The effect of time pressure, task complexity and litigation risk on auditors' reliance on decision aids

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THE EFFECT OF TIME PRESSURE, TASK
COMPLEXITY AND LITIGATION RISK ON
AUDITORS' RELIANCE ON DECISION AIDS

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THE EFFECT OF TIME PRESSURE, TASK COMPLEXITY AND LITIGATION RISK ON AUDITORS' RELIANCE ON DECISION AIDS

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TER VERKRIJGING VAN DE GRAAD VAN DOCTOR
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This document is dedicated to my parents, my sister, and to my wife Shyemaa. They have all constantly supported me throughout this project and have encouraged me to complete it

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Auditors' reliance on decision aids has been the subject of much research in the decision-aid literature. It is generally argued that proper use of decision aids can improve decision accuracy, thus audit effectiveness (Benbasat and Nault 1990; Ashton 1992). Extant literature, however, shows that auditors are somewhat reluctant to rely on decision aids throughout the audit process (Pincus 1989; Ross 2002). Prior audit research in the area of decision aids has mainly been limited to the effect of incentives, feedback, expertise, knowledge and justification on reliance (e.g., Ashton 1990; Boatsman et al. 1997; and Rose 2002). The current study furthers this line of research by examining the main and interactive effects of three additional factors that have received much attention in audit research, but little consideration in the auditing decision aid literature – litigation risk, time pressure and task complexity (e.g., Palmrose 1988; Dalton et al. 1994, 1997; Alderman and Deitrick 1982; Arnold et al. 1997; Bonner 1994; Kelly and Margheim 1990).

A major source of time pressure in an audit environment arises from budget constraints. Several studies have indicated that audit performance can deteriorate when auditors work under excessive time pressure, as the deleterious effects of such pressure can become manifest in many ways, such as reduced audit scopes, minimized effort on certain audit procedures, lowered quality of evidentiary matter, hastened audit sign-offs, and omitted audit procedures (e.g., Alderman and Deitrick 1982; Arnold et al. 1997; Kelly and Margheim 1990). When time is a constraint decision aids can enhance the efficiency and some would argue the effectiveness of auditors' decision-making processes, especially in highly structured environments. As characterized by Simon (1965), decision making involves three stages: "intelligence, design and choice" (Brown and Eining, 1997, 167).

With regard to the intelligence stage of decision making, decision aids can help auditors collect "a more complete set of information for decision making" (Brown and Eining 1997, 167). In the design stage, decision aids can assist auditors in determining "information that is important for the decision" and "the number of alternatives examined" (Brown and Eining 1997, 167). In the final stage, decision aids can facilitate auditors as they choose from among the various alternatives by guiding the "decision maker through a choice model", thereby potentially resulting in more accurate decisions (Brown and Eining 1997, 172). Accordingly, decision aids can potentially help improve the efficiency and effectiveness of decision processes across all three stages (Brown and Eining 1997).

Audit task complexity is another important factor in the decision aid reliance equation. Many audit tasks are highly complex and the intricacy of such tasks can have a major impact on audit judgments (Bonner 1994; Libby 1985). Task complexity has been studied in many fields, including psychology and management. While task complexity can have wide-ranging effects on human judgment, in general, this line of research indicates that higher levels of task complexity tend to decrease judgment quality (Bonner 1994).

The use of decision aids in the decision making process could help improve judgment quality when task complexity increases. The reasoning behind this proposition is rooted in the relationship between task complexity and cognitive information processing load. The chain of logic is as follows: as task complexity increases, the cognitive load required to process higher volumes and greater variance of decision relevant information increases; as cognitive load increases, the granularity or abstraction of decision heuristics used by the decision maker increases; as the granularity of decision heuristics grows larger, the accuracy of decisions decreases (Bonner 1994; Libby and Lewis 1977). Decision aids could simultaneously ease cognitive information processing load, reduce the tendency to resort to highly granular decision heuristics and improve decision accuracy (Baron et al 1996). Therefore, under conditions of relative high task complexity, decision aid reliance should improve audit quality. Prior research suggests a positive relationship between task complexity and decision aid use (Arnold and Sutton 1998), and indicates that different types of decision aids are required for tasks of differing complexity (Abdolmohammadi 1997; Fleishman 1975).

