

**Motivation in Accounting Decisions:  
The Effects of Rewards and Environment on Decision Performance and Knowledge  
Acquisition**

By

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## Abstract

The present study investigated the effects of reward structure and environmental conditions (i.e., context) on integrated motivation for an accounting task using 101 undergraduate accounting students. A computer-simulated task in which students were asked to estimate allowance for doubtful accounts was used to create and manipulate reward structure (i.e., performance-contingent vs. task-contingent) and context (i.e., self-determined vs. controlled). It was hypothesized that a self-determined context would create greater motivation than a controlled context when motivation was measured by response intensity, response persistence, integrated response intensity, and integrated response persistence. An ordinal interaction was also hypothesized such that in a self-determined context, performance-contingent rewards would create more motivation than task-contingent rewards, and in a controlled context, performance-contingent rewards would create less motivation than task-contingent rewards.

Results indicated that response intensity, as measured by time on task, did not support the hypothesized main effect or the ordinal interaction; however, when self-reported effort was used as a measure of response intensity, support for both hypotheses was found. Similarly, when response persistence was measured by time on task, support for the hypotheses was not found; however, when number of problems worked during the free choice period was used to assess response persistence, hypothesized effects were supported. For integrated response intensity and persistence, support for the hypotheses was not found.

## Dedication

This project is dedicated to my wife and family. Beth you have been a great source of emotional strength. Our first year of marriage has been so intermingled with this project that it seems like we should have written “for better or for worse, for dissertation results or for no significant differences” right into the vows. It brings to life the verse “I will make a helper suitable for him” (Genesis 2:18). You have been a great source of emotional comfort and your prayers have carried me to the finish. I also appreciate your strong critical thinking and writing skills and your patience in sharing those gifts with me. I am grateful for your discretion in encouraging me. You chose the right moments in which to bite your lip or assertively voice your opinion. You have pushed me towards a better dissertation and made me a better researcher. This project could not have been completed without your emotional, technical, and spiritual support. I can empirically prove that you are the best wife a man could hope for.

I never dreamed of being a professor. If they gave superlatives at my undergraduate institution, my fellow students would have voted me “Most likely not to be a college professor.” In fact, I set out to avoid the area of educating others, but I have been drawn back towards education by the models in my family. I could not resist the quality of life that my dad provided for our family. As a professor, he was able to work late at night and early in the morning so that he could attend little league baseball games or high school wrestling matches. I am only beginning to appreciate his commitment to our family. I admire his ability to solve problems and hope that I can emulate his abilities in my research. I want to thank my mom for modeling a great commitment to her students. She has left many administrative battles behind and focused on her students. I hope that I can maintain the same commitment to my students. I cannot convince her that I am not the greatest accounting student to ever walk the earth, and for that I am thankful.

The modeled commitment to education has passed through more than one generation. My grandfather, Robert Blackmon, was the premiere self-educated man. If he were given an opportunity to go to a university, he would have read every book in the library. I suspect he would like to have his name mentioned in a university library. My

other grandfather, John Richardson, was a lifelong student and school principal committed to education without prejudice. Both of my grandmothers were fine teachers. They have since passed from this life, but I hope they can see their impact.

I have been fortunate to have such a wonderful family. But the most significant figure is my Heavenly Father. I committed to finish this dissertation for Him. It is His willingness to sacrifice His Son Jesus for my sins that I will be eternally grateful. I owe Him my life.

“Whatever you do, work at it with all your heart, as working for the Lord, not for men, since you know that you will receive an inheritance from the Lord as a reward.”

Colossian 3:23-24

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Accountants tend to see control as a solution; sociologists as a problem.

*Luc Wilkin quoted in Hofstede (1981)*

## Chapter 1

### INTRODUCTION

#### 1.1 Background

Libby and Luft (1993) asserted that performance is determined by four factors represented in the following equation:  $\text{Performance} = f(\text{Ability, Knowledge, Motivation, Environment})$ . Much of the accounting literature has focused on the factors of ability, knowledge, and environment in an attempt to explain differences in experience and performance (e.g., Ashton and Brown (1982); Bonner and Lewis (1990); Libby and Frederick (1982) ). While notable, each of these attempts has left a substantial amount of the variance unaccounted for. For example, Bonner and Lewis (1990) measured the performance of auditors on four accounting tasks and found that a statistically significant portion of the variance was accounted for by the variables of knowledge, innate ability, and task-specific experience. However, their hypothesized models only explained 3% to 46% of the variance in performance. Libby and Tan (1994) asserted that the large unexplained variance may have been due to incomplete models and cited two particularly important omissions, effort (i.e., motivation) and multi-period effects on learning and performance.

Although the factors of knowledge, ability, and the environment have received considerable attention, research into the effects of motivation on accounting decisions has been scant. A better understanding of the motivation variable could provide more complete explanations of differences in decision performance. This study expands the

current concept of motivation in the accounting literature and demonstrates how motivation and the environment interact to affect knowledge acquisition and decision performance in an accounting task.

This chapter is divided into four sections. First, the use of extrinsic incentives in accounting to manipulate motivation will be discussed. Second, a distinction will be made between intrinsic and extrinsic motivation. Finally, the research question will be defined, followed by a statement of purpose.

## **1.2 Use of Extrinsic Incentives**

Awasthi and Pratt (1990) acknowledged that much accounting research focuses on extrinsic incentives (e.g., monetary rewards) used to direct and control individual actions. One general assumption found in the literature is that certain extrinsic reward structures create cognitive effort (i.e., motivation) and the resulting motivation improves decision performance. However, this is not always the case. Existing research suggests that monetary incentives sometimes improve, sometimes harm, and sometimes have no effect on performance (Libby and Lipe, 1992). Prior researchers have partially addressed these inconsistent results by demonstrating that the effects of incentives are restricted by a decision maker's ability (Awasthi and Pratt, 1990) or by the type of task (Libby and Lipe, 1992). The current study is unique in that it reexamines the fundamental assumption that extrinsic incentives increase motivation.

## **1.3 Extrinsic and Intrinsic Motivation**

Before studying whether or not extrinsic incentives increase motivation, it is important to understand what motivation means. The psychology literature distinguishes between two types of motivation; extrinsic and intrinsic. Extrinsic motivation is the desire to perform a behavior due to promised rewards or threats of punishment (Myers, 1992). Intrinsic motivation is the desire to perform a behavior for its own sake (Myers, 1992).

Spence and Helmreich (1983) found that students who were more intrinsically motivated were shown to outperform students that were more extrinsically motivated, based on a measure of grade point average. Helmreich, Beane, Lucker, and Spence

(1978) found similar results with academic scientists. They demonstrated that intrinsically motivated scientists had more citations than their extrinsically motivated colleagues. Intrinsically motivated behavior has been associated with many other positive effects, such as improved cognitive flexibility, increased persistence, and greater conceptual understanding (Deci and Ryan, 1994). In the accounting literature, little has been done, however, to distinguish what type of motivation is created by extrinsic incentives and the resulting effects of that type of motivation on decision performance.

#### **1.4 Research Question**

Motivation could potentially explain a significant proportion of the differences in performance among accountants. A common solution to improving performance in accountants is to increase motivation through extrinsic incentives; however, the fields of psychology and organizational behavior distinguish between extrinsic motivation and intrinsic motivation and assert that extrinsic motivation can result in behaviors and attitudes that conflict with those produced by intrinsic motivation. Similar to the research question of Libby and Lipe (1992), the current research question asks: Under what conditions will the presence of explicit monetary incentives improve, harm, or have no effect on extrinsic and intrinsic motivation and performance in accounting tasks?

#### **1.5 Statement of Purpose**

Libby and Lipe (1992) addressed the question by examining how cognitive effort (i.e., motivation) interacts with the cognitive processes involved in the task. Awasthi and Pratt (1990) addressed the question by examining how cognitive effort interacts with the cognitive characteristics of the decision maker. Both studies assumed that monetary incentives increased motivation. The present study is unique in that it expands the concept of motivation to include both intrinsic and extrinsic motivation and examines the assumption that extrinsic incentives increase motivation. The apparent dichotomy between extrinsic incentives and intrinsic motivation will be reviewed and cognitive evaluation theory will be presented as a bridge between the two types of motivation. Specifically, the interactive effects of the environmental context and extrinsic reward structures on intrinsic motivation and extrinsic motivation will be examined in an

allowance for doubtful accounts estimation task. Additionally, this study will examine how the resulting types of motivation affect the acquisition of knowledge and decision performance of accountants.

A better understanding of motivation could provide a more complete explanation of expert judgment performance in accounting as well as improve the efficiency of rewards used in experimental settings. Additionally, an understanding of the effects of extrinsic reward structures and the environment might direct future research toward determining the appropriate reward structures for different accounting firms. Research based on the findings in this experiment could also help firms understand how reward structures and the environment in which they are given create attitudes toward job satisfaction in accounting which might in turn reduce job turnover.

## **Chapter 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Motivation is a critical element in decision performance, yet it has received limited attention in accounting decision research. This literature review is divided into two major sections. The first section describes the findings in motivation research in the psychology and organizational behavior literature. This section also defines the concepts of extrinsic and intrinsic motivation, presents the apparent disunity between the two, and suggests cognitive-evaluation theory as a bridge between these two potentially conflicting types of motivation. In the second section, a review of the accounting literature illustrates the current emphasis placed on extrinsic reward structures.

#### **2.2 Psychology and Organizational Behavior Literature**

##### **2.2.1 Extrinsic motivation**

Extrinsic motivation arises from conditions in the external environment. Condry and Stokker (1992) define extrinsic motivation as the drive for a goal outside of the individual. In a business context, this is represented as working hard to receive, for example, a financial reward or recognition from an employer. This concept of motivation is used to train rats to press bars in operant learning situations, and Kohn (1993b) even argues that it has been used to train the entire U.S. workforce.

The study of extrinsic motivation has largely been driven by two theories: operant theory (Skinner, 1953) and drive theory (Hull, 1943). Operant theory holds that all voluntary behaviors are extrinsically motivated by operationally separable reinforcements. Operant theory is used to describe a rat engaging in the voluntary behavior of negotiating a maze in order to get a food pellet (the separable reinforcement). Critics of the theory argue that some motivated behavior occurs in the absence of external reinforcements. These critics assert that while these voluntary behaviors may

seem to be "caused" by external environmental events, the behaviors result from a mere "interaction" with the environment.

Drive theory (Hull, 1943), which also describes extrinsic motivation, asserts that all behaviors result from tissue deficits associated with four primary innate drives including hunger, thirst, sex, and avoidance of pain. According to this theory, motivation is exhibited in attempts to satisfy the four primary tissue deficits. Drive theory explains that a rat negotiating a maze for a food pellet (i.e., primary reinforcer) is attempting to satisfy the tissue deficit related to hunger. However, critics of drive theory argue that some behaviors seem to occur even in the absence of primary reinforcers. Drive theorists claim that those seemingly unrelated behaviors are caused by secondary conditioned sources of the primary drives. A secondary conditioned source is a derivative stimulus that is associated with a primary reinforcer. Food would be an example of a primary reinforcer of the hunger drive, while the dish that the food was served in would serve as the secondary conditioned source. Over time the rat might work through the maze in order to get to the dish (i.e., secondary reinforcer) even when food (i.e., primary reinforcer) is not present.

### **2.2.2 Intrinsic motivation**

Both the drive and operant theories of motivation have failed to completely explain curiosity or exploratory motivation. In response to this failure, Maslow (1943), White (1959) and Harlow (1958) proposed that another type of motivation exists (i.e., intrinsic motivation).

Maslow (1943) suggested autonomy as the basic psychological need to be the source of one's actions. While Maslow recognized the importance of drive theory, he held that there are other innate needs, such as autonomy, that are not derivatives of the basic drives associated with tissue deficits. The innate needs of Maslow's theory are grouped into five hierarchically arranged categories. From the lowest to the highest need they include: 1) physiological needs (e.g., food, water, etc.), 2) needs of security (e.g., safety, stability, etc.), 3) needs of affiliation (e.g., friendship, belonging, etc.), 4) esteem needs (e.g., autonomy, self-worth, respect, etc.), and 5) self-actualization needs (e.g., acceptance of self and others). Maslow claimed that, in general, the lower-level needs

must be met before an individual is motivated by the higher-level needs.

White (1959) asserted that the exploratory drive shows no relation to a tissue deficit. He proposed that exploratory behavior arises out of the need for effectance or efficacy. White described this need as the innate desire to effectively interact with one's environment. While the need for competence is often an important aspect of this drive, the desire for efficacy can persist even when the knowledge acquisition and the competence that accompany the drive are no longer exhibited.

Harlow (1958) claimed that humans also need affiliation. While he acknowledged that the drive for love or affection are often explained as secondary drives derived from the physiological tissue needs for hunger, thirst, and sex, he demonstrated that there is a psychological need for love and acceptance that is distinct from the basic drives associated with tissue deficits.

Maslow, White, and Harlow presented the first evidence of a different type of motivation that is now known as intrinsic motivation. Intrinsic motivation is somewhat related to the motivation described in drive theory because it is based on innate needs. However, it differs from drive theory motivation in that intrinsic motivation is based on innate *psychological* needs instead of *physiological* needs. Intrinsic motivation can be defined as an innate drive for an activity itself. In contrast to extrinsic motivation, there is no separable goal or reinforcement outside the activity (Condry and Stokker, 1992). Deci (1992) claims that intrinsically motivated behaviors are performed out of interest and require no "reward" other than the spontaneous internal experience of interest and enjoyment. This type of motivation may be exhibited when a rat runs in a spinning wheel but receives no food for its efforts.

### **2.2.3 Extrinsic versus intrinsic motivation**

The existence of intrinsic motivation tends to conflict with the view of operant theorists, who hold that all behaviors are motivated by an operationally separable reinforcer. A possible explanation for this conflict is that while intrinsic motivation exists, it can and often is undermined by extrinsic incentives. Deci (1971) examined this possibility in an experiment in which two groups of college students were assigned to solve puzzles during three sessions. In all sessions, both the experimental group (n=12)



and the control group (n=12) solved puzzles provided by the researcher. During the middle of each session, the experimenter left the room for about eight minutes and subjects in each condition were told they could continue to solve puzzles or read one of several popular magazines. Intrinsic motivation was measured by the time spent solving puzzles during the eight minute breaks. This measure of persistence is commonly referred to as a free choice measure of intrinsic motivation. In the second session, reward structures were introduced. Subjects in the experimental condition were given \$1 reward for each puzzle they solved while subjects in the control condition received no reward. During the third session, the experimental group was informed that the financial rewards had run out. Thus, neither the experimental group nor the control group received any money in the third session. To examine the effects of rewards on intrinsic motivation, Deci examined the difference between time spent on the puzzle-solving task in the third session free choice period and the first session free choice period. As hypothesized, subjects in the reward group demonstrated a much greater ( $p < .10$ ) decrease in time spent on task during the free-choice periods than subjects in the no-reward group; however, the time spent on task in the free choice period was greater for the reward group than for the no-reward group during the second trial (i.e., introduction of reward structure). Deci concluded that extrinsic rewards decrease intrinsic motivation. A second study in the same article reported similar effects over a 16-week experiment, demonstrating that extrinsic rewards can have long lasting effects on intrinsic motivation.

An alternative explanation to Deci's results is that reward recipient subjects worked harder during the free choice period in the second session and the resulting decline in response persistence during the free-choice period in the third session (i.e., removal of reward structure) was due to fatigue, not a decrease in intrinsic motivation. In order to examine this possibility, Deci (1972) designed another puzzle-solving experiment with just one session in which there was no previous exposure to the task before introducing the reward structure. That is, the reward structure was introduced at the first and only session. In this study, 96 college students were assigned to one of the following groups: (a) no reward, (b) rewarded with money before the free choice period, or (c) rewarded with money after the free choice period was employed. The time spent

by the no-reward group during the free-choice period was significantly greater ( $p < .005$ ) than the time spent by the group in which individuals received a reward after the free choice period. Deci concluded that the difference was due to differences in intrinsic motivation and not just satiation or fatigue experienced by the reward group. In addition, Deci found that paying subjects before the free choice period actually increased the time spent in the free choice period compared to the no reward group. However, Deci expected this result and concluded that the subjects felt like they had been paid too much early in the experiment, and thus worked harder in the free choice period in order to earn the money, not because they enjoyed the task. This finding is important because it demonstrates a situation in which a subject is motivated but not intrinsically motivated.

Harackiewicz (1979) replicated the finding that extrinsic rewards decrease intrinsic motivation and expanded prior research by studying different reward structures. Harackiewicz employed two different reward structures, task-contingent and performance-contingent. Task-contingent rewards are defined as incentives given to work on or to complete a task. There is no specific level of performance to reach. In many respects, this might resemble a salary. Performance-contingent rewards, on the other hand, are given only for a specified level of performance. With performance-contingent rewards, completion of the task is not enough; some degree of achievement must be shown in order to receive the reward. Performance-contingent rewards resemble a bonus or piece-rate pay scheme. In Harackiewicz's study, 93 high school students were asked to work hidden figure puzzles, which require individuals to find small disguised objects or words in a larger picture and are thought to be intrinsically interesting. Like Deci's studies (1971, 1972), the time spent on the task during a free-choice period served as a behavioral measure of persistence (i.e., intrinsic motivation). However, the Harackiewicz study was more informative because it included a variety of dependent, intrinsic motivation measures. The number of extra puzzles reviewed during the free-choice period served as one additional behavioral measure of intrinsic motivation because it was thought to represent a degree of persistence. It was hypothesized that subjects who were intrinsically motivated (i.e., enjoyed the puzzles) were likely to work more puzzles in the free choice period. In addition to the behavioral measures of

intrinsic motivation, two attitudinal measures were taken. Because intrinsically motivated behaviors are performed out of interest and enjoyment, self-report measures of enjoyment were taken as one of the attitudinal measures. The subjects' attitudes towards participation in future research studies served as the second attitudinal measure. Harackiewicz asserted that interest in future projects was an indication of enjoyment and persistence, and thus, of intrinsic motivation. She found that the performance-contingent and task-contingent rewards decreased intrinsic motivation relative to the no-reward control groups, leading her to conclude that extrinsic rewards decrease intrinsic motivation. Although there are some flaws in this study that will be discussed later, it serves as another example of extrinsic incentives decreasing intrinsic motivation and it provides an array of intrinsic motivation measures.

A study by McGraw and McCullers (1979) indicated that extrinsic incentives can result in less cognitive flexibility. In that study, college students were asked to solve ten mathematical puzzles. The first nine puzzle solutions were designed to establish a mental set (i.e., a strategy) and the last puzzle solution required them to break the mental set and use a nontraditional strategy. Half of the subjects received financial incentives for solving the puzzles and half of the subjects received nothing. There was no difference in group performance among the first nine puzzles. However, on the tenth puzzle, the no-reward group outperformed the reward group. The difference was attributed to the detrimental effects that extrinsic rewards have on creativity.

