinenda et al. 2006) show that cognitive load disrupts the somatic marker process, such that participants in the gambling task under high load did not develop somatic markers and were subsequently unable to adjust and improve their performance. Cognitive load inhibited the affective response of the participants and prevented them from distinguishing between rewarding and punitive gambles. While this was problematic in the gambling task (Bechara et al. 1994; Bechara et al. 2000), it may be a

benefit in the current setting. Success in the gambling task was predicated on participants having an affective response to the decks (a "feeling" of which was good/bad). However, optimal capital budgeting decisions often require the decision maker to set aside feelings, and use more objective criteria such as return rate.

Other research has demonstrated participants' unwillingness to make tradeoffs between choices involving conflicting goals (Luce et al. 1998; Luce et al. 1999). Specifically, when the choice is between an emotion laden attribute (for example, car safety) and a monetary attribute (price), participants are reluctant to trade the former for the latter for fear of negative emotional backlash. In the current context, this means that managers may be unwilling to trade working with someone they dislike (an affective cue) in exchange for earning a higher return, as seen in Kida et al. (2001). More recent research suggests cognitive load disrupts mental processing by reducing sensitivity to negative emotional consequences, thereby increasing willingness to make economically advantageous tradeoffs (Drolet and Luce 2004). Cognitive load may reduce affective feelings, allowing for more objective judgment.

A related stream of psychology literature suggests that cognitive load decreases the affective forecasting error known as impact bias (Hoerger et al. 2010; Sevdalis and Harvey 2009). Affective forecasting is when an individual predicts how a decision or event will make them feel in the future. Impact bias is the overestimation of those future feelings. Similar to the tradeoff research, it appears cognitive load may have the effect of dampening managers estimation of "how bad" it would be to work with someone they dislike, thus decreasing managers' reliance on affective information.

Cognitive load has received limited attention in the accounting literature. It has mainly been used to describe "information overload", or the effects of having too much information

during decision making (Eppler and Mengis 2004; Schick et al. 1990). These studies generally find that too much information alters search patterns and strategies, and may decrease decision accuracy. It has also been used to explain decision aid disadvantages such as impairment of task-related knowledge acquisition (Glover et al. 1997; Rose and Wolfe 2000). Cognitive load has also been shown to adversely impact memory recall from long term memory, which subsequently negatively affects investment decisions (Rose et al. 2004). None of these studies focused on multi-tasking, their primary interest was in the effects of the quantity or presentation mode of information on search strategy, recall ability, and decision accuracy. The current study examines cognitive load and its effect on cognitive processing, and the use of heuristics.

While there is some evidence to suggest cognitive load may increase reliance on the affect heuristic in simple choice situations, the decision context matters. There is a strong body of evidence that suggests cognitive load inhibits affective responses in gambling and gain/loss type decisions. The results of this literature suggest cognitive load may neutralize affect in a capital budgeting decision. If a manager is too preoccupied to develop a somatic response to an affective attribute, or too distracted to become emotionally stricken, then the role of affect may be greatly reduced in their decision making.

2.4 Hypotheses

I first seek to replicate the result of Moreno et al. (2002), I hypothesize that affect has a strong impact on decision makers. Decision makers are expected to reject alternatives associated with negative affect and accept those associated with positive affect. This affect heuristic can influence decision makers to ignore the framing effect and act contrary to prospect theory.

> **H1:** Participants exposed to negative affective cues will rely on their affective reactions to make decisions, resulting in prospect theory inconsistent choices (risk seeking in gain contexts and risk avoidance in loss contexts).

I also propose that cognitive load will "neutralize" participant reactions to affect-laden information within the capital budgeting decision. I argue that cognitive load will inhibit the processing of affective information. Decision makers under high cognitive load will revert to the framing effect and adhere to prospect theory, despite the presence of affective information.

> **H2:** Participants under cognitive load will not rely on affective reactions to make decisions, resulting in prospect theory consistent choices (risk avoidance in gain contexts and risk seeking in gain contexts).

3 Methodology

3.1 Participants

Participants were 96 college students, ranging from juniors to masters level, seeking accounting degrees at three different US universities[2]. The average age of participants was 26 (range 20 – 47). The argument for using an appropriate participant pool is one of external validity. The rationale is that professionals have acquired skills or experiences that allow them to overcome heuristics and biases. In that vein, the Kida et al. (2001) and Moreno et al. (2002) results were obtained on samples of managers. Both papers showed experienced professionals succumbing to the affect heuristic, suggesting the training and experience of the professionals made no difference in their decision making. If professionals and students react identically to the same biases, students are an acceptable proxy. My paper attempts to show that cognitive load impedes reliance on the affect heuristic. There is little reason to suspect that the effect of cognitive load would differ between management students and professionals.

[2] A total of 102 students were asked to participate in the study, 6 were removed due to incomplete instruments. Due to the design, and relatively small sample size, there were not adequate samples from each university to analyze the main result for a university effect. Demographically, there were no significant differences between the universities.

Demographic information reveals that 65% of participants were male (35% female). Chi-square analysis of the dependent variable (prospect theory consistent decision making) and gender revealed no significant differences in choice between genders ($\chi^2 = .915$, $p = .394$). Gender differences were not expected, in line with prior research (Moreno et al. 2002). Additionally, there were no significant differences in age, based on a median split ($\chi^2 = 1.945$, $p = .163$), suggesting no difference in behavior between younger and older participants.