The third decision aid reliance factor examined in this study deals with audit litigation risk. The vulnerability of the audit profession to lawsuits has been recognized in the auditing literature. The seriousness of the problem is evident by the increasing number of lawsuits filed against audit firms (St. Pierre and Anderson 1984; Palmrose 1988; Stice 1991; and Lys and Watts 1994) and the large litigation costs incurred by audit firms (Arens and Loebekke 1997). As indicated in prior studies, litigation against audit firms can lead to huge settlements, damaged reputations, downsizing decisions, and even bankruptcies (e.g., Palmrose 1988; Dalton et al. 1994, 1997). Audit failures, a major factor leading to litigation, occur when auditors do not detect, correct and/or reveal material misstatements or omissions of financial information (Palmrose 1988). The ENRON case is a recent example of the severe legal consequences of an audit failure.

The increasing number of negligence lawsuits filed against audit firms heightens the awareness that auditors need to pay a great deal of attention to audit effectiveness and quality. In such a litigious environment, auditors need to take all reasonable steps to ensure that they can stand up against the concept of *prospective rationality* (Staw 1980), where individuals know in advance that they may have to defend their decisions to others. Lowe and Reckers (2000) argue that in the "current legal system, hindsight judgments are used to evaluate auditor decisions performed in foresight" (Lowe and Reckers 2000, 98); hence, to reduce potential negative outcomes of litigation, auditors need to use foresight- or prospective-oriented decision aids when available.

Time pressure and task complexity may jointly affect the performance of decision makers. Prior research has documented a relationship between time pressure and task complexity, and findings have shown that as the complexity of the task increases, individuals tend to look for supplemental sources to help perform the task (Coury and Boulette 1992; Byström and Järvelin 1995). In an auditing context, due to the importance of decision accuracy, when performing a complex task under a high time pressure situation, an auditor will try to find a smarter way of performing the task that will improve the efficiency and effectiveness of the decision making process. The increased pressure to improve efficiency resulting from time pressure and the cognitive overload caused by the task complexity should lead auditors to search for supplemental sources, such as a decision aid, to help complete the audit task more effectively and efficiently, thereby resulting in higher reliance on a decision aid's advice.

Time pressure and litigation risk can jointly result in a significantly higher level of decision aid reliance than either factor alone. This could occur because a rational auditor will try to improve two key aspects of audit performance: effectiveness and efficiency. When faced with time pressure, auditors will be motivated to rely on decision aids primarily to improve the efficiency of their performance. On the other hand, when auditors are faced with high litigation risk, they will be more concerned with the accuracy of their judgments; hence, they will be motivated to use decision aids to improve effectiveness. In an audit engagement, when auditors work under high time pressure and at the same time face high litigation risk, they will be confronted two opposing forces (efficiency and effectiveness), both of which are expected to create motivation to rely on decision aids. Accordingly, auditors working under high time pressure and facing high litigation risk are expected to have a strong motivation to rely on decision aids to increase the efficiency and effectiveness of their performance.

Litigation risk can interact with task complexity, thereby affecting a decision maker's decision aid reliance behavior. Litigation or outcome risk increases the amount of cognitive attention focused on making more accurate decisions (Palmrose 1988; Stice 1991). Therefore, when faced with the risk of litigation, auditors will be concerned with the effectiveness of their audit. Prior research has also shown that as the complexity of the task increases, individuals also tend to look for supplemental sources to help perform the task effectively (Byström and Järvelin 1995). When these two factors are both at relatively low levels, auditors' motivation to rely on a decision aid to improve effectiveness should be low. Therefore, they are expected to rely less on decision aids when these two factors are at relatively low levels. On the other hand, when either of these factors is at relatively high levels, auditors should be motivated to rely more on decision aids to improve the effectiveness of their audit. However, since both of these factors provide motivation to improve performance or audit effectiveness, it is expected that auditors' reliance behavior will not differ significantly when both factors are at a high level, as compared to when either litigation risk or task complexity is high. This result is expected since auditors who are motivated to rely on a decision aid to improve audit effectiveness due to either high litigation risk or high task complexity

will already be putting forth maximum effort to improve effectiveness, hence the combined effect of the two factors should not induce yet higher decision aid reliance due to a ceiling effect.