An example of the effects of intrinsic motivation on conceptual learning is provided by Benware and Deci (1984). In their study, they randomly assigned forty college students into two groups: passive learners (n=21) and active learners (n=19). The passive learners were asked to read and study an article in preparation of being tested, while the active learners were asked to learn the material in order to teach someone else. The evaluative aspect of being tested was assumed to be an extrinsic incentive for the passive learners. The active learners were assumed to be more intrinsically motivated because the task had more meaning and satisfied the need for effectance, a psychological need previously identified by White (1959). The standard free-choice measure of intrinsic motivation was not applicable in this study, therefore, self-report measures were used to assess the intrinsic motivation of the subjects. As

expected, the active learners (i.e., intrinsically motivated) reported more enjoyment ( $p < .01$ ), more interest ( $p < .001$ ), and greater desire to return to volunteer in the activity ( $p < .05$ ) than the passive learners (i.e., extrinsically motivated). This study also addressed performance. While there was no difference in rote memorization between the groups, active learners exhibited a significantly better ( $p < .001$ ) conceptual understanding of the material. Since the experiment was not controlled in a lab, one could argue that differences in performance were due to the time spent on the task. However, self-report measures of time revealed that the average time spent on the task was three hours with no significant differences between the groups.

Grolnick and Ryan (1989) studied how the environment affects the intrinsic and extrinsic motivation of children with a reading comprehension task. Ninety-one fifth-grade children were randomly assigned to three groups: (a) directed noncontrolling, (b) nondirected, and (c) directed controlling. The directed noncontrolling group and the nondirected group were asked to read a passage and told that they would be asked some questions afterwards. Grolnick and Ryan held that these two groups would be more intrinsically motivated than the directed controlling group which was told that they would be tested on what they read. The exam for the directed controlling group served as an extrinsic incentive that would decrease intrinsic motivation. Additionally, the researchers utilized semantics that communicated control over the children. As expected, they found that the directed noncontrolling group and the nondirected group exhibited more interest ( $p < .05$ ) and performed better ( $p < .05$ ) with regard to conceptual understanding than the directed controlling (i.e., extrinsically motivated) group. Furthermore, children in the extrinsically motivating environment demonstrated a greater decline ( $p < .10$ ) in rote memorization than students who were in an intrinsically motivating environment. This study showed that a controlling environment can reduce intrinsic motivation and that intrinsic motivation can produce higher performance for longer periods of time than extrinsic motivation.

The studies reviewed above demonstrate that intrinsic motivation is a distinct construct that has desirable, yet different effects than extrinsic motivation. The studies show that intrinsic motivation is associated with increased persistence, greater creativity and cognitive flexibility, greater conceptual learning, and longer lasting memory. All of

these decision qualities could be quite beneficial in accounting. Unfortunately, one of the most conclusive findings throughout the 1970=s and 1980=s was that extrinsic rewards decrease intrinsic motivation (Kohn, 1993a). Because of these findings, several researchers have denounced the use of extrinsic incentives to increase motivation (Kohn, 1993a). Not using extrinsic incentives may be a plausible solution when attempting to motivate children to read. However, no one is going to volunteer to work in an accounting firm without pay. Fortunately, Deci and Ryan (1994) asserted that the dichotomy between the existence of intrinsic and extrinsic motivation is not necessary. The two types of motivation can coexist in a self-determined environment.

#### **2.2.4 Cognitive evaluation theory**

Cognitive evaluation theory attempts to close the gap between intrinsic and extrinsic motivation. It posits that intrinsic motivation can be integrated with extrinsic motivation. This integrated motivation can occur in the presence of extrinsic rewards, if the environment promotes self-determined behavior (Deci, 1975).

The idea of self-determined behavior came from DeCharms' (1968) work on personal causation. He suggested that individuals have a need to be causal agents and not feel like pawns to external forces. DeCharms introduced the terms internal and external perceived locus of causality. Internal perceived causality is seeing one's self as the origin or cause of an action. External perceived causality is seeing the action initiated outside of one's self. These terms should not be confused with internal and external locus of control. An individual with an internal locus of control believes they can obtain certain outcomes. An individual with an external locus of control believes that the environment controls their outcomes. There are parallels among internal/external locus of control and internal/external locus of causality, but an individual may believe that an outcome can be obtained (i.e., internal locus of control) and still not feel like the initiator of the action (i.e., internal perceived locus of causality).

Self-determined behavior results when an individual feels like the cause of their own actions. Self-determined behavior is produced when external regulatory processes (e.g., extrinsic incentives) are converted into internal regulatory processes through introjection and integration (Deci, Eghrari, Patrick, and Leone, 1994). When a person

adopts a value or regulatory process but does not identify with it and accept it as their own, it is considered introjection. The value only exists because of extrinsic incentives. Thus, the process or value becomes controlling and is accompanied by pressure, tension, and anxiety (Ryan and Connell, 1989). Integration, on the other hand, occurs when an individual accepts a value or process as their own. Because the value is seen as their own (i.e., self-determined), the individual feels that they are the cause of their own actions. Integration, because it combines intrinsic motivation with extrinsic motivation, is accompanied by feelings of interest and enjoyment. Deci et al. (1994) found that the processes of internalization and integration can result in four types of regulation that can be classified along a continuum:

*External regulation* describes behaviors that are regulated by contingencies overtly external to the individual, like the promise of reward or the threat of punishment. Intrinsic motivation is least likely to exist here.

*Introjected regulation* refers to behaviors that are motivated by internal prods and pressures such as self-esteem-relevant contingencies. It is this type of regulation that is present when one behaves because one thinks one should or because one would feel guilty if one did not. A little intrinsic motivation may be found here.

*Identified regulation* occurs when a behavior or regulation is adopted by one's self as personally important. Here people would not behave simply because they feel they should, but rather because of the personal importance of the behavior. This results because they have identified with the underlying value of the activity and accepted its regulation as their own. Intrinsic motivation definitely exists here, but it is not at its maximum level.

*Integrated regulation* is the most autonomous or self-determined form of extrinsic motivation and results from the integration (or reciprocal assimilation) of separate identifications into one's coherent sense of self. The highest degree of intrinsic motivation is found here.

Cognitive-evaluation theory (Deci and Ryan, 1985) attempts to assimilate the innate human needs discussed earlier. The theory asserts that people are motivated by the psychological needs for effectance/competence (White, 1959), autonomy (Maslow, 1943), and relatedness/affiliation (Harlow, 1958). When these three needs are met, integrated regulation (i.e., self-determined behavior) is most likely to occur. Deci et al.

(1994) hypothesized that the most integrated regulation (i.e., highest intrinsic motivation) is more likely to occur when the following contextual conditions are met: 1) a meaningful rationale for performing a task is provided, 2) the subject's feelings or perspective is acknowledged, and 3) choice by the subject rather than control over the subject is conveyed.

Although Deci et al. (1994) do not explicitly describe how the contextual conditions promote self-determined behavior, they imply that contextual conditions create a self-determined context that allows satisfaction of the three psychological needs for competence/effectance, autonomy, and relatedness. Each contextual condition does not necessarily satisfy just one psychological need. For example, providing subjects with a choice rather than control would most likely satisfy the needs of autonomy *and* competence/effectance. The need for autonomy could be fulfilled if the individual's choice makes them feel like the initiator of the action. Competence/effectance could be satisfied because the individual might feel that by choosing options, they are effectively interacting with the task through their decisions.

Some contextual factors are likely to satisfy just one psychological need. Providing a meaningful rationale for performing a task, for example, would probably not satisfy competence/effectance or relatedness. However, it could help satisfy the need for autonomy. If a person sees a meaningful purpose in performing a task, they are more likely to accept the task as their own and feel as if they are the origin of their behavior. As another example, acknowledging an individual's feelings about a task would likely satisfy the relatedness/affiliation need in an individual. For example, Deci et al. (1994) admitted to the subjects that they understood the task to be performed was boring. They asserted that this made subjects feel as if someone sincerely related to their feelings and probably satisfied the relatedness/affiliation need.

As the individual interacts with different contextual factors found in the environment, different degrees of integration will be exhibited. Deci et al. (1994) employed a full factorial design in which each of the three contextual factors was an independent variable. One hundred and ninety-two introductory psychology students were randomly assigned to the eight cells. When two or three of the contextual conditions were present, subjects displayed more response persistence (time spent during

a free-choice period) than subjects with just one of the contextual conditions present. However, this difference in response persistence is only partial support for the integration process. Integration is indicated by behavior (i.e., response persistence) accompanied by affective states such as enjoyment and interest. Deci et al. (1994) measured integration by the correlation between time spent during the free-choice period and self-reports of interest and enjoyment. A significant positive correlation ( $p < .01$ ) between time spent in a free-choice period and self-report measures of interest and enjoyment occurred for subjects in the self-determined context (i.e., two or three contextual factors present). A significant negative correlation ( $p < .01$ ) between self-report measures of interest and enjoyment occurred for subjects in the controlling context (i.e., zero or one contextual factor present). The difference and directions of the correlations indicated that more integration occurred in a self-determined context.

Ryan, Koestner and Deci (1991), also used this correlation measure of integration in two experiments examining free-choice behavior. In the first experiment, forty-eight introductory psychology students were randomly assigned to one of three conditions: task-involved, ego-involved, ego-involved with videotape (i.e., subjects were aware that the session was videotaped). Ego-involvement was manipulated by informing subjects that the task was a sign of creative intelligence. Ego-involved subjects were supposed to be less intrinsically motivated because they felt they needed to protect their ego in front of the researcher. Task-involvement was manipulated by simply not drawing attention to the creative intelligence issue. Task-involved subjects were thought to be more intrinsically motivated because they could work the task out of enjoyment, not to impress anyone else. Ryan et al. found that task-involved subjects (i.e., less intrinsically motivated) worked longer in the free-choice period than ego-involved subjects, a replication of earlier findings on intrinsic motivation. However, the second experiment was unique because it introduced negative performance feedback to both the task-involved group and the ego-involved group. Contrary to prior findings, the ego-involved group (i.e., less intrinsically motivated) displayed more persistence in the free-choice period than task-involved subjects. Ryan, et al. asserted that because the ego-involved group received negative performance feedback, they worked harder in order to prove their intelligence, not out of interest or enjoyment. As expected, they found that subjects



in the task-involved group had significantly stronger correlations between time on task in the free choice period and interest/enjoyment measures than subjects in the ego-involved group. The important finding in both the Deci et al. (1994) study and the Ryan, Koestner, and Deci (1991) study is that time spent in a free choice period is not always a sufficient measure of intrinsic motivation by itself. Time should be integrated (i.e., correlated) with feelings of interest and enjoyment.

Most of the studies on intrinsic motivation incorporate inherently interesting tasks. The Deci et al. (1994) study was unique in that it used an uninteresting task. The subjects were paid to identify random dots of light as they appeared on a computer screen. Their results support Deci and Ryan's (1985) assertion that individuals are inherently motivated to internalize the regulation of uninteresting, though important, activities. This is significant because many important tasks in accounting can be considered mundane (e.g., vouching invoices, recalculations). Given the necessity of rewards in motivating individuals to do tasks that are not inherently interesting, it is useful to determine the appropriate type and optimum administration of rewards.

### **2.2.5 Task-Contingent Rewards versus Performance-Contingent Rewards**

The effects of task-contingent rewards and performance-contingent rewards should be reconsidered in light of cognitive evaluation theory. Recall that Harackiewicz (1979) concluded that performance-contingent and task-contingent rewards decrease intrinsic motivation in individuals in those reward conditions relative to no-reward control groups. Ryan, Mims, and Koestner (1983) pointed out that in neither of Harackiewicz's task-contingent groups were the subjects provided with any norm of performance (i.e., average score, expected score, etc.). Cognitive evaluation theory holds that for someone's intrinsic interest to improve, a person needs to get some feel for how well they are doing (i.e., efficacy). Without any norms of performance, the subjects in the task-contingent group were unable to determine how well they were doing during the task. Ryan et al. (1983) further suggested that the negative effects of task-contingent rewards may tend to disappear if the rewards are given over multiple trials. This might occur because subjects would be able to assess how well they were doing by comparing their performance to previous trials. All the tasks in the Harackiewicz (1979) experiment

were performed over one trial only. Assessing one's performance compared to prior performance would be impossible. The lack of norms and multiple trials in the task-contingent reward groups call into question Harackiewicz's conclusion that task-contingent rewards decrease intrinsic motivation relative to no-reward.

Harackiewicz (1979) also concluded, perhaps erroneously, that performance-contingent rewards decrease intrinsic motivation more than task-contingent rewards. The comparison was made between two combined task-contingent reward groups and two combined performance-contingent reward groups. A review of the results shows that the decrease in intrinsic motivation for the performance-contingent groups was driven by a large decline in one performance-contingent group that received no norms. Ryan et al. (1983) asserted that giving a reward contingent on performance without providing an indication of the expected performance (i.e., a norm) could be perceived as very controlling and be very detrimental to integrated motivation.

Condry (1977) suggested that the main issue is not necessarily the type of reward, but rather the context in which the rewards are given. Deci and Porac (1978) asserted that extrinsic rewards contain a controlling aspect that decreases intrinsic motivation and an informational (i.e., competence) aspect that increases motivation. They agreed that the effects of the reward depend on what the context emphasizes (i.e., controlling or informational). Ryan, Mims, and Koestner (1983) investigated the effects of the context of rewards as well as the reward structure on intrinsic motivation. They compared performance-contingent rewards that emphasized the controlling aspects of rewards to performance-contingent rewards that emphasized the informational aspects of rewards. Similar to Harackiewicz (1979), Ryan et al. asked college students to find hidden figures in puzzles. Subjects in the performance-contingent conditions were told that they would receive \$3 if they did well on the task and subjects in the no reward condition received nothing. In order to emphasize the controlling aspects versus the informational aspects of the environment, the language given during feedback was manipulated in a fashion similar to Grolnick and Ryan (1989). Subjects in the controlling condition received statements such as, "You did very well, just as you should," as opposed to subjects in the informational condition whose equivalent feedback was, "You did very well." Ryan et al. used time on task during a free-choice period to measure intrinsic motivation. They

found that subjects in the informational, performance-contingent reward condition experienced *increased* levels of intrinsic interest as compared to subjects in the controlling performance-contingent reward condition. Ryan et al. also compared no-reward groups in each environmental condition (i.e., controlling or informational) to the respective performance-contingent groups. In both the controlling and environmental conditions, the no-reward groups displayed more intrinsic motivation than the respective performance-contingent groups. Although Ryan et al. concluded that performance contingent rewards reduce intrinsic motivation compared to no-reward groups, it should be noted that individuals in the performance-contingent groups in their study had no clear indication of what acceptable performance was at the outset of the study. Without a defined norm, the subjects constantly relied on the researchers to provide competence feedback. This might have made the performance-contingent rewards appear more controlling. A task-contingent group was included in the study but individuals in that condition did not receive any feedback on performance. Thus, the task-contingent group cannot be fairly compared to the performance-contingent groups because those groups received positive feedback.

Harackiewicz, Manderlink and Sansone (1984) proposed that performance-contingent rewards have three distinct properties: performance evaluation, competence feedback, and symbolic cue value. This complicates the effects of performance-contingent rewards on intrinsic motivation because the three properties of performance-contingent rewards have conflicting effects. Performance evaluation (i.e., being judged by others) was predicted to have a negative effect on intrinsic motivation, and competence feedback was predicted to have a positive effect on intrinsic motivation. Cue value, or receiving the reward, was thought to positively affect intrinsic motivation. Results indicated that groups receiving performance-contingent rewards experienced enhanced intrinsic motivation compared to no-reward groups who were simply provided competence feedback and performance evaluation. The difference in intrinsic motivation was attributed to the cue value of the performance-contingent group (i.e., receiving the reward).

In a second study (Harackiewicz et al., 1984), subjects were provided with a standard of performance at the beginning of the experiment. The standard was provided

in order to reduce the subjects reliance on competency feedback from the researcher. They found that providing a norm/standard at the beginning of the experiment reduced the detrimental effects of performance evaluation (i.e., being judged by others) on intrinsic motivation. Because Harackiewicz (1979) did not provide norms/standards in her experiment, the conclusion that performance-contingent rewards decrease intrinsic motivation more than task-contingent rewards could be erroneous. Unfortunately, Harackiewicz et al. (1984) made no comparison between task-contingent and performance-contingent rewards. Neither the Ryan et al. (1983) or Harackiewicz et al. (1984) made a fair comparison between performance-contingent rewards and task contingent rewards.

### **2.3 Accounting Literature**

Much of the accounting literature has focused on extrinsic motivation. The work that has addressed intrinsic motivation has mostly adapted a macroanalytic approach and has accordingly been restricted to field studies. The following review of the accounting literature is divided into three sections. The first section describes the results and limitations of the motivation studies conducted in the field. The second section is a review of the experimental studies. The current emphasis on extrinsic motivation in accounting will be demonstrated and hypotheses about how the environment and extrinsic reward structure affect motivation will be developed. The last section describes the difference between behavior and performance evaluation. In this section, hypotheses are developed about how motivated behavior results in performance.

#### **2.3.1 Field Studies**

Using Maslow's (1943) hierarchy of needs theory, Carpenter and Strawser (1971) examined the needs of academic accountants. Surveys indicated that: 1) affiliation needs were well satisfied in the academic environment, 2) esteem needs were more fulfilled for full and associate professors when compared to assistant professors, 3) self-actualization needs were more fulfilled at large schools and at the full professor level, and 4) autonomy needs were fulfilled more than other need categories. Smith and Uecker (1976) also applied Maslow's theory to test job satisfaction of internal auditors.

Consistent with the theory, they found that the degree of satisfaction decreased gradually up the Maslow's needs hierarchy. The biggest difference between satisfied and unsatisfied needs occurred between the affiliation and esteem levels. Although Maslow's theory is not the focus of this study, it is worth noting that both the Carpenter and Strawser (1971) and Smith and Uecker (1976) studies provided support for the notion that accountants recognize a need for autonomy and affiliation, two needs central to cognitive evaluation theory.

Another theory that has implications for cognitive evaluation theory is Herzberg's (1959) two-factor theory. Herzberg (1959) proposes that motivation is a function of motivator and hygiene factors. Motivator factors include type of work, recognition, advancement, and responsibility. Hygiene factors include company policies and administration, technical supervision, salary, working conditions, and interpersonal relations. Motivator factors are associated with positive feelings of job satisfaction while hygiene factors are associated with negative feelings of job satisfaction. Herzberg's theory holds that only motivator factors lead to individual motivation. Hygiene factors can prevent job dissatisfaction, but cannot lead to job satisfaction. Meagher (1979) used Herzberg's theory to study accountants in industry. He found that accountants placed much higher importance on motivator factors than hygiene factors. Salary, the equivalent of reward structure, appeared to be less important than type of work. This is also consistent with cognitive evaluation theory where the enjoyment of the task itself is more important than reward structure.