3.2 Overview of Experiment

The experiment is a 2X2X2 between participants factorial design. Following Moreno et al. (2002), I manipulated frame (gain/loss context), affect (negative affect/no affect)[3], and cognitive load (load/no load). Participants were asked to imagine themselves in the position of an assistant controller for a publicly traded company, responsible for making decisions. The backstory was meant to include a job and responsibilities that participants could realistically be expected to fill in a few years' time. It was also meant to closely replicate the design in Moreno et al. (2002). A role-playing design is frequently used in experimental accounting research because it is difficult to experiment with real life decisions. A written scenario ensures control over the manipulations and information provided, and allows for comparability between participants on the exact same task. Participants were given a first task to manipulate cognitive load, then a secondary task to manipulate affect and frame and measure prospect theory consistency. After the second task, they completed manipulation checks for affect and cognitive load. A thirteen question risk profile (Grable and Lytton 1999) and a four question measure of impulsivity (Shiv and Fedorikhin 1999) were also included. Finally, participants completed demographic information (age, gender, school, class, major). Typically, the entire instrument

[3] In the original work, Moreno et al. (2002) manipulated both positive and negative affect compared to a control (no affect) group. Due to concerns over participant availability, I opted to exclusively examine negative affect.

took between 20 and 30 minutes to complete, however, individuals were not timed (see Appendix A for an example of the full instrument).

3.3 Independent Variables

3.3.1 Cognitive Load

The initial judgment task (Task 1), required participants to read a short narrative, examine a provided fact pattern, and make an inventory obsolescence decision. Participants in the cognitive load condition were then instructed to remember their rationale for their Task 1 decision, as they would be asked to recall this information later. No load participants were not given this instruction[4]. Later in the experiment, all subjects were asked to recall their rationale. Cognitive load participants should have anticipated this recall task, and been prepared. Participants in the no cognitive load condition should not have expected to be asked to recall the details of the previous task.

3.3.2 Frame

Borrowing from Moreno et al. (2002), I use information related to a capital budgeting decision to couch prospect theory elements. Participants must choose between a certain (estimated ROI is a single point) and risky (estimated ROI is a range) option. In the gain frame, the ROI of the certain option exceeds what is required to meet segment performance goals. The low estimate of the risky option is below the requirement, while the high estimate not only exceeds the requirement, but also the certain option. The average (or expected return) of the risky option minimally exceeds the required return and certain option return. For example, the

[4] This differs from traditional cognitive load manipulations of word/number memorization, see Conway et al. (2005) for a review. However, the task was chosen for its realistic nature. An accounting manager is not likely to be required to memorize a span of words or numbers, but needs to keep decisions and details accessible for meetings and discussions with superiors.

required ROI is set at 10%, the certain option returns 12%, while the risky option range is 8-18% (average of 13%). Prospect theory predicts that in a gain frame, the certain option will be chosen, due to loss aversion (if the risky option is taken, there is a chance the requirement will not be met).

In contrast, for the loss frame, the ROI of the certain option is below the requirement to meet segment performance goals. The low estimate of the risky option is below the requirement, while the high estimate exceeds the requirement as well as the certain option. However, the average (or expected return) of the risky option is below both the required return and the certain option return. As an example, the required ROI is set at 14%, the certain option returns 13%, and the risky option range is 8-16% (Average of 12%). Here, prospect theory predicts that in a loss frame, the risky option will be chosen, because if the certain option is taken, there is no chance to meet the requirement, so there is higher incentive to take the risk.

3.3.3 Affect

Similar to Moreno et al. (2002), each investment required working with a different segment manager. All conditions implied that the project managers were equally talented. The negative affect conditions received additional personal information suggesting one manager was difficult to work with (arrogant, condescending). The no affect condition was a control condition that received no information regarding the personality of either manager they would be working with. In all affect conditions, the negative affect was attached to the choice predicted to be favored by prospect theory. Thus, the certain (risky) choice received the negative affect information in the gain (loss) frames. This way, like the Moreno paper, negative affect should encourage participants to be risk seeking (averse) in gain (loss) contexts.

[Insert Tables 1 and 2 here]

The frame and affect manipulations differ from the Moreno et al. (2002) paper in several ways. First, they proposed their options in terms of dollar amounts[5]. Second, they constructed their choices so that the alternative with negative affect had the highest dollar amount. This means in the gain (loss) condition the certain (risky) choice had a higher expected value. They argue that this is a stronger test of affect because participants in the affect condition were not only differing from prospect theory, but also taking a lower valued project based on their feelings. I chose the more traditional prospect theory presentation (the reverse of their construction), because their scenarios potentially skew the control condition results. For example, given no affective factors and the options in footnote 5, the certain option is arguably much more appealing, potentially leading to an artificially high number of prospect theory consistent participants in the control sample.

3.4 Manipulation Check

After completion of Task 2, participants in the negative affect conditions were asked to indicate how the qualitative factors of the affect-laden choice made them feel. Specifically, participants were asked to assess how they felt toward the affect-laden option on four relevant emotions: anger, frustration, happy and liking. Answers were recorded on seven-point scales where the endpoints were labeled "strongly disagree" and "strongly agree," and the midpoint "neutral." Participants in the no affect conditions were asked the same question; however, as they were not provided affective queues, their responses were expected to be more neutral. The negative affect conditions were expected to have higher scores on the two negative emotions,

[5] From Moreno et al. (2002): "the certain option yielded a certain profit of $481,000, whereas the more risky alternative offered a 40% probability of a $552,000 profit and a 60% probability of a $415,000 profit, resulting in an expected value of $469,800).

and lower scores on the two positive emotions, indicating greater discontent relative to the no affect conditions.