The triad of time pressure, task complexity and litigation risk might also jointly affect decision aid reliance, thereby resulting in a significantly higher level of decision aid reliance than any of these pressures alone. Rational auditors will typically try to improve the effectiveness and efficiency of their performance in an audit engagement. When faced with time pressure, audit task complexity and litigation risk, an auditor will not only be motivated to rely on a decision aid to gain audit efficiency (i.e. complete the audit task on time) and gain audit effectiveness (i.e. improve the accuracy of their judgment) due to litigation risk, but will also be motivated to use the decision aid to work smarter and reduce the cognitive load associated with performing a complex audit task. However, since both litigation risk and task complexity provide motivation to improve performance or effectiveness, it is expected that, holding time pressure constant, auditors' reliance behavior will not differ significantly when both of these effectiveness factors are at a high level, as compared to when one is at a high level and the other at a low level.

Despite potential improvement in decision accuracy provided by the use of decision aids, current practices show that auditors rely more on their judgment than on decision aids in the different stages of the auditing process (Pincus 1989; Ross 2002). Existing empirical research provides little explanation for such behavior. This could be due to some methodological issues in decision aid research, the difficulty of measuring accuracy of decisions or both (Messier 1995). The current study proposes that under-reliance might be explained by a lack of sufficient exogenous pressure, and argues that client litigation risk has become so dominant and costly in the U.S. that auditors are now more consciously aware than ever of the benefits of decision aids. Although the constructs of time pressure, task complexity and litigation risk have been examined extensively in the auditing literature, no empirical research has attempted to examine the auditors' behavior with respect to reliance on decision aids when they are faced with different levels of external pressure created by these three sources.

1.2 The Study

The objective of this study is to investigate the effects of time pressure, task complexity and litigation risk on auditors' reliance on decision aids. More specifically, this study empirically examines the extent to which the auditors' reliance on decision aids is associated with the perceived level of time pressure imposed by a time budget constraint, the perceived level of audit task complexity and the perceived level of potential litigation risk faced by the audit firm for a particular client. Six hypotheses are developed in this study, each linking one or more of the independent variables (i.e., pressure inducers) to decision aid reliance. A 2 x 2 x 2 between-subjects design is used to test the hypotheses of the study using experimental research methodology. The following three independent variables are

manipulated in this experiment: time pressure (high, low), task complexity (high, low) and litigation risk (high, low). The dependent variable is the level of auditor's reliance on a decision aid.

1.3 Contribution of the Study

Although some research has examined the effect of time pressure and task complexity on auditor's use of decision aids, this study is the first to investigate the effect of litigation risk as well as the joint impact of these three pressure inducers on the level of auditor's reliance on decision aids. Research of this nature is especially important in light of the increased litigation cost faced by the audit profession. Findings from this study can help provide further understanding of auditors' behaviors with respect to reliance on decision aids and open the door for other future research in this area.

1.4 Conclusion

This chapter discussed three factors, or pressure inducers, that can potentially affect auditors' decision aid reliance behavior in their decision making processes. The chapter briefly analyzed how each of these factors and their interactions are expected to effect decision aid reliance behavior. Finally, this chapter outlined the dissertation and its contributions to knowledge in this field.

The remainder of this dissertation is organized as follows: Chapter 2 presents the relevant literature and develops the study hypotheses. First the chapter examines time pressure, audit task complexity, and litigation risk, and hypotheses expected main effects, two-way and three-way interactions. Chapter 3 explains the methodology employed in the study to test the hypotheses. Chapter 4 offers the results of the study. Finally, Chapter 5 discusses the study, includes concluding remarks and offers suggestions for future research.