McClelland's (1962) trichotomy theory proposes that individuals have three strong needs: achievement, affiliation, and power. McClelland asserts that when a need is strong it will motivate an individual to use behavior to satisfy the need. Harrell and Stahl (1984) used McClelland's trichotomy to explain why some individuals experience job satisfaction and others do not. As hypothesized, they found that partners' and managers' need for affiliation correlated negatively with job satisfaction. Harrell and Stahl explained that difficult personnel decisions made by partners would cause the partners with high affiliation needs to have lower satisfaction. It was also predicted in the study that the influence activities associated with job positions would allow those with high needs for power to experience satisfaction. As expected, the need for power

correlated positively with job satisfaction for partners and managers, as well as for junior level audit/tax specialists. Need for achievement correlated positively with hours worked by junior-level audit/tax specialists but not for partners, managers or junior level consultants. Need for achievement also correlated with the firm's performance ratings of partners, managers and junior-level audit/tax specialists, but not junior level consultants. The Harrell and Stahl study confirms that accountants need affiliation and achievement (i.e., an aspect of efficacy), two basic psychological needs found in cognitive evaluation theory.

In a later study, Snead and Harrell (1991) examined job satisfaction of senior auditors as it is related to McClelland's trichotomy. Using path analysis, the authors concluded that job satisfaction is a direct determinant of the number of hours an individual was willing to work. This seems to be analogous to the relationship between task interest and response persistence found throughout the psychology literature and cognitive evaluation theory (e.g., Harackiewicz 1979; Ryan, Koestner, and Deci 1991; Deci et al. 1994).

Parker et al. (1989) asserted that motivation in accounting has been most frequently described using expectancy theory. Ferris (1977a, 1977b, 1978) studied the effect of environmental uncertainty on the predictive-ability of the expectancy model. A common hypothesis of all studies is that the level of perceived environmental uncertainty varies inversely with the level of job satisfaction. This was supported in one accounting firm but not the other. Performance, as measured by supervisors' ratings, was also studied. Ferris found that as environmental uncertainty increased, expectancy estimates decreased, and the predictive-ability of the expectancy model decreased with respect to performance. Overall, the predictive-ability of the model with respect to performance was low. This supports the case for needing a better theory of motivation in accounting.

Dillard and Ferris (1989) summarized the literature on motivation and job satisfaction with four consistent tenets. First, almost all studies have shown low levels of job satisfaction, which has been linked to expectations of job turnover. However, the causes of the low satisfaction have been inconsistent. Second, no theory of motivation has given a high degree of explanatory power of performance or turnover in public

accounting firms. Third, significant differences have been shown to exist between audit/tax and consulting services. Fourth, higher level needs (e.g., achievement) have been relatively more important in promoting job satisfaction and work behavior of accountants than lower level needs (e.g., salary).

Dillard and Ferris (1989) also pointed out some methodological concerns of the motivation research. Nearly all of the studies were field studies using questionnaires, making it difficult to maintain adequate experimental control and determine causality. While the research has focused on outcome variables such as job satisfaction and turnover intention, very few studies have examined the formulation of attitudes, the actual behavior, or interactions between the individual and the environment. The current study has addressed some of Dillard and Ferris' (1989) methodological concerns. The current experiment was conducted as a controlled laboratory experiment and it has examined the impact of environmental factors on *actual* motivated behavior.

### **2.3.2 Experimental studies**

While nonexperimental studies on job satisfaction and turnover lack control and the ability to determine causality, the experimental studies, with the exception of one, focus primarily on extrinsic incentives. Most experimental accounting studies examining motivation focus on determining the types of extrinsic incentives which create maximum performance.

Extrinsic incentives do not have to be only monetary; they can include recognition, competition, or the dictates of other people (Amabile, Hennessey, and Tighe, 1994). For example, accountability, or the pressure to justify one's decisions to others, is a type of non-monetary extrinsic incentive. An example of this type of incentive is found in Kennedy's (1993) study on debiasing audit judgment with accountability. She found that the recency bias in a bankruptcy prediction task was mitigated by the extrinsic motivator of accountability. Kennedy concluded that accountability is effective at correcting effort-related biases, but that it has failed to correct data-related biases (e.g., ignoring sample size, conjunction fallacy, ignoring base rates). She claims that the failure is due to data-related biases being immune to increases in effort and thus immune to the incentive systems that produce effort. However,

intrinsic motivation has been shown to help break a mental set (McGraw and McCullers, 1979), a bias that might appear immune to incentive systems. It might be that some biases are not immune to incentive systems, but rather to the type of motivation (i.e., extrinsic) *produced* by the incentive systems. While it is widely accepted that accountability often increases effort, it is not known whether or not that effort is integrated with intrinsic motivation.

Although several studies have examined accountability as a motivator, the extrinsic incentive of interest in the current study is financial rewards. Chow (1983) studied the effects of financial rewards on performance. Subjects were assigned to three different reward structures: 1) fixed rate (i.e., task-contingent), 2) piece rate (i.e., performance-contingent), and 3) budget based (i.e., performance-contingent). Subjects in the piece rate condition (i.e. performance-contingent) outperformed subjects in the fixed rate (i.e., task-contingent) condition presumably due to greater motivation. However, time on task was not measured and there were no significant differences in self-report measures of interest across the three reward conditions.

In a second study by Chow (1983), subjects were allowed to choose the reward structure in which they wanted to work. As expected, subjects self-selected according to ability. That is, subjects who perceived their ability to be greater selected a competitive reward structure (i.e., performance-contingent), while those who perceived their own ability to be low selected a less competitive reward structure (i.e., task-contingent). Chow also examined whether providing a choice affected performance by altering attitudes towards the task. The self-report measures of interest were compared between the assigned and self-select groups revealing no significant differences. It is not surprising that task interest did not vary since choice of compensation scheme was provided rather than choice of *tasks*. A major criticism of both studies was that the compensation schemes were "make believe" and no actual payments were involved.

Ashton (1990) examined how extrinsic incentives, such as financial rewards, affected accuracy in a repetitive bond rating task. He employed a type of performance-contingent financial reward called a tournament incentive scheme. In this scheme, subjects were placed into a potential-reward group or a no-reward group. In the potential reward group, the two subjects who classified the greatest number of bonds correctly



would be awarded a large prize of \$100, and the other subjects received nothing. The subjects were 182 auditors employed by a Big-Six CPA firm. Extrinsically motivated accountants (i.e., in the potential-reward group) achieved higher bond rating accuracy than accountants without such incentives (i.e., in the no-reward group). This finding on extrinsic motivation is consistent with the psychology literature. While Ashton expanded prior research by including repetitive decisions, as opposed to a one-time performance, effort (i.e., motivation) was not directly measured. Ashton also suggested that affective variables, such as perceived task difficulty, pressure felt, anxiety, and effort levels, might be useful measurements for future research. Perceived task difficulty and effort levels were measured in the current study.

Awasthi and Pratt (1990) examined how financial incentives interact with ability and task characteristics. Student subjects were asked about their understanding of conjunction probability, sample size, and sunk cost decision rules and were tested on their ability to apply the rules in different accounting contexts. Half of the subjects were given a performance-contingent financial incentive and half received no incentive. They found that performance-contingent rewards increased response effort (i.e., intensity) as directly measured by time on task. Additionally, as they hypothesized, this improvement was found to be restricted by ability. Monetary incentives improved performance of subjects that scored high on an ability measure, but they did not improve performance of subjects classified as low on an ability measure. Awasthi and Pratt demonstrated that the effectiveness of an extrinsic incentive is dependent on the ability of the accountant.

In a similar study, Libby and Lipe (1992) asked auditing students to review a list of internal controls related to the purchasing cycle (i.e., encoding stage). After a distraction task, they were asked to recall as many internal controls as they could and then were later asked to recognize the internal controls from a twenty-item list (i.e., retrieval stage). One group of subjects received a task-contingent incentive for both stages. The second group received the task-contingent incentives that the first group received and they received an additional performance-contingent incentive during the retrieval stage. The third group received the task-contingent incentives that the first and second groups received, and they received performance-contingent incentives in both the encoding and retrieval stages. Results indicated that subjects who received performance-

contingent incentives prior to the encoding stage exerted more response effort, as measured by time on task, and recalled more controls than those that did not. Subjects that received performance-contingent incentives in the retrieval stage also exerted more effort than those that did not. However, this effort was not always productive, as evidenced by the low correlation between time spent (i.e., effort) in the retrieval stage and accuracy of recall. Libby and Lipe (1992) concluded that increasing incentives improves task performance only if increases in response intensity (i.e., effort) result and if the cognitive processes involved are sensitive to increased effort. Libby and Lipe (1992) asserted that future research should consider the level of intrinsic incentives.

Becker (1997) used cognitive evaluation theory to evaluate the effects of choice on intrinsic motivation. In her study, 41 auditors completed a bankruptcy prediction task. Subjects who were given a choice of ratios with which to predict bankruptcy were found to be more self-determined than those who were not given a choice. The resulting self-determination produced higher response intensity (i.e., cognitive effort) and higher accuracy in predicting bankruptcy. Similar to the Becker study, the current study employed time on task as a measure of response intensity. Becker (1997) did not examine the effects of extrinsic incentives within cognitive evaluation theory, but as noted earlier, extrinsic incentives are necessary for the duties of professional accountants.

## **2.4 Chapter Summary**

The review of the psychology literature demonstrated that intrinsic and extrinsic motivation are different constructs. Many positive outcomes (e.g., cognitive flexibility, conceptual learning, persistence) associated with intrinsic motivation were also presented. However, there is a debate as to whether the two types of motivation can coexist. Although many researchers in the psychology literature have concluded that extrinsic incentives decrease intrinsic motivation, cognitive evaluation theory (Deci and Ryan, 1985) suggests that it is not so much the incentive itself that decreases intrinsic motivation, but it is the context in which the incentive is given.

In the accounting literature, field studies, while addressing aspects of intrinsic motivation, have lacked the control and manipulation to explain what factors specifically

affect motivation. In the experimental studies, the overriding emphasis has been on the use of extrinsic incentives to increase motivation, with little distinction being made between intrinsic and extrinsic motivation. The only experimental accounting study that specifically addressed intrinsic motivation did so in the absence of any reward structure.

## Chapter 3

### HYPOTHESES

#### 3.1 Introduction

This chapter will use cognitive evaluation theory as the conceptual foundation for developing hypotheses about the effects of context and reward structure on motivation. The hypotheses will be developed and described in three sections. In the first section, hypotheses will be made concerning the effects of context on intrinsic motivation, extrinsic motivation and the integration of the two types of motivation. In the second section, hypotheses will be developed regarding how reward structure interacts with context and affects motivation. The last section, will include hypotheses concerning the context itself and its interaction with reward structure affects performance.

#### 3.2 Context Hypotheses

Using cognitive evaluation theory, Becker (1997) demonstrated that choice promoted a self-determined context in a bankruptcy prediction task and resulted in more motivation in accountants than a context where no choice was made. The current study attempted to replicate her finding by providing half of the subjects with a self-determined context and half with a controlled context. As in many previous studies, response intensity (i.e., motivation) was measured by time on task. This leads to the first hypothesis of the current study stated in the alternative form:

H1A: Subjects in a self-determined context will display greater *response intensity* than subjects in a controlled context.

Hypothesis 1A is not an exact replication of Becker's finding, as Becker did not include reward structure in her study. This prevented Becker from assessing response persistence (i.e., motivation) since by definition, there could be no free choice period without a paid period (i.e., reward structure). In the current study, a reward structure was included and therefore response persistence (i.e., time on task during a free-choice period) was measured as well as response intensity (i.e., time on task during the paid period). This leads to the second hypothesis.

H1B: Subjects in a self-determined context will display greater *response persistence* than subjects in a controlled context.

Amount of response intensity or persistence only partially supports cognitive-evaluation theory. Recall that Ryan, et al (1991) showed that an individual can demonstrate persistence without being intrinsically motivated. They demonstrated that a subject's intensity and persistence should be accompanied by feelings of interest and enjoyment to be considered integrated. Ryan et al. (1991) measured this integration by correlating response persistence with self-report measures of enjoyment/interest and similar measures were used in the current study. In the current study, integrated response *intensity* was measured as the correlation between time on task *during the paid period* and self-report measures of enjoyment/interest. Integrated response *persistence* was measured as the correlation between time on task *during the free choice period* and self-report measures of enjoyment/interest.

H2A: Subjects in a self-determined context will display more *integrated response intensity* than subjects in a controlled context.

H2B: Subjects in a self-determined context will display more *integrated response persistence* than subjects in a controlled context.

### 3.3 Reward Structure Hypotheses

None of the accounting studies that compared reward structures made any attempt to manipulate the context in which the incentive was provided. The current study examined the effects of task-contingent rewards and performance-contingent rewards on integrated motivation within different contexts (i.e., self-determined and controlled). While both reward systems are considered to be extrinsic incentives, performance-contingent rewards differ from task-contingent rewards in that performance-contingent rewards contain both a competency property and a performance evaluation property. Therefore, any differences in the effects of the two reward systems on integrated motivation should be explained by the effects of the performance evaluation and competency properties on integrated motivation. Recall that communicating competency to subjects in psychology studies increased integrated motivation, while introducing performance evaluation decreased integrated motivation (e.g., Harackiewicz, 1984). This finding complicated the prediction of performance-contingent rewards because the two unique properties of performance contingent rewards conflict in their effects on integrated motivation. Ryan et al. (1983) asserted that the overall effect of the two conflicting properties on intrinsic motivation was driven by the context in which the reward was administered. Ryan et al. proposed that in a self-determined context, the competency property of performance-contingent rewards would be emphasized rather than the performance evaluation property, and integrated motivation would increase. However, in a controlling context, the performance evaluation property would be emphasized rather than the competency property, thus, decreasing motivation. Although performance-contingent rewards in a self-determined context produced more intrinsic motivation than performance-contingent rewards in a controlling context, a fair comparison between task-contingent rewards and performance-contingent rewards could not be made because the two groups differed in the types of feedback (i.e. positive or negative) received.

In sum, with similar feedback, performance-contingent rewards in a self-determined context should produce more integrated motivation than task-contingent rewards because the competence communication, a unique property of performance

contingent rewards that enhances intrinsic motivation, should be emphasized. Similarly, performance-contingent rewards in a controlling context should produce less integrated motivation than task-contingent rewards because performance evaluation, a unique property of performance-contingent rewards that decreases intrinsic motivation, should be emphasized. This leads to the following four hypotheses stated in the alternate form:

H3A: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will result in *more response intensity* than task-contingent rewards, while in a controlled context, performance-contingent rewards will result in *less response intensity* than task-contingent rewards.

H3B: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will result in *more integrated response intensity* than task-contingent rewards, while in a controlled context, performance-contingent rewards will result in *less integrated response intensity* than task-contingent rewards.

H4A: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will result in *more response persistence* than task-contingent rewards, while in a controlled context, performance-contingent rewards will result in *less response persistence* than task-contingent rewards.

H4B: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will result in *more integrated response persistence* than task-contingent rewards, while in a controlled context, performance-contingent rewards will result in *less integrated response persistence* than task-contingent rewards.

The hypothesized ordinal interaction is graphically displayed in Figure 1. The ordinal interactions hypothesized above are dependent upon prior hypotheses concerning context. In order for hypothesis 3A to be significant, hypothesis 1A must also be significant. Similarly, in order for hypothesis 3B to be significant, hypothesis 1B must also be significant. In order for hypothesis 4A to be significant, hypothesis 2A must also be significant. In addition, in order for hypothesis 4B to be significant, hypothesis 2B must also be significant.

### **3.4 Performance Evaluation Hypotheses**

Kanfer (1990) states that when studying motivation, a distinction between behavior and performance evaluation is helpful. A behavior is a result of motivational processes, while performance evaluation is a rating of that individual's behavior. For example, a behavior might be measured by how much time a subject spends preparing a series of tax returns. The related performance evaluation of the behavior might be the number of errors found in the completed returns. Performance evaluation can be related to Libby and Luft's (1993) model of decision performance which asserted that performance is a function of ability, knowledge, motivation, and environment. Differing levels of motivated behavior will not elicit different performance evaluations unless the degree of ability and knowledge is sufficient for the task (i.e., a component of the environment). Awasthi and Pratt's (1990) study provides an example of such a constraint. Recall that in their study, the subjects who had high ability demonstrated increased motivation and received higher performance evaluations. Although subjects with low ability also had increases in motivated behavior, the change did not result in better performance evaluations. Two measures of performance evaluation (i.e., knowledge acquisition and self-insight) were taken during the current study.

#### **3.4.1 Knowledge Acquisition**

The previous hypotheses predicted differing levels of motivated behavior as a result of different contexts (i.e., self-determined and controlled) and interactions with reward structures (i.e., performance-contingent and task-contingent). As mentioned above, motivated behavior often results in higher performance evaluations. In the current study, the type of task performed is sensitive to different levels of motivated behavior, the fifth and sixth hypotheses follow:

- H5: Subjects in a self-determined context will have *more* knowledge acquisition than subjects in a controlled context.



H6: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will yield *greater* acquisitions of knowledge than task-contingent rewards, and in the controlled context, performance-contingent rewards will result in *less* acquisition of knowledge than task-contingent rewards.

Hypothesis five (H5) is a necessary but not sufficient condition for hypothesis six (H6) to be true.

### 3.4.2 Self-Insight

Grolnick and Ryan (1987) demonstrated that intrinsically oriented subjects did not outperform extrinsically oriented subjects in *quantitative* performance evaluations (i.e., number of items recalled), but did outperform them in a more *qualitative* performance evaluation (i.e., conceptual learning). Self-insight is considered to be a qualitative measure of one's decision (Johnson and Kaplan, 1991). It is defined as the degree to which an individual is aware of their own decision strategy. An individual can be good at making decisions but have difficulty in communicating how they reached those decisions because they lack self-insight related to their strategy. Individuals need to achieve clear self-insight in order to instruct others and justify their decisions. Self-insight is measured by comparing one's stated decision strategy to one's actual strategy. This leads to the seventh and eighth hypotheses:

H7: Subjects in a self-determined context will display *greater* self-insight than subjects in a controlled context.

H8: An ordinal interaction effect will occur for context and reward contingency such that in a self-determined context, performance-contingent rewards will *enhance* self-insight compared to task-contingent rewards, and in the controlled context, performance-contingent rewards will *decrease* self-insight in comparison to task-contingent rewards.

Similar to the earlier hypotheses, hypothesis eight (H8) is dependent on a previous hypothesis (H7) being true.

### **3.5 Conclusion**

This chapter developed hypotheses to test cognitive evaluation theory. These hypotheses are expansion of the findings in previous psychology and accounting research. Prior research in psychology has not effectively compared performance-contingent rewards and task-contingent rewards (i.e., H3A, H3B, H4A, H4B, H6, and H8). Prior accounting research has not studied the motivation effects of context in the presence of differing reward structures. This chapter and the literature review has described several of the differences and similarities in prior studies. These are highlighted in Table 1.