Participants' affective reactions to the negative affect-laden choice were compared. The mean of the affect group was significantly higher for anger ($M_{affect} = 3.27$, $M_{no\ affect} = 2.15$, $p < .001$), and for frustration ($M_{affect} = 3.65$, $M_{no\ affect} = 2.6$, $p = .004$). Additionally, Participants in the affect group had a significantly lower rating for liking ($M_{affect} = 3.27$, $M_{no\ affect} = 4{,}13$, $p = .011$). This suggests that the manipulation was effective in eliciting negative emotions in the participants toward the negative affect-laden choice.

[Insert Figure 1 here]

As a check of the cognitive load manipulation, participants were asked to recall their rationale for their Task 1 decision. Cognitive load participants were explicitly told this was going to happen later in the experiment, while those in the no load condition were not expecting this recall task. I coded the number of words written and number of supporting reasons given as measures of recall task performance. I expected those in the cognitive load condition to perform better. Participants in the cognitive load condition did not differ from those in the no load condition on words written ($M_{load} = 44.6$ $M_{no\ load} = 44.5$, $p = .497$) or on supporting reasons ($M_{load} = 2.15$ $M_{no\ load} = 2.15$, $p = .487$). These results suggest no difference in performance, and possible ineffectiveness of the cognitive load manipulation[6].

4 Results

4.1 Prospect Theory Consistency

[6] An alternative analysis would be to have independent raters, blind to the experimental conditions, rate the strength of the rationale provided. I would expect the cognitive load condition to yield stronger rationales than the no load condition.

Table 3 contains the frequencies (total number and percentage) of participants that made decisions that were consistent and inconsistent with prospect theory in each of the conditions tested. Table 4 is the loglinear analysis conducted on the data. According to (Field 2009), loglinear analysis is the appropriate statistical tool to evaluate multiple categorical variables. In this case, the dependent variable is a dichotomous category: prospect theory (consistent/inconsistent), as are the independent variables: affect (negative/none), frame (gain/loss), and cognitive load (load/no load). The same analysis was also conducted in Moreno et al. (2002) on a 2X2 design.

[Insert Tables 3 and 4 here]

The results indicate that the loss manipulation was ineffective. Thus, the significant main effect for frame in Table 4 ($\chi^2 = 25.506$, $p < .001$). Participants in the gain frame control condition conformed to prospect theory (92% consistent). Participants in the loss frame control condition realized their division was performing poorly[7]. However, they were extremely reluctant to select the risky choice, as predicted by prospect theory (18% consistent). Similar unwillingness to take risk was documented in Moreno et al. (2002).

This result is most likely due to an unenticing risky option, and too weak of a frame. Pilot testing was unable to be conducted, thus all participants received the same choice[8]. I suspect that the certain option was too close to the target (only 1% short), and the guarantee of falling just shy was more appealing to participants than the risky option. Levin et al. (1998) review a large number of framing studies to examine disparate results. A more effective way to frame the loss

[7] Participants were asked to rate on a 0 – 10 scale "very poorly" to "very well" how well their segment was performing. Participants in the loss conditions rated the segment performance as significantly worse ($M_{loss} = 3.86$, $M_{gain} = 7.69$, $p > .001$).

[8] Required ROI in the loss condition was 14%, the certain investment returned 13%, and the risky investment returned 8 – 16%.

may be to have options contain actual losses. For example, Moreno et al. (2002) gave participants choices that involved upfront costs.

4.2 Replication of Moreno et al. (2002).

Consistent with the prior work of Moreno et al. (2002), there is a marginally significant main effect for affect on prospect theory consistent choice in Table 4 ($\chi^2 = 2.762$, $p = .097$). These results were diluted by the failure of the loss manipulation. Similar to Moreno et al. (2002), the affect*frame interaction is insignificant ($\chi^2 = 1.021$, $p = .312$). This implies that affect did not vary in its effect on choice between the gain and loss frames, which is odd considering the failure of the loss frame discussed previously[9]. A secondary loglinear analysis restricted to the gain conditions (Table 5) reveals a much stronger main effect for affect ($\chi^2 = 3.902$, $p = .048$). These results replicate Moreno et al. (2002) and confirm H1, demonstrating that negative affect alters choice preference. Participants in the affect conditions relied more heavily on the affect heuristic than framing effects to make their decisions. This can be seen clearly in Table 3; under the no load, gain frame, participants in the no affect condition were consistent with prospect theory 92% of the time, while participants in the negative affect conditions were consistent only 43% of the time.

4.3 Cognitive Load

I find that cognitive load does not significantly alter risk preferences, consistent with prior literature (Whitney et al. 2008). Table 3 shows participants in the cognitive load, no affect, gain condition were consistent with prospect theory 71% of the time, while control participants

[9] Note that there is virtually no difference in choice between the negative affect (89% inconsistent) and no affect (82% inconsistent) loss conditions in Table 3.

were consistent 92% of the time[10]. There is an insignificant main effect for cognitive load in Table 4 ($\chi^2 = .297$, p = .586), as well as in the gain restricted sample in Table 5 ($\chi^2 = .044$, p=.834). The cognitive load*frame interaction in Table 4 is also insignificant ($\chi^2 = .351$, p = .553), which implies the effects of cognitive load did not vary between frames.

The only marginally significant two way interaction in Table 4 is affect*cognitive load ($\chi^2 = 3.054$, p = .081). The same holds for the gain restricted sample in Table 5 ($\chi^2 = 2.883$, p = .09). Table 3 shows that in the gain condition, cognitive load/affect participants were more prospect theory consistent (67%) as compared to no cognitive load/affect participants (48%). These results partially support H2; cognitive load impedes the use of affective information, resulting in reliance on the framing effect, and prospect theory consistent behavior (risk aversion in the gain frame).