CHAPTER 2

THEORETICAL FOUNDATION AND HYPOTHESES DEVELOPMENT

2.1 Introduction

This chapter presents the theoretical foundation of the dissertation. Prior studies in the areas of audit time budget pressure, task complexity and litigation risk are discussed. The links between each of these factors and decision aid reliance are explained, leading to the six hypotheses proposed herein.

2.2 Time Pressure

Arguably, one of the main factors that lead to poor audits and, in-turn, audit failures is time pressure created by audit time budgets. Two lines of research can be identified in the existing time pressure literature (Arnold et al. 2000). The first examines behavioral responses to time pressure (e.g., Mann and Tan 1993; Alderman and Dietrick 1982; Kelley and Margheim 1990; and Arnold et al. 1997), while other research investigates the effects of time pressure on individual and group decision making (e.g., Smith et al. 1997; and Arnold et al. 2000).

Behavioral research suggests that when individuals have to make conflicting decisions under time pressure, they will be subject to “hypervigilance” (Mann and Tan 1993), which reflects a mental state in which a decision maker, when faced by time pressure, “is reduced to panicky, incomplete information search before selecting an (often) inferior course of action” (Mann and Tan 1993, 189). As noted by Mann and Tan (1993), this often results in “high stress, a marked deterioration in thinking and judgment, a narrowing perception of options, an incomplete and haphazard search of information, vacillation, and, finally, an impulsive choice” (Mann and Tan 1993, 198). This analysis is consistent with the results of some psychological research indicating that time pressure negatively affects the information processing capacity when making complex decisions (e.g., Gilliland and Schmitt 1993; Weenig and Maarleveld 2002).

The concept of “hypervigilance”, as described in the behavioral research, has also been investigated in business environments. Kocher et al. (2003), for example conducted an experimental ultimatum game to examine individual behavior in a bargaining context under time pressure. They compared individual behavior under two time pressure conditions, a tight time constraint and a very weak time

constraint, to investigate the effect of time pressure on the probability of an individual accepting a given offer. They found that imposing a tight time limit for decision-making results in significantly more rejections than when making decisions under a weak time constraint (Kocher et al. 2003).

Rieskamp and Hoffrage (2002) investigated how decision makers behave under limited time, knowledge and computational capacities. They argue that perceived time pressure, not actual time, affects decision makers' behaviors when making decisions under severe constraints (Rieskamp and Hoffrage 2002). Their argument is that time pressure can be viewed by decision makers as information overload and that "the subjective perceived strength of time pressure depends on information load and the information processing rate" (Rieskamp and Hoffrage 2002, 34). When a decision maker perceives time to be too tight to process all available information, he/she will tend to employ simple, coarsely granular heuristics in his/her information search and choices. The results of their study suggest that individual decision makers select from a repertoire of strategies based on the costs and benefits of their decisions (Rieskamp and Hoffrage 2002).

Several studies examined the effect of time pressure in the auditing environment. The results of these studies document that audit performance deteriorates due to time pressure through tightened audit scopes, reduced work on certain audit procedures, increased reliance on lower quality evidence, prematurely determined audit sign-offs, and omitted audit procedures (e.g. Alderman and Deitrick 1982; Arnold et al. 1997; Kelly and Margheim 1990).

Arnold et al. (2000), for example, examined the auditor's behavior when making a materiality decision under pressure. They conducted an experiment in a controlled environment. Participants were given six different information cues about a client and asked to derive the overall materiality level that should be assessed for that client. Three dependent variables were observed: decision quality, time spent in viewing information cues, and number of redundant accesses to information cues. The authors used a computerized experiment to provide participants with information and automatically record data related to the three dependent variables. Time pressure was induced through a monetary payoff function, based on time used to reach a decision. Their results document a time pressure effect, as participants used less time when they were induced by incentives to perform the task relatively quickly. They also found that the quality of decisions under time pressure was worse than decisions made under no time pressure. Similar conclusions were made by Alderman and Deitrick (1982) and Kelly and Margheim (1990).