## Chapter 4

### METHODOLOGY

#### 4.1 Overview

The current study employed a 2 (reward structure) X 2 (context) factorial design (See Table 2 for design and Table 3 for related hypothesized results). Effects on motivation were examined by crossing two types of reward structure, task-contingent and performance-contingent, with two types of context, self-determined and controlled.

#### 4.2 Subjects

One hundred four undergraduate accounting students from a major U.S. university participated in the study for a fixed amount of extra credit in a relevant class. All of the subjects had attained at least six hours of financial/managerial accounting.

Undergraduate accounting students were purposefully selected for this study instead of professional accountants. With regard to differences in students and professionals, Birnberg and Nath (1968) cautioned that potential differences in task-related knowledge, established attitudes towards the task, and routinized behavior may differentially affect performance. Since the focus of this study was on knowledge *acquisition* and the *development* of attitudes rather than on existing knowledge or attitudes, students were appropriate subjects because they did not bring task-specific experience or established attitudes to the task. Birnberg and Nath's third concern, differences in routinized behavior, is that professional subjects become so practiced in

their tasks that their decisions are automatic and routine and thus differ from student subjects whose decisions require time and effort. Using professional subjects with routinized behavior could have been problematic in the current study. If their decisions had been automatic, differences in motivation (i.e., effort) would have been hard to detect.

After examining the student surrogate issue empirically, Ashton and Kramer (1980) concluded that the differences between students and professionals is dependent on the purpose of the research. If the purpose is to specify the nature and general characteristics of a potential judgment improvement program, then there may be no significant differences between students and professionals. The current study was focused on specifying the general characteristics (i.e., reward type and context) involved in improving motivation.

In addition to meeting the qualifications set forth by Birnberg and Nath (1968) and Ashton and Kramer (1980), the nature of the current research question (i.e., the effects of rewards on knowledge acquisition) lends itself to using student subjects. Similar to the current study, several studies in the accounting literature have required subjects to estimate a dependent measure using several independent measures, such as financial risk assessments or internal control judgments (e.g., Ashton and Brown, 1980; Mear and Firth, 1987). The research question in those studies usually involved assessing the weights that experienced professional accountants attached to certain independent variables. The approach in those studies is referred to as policy capture and it was necessary to use professional accountants. The current study has a subtle but distinct difference in that its focus is on determining *how* accountants *acquire* the policies they use (i.e., knowledge acquisition) rather than determining the actual policies used. This knowledge acquisition approach is referred to as a multiple cue probability learning (MCPL) task. Brehmer and Brehmer (1988) claimed that it is inappropriate to surrogate students for professionals in policy capture studies because they lack experience, and thus, have no meaningful policy (i.e. strategy). However, Brehmer and Brehmer stated that students can be appropriate in MCPL studies, where the focus is on knowledge acquisition.

A second reason that the research question lends itself to using student subjects is

that it focuses on extrinsic rewards. Harrison (1989) has argued that many studies may not have found differences in performance because they did not provide sufficient compensation (i.e., extrinsic rewards) for their subjects. Because student subjects are not accustomed to the large financial incentives provided to professionals, students may be more easily motivated through the lower financial incentives typically used in research. The need to motivate subjects through extrinsic incentives is not an ancillary concern of this project but an explicit manipulation in the study. Considering the necessity of motivating the subjects with extrinsic rewards, student subjects would seem to be an appropriate choice.

### **4.3 Procedure**

Subjects signed up for the experiment on a schedule which was brought to class several days before the experiment was conducted. When subjects arrived at the testing facility (i.e., behavioral laboratory), they were randomly assigned to one of the following four conditions: self-determined, performance-contingent; self-determined, task-contingent; controlled, task-contingent; and controlled, performance-contingent. Subjects were tested in four separate rooms in order to reduce distractions. Each room had one computer and the conditions were systematically rotated within each room so that each room was used for testing all four conditions. Additionally, the times that conditions were tested varied systematically so that in any given hour each condition was equally likely to be tested.

Subjects completed the experimental task on computers programmed using Visual Basic Applications for Excel software. The task was completely mouse driven and required no programming knowledge on the part of the subject. The use of a computer enabled the experimenter to give consistent feedback within each condition. Additionally, Visual Basic Applications for Excel can record time to the hundredth of a second, permitting an accurate and unobtrusive measure of time on task.

Interaction between the experimenter and subjects was minimal. The experimenter simply assigned the subjects to the test room and instructions were provided through the computer. On the introductory screen of the program, subjects in the self-determined context were given rationales for performing the task (e.g., "The



category) remained constant for all rounds and that feedback on the correct answer could be used to update their strategy. The feedback for each round consisted of a correct total of allowance for doubtful accounts and the amount in dollars that the subject's answer was over or under the correct answer. Feedback on the correct percentages for each individual aging category was not provided as that was the task of the subject. Each subject completed 18 consecutive rounds of estimations and feedback. To keep task difficulty constant across all conditions, each subject received the same dollar values for the accounts receivable agings in the same order. It should be noted that the underlying formula (i.e., solution) for both industries was the same, so that subjects in the self-determined context could *perceive* choice while actual task difficulty between the conditions remained constant.

Since the research question was concerned with knowledge acquisition, no practice rounds were given. However, subjects were provided with an informative tutorial before beginning the task. Pilot tests involving undergraduate subjects revealed that the level of difficulty provided an optimal challenge over the duration of the experiment and that subjects had plenty of time in which to make estimates and review the solutions. None of the pilot subjects derived the solution exactly.

To ensure that the reward structure was effectively manipulated, subjects in both conditions were occasionally reminded of their reward condition by a message on the computer screen. Subjects in the performance-contingent condition were provided feedback such as, "You are performing well. If you continue to perform at the expected level, you will receive \$5." Subjects in the task-contingent condition were provided with statement such as, "You are performing well. You are reminded that you will receive a \$5 reward at the completion of the task."

To ensure that the manipulation of context was effective, the language used in the two contexts varied. Recall that controlling words such as "must" and "should," as opposed to "may" and "can," can result in less intrinsic motivation (Deci et al., 1994; Ryan et al., 1983). The instructions and feedback in the controlling context utilized more than twenty-five semantic manipulations (e.g., "must," "should," "have to," etc.).

When subjects completed 18 rounds, they were asked to state their own decision strategy (i.e., the percentages applied to each aging group). This was used as a measure

of self-insight (i.e., decision quality). They were then informed that the computer needed approximately five minutes to calculate and record the overall scores. Subjects were permitted to continue practicing estimations during this waiting period (i.e., free choice period). The computer tracked the number of seconds, if any, that the subjects practiced during the free choice period.

After the five minute free choice period, subjects were informed that they had earned the \$5 reward. Subjects were then informed that after completing an exit questionnaire on the computer, they would receive a three digit code to take to the administrator in order to receive payment. A twenty-five item questionnaire included an assessment of questions related to interest and enjoyment, manipulation checks and questions related to subject demographics.

Upon completing the questionnaire and turning in the three-digit code, subjects were paid \$5. They were thanked and told that if they would like to know the answer (i.e., percentages of the independent variables), they could fill out a self-addressed note card. The subjects were also provided a sign-up sheet for future experiments. The steps in the experiment are summarized in Figure 2.

#### **4.4 Dependent Measures**

##### **4.4.1 Response intensity**

Time spent on task has commonly been used in the psychology literature (e.g., Harackiewicz, 1984; Ryan et al., 1983) and the accounting literature (e.g., Awashti and Pratt, 1990; Libby and Lipe, 1992) as a measure of response intensity. In the present study, intensity was measured as an individual's time spent estimating the allowance for doubtful accounts for eighteen periods. The computer recorded this measure in seconds. Libby and Lipe (1992) demonstrated that time on task does not perfectly measure intensity. This measure was noisy in the current study because time on task involves use of a computer mouse and the time required to input solutions, not just the cognitive time spent estimating allowances. Additionally, individuals can work very hard (i.e., be highly motivated), but do so only for a short period of time. Therefore, a self-report measure of effort was used to corroborate time on task. The self-report measure of effort



was calculated by averaging the response on three items assessed on a 6-point Likert scale in the exit questionnaire. One of the questions was reverse scored to determine the validity of the subjects' responses and an adjustment was made to the reverse scored question so that an appropriate average could be taken. The adjustment was simply subtracting the reversed score from seven, in effect adjusting all three questions in the same direction on the same scale (i.e., a scale of one to six).

#### **4.4.2 Integrated intensity**

Ryan et al. (1991) and Deci et al. (1994) found that measuring time on task alone is not sufficient to capture integrated intensity. They asserted that the time on task must be accompanied by interest and enjoyment. Thus, the correlation between time on task and self-reported measures of interest/enjoyment was used to measure integration. Significant positive correlations indicated more integration. Similar to the self-report measure of effort, the self-report measure of interest/enjoyment was calculated by averaging responses to three questions which were scored on a 6-point Likert scale. One question was reverse scored and adjusted before the average was calculated.

#### **4.4.3 Response persistence**

Harackiewicz et al. (1979) used multiple measures of intrinsic motivation, including time spent in a free-choice period, and the number of puzzles requested during a free-choice period. Likewise, response persistence in the current study was measured by time spent on task during the five minute free-choice period in addition to the number of estimates made during the free-choice period. The number of estimations made during the free choice period is a "cleaner" measure of response persistence because it is free of the problems associated with time described with response intensity above. Following receipt of reward, two additional measures of response persistence were taken: number of self-addressed note cards indicating a request for the solution and number of subjects indicating interest in participating in future experiments. The two additional measures were not used in the formal testing of hypotheses.

#### **4.4.4 Integrated response persistence**

Integrated response persistence was measured by the correlation between the number of seconds spent on the task during the free-choice period and the self-report measures of interest/enjoyment.

#### **4.4.5 Knowledge Acquisition**

Because subjects were thought to have no prior knowledge of the solution, the accuracy in the final (i.e., eighteenth) round was considered to represent the knowledge acquired during the task. The accuracy was measured by the absolute value of each estimate subtracted from the correct estimate of the allowance for doubtful accounts for the eighteenth period. Thus, a smaller score indicated greater accuracy (i.e., knowledge acquisition).

#### **4.4.6 Self-insight**

The current study assessed self-insight by measuring the correlation between subject-reported percentages and actual percentages used during the eighteenth problem. The manner in which the dependent variables were operationalized is depicted in Table 4.

## **Chapter 5**

### **RESULTS**

#### **5.1 Introduction**

This chapter begins with an analysis of the demographic characteristics of the subjects. Analyses of the validity of the self-report questions and the manipulation checks follows. The statistical analysis of hypotheses is then presented in the same order in which they were addressed in Chapter 4, with supplemental analyses provided for some hypotheses. Although the supplemental analysis sections do not directly address the hypothesis in question, they are relevant to the discussion and interpretation of hypotheses that follows in Chapter 6.

#### **5.2 Demographics**

Of the one hundred and four subjects who participated in the study, three subjects' responses were omitted from the analyses. Two of the subjects whose scores were omitted were unable to understand the instructions of the experiment, skipped problems during the paid period, and required time consuming explanations by the experimenter in order to continue the experiment. The third subject whose score was omitted indicated in the exit questionnaire that he/she strongly disagreed with the statement, "I understood the instructions of the experiment." The three subjects' scores were omitted because their lack of understanding of the instructions could have confounded several crucial measures (i.e., time on task, accuracy, enjoyment). The remaining 101 subjects were distributed as follows: 23 subjects in the self-determined, performance-contingent group (i.e., SDPC); 25 subjects in the self-determined, task

contingent group (i.e., SDTC); 27 subjects in the controlled, task-contingent group (i.e., CTC); and 26 subjects in the controlled performance-contingent group (i.e., CPC).

A review of normal probability plots and a Lilliefors significance test indicated that the dependent variables of interest were not normally distributed. Levene tests further indicated that the assumption of homogeneity of variance was also violated for the dependent variables of interest. Due to the violations of the normality assumption and the homogeneity of variance assumption, the following tests examining differences between means were conducted using nonparametric Mann-Whitney *U* tests. Additionally, statistical tests of significant correlations were conducted using Spearman's rho nonparametric correlations. Mann-Whitney *U* tests indicated that there were no significant differences at the .10 level among the experimental conditions in SAT scores, QCA (i.e., grade point average), experience with a computer mouse, or academic level.

### **5.3 Validity of Self-Report Measures**

An existing instrument used to measure self-report interest/enjoyment, choice, usefulness, and effort did not exist. Although these variables were measured in previous studies, the exact wording used in those studies was not applicable in the current study. Therefore, three questions were devised to measure each of the four variables mentioned above. Prior studies have shown that 2-4 questions provide an adequate measure of intrinsic motivation (Epstein and Harackiewicz, 1992). Principal components factor analysis with a varimax rotation was performed on the twelve questions. A scree plot (see Figure 3) revealed that four factors were appropriate. In the rotated solution, the three questions that loaded highest on the first factor applied to effort, with the lowest factor loading at .848. The three questions that loaded highest on the second factor all applied to usefulness, the lowest factor loading of which was .795. For the third factor, the three questions concerning choice had the highest factor loadings, the lowest of which was .862. The three questions that loaded highest on the fourth factor were related to enjoyment, with the lowest of the three factor loadings being .744. The rotated component matrix is displayed in Table 5.

After the principal components analysis confirmed that the questions represented

the four expected factors, Cronbach's Alpha was calculated on the three questions related to each factor. Cronbach's Alpha was .9089 for the enjoyment measure, .8949 for the usefulness measure, .8790 for the choice measure, and .9315 for the effort measure. The three questions representing each factor were averaged together to compute the four composite scores of perceived choice, perceived usefulness of task, self-reported enjoyment, and self-reported effort.

#### **5.4 Manipulation Checks**

Both choice and meaningful rationale were manipulated in order to create a self-determined or controlled context. Accordingly, subjects in the self-determined context reported more perceived choice ( $\underline{M} = 4.95$ ,  $\underline{SD} = .859$ ) than subjects in the controlled environment ( $\underline{M} = 4.64$ ,  $\underline{SD} = .891$ ). A Mann-Whitney  $U$  test of ranks revealed that the difference was significant ( $U=1033.50$ ,  $p=.051$ ). The second variable, related to context, yielded similar results. As expected, subjects in the self-determined context indicated that they perceived the task to be more useful ( $\underline{M} = 4.23$ ,  $\underline{SD} = .928$ ) than subjects in the controlled context ( $\underline{M} = 3.82$ ,  $\underline{SD} = 1.15$ ). A Mann-Whitney  $U$  test of ranks revealed that this difference was also significant ( $U=994.5$ ,  $p=.05$ ).

To test the manipulation of reward structure, subjects were asked if they felt their payment depended on their performance. Subjects responded on a six-point Likert-style question ranging from strongly disagree (i.e., "1") to strongly agree (i.e., "6"). The mean for subjects that received performance-contingent rewards was 4.94 ( $\underline{SD} = 1.31$ ) indicating that they believed their rewards to be dependent on their performance. The mean for subjects that received task-contingent rewards was 2.85 ( $\underline{SD} = 1.55$ ) indicating that they did not believe their rewards to be dependent on their performance. A Mann-Whitney  $U$  test of ranks revealed that the difference in responses was significant ( $U=406$ ,  $p=.001$ ). The results above indicate that the context and reward structure were effectively manipulated.

#### **5.5 Hypotheses 1A**

Hypothesis H1A predicted that subjects in a self-determined context will display greater response intensity than subjects in a controlled context. Subjects in the self-

determined group spent an average of 22:03 minutes ( $\underline{SD} = 6:32$ ,  $n=48$ ) on the task while subjects in the controlled group spent an average of 22:43 minutes ( $\underline{SD} = 5:08$ ,  $n=53$ ) on the task. The difference between the two groups was not significant ( $p=0.18$ ) (see Table 6).

## 5.6 Supplementary analyses related to H1A

Several additional analyses are appropriate and relevant to later discussion, although they were not formally hypothesized. Subjects in the performance-contingent group spent *less* time on the task ( $\underline{M}=21:12$  minutes,  $\underline{SD} = 5:52$ ) than subjects in the task-contingent group ( $\underline{M}=23:32$  minutes,  $\underline{SD} = 5:37$ ). A Mann-Whitney  $U$  test of ranks showed that the difference was significant ( $U=954.5$ ,  $p= .015$ ).

To investigate the legitimacy of time as a measure of effort, correlations between time on task and self-report measures of effort were taken. The overall correlation ( $\underline{r}=.316$ ) for all subjects was significant at the .001 level. When examined according to reward structure, a statistically significant correlation between time and self-reported effort ( $\underline{r}=.438$ ,  $p=.002$ ) occurred in the performance-contingent group while the correlation between time and self-reported effort in the task-contingent group was not significant at the .10 level ( $\underline{r}=.230$ ,  $p=.101$ ). Fisher's  $Z$  transformation was used to test for between group differences in the correlations. Although, the correlation was higher in the performance-contingent group, the difference between the two correlations was not significant ( $\underline{z}=1.15$ ,  $p=.13$ ).

The self-reported measures of effort were also compared. The subjects in the self-determined context reported larger scores ( $\underline{M}=4.38$ ,  $\underline{SD}=1.18$ ) than subjects in the controlled context ( $\underline{M}=4.05$ ,  $\underline{SD}=1.13$ ). The difference was significant ( $p=.04$ ) (see Table 6).

## 5.7 Hypothesis 1B

Hypothesis 1B predicted that subjects in a self-determined context would display greater response persistence than subjects in a controlled context. Response persistence was measured in two ways, time on task during the free choice period and the number of problems worked during the free choice period. The mean time spent during the free

choice period for subjects in the self-determined context was 2:56 minutes ( $SD = 1:39$ ), while the mean time on task for the subjects in the controlled context was 2:21 minutes ( $SD = 1:57$ ). Although the mean for subjects in the self-determined context was larger than the mean for those in the controlled context, a Mann-Whitney test revealed that the difference was not significant ( $U=1129$ ,  $p=0.16$ ) (see Table 6).

Using the second measure, number of free choice problems worked, a significant difference between the two groups was found. As hypothesized, subjects in the self-determined context worked more problems than subjects in the controlled context ( $M = 3.29$ ,  $SD = 2.01$  and  $M=2.53$ ,  $SD = 2.40$ , respectively). The difference was significant ( $U=1024$ ,  $p=.044$ ) and thus supports hypothesis 1B (see Table 6).

## 5.8 Hypothesis 2A

Hypothesis 1A and 1B were related to the *amount* of motivation that occurred in different contexts. As an expansion, Hypothesis 2A was concerned with the degree of integration between extrinsic and intrinsic motivation that occurred in the different contexts.