This is further supported by evidence of participants' emotional reactions to the affect-laden option. Participants in the cognitive load and no load conditions had similar responses for anger ($M_{load} = 2.74$ $M_{no\ load} = 2.67$, p = .839), frustration ($M_{load} = 3.06$ $M_{no\ load} = 3.2$, p = .714), and happiness ($M_{load} = 3.32$ $M_{no\ load} = 3.72$, p = .203), and only marginally significant differences for liking ($M_{load} = 3.42$ $M_{no\ load} = 4.0$, p = .088). This suggests that participants had similar affective feelings across the load and no load conditions, but only participants under the no load conditions acted on their negative emotions.

[Insert Figure 2 here]

Since cognitive load and no load participants had similar emotional reactions, but made different choices, the findings appear to be most consistent with earlier cited research that

[10] Had the loss manipulation succeeded, there should be a similar pattern of prospect theory consistency in the loss frame. However, because it failed there is actually a pattern of prospect theory inconsistency over the load and no load (no affect) conditions (both 82% inconsistent) in the loss frame.

suggests cognitive load can impede affect-driven biases, such as impact bias (Hoerger et al. 2010; Sevdalis and Harvey 2009). This appears more likely than the somatic marker hypothesis, in which cognitive load directly impairs affective reactions. Had the cognitive load participants experienced significantly less emotional reaction than the no load participants, this alternative would have been more plausible. However, more testing is required for a definitive explanation.

4.4 Additional Analysis

It is possible that other personal attributes contributed to the result. Shiv and Fedorikhin (1999) showed that the effects of cognitive load were moderated by impulsivity. Highly impulsive people were greatly affected by cognitive load, while cognitive load had no effect on participants scoring low on impulsivity. In another study Hinson et al. (2003) examine the effect of cognitive load on impulsive decision making. When choosing between a smaller immediate reward, and a larger delayed reward, they found that participants under high cognitive load discounted delayed rewards much more than those in the low load group. They conclude that high cognitive load results in more impulsive decision making (the need for more immediate gratification).

Participants complete a risk profile (Grable and Lytton 1999), as well as an impulsivity scale (Shiv and Fedorikhin 1999). I ran tests assessing high versus low risk and high versus low impulsivity participants. Preliminary analysis shows that the risk profile scores for the sample have a distribution that approximates normal (Kolmogorov-Smirnov and Shapiro-Wilks tests with $p > .05$). The impulsivity scale fails the normal distribution tests (K-S and S-W both with $p < .05$). However, further analysis reveals it is bimodal about the median, allowing for a median split. Given these results, I split both continuous variables on the median, into groups of high and low. Observations equal to the median were dropped from the analysis. Chi-square test reveal

that risk seeking behavior was significantly related to risk score ($\chi^2 = 4.288$, p = .038); however, adherence to prospect theory was not related to risk score ($\chi^2 = .82$, p = .365). Impulsivity score was unrelated to risk seeking behavior ($\chi^2 = .07$, p = .792) or adherence to prospect theory ($\chi^2 = .089$, p = .765). These results indicate that participants' risk appetite and impulsive tendencies do not affect the results.

A possible explanation for the lack of relationship between risk, impulsivity and prospect theory adherence is weak reliability of the risk and impulsivity scales. The risk profile generated a poor result on Cronbach's Alpha reliability test, $\alpha = .613$ in my sample, $\alpha = .751$ in the Grable and Lytton study. Typically, a score needs to be in the .7 to .8 range, minimally, for valid use of the scale to make group comparisons (Bland and Altman 1997). Similarly the impulsivity scale had a weak result, $\alpha = .53$ in my sample, $\alpha = .77$ in Shiv and Fedorikhin. Fatigue or disinterest could account for the poor reliability of the instruments; both of these measures were included at the end of the instrument, after the two decision tasks. In contrast, the risk profile was the only test given in the Grable and Lytton. While the impulsivity scale was given at the end of Shiv and Fedorikhin's experiment, their study was of shorter duration.

As robustness check, I analyze the relationships in a binary logistic regression using the original continuous variable as a predictor variable[11]. When risky option selection is regressed on risk score, risk score is significant (B = .113, p = .04). This suggests that high risk individuals are more likely to choose the risky option. However, when prospect theory consistency is regressed on risk score, the relationship is insignificant (B = .001, p = .987), suggesting that there is no relationship between risk profile and making prospect theory consistent choices. Impulsivity was not significant in the risky option selection (B = -.061, p = .803) or prospect theory consistency

[11] Some researchers take issue with the validity of results obtained with median splits (Cohen 1983; Maxwell and Delaney 1993). Their primary concerns are an underestimation of the strength of the relationship between variables, and a loss of statistical power.

(B = .044, p = .840) regressions. These results provide additional support that cognitive load moderates the affect-prospect theory choice consistency relationship.

5 Conclusion

This study provides evidence that the influence of affective reactions on risky decisions can be reduced by cognitive load. Prior literature has demonstrated that the affect heuristic tended to dominate the framing effect, resulting in prospect theory inconsistent choices (Moreno et al. 2002). Specifically, negative affect associated with a certain (risky) option will cause managers to select the risky (certain) option in a gain (loss) context, the exact opposite of prospect theory predictions. The current study introduced cognitive load as a moderator of the affect heuristic. While replicating the original result, I also find reliance on the affect heuristic is dependent on the availability of cognitive resources and when those resources are strained, individuals are less reliant to affective cues. Cognitive load can reduce dependence on affective reactions and lead to reliance on the framing effect to guide decision making, resulting in prospect theory consistent choices.