The other line of time pressure research focuses on the effects of time pressure during the decision-making process (e.g., McDaniel 1990; and Arnold et al. 2000). McDaniel (1990) investigated the impacts of time pressure and audit program structure on audit performance. She conducted an experiment in which seventy-nine staff auditors from a national CPA firm were asked to perform the task of implementing a partial year-end audit program to test the details of inventory. She manipulated two types of audit programs (structured and unstructured) and four

levels of time pressures among participants. Her results show that, for both types of audit program structures, time pressure has a positive effect on audit efficiency but negative effect on audit effectiveness. As cited in Arnold et al. (2000), Smith et al. (1997) examined the effect of time pressure on judgment tasks versus choice tasks and found that time pressure negatively affects the quality of judgment decisions more than the quality of choice tasks (Arnold et al. 2000).

Arnold et al. (2000) criticized prior studies for emphasizing time constraints when investigating the effects of time pressures on the quality of decisions. They use Payne et al.'s (1996) argument that stress resulting from time pressure in "high-velocity environments" is "due to opportunity-cost of delaying decisions" (Arnold et al. 2000, 73). They conducted an experiment to investigate opportunity-cost time pressure, as an experimental treatment for time pressure, on group decision making. Their results show that opportunity-cost time pressure impacts the time spent by individuals on decision making and disrupts the decision-making processes (Arnold et al. 2000).

The above discussion reveals that perceived time pressure impacts the behavior of decision makers and affects the quality of decisions as a result of reduced and/or disrupted cognitive effort. Two possible explanations are presented by Mann and Tan (1993). The first is based on a cognitive model, where "actual or subjective time pressure creates psychological stress which in turn interferes with the capacity for judgment and problem solving skills" (p. 206). The other explanation is based on a motivational model that time pressure as conveyed to the individual "induces a need for cognitive closure," (p. 296) which reduces information search effort and increases reliance on simple decision rules.

In a typical audit engagement, an auditor will be concerned with both aspects of audit performance - effectiveness and efficiency. Given the high time-pressure audit environment, limitations on human information processing and advances in information technology should lead a rational auditor to use whatever means available to help improve both aspects of performance. Decision aids, such as decision support systems and group support systems, have proved to be useful when used for making decisions under time pressure.

2.2.1 Time Pressure and Decision Aids

Decision support systems/decision aids (DSS/DA) are developed to help decision-makers enhance decision-making processes and judgments, especially in highly structured environments (Kleinmuntz 1990; Rose 2002). Sarter and Schroeder (2001), for example, found that decision aids provide accurate information that lead to improved performance under time pressure and uncertainty. They argued that high levels of time pressure can "lead to perceptual narrowing and thus a reduced utilization of available cues, decreased vigilance, and reduction in working memory capacity" (p. 3). Hence, one possible approach to alleviating perceived time pressure is to use some form of decision aid.

Existing decision aid literature documents that using decision aids when making decisions under time pressure does not only improve the accuracy of decisions, but also enhances the efficiency of the decision making process (Kumar 1997; Smith et al 1998; Chu and Spires 2003; and Arnold et al 2000). Kumar (1997) developed a mathematical model based on the 'real option theory' to explain the relationship between decision support and performance. He showed that decision support systems increased flexibility, as measured by the speed of response and cost of response, in the context of time-constrained decision making.

Chu and Spires (2003) examined the effect of decision support systems on decision-making processes in an experimental context. They found that when decisions are made under time pressure, a properly designed DSS improved the decision-making process and the quality of decisions by inducing decision makers to process more information and use more rigorous decision strategies.

Smith et al. (1998) examined the effect of using a group support system (GSS) on decision speed and decision quality under time pressure. They reported the results of three different sets of experiments where subjects were assigned to either a group using a GSS or a group that interacted face-to-face. In the three experiments, they found that, when under time pressure, the groups supported by GSS made higher quality decisions than the non-GSS groups. The difference was significant, however, in only two of the three experiments.