Hypothesis 2A predicted that subjects in a self-determined context would have more integrated response intensity than subjects in a controlled context. In other words, subjects in a self-determined context would be motivated by their interest and enjoyment in the task, while those in the controlled context would not. Subjects in the self-determined context, therefore, should have had stronger positive correlations between time spent on task and self-report measures of interest/enjoyment than subjects in a controlled context.

However, the correlations between time on task and self-report measures of interest/enjoyment were not significant for those in the self-determined context and those in the controlled context ( $r=.07$ ,  $p=.33$  and  $r=.15$ ,  $p=.14$ , respectively). Using Fisher Z-transformations, the correlations were converted to Z-scores and tested for significant differences. The difference between the two groups was not significant ( $p=.10$ ), and thus, did not support hypothesis 2A (see Table 7).

## 5.9 Supplementary analyses related to Hypothesis 2A

Because of the unexpected finding in a supplementary analysis related to hypothesis 1A, that subjects in the performance-contingent reward group spent less time on task than subjects in the task-contingent reward group, the two groups were compared to see if differences in correlations between time on task and self-report measures of interest/enjoyment existed. For the performance-contingent group, there was a significant positive relationship ( $r=.37$ ,  $p=.01$ ) between time on task and self-report measures of interest and enjoyment. In the task-contingent group, the relationship was negative ( $r=-.16$ ) and was not significant ( $p=.27$ ). Fisher Z transformations were computed and the difference between the two groups proved to be significant ( $p=.001$ ) (see Table 8).

The agreement (i.e., correlation) between time on task and self-report measures of interest and enjoyment indicates the degree of *integration*. The correlation does not necessarily indicate the degree of intrinsic motivation. To examine the degree of intrinsic motivation self-report measures of interest/enjoyment were compared between the two contexts. As expected, the mean score on the self-report measure of interest/enjoyment for the self-determined group ( $M=4.44$ ,  $SD=.850$ ) was greater than that of the controlled group ( $M=4.09$ ,  $SD=1.07$ ). A Mann-Whitney U test indicated that the difference was significant ( $p=.03$ ) (see Table 6).

## 5.10 Hypothesis 2B

While hypothesis 2A was concerned with the correlation between response *intensity* and self-report measures of enjoyment, hypothesis 2B was concerned with the correlation between response *persistence* and self-report measures of interest and enjoyment. Response persistence was measured by time on task in the free choice period and by number of free choice problems worked. The correlation between time on task during the free choice period and self-report measures of interest/enjoyment was not significant for the subjects in the self-determined context ( $r=.10$ ,  $p=.24$ ) nor for the subjects in the controlled context ( $r=.15$ ,  $p=.14$ ). The correlations were compared using



Fisher Z transformations and the differences between the groups were not significant (see Table 7).

The second measure of response persistence, number of free choice problems worked, produced slightly different results. For the self-determined context, the correlation between the number of free choice problems worked and self-report measures of interest/enjoyment was positive ( $r=.19$ ) and not significant ( $p=.10$ ). In the controlled context, the correlation was also positive ( $r=.23$ ) and not significant ( $p=.05$ ). However, the differences in the correlations of the two groups were not insignificant ( $p=.22$ ); hypothesis 2B was not supported (see Table 7).

### **5.11 Supplementary analyses related to H2B**

Because of the unique relationship found between performance-contingent rewards and task-contingent rewards in the previous supplemental analyses, a similar comparison was made for the correlation of response persistence and self-report measures of interest/enjoyment under both of the reward structures. Under the performance-contingent reward structure, there was a positive correlation ( $r=.29$ ) between time on task during the free choice period and self-report measures of interest/enjoyment. The correlation was significant ( $p=.05$ ). Little agreement between time on task during the free choice period and self-report measures of interest/enjoyment ( $r=.05$ ,  $p=.72$ ) was found in the task-contingent reward condition. The correlation in the performance-contingent group was not significantly greater than the correlation found in the task-contingent group ( $z=1.19$ ,  $p=.12$ ) (see Table 8).

Similar results were found when using the number of free choice problems as a measure of response persistence. The number of free choice problems worked by subjects in the performance-contingent reward group was positively correlated with self-report measure of interest/enjoyment ( $r=.32$ ,  $p=.03$ ). For the task-contingent group, the correlation was also positive but not significant ( $r=.19$ ,  $p=.17$ ). Fisher's z transformations were performed on the correlations and the differences were not found to be significant ( $z=.63$ ,  $p=.27$ ) (see Table 8).

### 5.12 Hypotheses 3A and 3B

Hypothesis 3A asserted that an ordinal interaction would occur between context and rewards such that in a self-determined context, performance-contingent rewards would result in more response intensity than task-contingent rewards, while in a controlled context, performance-contingent rewards would result in less response intensity than task-contingent rewards. Support for the ordinal interaction of hypothesis 3A is dependent upon support for hypothesis 1A. Since hypothesis 1A was not supported, hypothesis 3A, by definition, could not be supported.

In a similar fashion, support for hypothesis 3B was dependent on support for hypothesis 2A. Since hypothesis 2A was not supported, hypothesis 3B could not be supported and therefore, was not tested.

### 5.13 Supplementary analysis related to H3A and H3B

While the analysis of the measure of response intensity (i.e., time on task) yielded insignificant differences between the self-determined context group and the controlled context group, self-report measures of effort were significantly larger in the self-determined group in comparison to the controlled group. Therefore, the ordinal interaction of hypothesis 3A was examined using self-report measures of effort. Specifically, the SDPC group reported slightly less effort ( $\underline{M}=4.37$ ,  $\underline{SD}=1.18$ ) than the SDTC group ( $\underline{M}=4.40$ ,  $\underline{SD}=1.19$ ). Both the SDPC groups and the SDTC groups reported more effort than the CTC group ( $\underline{M}=4.06$ ,  $\underline{SD}=1.11$ ) which reported more effort than the CPC group ( $\underline{M}=4.03$ ,  $\underline{SD}=1.18$ ). The Jonckheere-Terpstra  $J^*$  statistic was used to test for the hypothesized trend (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ) in the amount of self-report effort between treatment groups.<sup>1</sup> The trend was found to be significant ( $J^*=1.52$ ,  $p=.07$ ) (see Table 9).

The same ordinal interaction was also examined using the self-report measures of enjoyment. Similar to the effort measures, the SDPC group ( $\underline{M}=4.434$ ,  $\underline{SD}=.83$ ) reported

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<sup>1</sup> The Jonckheere-Terpstra J statistic is a summary of the Mann-Whitney  $U$ s. The null hypothesis for this test is that the rank (R) orders are equal and the alternative hypothesis being  $R_1 \geq R_2 \geq R_3 \geq R_4$  with  $R_1$  not equal to  $R_n$ .

slightly less enjoyment than the SDTC group ( $\underline{M}=4.44$ ,  $\underline{SD}=.88$ ). Both the SDPC group and the SDTC group reported more enjoyment than the CTC group ( $\underline{M}=4.15$ ,  $\underline{SD}=.99$ ), and the CTC group reported more enjoyment than the CPC group ( $\underline{M}=4.04$ ,  $\underline{SD}=1.17$ ). The hypothesized trend (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ) was found to be significant ( $\underline{J}^*=1.51$ ,  $p=.07$ ) (see Table 9).

#### **5.14 Hypothesis 4A**

Hypothesis 4A stated that an ordinal interaction would occur such that in a self-determined context, performance-contingent rewards would result in more response persistence than task-contingent rewards, while in a controlled context, performance-contingent rewards would result in less response persistence than task-contingent rewards. Support for hypothesis 4A was dependent on support for hypothesis 1B. Hypothesis 1B was supported so hypothesis 4A was tested.

Response persistence was addressed by measuring both time spent in the free choice period and number of problems worked in the free choice period. The mean time spent during the free choice period was 2:55 minutes ( $\underline{SD}=1:39$ ) in the SDPC group, 2:57 ( $\underline{SD}=1:41$ ) minutes in the SDTC group, 2:33 ( $\underline{SD}=1:55$ ) minutes in the CTC group, and 2:08 ( $\underline{SD}=1:58$ ) minutes in the CPC group. The Jonckheere-Terpstra  $\underline{J}^*$  statistic was used to test for the predicted trend (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ) in the amount of time spent during the free choice period. The trend was not significant ( $\underline{J}^*=1.04$ ,  $p=.15$ ) (see Table 9).

An analysis of the number of problems completed during the free choice period (i.e., measure of response persistence) yielded a significant result. The average number of problems worked during the free choice period was 3.52 ( $\underline{SD}=2.13$ ) for the SDPC group, 3.08 ( $\underline{SD}=1.91$ ) for the SDTC group, 2.52 ( $\underline{SD}=2.29$ ) for the CTC group, and 2.54 ( $\underline{SD}=2.55$ ) for the CPC group. A Jonckheere-Terpstra  $\underline{J}^*$  statistic revealed the hypothesized trend was significant ( $\underline{J}^*=1.84$ ,  $p=.03$ ) (See Table 9).

#### **5.15 Hypothesis 4B**

Hypothesis 4B asserted that an ordinal interaction would occur between context and rewards such that in a self-determined context, performance-contingent rewards

would result in more integrated response intensity than task-contingent rewards, while in a controlled context, performance-contingent rewards would result in less integrated response intensity than task-contingent rewards. Support for the ordinal interaction of hypothesis 4B was dependent upon support for hypothesis 2B. Since hypothesis 2B was not supported, hypothesis 4B could not be supported and was, thus, not tested.

### **5.16 Hypothesis 5**

Hypothesis 5 stated that subjects in a self-determined context would display more knowledge acquisition (i.e., accuracy) than subjects in a controlled context. Accuracy was measured by the absolute value of the difference between a subject's answer for the 18th problem and the correct answer for the 18th problem. Thus, a smaller calculated difference equated with greater accuracy. As expected, the mean calculated difference for the subjects in the self-determined group ( $\underline{M}=50,518$ ,  $\underline{SD}=45,438$ ) was less than the mean calculated difference for the subjects in the controlled group ( $\underline{M}=59,640$ ,  $\underline{SD}=85,117$ ); however, the difference was not significant ( $p=.27$ ) (see Table 11).

### **5.17 Supplementary analyses related to H5**

A second measure of knowledge acquisition was determined by the change in accuracy from round one to round 18. Therefore, the difference in the errors (i.e., absolute value of the difference between a subject's response and the correct answer) during the first round less the errors in the 18th round was calculated. Higher values of this new measure, change in accuracy, represented greater knowledge acquisition. Subjects in the self-determined context had a greater change in accuracy ( $\underline{M}=53,084$   $\underline{SD}=45,972$ ) than subjects in the controlled context ( $\underline{M}=36,395$ ,  $\underline{SD}=92,872$ ), although the difference in the two groups was not significant ( $p=.39$ ) (see Table 11).

### **5.18 Hypothesis 6**

Hypothesis 6 asserted that an ordinal interaction would occur between context and rewards such that in a self-determined context, performance-contingent rewards would result in more knowledge acquisition than task-contingent rewards, while in a controlled context, performance-contingent rewards would result in less knowledge

acquisition than task-contingent rewards. Support for this ordinal interaction was dependent on support for hypothesis 5. Since hypothesis 5 was not supported, hypothesis 6 was not tested.

### **5.19 Supplementary analyses related to H6**

The ordinal interaction was examined using a second measure of knowledge acquisition (i.e., the difference in the absolute value of the error during the first round less the absolute value of error in the 18th round). Contrary to the hypothesis, the mean score for the SDPC group ( $\underline{M}=48,474$ ,  $\underline{SD}=46,288$ ) was less than the mean score for the SDTC group ( $\underline{M}=57,209$ ,  $\underline{SD}=46,272$ ). Consistent with the hypothesis, the means for SCPD group and the SDTC group were larger than the mean for the CTC group ( $\underline{M}=38,009$ ,  $\underline{SD}=102,158$ ) and the mean for the CTC group was larger than the mean for the CPC group ( $\underline{M}=34,718$ ,  $\underline{SD}=84,148$ ). However, the hypothesized trend (SDPC>SDTC>CTC>CPC) was not significant ( $p>.50$ ) (see Table 12).

### **5.20 Hypothesis 7**

Hypothesis 7 asserted that subjects in a self-determined context would demonstrate greater self-insight than subjects in a controlled context. Self-insight was measured for each of the three aging categories by taking the absolute value of the difference between the percentages that the subjects stated they used in the 18th round less their actual percentages used. Thus, smaller values (i.e., differences) reflected greater self-insight.

For the first aging category, the subjects in the self-determined context exhibited larger differences (i.e., less self-insight) ( $\underline{M}=3.52$ ,  $\underline{SD}=6.73$ ) than subjects in the controlled context ( $\underline{M}=1.69$ ,  $\underline{SD}=2.55$ ). However, the differences were not significant ( $p=.13$ ). In the second aging category, subjects in the self-determined context exhibited smaller differences (i.e., more self-insight) ( $\underline{M}=3.01$ ,  $\underline{SD}=5.43$ ) than subjects in the controlled context ( $\underline{M}=4.79$ ,  $\underline{SD}=5.83$ ). This difference was in the expected direction and significant ( $p=.01$ ). For the third aging category, subjects in the self-determined context displayed smaller differences (i.e., more self-insight) ( $\underline{M}=3.46$ ,  $\underline{SD}=6.00$ ) than subjects in the controlled context ( $\underline{M}=4.34$ ,  $\underline{SD}=8.98$ ). Although the difference in self-

insight on the third aging category was in the expected direction, it was not significant ( $p=.32$ ) (see Table 11).

### **5.21 Hypothesis 8**

Hypothesis 8 stated that an ordinal interaction would occur between context and reward such that in a self-determined context, performance-contingent rewards would result in greater self-insight than task-contingent rewards, while in a controlled context, performance-contingent rewards would result in less self-insight than task-contingent rewards. Similar to earlier interaction hypotheses, support for hypothesis 8 was dependent on support for an earlier hypothesis (i.e., hypothesis 7). Because there was limited support for hypothesis 7 (i.e., expected results occurred only for the second aging category), only the second aging category was tested for the ordinal interaction. Results indicated that the means for the groups were ordered as hypothesized: SDPC ( $\underline{M}=2.52$ ,  $\underline{SD}=3.62$ ), SDTC ( $\underline{M}=3.47$ ,  $\underline{SD}=6.78$ ), CTC ( $\underline{M}=4.04$ ,  $\underline{SD}=5.59$ ), and CPC ( $\underline{M}=5.56$ ,  $\underline{SD}=6.08$ ). The Jonckheere-Terpstra  $J^*$  statistic was used to test for an increasing trend (i.e.,  $SDPC \leq SDTC \leq CTC \leq CPC$ ) in self insight (i.e., the difference in the stated percentage used and actual percentage used, with smaller numbers indicating more self-insight). The trend was significant ( $p=.01$ ) (see Table 12).

## Chapter 6

### DISCUSSION AND CONCLUSIONS

#### 6.1 Introduction

A discussion of the results of the experiment is followed by concluding statements. The limitations of the study are then discussed, followed by a section describing the relevant contributions of the study. Finally, recommendations for future research are presented.

#### 6.2 Interpretation of Hypothesis 1A

Hypothesis 1A, which predicted that self-determined context would produce more response persistence than a task-contingent context, was not supported when time on task was used as a measure of response intensity. In fact, the results support the conclusion that performance-contingent rewards result in subjects spending *less* time on task (i.e., effort) than subjects receiving task-contingent rewards. This is particularly interesting because the results are not only unsupportive of the hypothesis in question, but are opposite of the findings in previous research. Both Libby and Lipe (1992) and Awasthi and Pratt (1990) found that subjects in a performance-contingent reward structure spent *more* time on task than subjects in a task-contingent reward structure. This difference in findings may be related to the difference in the structure of the tasks utilized in the current study and past research.

A unique aspect of the current study is the use of multiple trials with feedback. In both the Libby and Lipe and the Awasthi and Pratt studies, subjects received no competence feedback until the experiment was completed. The need to display competence is central to cognitive-evaluation theory. In the current study, all subjects received competence feedback after each of the eighteen problems. Thus, the faster subjects worked a problem, the sooner they received competence feedback (i.e., intrinsic

motivation). Discussions with individuals who pilot tested this experiment revealed that several subjects expressed a desire for competence feedback screens to appear more quickly. If there were different desires to receive competence feedback, it could help to explain why certain subjects responded more quickly (i.e., less time on task) than others. One way in which performance-contingent rewards are unique from task-contingent rewards is that they emphasize competence feedback. Because subjects in a performance-contingent reward structure are more focused on competence feedback than subjects in a task-contingent reward structure, subjects in a performance-contingent reward structure have a desire to work faster to receive the competence feedback more frequently. This could explain why subjects in the performance-contingent reward structure spent less time on the task than subjects in the task-contingent reward structure.

The supplementary analysis of hypothesis 1A raises further concerns with time on task as a measure of response persistence. As stated earlier, time on task is an attractive measure because it can be recorded unobtrusively. However, Libby and Lipe (1992) cautioned that time on task is a potentially problematic measure of response intensity because time on task does not always correlate with effort. Although the relationship ( $r=.316$ ,  $p=.001$ ) between time on task and the self-report measure of effort in this study was significant, the correlation was still quite low considering that both measures assessed the same construct (i.e., motivation). Furthermore, the correlation between time on task and the self-report measure of effort varied across conditions. The relationship between time on task and self-report measures of effort was significantly greater in the performance-contingent group compared to the task-contingent group. This indicates that time on task, as a measure of response intensity, may have been more meaningful under performance-contingent reward structures rather than under the task-contingent reward structures. In sum, task-contingent rewards appeared to have resulted in more activity (i.e., time on task) than performance-contingent rewards, but the activity was not as focused or intense (i.e., low correlation between time on task and self-report measures of effort). When self-reported effort scores were used as a measure of response intensity, expected significant differences between subjects in the self-determined group and subjects in the controlled group occurred. While time on task as a measure of response intensity did not support Hypothesis 1A, the self-report measure of effort did.



### **6.3 Interpretation of Hypothesis 1B**

Time spent during the free choice period by subjects in a self-determined environment was greater than time spent during the free choice period by subjects in a controlled environment. That is, the means for both measures of response persistence (i.e., time on task during the free choice period and number of problems worked during the free choice period) were in the expected direction; however, the difference between the two groups was not significant. This lack of a significant difference might have been more a function of the problems associated with using time as a measure of response persistence than a lack of a true difference in response persistence. Consider the results when the number of problems worked in the free choice period was used as a measure of response persistence rather than time spent on task in the free choice period. When the number of problems worked during the free choice period was used as the measure of response persistence, the self-determined group displayed significantly more response persistence than the controlled group. In sum, the results indicate that a self-determined context may promote response persistence.

Recall that the correlation between time and self-report effort was significant but low. It called into question the sufficiency of time on task as a measure of motivation. The results found in hypothesis 1B also highlight the complications of using time as a measure of motivation. When time in the free choice period was used as a measure of response persistence, the groups were not significantly different. However, when the number of free choice problems worked (i.e., a measure of motivation independent of time) was used as a measure of response persistence, results were in the expected direction *and* significant.