While the exact mechanism for this result will require further research. I speculate that cognitive load impedes participants' ability to process affective information, rather than prevent them from feeling emotions. I draw this conclusion based on evidence that participants in both the cognitive load and no load conditions had similar affective responses, but only those in the no load conditions appeared to act on that information to select the option inconsistent with prospect theory. This is consistent with prior psychology literature suggesting that cognitive load may reduce the strength of affective biases such as impact bias (Hoerger et al. 2010; Sevdalis and Harvey 2009).

This has a wide range of applications in accounting. Prospect theory has been used to describe a wide range of observed behaviors including asset purchasing decisions (Jackson et al. 2009), R&D decisions (Case and Shane 1998), tax preparer aggressiveness (Schisler 1994), and audit manager aggressiveness (Cohen and Trompeter 1998). Moreno et al. (2002) proposed that affect could explain unexpected results or staunch adherence to risk averse (seeking) behavior. For example a strong dislike (fear) of the government could explain risk seeking (aversion) in tax aggressiveness. This study confirms that affect can influence risky decisions, but also suggests that the effects may be mitigated by other contextual variables, namely cognitive load. These prior studies are meant to examine the decisions of business professionals. Most professionals are extremely busy individuals who are constantly multi-tasking and juggling responsibilities. Thus, including a cognitive load manipulation to more accurately mimic their actual decision making environment can potentially provide clearer insight into how they would make these decisions in the real world.

This study is by no means definitive, and is subject to the usual limitations of experimental research. The experiment was conducted on upper level accounting students, who will eventually be making these decisions, but who currently have at best limited actual experience. The trend in recent accounting experimental work is to use professional subjects (Birnberg 2011). While active business professionals would have been the preferred participant group, the theory and prior literature suggests accounting students are an acceptable proxy. External validity is the primary concern for proxy participants. The argument is that experience may allow individuals to develop skills or familiarity that allows them to overcome biases and heuristics. However, Moreno et al. (2002) already demonstrated that experienced managers were

susceptible to the affect heuristic, in that way they are similar to students. Additionally, there is no strong theoretical reason to expect cognitive load to affect the two groups differentially.

While students were asked to imagine themselves as the person making this decision, it is nevertheless a role-playing activity. There were no true repercussions for actions or anything at stake for the participants. Dislike for a fictional co-worker may be tempered compared to dislike for a real person. Similarly, while every attempt was made to make the decision tasks as realistic as possible, they are rather simplified. For the sake of experimental brevity, the information provided was much more condensed than what is normally available to a manager when making a capital budgeting decision. There are clear design issues (most noticeably the failure of the loss manipulation) that were unable to be pre-tested out due to time and participant pool restraints.

Accounting is generally not at the forefront of behavioral and cognitive research. However, it is important to keep abreast of the latest theories being tested in psychology. The results in this paper suggest that cognitive load can potentially impact any accounting-based decision making study involving heuristics and biases. Future accounting decision making research should consider the ramifications of cognitive load. Generally, cognitive load is seen as a negative (limiting processing resources). However, in certain circumstances it could be a positive, if it leads individuals to ignore "noisy" information, such as affective feelings, which may cloud judgment.

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Tables, Figures and Appendices

Table 1

Summary of Experimental Conditions

	Gain Frame[a]		Loss Frame	
	Cognitive Load	**No Load**	**Cognitive Load**	**No Load**
Negative Affect	Negative affect associated with certain alternative		Negative affect associated with risky alternative	
No Affect		Control		Control

[a] Subjects in the gain (loss) frame were told their segment performance was strong (weak). Additionally their certain investment option was above (below) their target ROI.

Table 2

Summary of Experimental Predictions

	Gain Frame		Loss Frame	
	Cognitive Load	**No Load**	**Cognitive Load**	**No Load**
Negative Affect	Risk Averse (H2)	Risk Seeking (Moreno et al. 2002)	Risk Seeking (H2)	Risk Averse (Moreno et al. 2002)
No Affect	Risk Averse (H1)	Risk averse (Prospect Theory)	Risk Seeking (H1)	Risk Seeking (Prospect Theory)

Table 3

Summary of Results

Number (%) of Subjects Making the Prospect Theory Consistent and Inconsistent Choice

	Gain Frame			
	Cognitive Load[d]		**No Load**	
	Consistent with Prospect	**Inconsistent with Prospect**	**Consistent with Prospect Theory**	**Inconsistent with Prospect**
Negative Affect[a]	8 (67%)	4 (33%)	6 (43%)	8 (57%)
No Affect[b]	10 (71%)	4 (29%)	11 (92%)	1 (8%)

	Loss Frame			
	Cognitive Load		**No Load**	
	Consistent with Prospect Theory	**Inconsistent with Prospect Theory**	**Consistent with Prospect Theory**	**Inconsistent with Prospect Theory**
Negative Affect	3 (23%)	10 (77%)	1 (11%)	8 (89%)
No Affect	2 (18%)	9 (82%)	2 (18%)	9 (82%)

[a] Negative affect was manipulated by including negative personality qualities about the manager the subject would have to work with the quantitative data.

[b] Subjects in the no affect conditions were given identical quantitative information regarding each investment as the affect condition, but no affective information.