Arnold et al. (2000) examined the impact of opportunity-cost time pressure and group support systems on group decision-making. They report that, although opportunity-cost time pressure influenced the amount of time spent by individuals on making decisions, it affected the GSS group and the non-GSS group differently. Both groups reduced their time to reach a decision; however the GSS group took much longer than the non-GSS group, suggesting that the time pressure felt by individuals and their time allocations during the decision making process is affected by changes in the decision making environment.

The above review of the time pressure and decision aid literature suggests that, in an auditing context where auditors are frequently faced with decision-making situations under time pressure, they will tend to rely on decision aids in their decision making process to improve the efficiency of their performance. This leads to the following hypotheses:

H1: There is a positive relationship between perceived time pressure and decision aid reliance.

2.3 Audit Task Complexity

Task complexity plays a major part in any decision making task. Complex tasks require more time and effort to complete, as opposed to simple tasks, therefore affecting decision making efficiency (Asare and McDaniel 1996). Complex tasks are also more mentally taxing, thus requiring additional cognitive resources (Foos

1992; Masha and Miller 2001). An important characteristic of an audit task is its complexity.

Many of the tasks auditors perform are highly complex. The complexity of these audit tasks can have a major impact on audit judgments (Bonner 1994; Libby 1985). Several studies in psychology and management have shown that task complexity can have a wide range of effects on judgment and that, in general, increases in task complexity tend to decrease judgment quality (Bonner 1994). The use of decision aids in the decision making process can help improve judgment quality in the presence of complex tasks. Prior research documents a positive relationship between task complexity and decision aid use (Arnold and Sutton 1998). It also suggests that different types of decision aids are required for tasks of differing complexity (Abdolmohammadi 1997; Fleishman 1975).

Several definitions of task complexity have been proposed in the literature, each considering different aspects in their definitions. For example, studies in different domains have looked at whether task complexity is a function of the task itself, or whether it depends on both the task and the person performing the task (Bonner 1994; Campbell 1988; Fleishman 1975; Wood 1986). Studies that believe task complexity is a function of the task alone generally assert that the complexity is perceived equally by all individuals irrespective of their personal attributes, such as skill or motivation at the input stage of a task (Bonner 1994; Campbell 1998). Studies in this area examined objective task qualities that contribute to complexity; for instance, the number of ways to accomplish the task, the uncertainty of the outcomes, or the affective or cognitive reactions to the task (e.g. Campbell 1984; Schwab and Cummings 1976; Terborg and Miller 1978). These studies believe that personal attributes only affect judgment during the processing stage of a task (Bonner 1994; Campbell 1998).

On the other hand, other studies believe that the attributes of the person performing the task can interact with the objective task complexity at the input stage, and such interaction would continue throughout the remaining information processing stages (Bonner 1994; Campbell 1998). These studies examined personal characteristics, such as skill and insight as well as task characteristics, such as the task's mode of representation or the number of processes required to perform the task (e.g. Frost and Mahonev 1976; Shaw 1976). Although the predicted effects of task complexity on judgment performance would not differ between these two views, perceived task complexity will be measured in the current study. This definitional view of task complexity assumes that such complexity is an interactive function of objective aspects of the task and personal characteristics of the decision-maker.

The definition of task complexity used in this study stems from a classification scheme used in prior reviews of audit judgment literature (Bonner 1994; Libby and Lewis 1977). These studies classify task characteristics into three components: input, processing and output. Each of the three components can be further decomposed into two components: amount and clarity (Figure 2-1).