### **6.4 Interpretation of Hypothesis 2A and 2B**

Hypothesis 2A predicted that subjects in the self-determined context would demonstrate more integration between response intensity and self-report measures of interest/enjoyment (i.e., higher correlations) than subjects in the controlled context. In other words, it was expected that there would be greater consistency between a subject's behavior (i.e., time on task) and a subject's reported feelings about the task (i.e.,

enjoyment/interest) for subjects in the self-determined context as compared to subjects in the controlled context. Contrary to predicted results, there was no significant difference in the correlations found in the self-determined context and those in the controlled context. Deci et al. (1994) found a significant difference in integration between the two contexts. However, a critical difference between the Deci et al. study and the current study is that the current study used both task-contingent and performance contingent rewards, while the Deci et al. study introduced neither of the reward structures.

A comparison between the two reward structures revealed that subjects in a performance-contingent reward structure had significantly more integrated behavior than subjects in the task-contingent reward structure. It appears that performance-contingent rewards may improve the integration process, and, as evidenced by the lack of differences in integration between contexts, rewards may override the integration process created by the context.

Although integration represents the agreement (i.e., correlation) between behavior and self-report measures of interest/enjoyment, it does not represent the amount of intrinsic motivation. While there appears to be no differences in integration between the two contexts, there are differences in intrinsic motivation. Self-report measures of interest/enjoyment (i.e., intrinsic motivation) were significantly greater for subjects in the self-determined context as compared to the subjects in the controlling context. In sum, subjects in the self-determined context appeared to be more intrinsically motivated (i.e., greater enjoyment/interest) than subjects in the controlled context, but the intrinsic motivation didn't correlate with effort.

## **6.5 Interpretation of Hypotheses 3A and 3B**

When testing the interaction between rewards and context, using time on task as a measure of response intensity did not support the hypothesized relationship (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ). As discussed in the interpretation of hypothesis 1, highly motivated subjects may have worked harder in a shorter period of time than less motivated subjects, casting doubt on the usefulness of time on task (i.e., in the paid period) as an exact measure of motivation. Therefore, self-report measures of effort were used to analyze the hypothesized trend. With self-report measures of effort used as a

measure of response intensity, the hypothesized trend was supported.

For integrated response intensity (i.e., H3B), the hypothesized trend cannot be supported based on the earlier interpretation of hypothesis 2A (i.e., performance-contingent rewards resulted in greater integrated response intensity than task-contingent rewards).

## **6.6 Interpretation of Hypotheses 4A and 4B**

Although the hypothesized ordinal interaction for response intensity (i.e., H3A) was not supported, it appears that the interaction occurred for response persistence. When the number of free choice problems worked was used as the measure of response persistence, the hypothesized trend (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ) was found to be significant.

When time spent during the free choice period was used as the measure of response persistence, the hypothesized trend was not significant, though none of the scores significantly contradicted the trend. This result may not be surprising if the sufficiency of time as a measure of motivation is considered. Recall that time on task did not correlate highly with self-reported effort. Again it is possible that time may not be an adequate proxy for motivation.

An earlier analysis, indicated that performance-contingent rewards improved integrated response *intensity* compared to task-contingent rewards. Apparently, the improved integration overrode any effects that the context might have on integrated response *intensity*. While there was support for performance-contingent rewards improving integration for response *intensity* compared to task-contingent rewards, the improved integration seemed to disappear for response *persistence* (i.e., as indicated by insignificant correlations between response persistence and self-reported enjoyment). Thus, performance-contingent rewards appear to improve the integration process, but the improved integration does not persist for long.

## **6.7 Interpretation of Hypotheses 5 and 6**

No significant differences in knowledge acquisition were found between groups. However, the means for the accuracy measure were in the predicted direction. That is,

subjects in the self-determined group demonstrated more accuracy than subjects in the controlled group. Prior to performing the study, it was believed that the best measure of knowledge acquisition involved assessing accuracy on the 18<sup>th</sup> round. However, it was determined post hoc that a better measure of knowledge should take into account accuracy on the 1<sup>st</sup> round as well as the 18<sup>th</sup> round. That is, the accuracy scores in the 18<sup>th</sup> round were somewhat dependent on the initial starting point (i.e., first estimate). If the first estimate of the allowance for bad debts, which was a guess for all subjects, was extremely inaccurate, then it would have taken longer (i.e., more rounds) to improve accuracy compared to subjects who started with more accurate initial estimates. A more appropriate measure of knowledge acquisition might have been the change in accuracy from round one to round eighteen. Using this measure of knowledge acquisition, the self-determined groups displayed more knowledge acquisition (i.e., change in accuracy) than the controlled groups. Although the means were in the hypothesized direction, the differences were not significant.

The lack of significant differences in knowledge acquisition is not totally surprising. Cognitive evaluation theory contends that context and reward structure creates motivation, and the resulting motivation improves performance evaluations (i.e., knowledge acquisition). Thus, improved performance evaluations are one step removed from the initial manipulation of context and process. This is consistent with Libby and Lipe's (1992) assertion that higher performance evaluations are dependent upon incentives creating more effort *and* that the cognitive processes involved in the task are sensitive to that increased effort. If the cognitive process involved in the current task were not sensitive to the motivation created by the context and reward structure, it would explain the lack of significant differences in knowledge acquisition.

## **6.8 Interpretation of Hypotheses 7 and 8**

Accuracy is a common objective measure used to evaluate performance; self-insight is a qualitative decision characteristic. While individuals may have very similar accuracy scores, they may possess different degrees of understanding their own decision processes (i.e., self-insight). Self-insight, as measured by comparing the actual and self-reported strategies for solving the task, only yielded a significant difference for one aging

category (i.e., 31-90 days). In that category, subjects in the self-determined context exhibited more self-insight than subjects in the controlled context. In the pilot study for this experiment, it was revealed that the dominant strategy for solving task (i.e., learning the true percentages of each aging category) was to concentrate on finding an adequate percentage for the first aging category (i.e., 0-30 days), before turning attention to the second category (i.e., 31-90 days). After an adequate percentage (i.e., estimate) for the second category was attained, the subjects moved on to the third aging category. The pilot test also revealed that subjects were rarely able to refine their estimate of the third aging category before the eighteen rounds ended. Assuming that all the subjects, regardless of motivation level, had the opportunity to fine tune their estimates of the first aging category, then one would expect all the subjects to be quite aware of their own estimate strategy for the first aging category. This would explain why no differences were found between groups for the first aging category. Subjects who were more motivated (i.e., self-determined) would be able to direct their attention to the second aging category earlier in the eighteen rounds than less motivated subjects (i.e., controlled). Thus, one would expect that more motivated subjects would have greater self-insight into their own strategy for the second aging category than less motivated subjects. This is consistent with the finding that subjects in the self-determined group displayed significantly greater insight into their strategy for the second aging category than subjects in the controlled group. If very few subjects in the experiment were able to refine their estimates for the third aging category (i.e., the case found in the pilot study), then one would expect there to be no significant differences in self-insight for the third aging category. Accordingly, the subjects in the self-determined group did not demonstrate significantly greater self-insight than subjects in the controlled group.

The expected ordinal interaction for self-insight (i.e., hypothesis 8) held true for the second aging category as well. The decreasing trend in self-insight (i.e.,  $SDPC \geq SDTC \geq CTC \geq CPC$ ) was found to be significant.

Interestingly, there were no significant results for the performance evaluation measure of knowledge acquisition; however, there were significant results for the performance evaluation measure of self-insight. This is analogous to Grolnick and Ryan's (1989) findings that intrinsically motivated subjects did not outperform

extrinsically motivated subjects on the performance evaluation measure of rote memory but did outperform extrinsically motivated subjects on the performance evaluation of conceptual understanding. Rote memory and knowledge acquisition are similar in that both are very objective and easily quantifiable measures of performance evaluation. On the other hand, self-insight and conceptual understanding are more *qualitative* measures of performance evaluation.

## **6.9 Conclusions and Contributions**

The interactive effects of context and reward structures on intrinsic motivation and extrinsic motivation were examined in an allowance for doubtful accounts estimation task. The current study examined the conditions in which monetary incentives could improve or impair motivation (i.e., both extrinsic and intrinsic) and the ensuing effects of improved or impaired motivation on performance evaluation and knowledge acquisition. Consistent with cognitive evaluation theory, the results indicated that a self-determined context enhances motivation compared to a controlling context. Furthermore, reward structure was found to interact with the different contexts. Performance-contingent rewards improved motivation (i.e., self-report interest/enjoyment, self-report effort and number of free choice problems worked) and performance evaluations (i.e., self-insight) compared to task-contingent rewards when the context was self-determined. However, when the context was controlling, performance-contingent rewards produced less motivation than subjects in a task-contingent reward structure.

The present study was unique in accounting in that it expanded the concept of motivation to include both intrinsic and extrinsic motivation and used the expanded concept in examining the assumption that extrinsic incentives increase motivation. Furthermore, understanding the effects of reward structure and context on this expanded concept of motivation is important to most researchers. Incentives are used in a variety of experimental settings, most of which do not directly study motivation. It is important for researchers to understand the potential impact that different incentive schemes and contexts can have on motivation.

Prior research in accounting has concluded that performance-contingent rewards

increase motivation and often improves decision performance evaluations. This study provides evidence that the benefits of performance-contingent rewards is often dependent on the context in which they are given.

Contributions were also made to the psychology literature. The process of integration is developed by examining integration under explicit extrinsic reward structures. This provided unique insights into the effects of extrinsic incentives on the integration process. Specifically, performance-contingent rewards produced more integrated motivation than task-contingent rewards.

### **6.10 Limitations**

The results and conclusions should be interpreted in light of several limitations. First, the reward structures used in this study were not as complex as they might be in applied settings where various combinations of performance-contingent and task-contingent reward structures are prevalent. Additionally, the reward structure was highly salient in this experiment, but it is unclear if this is representative of the salience of reward structures in applied settings.

Second, measuring the construct of motivation is a difficult task and the use of time and self-report measures are not likely to perfectly represent this construct. While other more direct measures (e.g., pupil dilation) could have been used, they were considered too obtrusive.

Finally, it was relatively easy for the performance-contingent reward group to perform within the suggested ranges. Had the requirements been more stringent, it is likely that more negative performance feedback would have resulted, probably altering the degree of intrinsic motivation in the performance-contingent group.

### **6.11 Recommendations for Future Research**

The results of this study open up a new set of questions about motivation. First, future research should focus on identifying other contextual variables that satisfy the innate psychological needs for competence, affiliation, and autonomy. The current study did not include the acknowledgment of an individual's perspective, a contextual variable that has proven to work in the absence of extrinsic incentives. It would be useful to

know if this variable can improve motivation in the presence of extrinsic rewards.

Second, the results found in this study need to be replicated in field studies. While the current study addressed how different contextual variables and rewards structure affected response persistence at the micro (i.e., individual persistence on a task) level, it would be useful to see if the same results for response persistence can be found at the macro level (i.e., employee turnover). Additionally cognitive evaluation theory could also be applied at a macro level that examines reward structures at the company or division level rather than the individual level. Results from a macro level approach could produce findings that are more germane to applied settings. Even the study of executive compensation plans might be complimented by examining how they interact with contextual variables (e.g. corporate culture).

Third, expanding the current research by examining how other extrinsic incentives affect intrinsic motivation could be helpful. Additional types of reward structures used in previous accounting studies (e.g., piece-rate, tournament, etc.) should be considered. The effects of nonfinancial incentives, such as accountability, on intrinsic motivation might also be interesting.

Fourth, future studies would be enhanced if they considered individual differences. Are some individuals more prone to intrinsic motivation or extrinsic motivation? Are some individuals conditioned to respond to only extrinsic incentives? Finally, more refined measures of intrinsic motivation need to be developed. These measures need to be meaningful in a variety of contexts and reward structures for a cohesive body of research on motivation to develop.



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Table 1: Comparisons of Experimental Motivation and Reward Studies in Accounting

	<b>Performanc e-contingent rewards included</b>	<b>Task- contingent rewards included</b>	<b>Self- determined versus controlled context</b>	<b>Time on task measured</b>	<b>Intrinsic motivation measured</b>	<b>Multiple trials with feedback</b>
<b>Chow (1983)</b>	Yes	Yes	No	No	Yes	No
<b>Ashton (1990)</b>	Yes	No	No	No	No	Yes
<b>Awasthi and Pratt (1990)</b>	Yes	No	No	Yes	Yes	No
<b>Libby and Lipe (1992)</b>	Yes	Yes	No	Yes	Yes	No
<b>Becker (1997)</b>	No	No	Yes	No	Yes	No
<b>Richardson (1998)</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>

Table 2: Experimental Design

		<b>Reward Structure</b>	
		<b>Task-Contingent</b>	<b>Performance-Contingent</b>
<b>C o n t e x t</b>	<b>Self-Determined</b>	Group SDTC	Group SDPC
	<b>Controlling</b>	Group CTC	Group CPC

Table 3: Hypotheses

<b>Hypotheses</b>	<b>Hypothesized Results</b>	<b>Dependent Variable</b>
<b>H1A</b>	<b>SDPC &amp; SDTC &gt; CTC &amp; CPC</b>	Intensity
<b>H1B</b>		Persistence
<b>H2A</b>		Integrated Intensity
<b>H2B</b>		Integrated Persistence
<b>H3A</b>	<b>SDPC &gt; SDTC &gt; CTC &gt; CPC</b>	Intensity
<b>H3B</b>		Integrated Intensity
<b>H4A</b>		Persistence
<b>H4B</b>		Integrated Persistence
<b>H5</b>	<b>SDPC &amp; SDTC &gt; CTC &amp; CPC</b>	Knowledge Acquisition
<b>H6</b>	<b>SDPC &gt; SDTC &gt; CTC &gt; CPC</b>	Knowledge Acquisition
<b>H7</b>	<b>SDPC &amp; SDTC &gt; CTC &amp; CPC</b>	Self-insight
<b>H8</b>	<b>SDPC &gt; SDTC &gt; CTC &gt; CPC</b>	Self-insight



Table 4: Dependent Variables

<b>DEPENDENT VARIABLE</b>	<b>OPERATIONALIZED MEASURE</b>
<b>Response Intensity</b>	Seconds spent on task
<b>Integrated Response Intensity</b>	Seconds on task (measured by computer) correlated with an average of self-report measures (measured by three questions) of interest/enjoyment
<b>Response Persistence</b>	Seconds spent on task during free period (measured by computer) and the number of estimates attempted during the free-choice period
<b>Integrated Response Persistence (prior to payment)</b>	Seconds on task during free-choice period (measured by computer) correlated with an average of self-report measures (measured by three questions) of interest/enjoyment
<b>Knowledge Acquisition</b>	Absolute value of the difference between the subject's estimated allowance for doubtful accounts and the true allowance totaled for 18 periods
<b>Self-Insight</b>	Correlation between the subject's stated strategy and the subject's actual strategy during the last round

Table 5: Rotated Component Matrix for Self-Report Measures

	<b>Component 1</b>	<b>Component 2</b>	<b>Component 3</b>	<b>Component 4</b>
<b>Work1</b>	<b>.863</b>	.236	.196	.250
<b>Work2</b>	<b>.929</b>	.094	.101	.165
<b>Work3</b>	<b>.848</b>	.085	.235	.283
<b>Use1</b>	.091	<b>.830</b>	.209	.270
<b>Use2</b>	.166	<b>.795</b>	.117	.374
<b>Use3</b>	.137	<b>.884</b>	.120	.229
<b>Choice1</b>	.216	.193	<b>.863</b>	.085
<b>Choice2</b>	.185	.241	<b>.865</b>	.037
<b>Choice3</b>	.077	.097	<b>.862</b>	.217
<b>Enjoy1</b>	.276	.334	.070	<b>.767</b>
<b>Enjoy2</b>	.261	.393	.217	<b>.774</b>
<b>Enjoy3</b>	.372	.408	.193	<b>.744</b>

Work1, Work2, and Work3 are the individual items used to assess self-reported work.

Use1, Use2, and Use3 are the individual items used to assess self-report of usefulness of task.

Choice1, Choice2, and Choice3 are the individual items used to assess self-report of choice.

Enjoy1, Enjoy2, and Enjoy3 are the individual items used to assess self-reported enjoyment.

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 6: Means and Standard Deviations for Motivation Measures in the Self-determined and Controlled Contexts

<b>Context</b>	<b>Time on task</b>	<b>Time on task in the free choice period</b>	<b>Number of free choice problems worked</b>	<b>Self-report effort</b>	<b>Self-report enjoy</b>
<b>Self-determined (n=48)</b>					
<u>M</u>	22:03	2:56	3.29	4.38	4.44
<u>SD</u>	6:32	1:40	2.01	1.18	.85
<b>Controlled (n=53)</b>					
<u>M</u>	22:43	2:21	2.53	4.05	4.09
<u>SD</u>	5:09	1:57	2.40	1.13	1.07
<b>Significance level (one tailed test)<sup>2</sup></b>	p=.18	p=.16	<b>p=.04</b>	<b>p=.04</b>	<b>p=.03</b>

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<sup>2</sup> Mann Whitney U tests were used to test all differences between means.

Table 7: Correlations for Self-Determined and Controlled Contexts

<b>Context</b>	<b>Time on task and self-report enjoyment</b>	<b>Time on task in the free choice period and self-report enjoyment</b>	<b>Number of free choice problems worked and self-report enjoyment</b>
<b>Self-determined (n=48)</b>			
r	.07	.10	.19
p (one-tailed)	.33	.24	.10
<b>Controlled (n=53)</b>			
r	.15	.15	.23
p (one-tailed)	.14	.14	.05
<b>Significance level for differences in context (one tailed test)<sup>3</sup></b>	p=.17	p=.21	p=.22

---

<sup>3</sup> Differences in correlations were measured using Fisher Z-transformations.

Table 8: Correlations for Performance-contingent and Task-contingent Rewards

<b>Context</b>	<b>Time on task and self-report enjoyment</b>	<b>Time on task in free choice and self-report enjoyment</b>	<b>Number of free choice problems and self-report enjoyment</b>
<b>Performance-Contingent (n=49)</b>			
r	.37	.29	.32
p (two tailed)	.01	.05	.03
<b>Task-Contingent (n=52)</b>			
r	-.16	.05	.19
p (two-tailed)	.27	.72	.17
<b>Significance level for differences reward structure (two-tailed test)</b>	<b>p=.001</b>	p=.12	p=.27

Table 9: Means and Standard Deviations for Motivation Measures by Groups (SDPC, SDTC, CTC, CPC)

<b>Context</b>	<b>Time on task</b>	<b>Time on task in the free choice period</b>	<b>Number of free choice problems worked</b>	<b>Self-report effort</b>	<b>Self-report enjoy</b>
<b>SDPC (n=23)</b>					
<u>M</u>	20:40	2:55	3.52	4.37	4.44
<u>SD</u>	6:47	1:40	2.13	1.18	.83
<b>SDTC (n=25)</b>					
<u>M</u>	23:19	2:57	3.08	4.40	4.44
<u>SD</u>	6:10	1:41	1.19	1.19	.88
<b>CTC (n=27)</b>					
<u>M</u>	23:43	2:33	2.52	4.06	4.15
<u>SD</u>	5:09	1:56	2.29	1.11	.99
<b>CPC (n=26)</b>					
<u>M</u>	22:24	2:08	2.54	4.03	4.04
<u>SD</u>	5:50	1:58	2.55	1.18	1.17
<b>Significance of trend (i.e., SDPC ≥ SDTC ≥ CTC ≥ CPC (one tailed test)<sup>4</sup></b>	p>.50	p=.15	<b>p=.03</b>	<b>p=.07</b>	<b>p=.07</b>

<sup>4</sup> Jonckheere's Terpstra J\* Statistic was used to test the significance of the trend.