[c] Prospect Theory predicts risk avoidance (seeking) in a gain (loss) frame

[d] Subjects in the cognitive load condition were asked to commit details about an earlier accounting choice to memory for future recall. No load subjects completed the same decision task, but were not asked to remember any details

Table 4		
Full Sample Statistical Analysis[a]		
Loglinear Analysis		
	Chi-square	p-value
Main effects:		
Affect	2.762	0.097***
Frame	25.506	<0.001*
Cognitive Load	0.297	0.586
Interactions:		
Affect x Frame	1.021	0.312
Affect x Cognitive Load	3.054	0.081***
Frame x Cognitive Load	0.351	0.553
Affect x Frame x Cognitive Load	0.522	0.47
[a]2x2x2 Analysis: Affect x Frame x Cognitive Load		
* Significant at 1% level		
*** Significant at 10% level		

Table 5		
Gain Frame Statistical Analysis[b]		
Loglinear Analysis		
	Chi-square	p-value
Main effects:		
Affect	3.902	0.048**
Cognitive Load	0.044	0.834
Interactions:		
Affect x Cognitive Load	2.883	0.09***
[b]2x2 Analysis: Affect x Cognitive Load		
** Significant at 5% level		
*** Significant at 10% level		

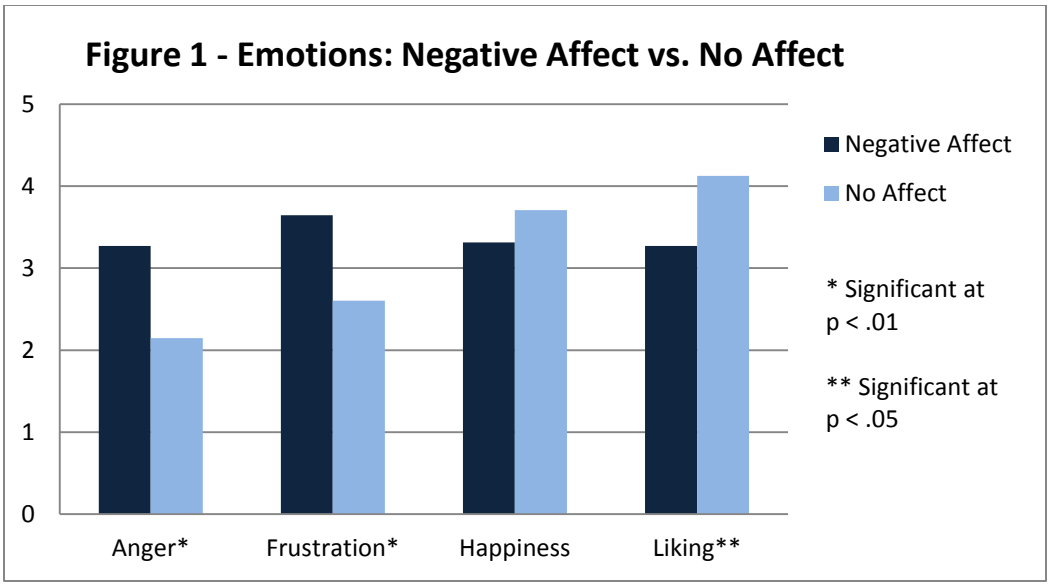
Figure 1 - Emotions: Negative Affect vs. No Affect
5
4
3
2
1
0
Anger*
Frustration*
Happiness
Liking**
Negative Affect
No Affect
* Significant at p < .01
** Significant at p < .05

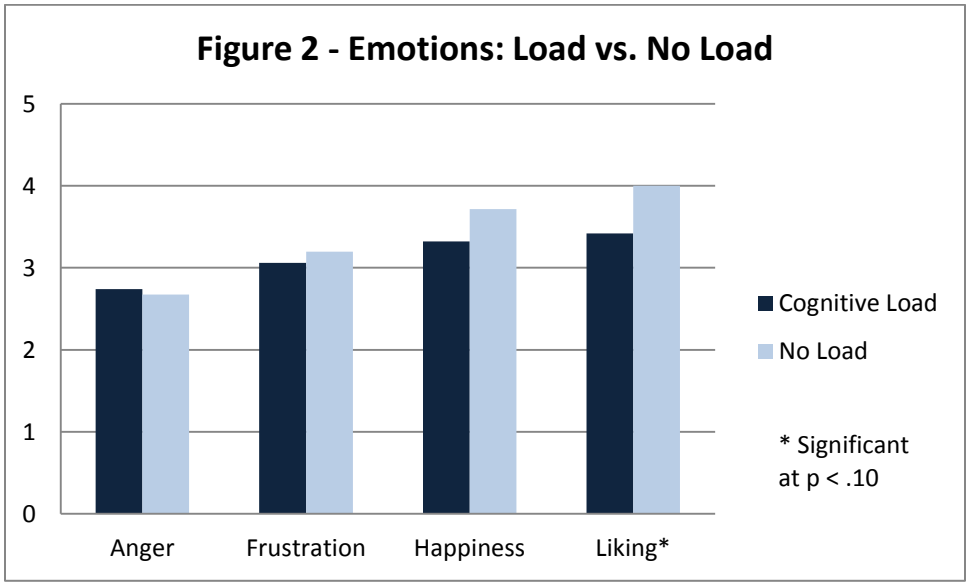
Figure 2 - Emotions: Load vs. No Load
5
4
3
2
1
0
Anger
Frustration
Happiness
Liking*
Cognitive Load
No Load
* Significant at p < .10

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

Dear Participant:

The following exercises are designed to explore judgment and decision making in accounting students. You will be asked to complete several short personality profile questionnaires and make two accounting-related decisions. You will be taking on the role of an assistant controller in a company, and asked for your input on two scenarios that a person of that level would be likely to face.

Please read all the information completely and proceed through the case sequentially (i.e., please complete the items in each part in order and do not skip any items).

If you are interested in the results of this research or have questions, please e-mail Matt Hayes and we will send you a summary of our findings and/or further discuss the purpose of the study with you. Taking part in this study is voluntary. Return of the case and questionnaire will be considered your consent to participate. Participation has no bearing on your grade.

Strict confidentiality for your answers will be maintained at all times. We are not collecting personally identifying information. Responses to demographic questions will be used only in aggregate form.

Once you have finished a section of the case, please do not refer back to that section or change any of your responses subsequently.

Thank you for participating.

D. Jordan Lowe

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PLEASE GO TO THE NEXT PAGE

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

Pre-evaluation Questionnaire

The following assessment is designed to capture how you feel **right now**. Each word describes an emotion or feeling. Read each item, and then write the number that corresponds to your current feeling in the space next to the word.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

Upset	
Hostile	
Alert	
Ashamed	
Inspired	
Nervous	
Determined	
Attentive	
Afraid	
Active	

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

TASK 1

You work for Galen Medical Inc., a publicly traded, medical technology company. You are the assistant controller for the Medical Products segment. Your primary duties include overseeing the preparation of the segment financial statements, as well as supporting senior leadership in the overall management of the segment.

During the year-end 2013 preparation of the financial statements, concerns have been raised regarding the **value of inventory** of one of your segment's top selling lines. The products in question are joint replacement prosthetics used in hip and knee replacement surgeries. In the prior year it was noted that several competitors were conducting research incorporating newly discovered plastics technology to develop a more wear-resistant prosthetic. Not only were these plastics longer lasting, but also cheaper to produce. The competition's efforts were only at the early research and development stage, however. No financial statement disclosures or adjustments were deemed appropriate for 2012. During 2013, updated information has become available (as shown on the next page).

YOUR TASK IS TO DETERMINE IF SIGNIFICANT INVENTORY OBSOLESCENCE HAS OCCURRED, AND IF FINANCIAL STATEMENT ADJUSTMENTS ARE NECESSARY IN 2013.

In performing this task, keep in mind that inventory is initially recorded on the balance sheet at cost. Obsolescence often occurs when the actual value of inventory falls below the original cost. This may be due to a decrease in demand for a product and/or changes in technology. If the inventory is unable to be sold, the value must be marked down. Generally Accepted Accounting Principles (GAAP) require inventory to be held at the lower of cost or market value, meaning the lower of the original cost or the current market value.

A. Galen Medical currently has 10,000 prosthetic units in year-end stock, carried at a cost of $5,500 each. This is equivalent to six month's sales. Production of the unit is ongoing.

B. Over the last three years, the average selling price is $6,000.

C. **TECHNOLOGICAL OBSOLESCENCE.** The competition's design is a technologically superior product. Your company has also been developing an upgrade, but it is not expected to be ready until the fourth quarter of next year (10-12 months away). Production of the old design has continued to serve customer's needs until then.

D. **MARKET OBSOLESCENCE.** The new plastics are cheaper than current materials to produce. Thus, the new prosthetic might sell at a lower price than your product has historically sold. Significant pricing changes might be necessary in order to sell existing inventory and continuing production. Profitability is a question.

E. **PRODUCT AVAILABILITY.** The head of marketing thinks any significant loss projections on the existing inventory may be premature. Although the competition is accepting orders, she estimates that it would take at least 8-10 months for the competition to gear up to full production.

F. **INTERNATIONAL MARKETS.** Past experience indicates that there is a healthy third-world market for products such as the old artificial joint. Due to the lag in medical training in underdeveloped countries, their surgeons are unqualified to use the newest medical technologies and techniques. Preliminary analysis indicates 500 units per month could be expected to sell in these foreign markets, at a price which would yield positive profit margins.

Selected 2013 unaudited financial data is provided below.

2013 SUMMARIZED, NON-AUDITED SEGMENT FINANCIAL INFORMATION

Net Sales	**$400,000,000**
Inventory	**$ 120,000,000**
Net Income	**$ 25,000,000**

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

QUESTIONS

1. What do you estimate as the probability that an inventory obsolescence problem exists for the product line discussed in the case? (Circle the appropriate %)

   0…..10%.....20%.....30%.....40%.....50%.....60%.....70%.....80%.....90%.....100%

2. Based upon your response to Question 1, what do you estimate as the likelihood that you would propose an inventory write-down? (Circle your choice)

   Definitely Not 1…..2…..3…..4…..5…..6…..7…..8…..9…..10 Definitely

3. In reaching your decision, you considered six pieces of information – items labeled A through F – Please look back through these pieces of information and rate the importance/relevance which YOU would attach to each piece of information.

0	1	2	3	4	5	6	7	8	9	10
Completely Unimportant					Neutral					Very Important

   You may assign any number between 0 and 10 for each item below. You do not have to "rank" the items either (if items are perceived to be equally important, they should receive the same number).

   ENTER YOUR EVALUATION FOR EACH ITEMS A THROUGH F

   A_____ B_____ C_____ D_____ E_____ F_____

4. **Please try and remember your rationale for your decision as you complete the remaining tasks. This is VERY IMPORTANT as you will be asked to RECALL your reasons at a later time (without looking back).**

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

TASK 2

Your segment manager has asked you to assess several potential investments, and provide feedback on which investment should be pursued. There are limited funds, and only one can be implemented. You will be asked to allocate 100 points across the two proposals to indicate your preference, (do not allocate 50-50, make sure your first choice receives more points).

Your annual performance success is measured in part by the financial success of the segment investments. **In the year to date, your segment has performed well and it will meet its specified performance goals.** There are also several highly promising projects in the pipeline for the next few years. With your recent success you are in line for a large bonus and raise.

As long as your projects continue to meet a **return on investment (ROI) of 10%** your performance goals should be met and your bonus will be secured.

Project 1

This project relates to an innovation on existing technology to enhance product features. This product has steady demand and the expected return is highly predictable. The cost is the same as project 2.