Table 10: Correlations by group (SDPC, SDTC, CTC, CPC)

<b>Group</b>	<b>Time on task and self-report enjoyment</b>	<b>Time on task in free choice and self-report enjoyment</b>	<b>Number of free choice problems and self-report enjoyment</b>
<b>SDPC (n=23)</b>			
r	.30	.19	.26
p (two tailed)	.17	.39	.23
<b>SDTC (n=25)</b>			
r	-.14	.04	.14
p (two-tailed)	.51	.84	.51
<b>SDTC (n=27)</b>			
r	-.20	-.01	.17
p (two-tailed)	.31	.97	.40
<b>SDTC (n=26)</b>			
r	.44	.27	.28
p (two-tailed)	<b>.02</b>	.18	.17

Table 11: Means and Standard Deviations for Performance Evaluation Measures in Self-determined and Controlled Contexts

<b>Context</b>	<b>Accuracy (Round 18)</b>	<b>Change in Accuracy (Round 1 - Round 18)</b>	<b>Insight 0- 30 day aging category</b>	<b>Insight 31-90 day aging category</b>	<b>Insight &gt;90 day category</b>
<b>Self-determined (n=47)<sup>5</sup></b>					
<u>M</u>	50,518	53,084	3.52	3.01	3.46
<u>SD</u>	45,438	45,972	6.73	5.43	6.00
<b>Controlled (n=53)</b>					
<u>M</u>	59,640	36,395	1.69	4.79	4.34
<u>SD</u>	85,117	92,872	2.55	5.83	8.98
<b>Significance level (one tailed test)<sup>6</sup></b>	.27	.39	.13	<b>p=.01</b>	.32

<sup>5</sup> One subject was excluded from the analyses of performance evaluation, because he/she did not provide an estimate for the final round.

<sup>6</sup> Mann Whitney U tests were used to test all differences between means.



Table 12: Means and Standard Deviations for Performance Evaluation Measures by Groups (SDPC, SDTC, CTC, CPC)

Context	Accuracy (Round 18)	Change in Accuracy (Round 1 - Round 18)	Insight 0-30 day aging category	Insight 31-90 day aging category	Insight >90 day category
<b>SDPC (n=23)</b>					
<u>M</u>	59,986	48,784	4.30	2.52	4.61
<u>SD</u>	48,133	46,288	8.16	3.62	7.46
<b>SDTC (n=24)<sup>7</sup></b>					
<u>M</u>	41,445	57,205	2.77	3.47	2.35
<u>SD</u>	41,684	46,272	5.08	6.78	4.02
<b>CTC (n=27)</b>					
<u>M</u>	56,714	38,009	1.38	4.04	2.24
<u>SD</u>	88,520	102,158	1.61	5.59	3.24
<b>CPC (n=26)</b>					
<u>M</u>	62,678	34,718	2.01	5.56	6.52
<u>SD</u>	83,073	84,148	4.79	6.08	12.12
<b>Significance of trend (i.e., SDPC ≥ SDTC ≥ CTC ≥ CPC (one tailed test)<sup>8</sup></b>	p>.50	p>.50	p>.50	<b>p=.01</b>	p>.50

<sup>7</sup> One subject was excluded from the analyses of performance evaluation, because he/she did not provide an estimate for the final round.

<sup>8</sup> Jonckheere's Terpstra J\* Statistic was used to test the significance of the trend.

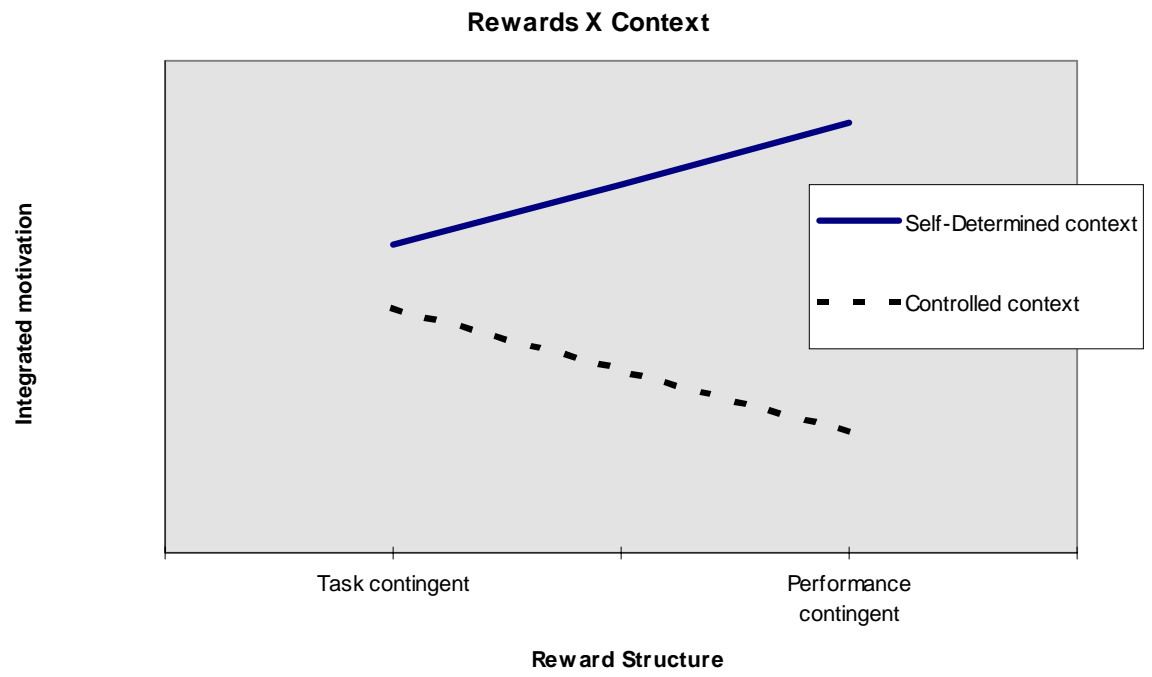


Figure 1: Ordinal Interaction Between Reward Structure and Context

## Experimental Steps

- 1) Subjects were randomly assigned to one of four groups.
- 2) Subjects in the self-determined context were given rationales for the task.
- 3) Subjects in the controlled context were given no rationales.
- 4) Compensation structure was described to the subjects.
- 5) Subjects in the self-determined context made a choice about the type of industry in which to estimate the allowance for doubtful accounts. Subjects in the controlled context had no choice.
- 6) Each subject completed a brief tutorial.
- 7) Subjects made estimations and received feedback for 18 rounds.
- 8) Subjects waited for five minutes while scores were computed during which time they were permitted to continue working on the task (i.e., making estimates during the free choice period).
- 9) Evaluation concerning receipt of reward was communicated to the subjects.
- 10) All subjects completed a questionnaire on enjoyment, interest, and demographic data.
- 11) Payments were handed out.
- 12) Sign-up sheets for future experiments and self-addressed solution requests were made available.

Figure 2: Experimental Steps

### Scree Plot

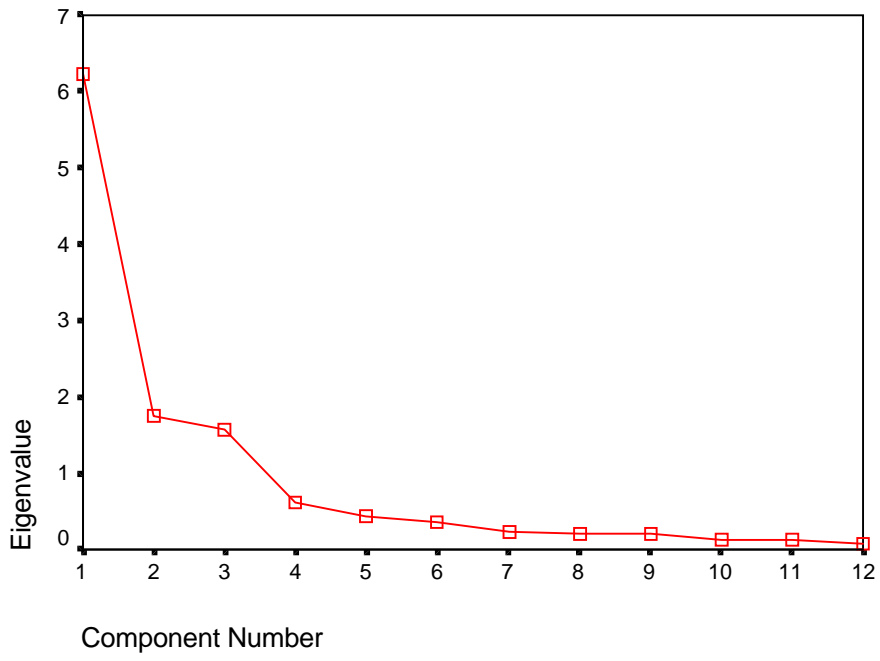


Figure 3: Principal Components Analysis - Scree Plot of Eigenvalues and Number of Components for Self-Report Measures

## **Appendix A - Instrument**

The following pages contain the instrument (i.e., instructions and task) used to collect data. Pages are listed in the order that subjects viewed them (i.e., the order of the computer screens). Additionally, any differences in screens viewed due to the condition are noted at the top of each page.

## Allowance for Bad Debts

Because even the best credit departments cannot eliminate uncollectible accounts, estimating the allowance for bad debts will be a recurring challenge for accountants and auditors. The estimation of the allowance for bad debts is an **important** task because the estimate directly affects the net income of a company.

When you are ready to continue, you may press the start button.

**Start**

Tools

## Allowance for Bad Debts

You **must** press the start button to begin.

Start

## Allowance for Bad Debts

It traditionally requires a significant amount of practical experience to become proficient at estimating bad debt. This is unfortunate because it is a critically important skill for accountants. However, research has suggested that a computer-interactive simulation may **significantly** reduce typical delays observed in the development of one's professional judgment in this area.

Next Screen



## Allowance for Bad Debts

You will be required to estimate the allowance for bad debts. You **must** press the "Next Screen" button to continue.

Next Screen

## **Allowance for Bad Debts**

In this experiment you will be asked to estimate the allowance for bad debts using a computer-interactive simulation.

This interactive simulation might help you develop strategies for understanding bad debt.

**Next Screen**

## Allowance for Bad Debts

All your estimates **must** be made on the computer.

Next Screen

Screen 4 - Self-determined context

To become proficient at estimating bad debt, it is helpful to focus on one industry. Several industries were considered for use in this study. Two of those industries are shown below.

Music Production Company

Production, licensing, and marketing of music for CDs, tapes, television videos, and movie soundtracks.

Lighting Wholesale/Manufacturer

Production of fluorescent lights, bulbs, and fixtures for use in industrial settings.

Some participants in this experiment will be **ASSIGNED** to one of the above industries while others will be given the opportunity to **CHOOSE**. Click on the "Next Screen" button to continue.

Next Screen

Screen 4 - Controlled Context

Several industries were considered for use in this study. Two of those industries are shown below.

Music Production Company

Production, licensing, and marketing of music for CDs, tapes, television videos, and movie soundtracks.

Lighting Wholesale/Manufacturer

Production of fluorescent lights, bulbs, and fixtures for use in industrial settings.

Some participants in this experiment will be **ASSIGNED** to one of the above industries while others will be given the opportunity to **CHOOSE**. Click on the "Next Screen" button to continue.

Next Screen

Screen 5 - Self-determined context

You will have the opportunity to choose an industry.

You might consider choosing an industry in which you would enjoy working one day.

Press the "Select" button in the industry in which you wish to estimate the allowance for bad debts.

Music Production Company

Production, licensing, and marketing of music for CDs, tapes, television videos, and movie soundtracks.

Select

Lighting Wholesale/Manufacturer

Production of fluorescent lights, bulbs, and fixtures for use in industrial settings.

Select

Screen 5 - Controlled context

You will be **assigned** an industry.

Press the "Assignment" button to determine the industry to which you will be assigned.

Assignment

Music Production Company

Production, licensing, and marketing of music for CDs, tapes, television videos, and movie soundtracks.

Lighting Wholesale/Manufacturer

Production of fluorescent lights, bulbs, and fixtures for use in industrial settings.

Screen 6 - Self-determined context

You have **chosen** the following industry:

**Music Production Company**

**Production, licensing, and marketing of music for CDs, tapes, television videos, and movie soundtracks.**

Next Screen



Screen 6 - Controlled context

You have been **assigned**  
to the following industry:

**Lighting**  
**Wholesale/Manufacturer**

**Production of fluorescent lights, bulbs,  
and fixtures for use in industrial settings.**

Next Screen

## **Allowance for Bad Debts**

In addition to receiving extra credit in your course, there is money available with which to pay you.

You will receive a \$5 payment at the completion of the experiment if you are able to perform within the guidelines.

Next Screen

## **Allowance for Bad Debts**

In addition to receiving extra credit in your course, there is money available with which to pay you.

You will receive a \$5 payment at the completion of the experiment.

Next Screen

## Allowance for Bad Debts

In addition to receiving extra credit in your course, there is money available with which to pay you.

You will receive a \$5 payment, but **ONLY** if you complete the experiment.

Next Screen

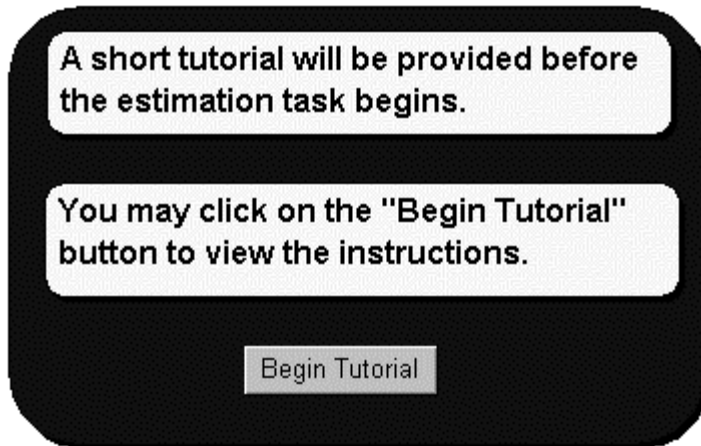
## Allowance for Bad Debts

In addition to receiving extra credit in your course, there is money available with which to pay you.

You will receive a \$5 payment at the completion of the experiment, but **ONLY** if you are able perform within the guidelines.

Next Screen

Screen 8 - Self-determined context

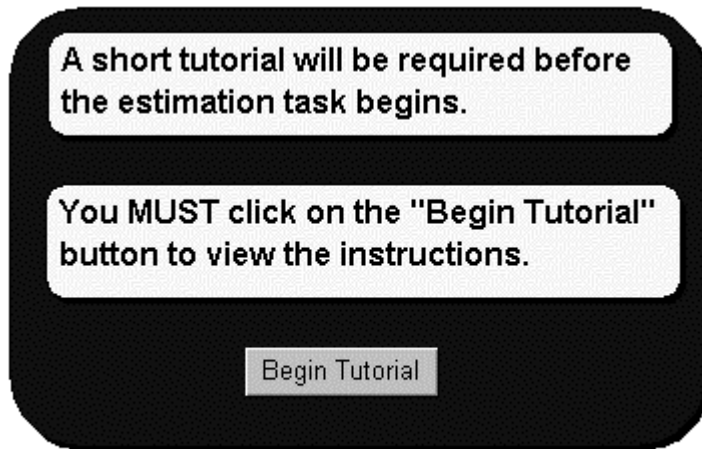


A short tutorial will be provided before the estimation task begins.

You may click on the "Begin Tutorial" button to view the instructions.

Begin Tutorial

Screen 8 - Controlled context

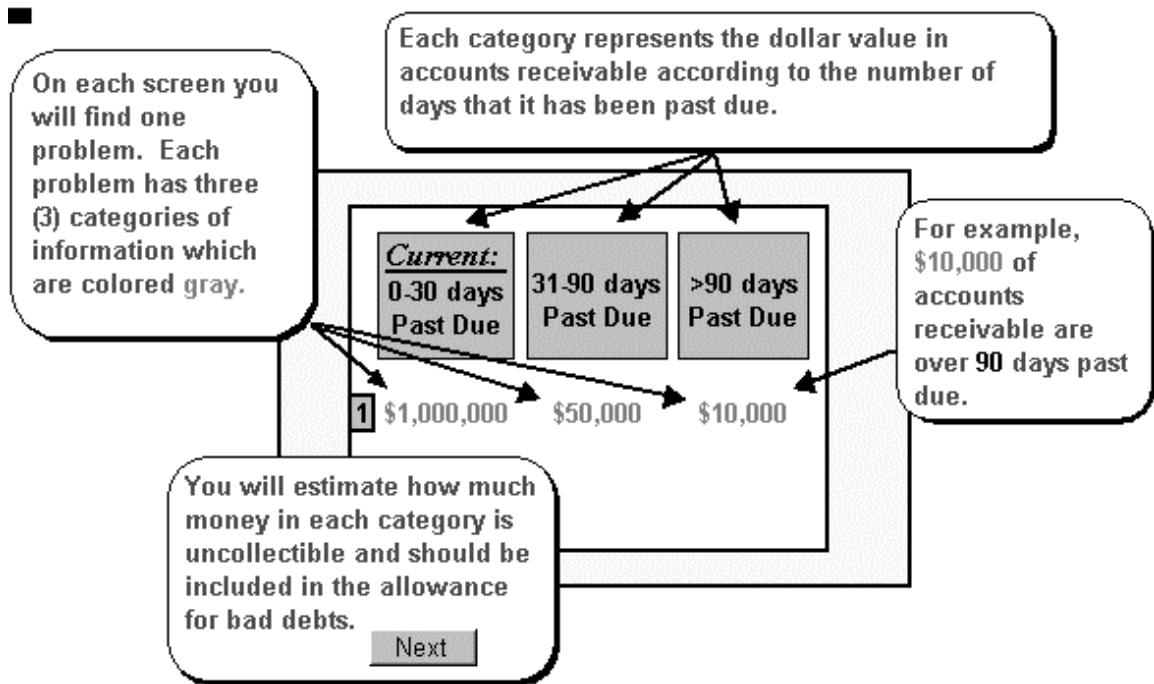


A short tutorial will be required before the estimation task begins.

You **MUST** click on the "Begin Tutorial" button to view the instructions.

Begin Tutorial

Screen 9 - All conditions





Screen 10 - Self-determined context

Guidelines for estimating the allowance for bad debts are provided in the blue boxes. For accounts receivable 0-30 days past due, 1-20% of the amount should be uncollectible and included in the allowance for bad debts.

To input your estimated bad debts for each category, you can click on the designated buttons.

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$1,000,000	\$0	\$50,000	\$0	\$10,000	\$0	Your Answer \$0

For example, if you think 1% of accounts receivable 0-30 days past due will be uncollectible, click the mouse on the button until \$10,000 (1% X \$1,000,000) appears. Make estimates for all three input boxes.

When entering your estimates for all three categories, the total will be automatically calculated for you under the heading "Your Answer."

Next

Screen 10 - Controlled context

Guidelines for estimating the allowance for bad debts are provided in the blue boxes. For accounts receivable 0-30 days past due, 1-20% of the amount should be uncollectible and included in the allowance for bad debts.

To input your estimated bad debts for each category, you must click on the designated buttons.

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$1,000,000	<input type="text" value="\$0"/>	\$50,000	<input type="text" value="\$0"/>	\$10,000	<input type="text" value="\$0"/>	Your Answer <input type="text" value="\$0"/>

For example, if you think 1% of accounts receivable 0-30 days past due will be uncollectible, click the mouse on the button until \$10,000 (1% X \$1,000,000) appears. Make estimates for all three input boxes.

When entering your estimates for all three categories, the total will be automatically calculated for you under the heading "Your Answer."

Ind
Label

You may take up to one minute and thirty seconds to complete your estimates. The time remaining will be updated every 10 seconds.

**Problem #**  
of 18

Next

1 : 30

<i>Current:</i>	0-30 days Past Due	0-30 days (1-20%) Past Due	31-90 days Past Due	31-90 days (10-50%) Past Due	>90 days Past Due	>90 days (30-70%) Past Due	<i>Total Allowance For Bad Debts</i>
\$1,000,000	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<b>Your Answer</b> <input type="text" value="\$0"/>

Indus

g Manuf.

Problem #  
of 18

You must complete your estimates in one minute and thirty seconds. The time remaining will be updated every 10 seconds.

Next

1 : 30

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%) Past Due	31-90 days Past Due	31-90 days (10-50%) Past Due	>90 days Past Due	>90 days (30-70%) Past Due	<i>Total Allowance For Bad Debts</i>
\$1,000,000	\$0		\$0		\$0	Your Answer \$0

## Industry Chosen: Music Label

Problem # 1  
of 18

Time Left:

1 : 30

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$1,000,000	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	Your Answer <input type="text" value="\$0"/>

If you complete your estimates for all three categories before the time expires, you may click on the button "I'm Done" to continue.

Next

I'm Done

# Industry Assigned: Lighting Manuf.

Problem # 1  
of 18

Time Left:

1 : 30

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$1,000,000	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	Your Answer <input type="text" value="\$0"/>

If you complete your estimates for all three categories before the time expires, click on the button "I'm Done."

Next

I'm Done

# Industry Chosen: Music Label

Problem # 1  
of 18

**Time Left:** 1:00

<i>Current:</i>							
0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>	

\$1,000,000 
\$0 

Your Answer

Low Range	Solution	High Range
\$10,000	\$156,800	\$200,000
	Over/Under \$156,800	

Four boxes will appear. The yellow box will show the solution and the white box will show the amount that "Your Answer" is over or under the solution. Next

# Industry Chosen: Music Label

Problem # 1  
of 18

**Time Left:** 1:00

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
--	----------------------	------------------------	------------------------	----------------------	----------------------	--

\$1,000,000	<input style="width: 80%;" type="text" value="\$0"/>	▲ ▼	\$0	<input style="width: 80%;" type="text" value="\$0"/>	▲ ▼	<b>Your Answer</b>	<input style="width: 80%;" type="text" value="\$0"/>
-------------	--	--------	-----	--	--------	--------------------	--

<b>Low Range</b>	<b>Solution</b>	<b>High Range</b>
<b>\$10,000</b>	<input style="width: 80%;" type="text" value="\$156,800"/>	<b>\$200,000</b>
<b>Over/Under</b>		
<input style="width: 80%;" type="text" value="\$156,800"/>		

The underlying formula used to calculate the solution remains the same for all problems within your chosen industry. You can use the feedback from each problem to revise your estimation strategy. Next



# Industry Chosen: Music Label

Problem # 1  
of 18

Time Left: 1 : 00

<i>Current:</i>	0-30 days	31-90 days	31-90 days	>90 days	>90 days	<i>Total Allowance For Bad Debts</i>
0-30 days Past Due	0-30 days (1-20%)	Past Due	(10-50%)	Past Due	(30-70%)	

\$1,000,000	<input style="width: 80%;" type="text" value="\$0"/>	\$0	<input style="width: 80%;" type="text" value="\$0"/>	\$0	Your Answer	<input style="width: 80%;" type="text" value="\$0"/>
-------------	--	-----	--	-----	-------------	--

<b>Low Range</b>	<b>Solution</b>	<b>High Range</b>	
\$10,000	\$156,800	\$200,000	
	<b>Over/Under</b>		
	\$156,800		

The two gray boxes represent the lowest and highest possible solutions using the guidelines found in the blue boxes. If you keep your answers within these suggested ranges, you will receive the \$5 payment.

Next

# Industry Assigned: Lighting Manuf.

Problem # 1  
of 18

**Time Left:**

**1 : 00**

<i>Current:</i>						
0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>

\$1,000,000

\$0

Your Answer

Low Range	Solution	High Range
<b>\$10,000</b>	<input style="width: 50px;" type="text" value="\$156,800"/>	<b>\$200,000</b>

Over/Under

The two gray boxes represent the lowest and highest possible solutions using the guidelines found in the blue boxes.

# Industry Assigned: Lighting Manuf.

Problem # 1  
of 18

Time Left: 1 : 00

<i>Current:</i>	0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
-----------------	-----------------------	----------------------	------------------------	------------------------	----------------------	----------------------	--

\$1,000,000

\$0

\$0

Your Answer

Low Range	Solution	High Range
\$10,000	\$156,800	\$200,000
	Over/Under	
	\$166,800	

The two gray boxes represent the lowest and highest possible solutions using the guidelines found in the blue boxes.

Next

## Industry Assigned: Lighting Manuf.

Problem # 1  
of 18

**Time Left:**

1 : 00

<i>Current:</i>							
0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>	

\$1,000,000 
\$0 

Your Answer

<b>Low Range</b>	<b>Solution</b>	<b>High Range</b>
\$10,000	\$156,800	\$200,000
	<b>Over/Under</b>	
	\$156,800	

The two gray boxes represent the **lowest** and **highest** possible solutions using the guidelines found in the blue boxes. You must keep your answers within these guidelines in order to receive the \$5 reward.

# Industry Chosen: Music Label

Problem # 1  
of 18

**Time Left:** 1 : 00

<i>Current:</i>							
0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>	

\$1,000,000	\$0	\$0	\$0
-------------	-----	-----	-----

Your Answer

\$0

Low Range      Solution      High Range

\$10,000	\$156,800	\$200,000
----------	-----------	-----------

Over/Under

\$156,800

If you complete your review of the solutions before 1 minute expires, you may press the "Next Problem" button to continue.

Next

Next  
Problem

# Industry Assigned: Lighting Manuf.

Problem # 1  
of 18

**Time Left:** 1 : 00

<i>Current:</i>							
0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>	

\$1,000,000	\$0	\$0	\$0
-------------	-----	-----	-----

Your Answer

<b>Low Range</b>	<b>Solution</b>	<b>High Range</b>
\$10,000	\$156,800	\$200,000
<b>Over/Under</b>		
\$156,800		
<b>Next Problem</b>		

When you have reviewed the solution, you must press the "Next Problem" button to continue. You must complete your review of the solution within 1 minute. Next

# Industry Chosen: Music Label

Problem # 2  
of 18

Time Left:

1 : 00

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$500,000	<input type="text" value="\$0"/>	<input type="text" value="\$60,000"/>	<input type="text" value="\$0"/>	<input type="text" value="\$20,000"/>	<input type="text" value="\$0"/>	Your Answer <input type="text" value="\$0"/>

Another problem will appear.  
There are 18 problems in  
which you can develop your  
strategy.

Next

# Industry Assigned: Lighting Manuf.

Problem # 2  
of 18

Time Left:

1 : 00

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
--	----------------------	------------------------	------------------------	----------------------	----------------------	--

\$500,000

Another problem will appear. There are 18 problems to complete.



## Industry Chosen: Music Label

Problem # 2  
of 18

Time Left:

1 : 00

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$500,000	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	<input type="text" value="\$0"/>	Your Answer <input type="text" value="\$0"/>

When you are ready to begin the estimation task, you may press the "Begin Task" button.

Begin Task

# Industry Assigned: Lighting Manuf.

Problem # 2  
of 18

Time Left:

1:00

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
--	----------------------	------------------------	------------------------	----------------------	----------------------	--

\$500,000  \$60,000  \$20,000  Your Answer

You must press the "Begin Task" button to continue.

Begin Task

Screens 19-72, Problem screen

Industry Chosen: Music Label

Problem # 1

**Time Left:**

(Updated every 10 seconds)

1 : 30

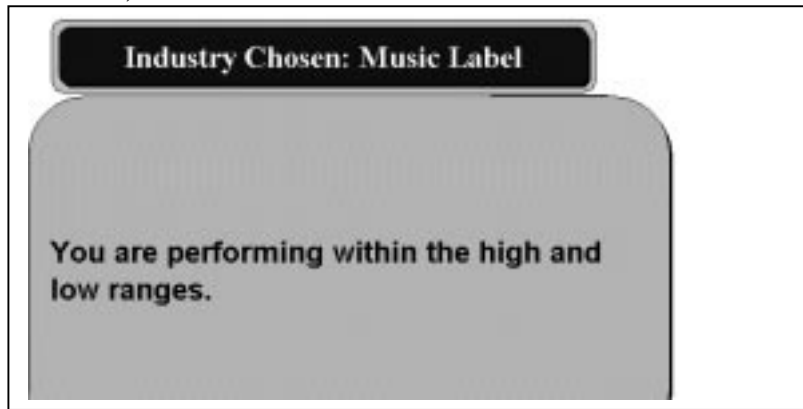
<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$1,000,000	\$0	\$100,000	\$0	\$8,000	\$0	<b>Your Answer</b> \$0

I'm Done

Subjects in each condition worked 18 consecutive problems in the same order. The eighteen sets of aging categories follows:

Round	0-30 days	31-90 days	>90 days
1	1000000	100000	8000
2	2000000	100000	4000
3	3000000	80000	8000
4	1000000	80000	8000
5	2000000	60000	4000
6	2000000	60000	8000
7	1000000	80000	4000
8	2000000	100000	8000
9	1000000	60000	4000
10	3000000	80000	8000
11	2000000	100000	4000
12	3000000	100000	8000
13	3000000	60000	4000
14	2000000	80000	4000
15	3000000	100000	4000
16	1000000	100000	4000
17	2000000	80000	8000
18	3000000	60000	8000

## Screens 19-72, Feedback screen



Subjects in each condition received the above feedback screen after each answer that scored within the high and low ranges. In addition to the above feedback, subjects received the following feedback:

Round 1 SDPC group - "You are performing within the high and low ranges. If you continue to perform within the high and low ranges, you will receive a \$5 payment."

Round 1 SDTC group - "You are performing within the high and low ranges. If you complete all of the problems, you will receive a \$5 payment."

Round 1 CTC group - "You are performing within the high and low ranges. You **MUST** complete all of the problems in order to receive a \$5 payment."

Round 1 CPC group - "You are performing within the high and low ranges. You **MUST** continue to perform within this range in order to receive a \$5 payment."

Round 5 SDPC group - "You are performing within the high and low ranges. If you continue estimating within the high and low ranges, you will receive a \$5 payment."

Round 5 SDTC group - "You are performing within the high and low ranges. If you complete all of the problems, you will receive a \$5 payment."

Round 5 CTC group - "You are performing within the high and low ranges. You are **REQUIRED** to complete all of the problems if you wish to receive a \$5 payment."

Round 5 CPC group - "You are performing within the high and low ranges. You are **REQUIRED** to continue estimating within the high and low ranges if you wish to receive a \$5 payment."

Round 10 SDPC group - "You will receive a \$5 payment at the completion of the experiment if your predictions continue to be within the high and low range."

Round 10 SDTC group - "You will receive a \$5 payment at the completion of the experiment if you complete all of the problems."

Round 10 CTC group - "You will receive a \$5 payment at the completion of the experiment **ONLY** if you complete all of the problems."

Round 10 CPC group - "You will receive a \$5 payment at the completion of the experiment **ONLY** if your predictions continue to be within the high and low range."

Screens 19-72, Solution screens for all conditions

Industry Chosen: Music Label

Problem 18  
#

**Time Left:**  
(Updated every 10 seconds)

0:40

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
\$3,000,000	<input style="width: 100px;" type="text" value="\$400,000"/>	\$60,000	<input style="width: 100px;" type="text" value="\$30,000"/>	\$8,000	<input style="width: 100px;" type="text" value="\$4,800"/>	<b>Your Answer</b> <input style="width: 100px;" type="text" value="\$434,800"/>
				Low	Solution	High Range
				<input style="width: 60px;" type="text" value="\$38,400"/>	<input style="width: 60px;" type="text" value="\$432,000"/>	<input style="width: 60px;" type="text" value="\$635,600"/>
					<b>Over/Under</b>	
					<input style="width: 60px;" type="text" value="\$2,800"/>	
						Next Screen

The high and low ranges were determined by the suggested percentages found within each aging category. The solution for each conditions and all 18 rounds can be calculated as follows: 14% of the 0-30 category plus 12% of the 31-90 day category plus 60% of the > 90 day category.

Screen 73 - All conditions

Tools

<i>Current:</i> 0-30 days Past Due	31-90 days Past Due	>90 days Past Due
▲▼ 12 %	▲▼ 50 %	▲▼ 60 %

Using the mouse on the scroll bars, indicate the percentages that you used on the last problem.

Continue

You have completed the estimation task. Your overall scores are currently being computed and recorded. This process will take five minutes. Payment will be distributed as indicated following the computation of scores and completion of a brief questionnaire.

While scores are being computed, you may continue the estimation task you were working on or wait patiently at the computer. If you would like to continue practicing the estimation task while you wait, press the practice button.

**Time Left:**

0 : 30

Practice

(Clock is updated  
every thirty seconds)

Screen 74a, Optional for all conditions

Tools

**Time Left:**

0:30

Practice  
Problem 4 of 18

(Clock is updated  
every thirty seconds)

<i>Current:</i> 0-30 days Past Due	0-30 days (1-20%)	31-90 days Past Due	31-90 days (10-50%)	>90 days Past Due	>90 days (30-70%)	<i>Total Allowance For Bad Debts</i>
1 \$1,000,000	\$200,000	\$60,000	\$30,000	\$4,000	\$2,000	Your Answer Total \$232,000

Next Problem

Quit Practicing



## Appendix B – Exit Questionnaire

Screen 75,  
all conditions

Your scores have been computed and you will receive a \$5 payment.

You now need to complete a twenty-five item questionnaire. After completion of the questionnaire, you will receive an authorization code to present to the one of the administrators. They will pay you \$5 when they receive the code. Your answers on the questionnaire will not affect your payment -

Go to  
Questionnaire

Screen 76, all conditions

Tools						
<b>1) While doing this activity, I believe that I had choices.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>2) I enjoyed doing this activity.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>3) I believe that doing this activity was useful.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>4) I worked hard on this task.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Screen 77, all conditions

Tools						
<b>5) I felt like I had some choice within this activity.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>6) I thought this was a boring activity.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>7) This activity will not benefit me in the future.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>8) I tried very hard during this task.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Screen 78, all conditions

Tools						
<b>9) There were no choices within this activity.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>10) I thought this was an interesting activity.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>11) I believe doing this activity could be somewhat beneficial.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>12) I did not put much effort into this task.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Screen 79, all conditions

Tools						
<b>13) I believe that I learned something useful in this project.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>14) The extra credit points motivated me to participate in this experiment.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>15) The payment motivated me to perform.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>16) Payment for this experiment was dependent on whether my estimations were within the high and low ranges.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Screen 80, all conditions

Tools						
<b>17) Please indicate your current accounting QCA.</b>	< 2.0	2.0 - 2.3	2.4 - 2.8	2.9 - 3.3	3.4 - 3.7	3.8 - 4.0
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>18) Please indicate your SAT score.</b>	<900	900-999	1000-1099	1100-1199	1200-1299	>1300
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>19) Indicate your career intentions.</b>	Auditing	Tax	Information Systems	Industry (Acct)	Government (Acct)	Other
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>20) Indicate your academic status.</b>	Sophomore	Junior	Senior	Graduate		
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		

Continue

Screen 81, all conditions

Tools						
<b>21) Please indicate how often (on average) you use a computer mouse.</b>	Never	Once a month	Once a week	Once a day	Several times a day	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>22) I believe it is easier to estimate bad debts in the music industry rather than the lighting industry.</b>	Disagree	Somewhat Disagree	No Difference	Somewhat Agree	Agree	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>23) I would have preferred to work in the other industry.</b>	Disagree	Somewhat Disagree	No Preference	Somewhat Agree	Agree	
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
<b>24) I understood the directions in this experiment.</b>	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Continue

Screen 82, all conditions

Tools

25) Please indicate your gender.

Male

Female



Continue



Thank you for completing the questionnaire. An authorization code is presented in the box below. This code authorizes the administrator to pay you \$5. Open the door to your cubicle and wait inside for the administrator. He will be with you shortly.

**Authorization Code:**

**111**

## **Robert Coakley Richardson**

Robert C. Richardson was born in Sumter, South Carolina on June 9, 1966. He spent his childhood in South Carolina, except for one year in Lexington, Kentucky while his dad finished his doctoral program. He graduated from Daniel High School in Clemson, South Carolina in 1984.

After high school, Bob attended Clemson University, where he completed a Bachelor of Science degree in accounting in May 1988. Following graduation he accepted a position as a staff accountant at Elliot, Davis and Company. His focus was in auditing although he had responsibilities in both individual and corporate tax. While at Elliot, Davis and Company, he passed the Certified Public Accountant's Examination and was promoted to senior accountant.

In 1991, Bob was accepted into the Master of Accountancy Program at Virginia Polytechnic Institute and State University. The following year he was accepted into the doctoral program at the same institution. He has completed his graduate studies at Virginia Polytechnic Institute and State University and has accepted a faculty position at the University of Houston which he will begin in August of 1998.