Estimated ROI: **12%**

In addition to the ROI information, there are qualitative factors to consider. This would be a joint project with another segment. You would be required to work with the Prescription Products segment controller. He is very arrogant, and condescending. He has made it clear that he does not need your input and that you are to be his subordinate and follow his instructions. However, he is well-regarded in the company for his strong performance record and completing projects on time.

Project 2

This project relates to a new product development. This product is seen as a potential "foot in the door" to a new market segment. However, it is unknown how successful the product will be. The cost is the same as project 1.

Estimated ROI: **8 – 18%**

In addition to the ROI information, there are qualitative factors to consider. This would be a joint project with another segment. You would be required to work with the Consumer Products segment controller. He is new to the company, and you have not previously worked with him. He comes with excellent credentials, and is already known for being a strong project manager.

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

QUESTIONS

1. Please indicate your investment preference for the above projects. 100 points should be allocated between Project 1 and Project 2. Do not allocate evenly (50-50), you must express a preference for one of the projects.

   Project 1_____ **Project 2**_____

2. In the scenario, how well was the segment performing? (Circle a choice)

   Very Poorly 0....1…..2.....3.....4…..5…..6.....7.....8.....9.....10 Very Well

3. Do you recall being asked to remember your rationale for your decision in TASK 1 (the inventory obsolescence decision)? (Circle one)

   YES NO

4. How did the qualitative factors of **PROJECT 1** make you feel? Please circle a number corresponding to each emotion/sensation.

Anger

1	2	3	4	5	6	7
Strongly Disagree			**Neutral**			**Strongly Agree**

Frustration

1	2	3	4	5	6	7
Strongly Disagree			**Neutral**			**Strongly Agree**

Happy

1	2	3	4	5	6	7
Strongly Disagree			**Neutral**			**Strongly Agree**

Liking

1	2	3	4	5	6	7
Strongly Disagree			**Neutral**			**Strongly Agree**

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

TASK 3

This is a memory task. Please write down your justification regarding the inventory obsolescence decision you made in **TASK 1, without referring back to the material**.

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

PROFILE QUESTIONS PART I - These questions are designed to assess personality characteristics, please respond with how you would normally act.

1. In general, how would your best friend describe you as a risk taker?
   a. A real gambler
   b. Willing to take risks after completing adequate research
   c. Cautious
   d. A real risk avoider

2. You are on a TV game show and can choose one of the following. Which would you take?
   a. $1,000 in cash
   b. A 50% chance at winning $5,000
   c. A 25% chance at winning $10,000
   d. A 5% chance at winning $100,000

3. You have just finished saving for a "once-in-a-lifetime" vacation. Three weeks before you plan to leave, you lose your job. You would:
   a. Cancel the vacation
   b. Take a much more modest vacation
   c. Go as scheduled, reasoning that you need the time to prepare for a job search
   d. Extend your vacation, because this might be your last chance to go first-class

4. If you unexpectedly received $20,000 to *invest*, what would you do?
   a. Deposit it in a bank account, money market account, or an insured CD
   b. Invest it in safe high quality bonds or bond mutual funds
   c. Invest it in stocks or stock mutual funds

5. In terms of experience, how comfortable are you investing in stocks or stock mutual funds?
   a. Not at all comfortable
   b. Somewhat comfortable
   c. Very comfortable

6. When you think of the word "risk" which of the following words comes to mind first?
   a. Loss
   b. Uncertainty
   c. Opportunity
   d. Thrill

7. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value; bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?
   a. Hold the bonds
   b. Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets
   c. Sell the bonds and put the total proceeds into hard assets
   d. Sell the bonds, put all the money into hard assets, and borrow additional money to buy more

8. Given the best and worst case returns of the four investment choices below, which would you prefer?
   a. $200 gain best case; $0 loss worst case
   b. $800 gain best case; $200 loss worst case
   c. $2,600 gain best case; $800 loss worst case
   d. $4,800 gain best case; $2,400 loss worst case

9. In addition to whatever you own, you have been given $1,000. You are now asked to choose between:
   a. A sure gain of $500
   b. A 50% chance to gain $1,000 and a 50% chance to gain nothing

10. In addition to whatever you own, you have been given $2,000. You are now asked to choose between:
    a. A sure loss of $500
    b. A 50% chance to lose $1,000 and a 50% chance to lose nothing

11. Suppose a relative left you an inheritance of $100,000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which one would you select?
    a. A savings account or money market mutual fund
    b. A mutual fund that owns stocks and bonds
    c. A portfolio of 15 common stocks
    d. Commodities like gold, silver, and oil

12. If you had to invest $20,000, which of the following investment choices would you find most appealing?
    a. 60% in low-risk investments 30% in medium-risk investments 10% in high-risk investments
    b. 30% in low-risk investments 40% in medium-risk investments 30% in high-risk investments
    c. 10% in low-risk investments 40% in medium-risk investments 50% in high-risk investments

13. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?
    a. Nothing
    b. One month’s salary
    c. Three month’s salary
    d. Six month’s salary

Appendix A: Example Instrument – Cognitive Load, Negative Affect, Gain Condition

PROFILE QUESTIONS Part II - Please rate on the scales how well the following words describe your personality, or how you typically act.

Impulsive

1	2	3	4	5	6	7
Seldom			**Somewhat**			**Usually**

Careless

1	2	3	4	5	6	7
Seldom			**Somewhat**			**Usually**

Easily Tempted

1	2	3	4	5	6	7
Seldom			**Somewhat**			**Usually**

ADDITIONAL INFORMATION

A. Age:_____

B. Gender: Male Female

C. College/University:_____

D. Year in school:

Freshman Sophomore Junior Senior Graduate

E. Major:_____