Several studies have examined the effects of the 'amount of input' and 'clarity of input' on task complexity (e.g., Bonner 1994; Payne et al 1990a, 1990b, 1992; Wood 1986; Moriarity 1979). The amount of input, such as the number of alternatives a judge must evaluate, has been found to have a positive correlation with perceived task complexity, as it produces information overload (Payne et al 1990a, 1990b, 1992; Wood 1986). Several studies have also examined the effects of input complexity on decision making (e.g. Payne et al 1990a; Bettman et al 1990; Karelaia 2004; Drolet and Luce 2004). They provided their participants with a typical choice problem (e.g. choosing an apartment, or choosing among job candidates) and provided a list of attributes for each alternative (e.g. the location and price of the apartment, or leadership potential and motivation of the job candidate). They manipulated input complexity by varying the number of alternatives to consider as well as the number attributes of each alternative. These studies found that as the amount of information increased, the perceived complexity of the task increased, thereby requiring more cognitive effort. They found that the strategy selected by a decision maker is a function of the amount of cognitive effort required by a strategy and its ability to produce accurate results. Therefore, decision makers will select strategies based on the degree to which they are willing to sacrifice accuracy for reduced effort.

The clarity of the input has also been shown by researchers to have a positive correlation with the perceived complexity of the task (Payne et al 1990b; Moriarity 1979). For example, Moriarity (1979) examined the effects of presentation format on bankruptcy judgments. His definition and manipulation of task complexity was based on the clarity of input. He presented his participants with information in one of three formats: financial statements, financial ratios, or graphical faces. He found that the complexity of the presentation format affected the decisions made by the participants. The lower the complexity of the input, the lower the number of misclassified firms.

Rumis (1984 and 1987) examined the effects of presentation mode in making production scheduling decisions. Rumis (1984) varied both input type and the complexity of the environment. He varied input type by providing either graphical or tabular displays. He found that as the perceived complexity of the environment increased, decision makers using the graphical (less complex) presentation outperformed decision makers using the tabular (more complex) presentation.

With respect to processing complexity, prior research has shown that increases in the amount of processing required, which is a function of the amount of input and number of steps to solve a problem, and decreases in the clarity of procedures needed to solve the problem act in concert to increase the perception of task complexity (Payne et al 1990a, 1990b, 1992; Bonner 1994; Wood 1986). For example, Hubber (1987) examined the effects of task difficulty, strategy and goal setting on the performance of a task. In his experiment, he varied processing complexity by altering the number of cues participants needed to examine as well as the number of moves required to escape from a maze. Hubber's findings indicate that as the number of cues processed or steps required increases, perceived task complexity also increases, thereby resulting in a higher cognitive load.

In a study that manipulated processing complexity via clarity of processing, Heiman (1990a) examined the effect of alternative explanations on experienced auditors analytical review judgments. More specifically, she examined the way auditors assess the likelihood of a hypothesized cause for unusual fluctuations in financial statement relations, and how auditors' likelihood assessment is affected by information about alternative explanations. She varied processing complexity by varying the receipt and/or the number and strengths of the alternatives (i.e. the explicit processing instructions for the ratio analysis). Her study results suggested that providing alternative explanations decreased the likelihood of a hypothesized cause and that varying the number of alternatives affected the degree of reduction. Auditors regularly evaluate one hypothesis at a time when several hypotheses are generated (Heiman 1990a). The reduction in the number of hypothesized causes, therefore, increases audit efficiency, but likely decreases audit effectiveness.

Figure 2-1. Components of Task Complexity
(Libby and Lewis 1977; Bonner 1994)

2.3.1 Task Complexity and Decision Aids

The effect of task complexity on decision making and decision aid reliance has been examined by several researchers in differing domains. Brown and Jones (1998) examined the effects of manipulating three factors (the extent of the algorithm revelation, decision framing – positive/negative, and task difficulty) on a user's level of reliance on a decision aid. The participants were required to select the best computer for a client from seven alternative computers, each containing seven attributes. A ranking system from 0 to 100 was used for each of the attributes. A decision aid was provided to the aided group that computed an equally weighted score based on the attributes. The decision aid recommended the computer with the highest score. The authors used two measures of reliance on the decision aid's

advice: the percentage of times the participant agreed with the decision aid and an agreement index measuring how close the participants were to the answer provided by the decision aid. They found that agreement with the decision aid for the least ambiguous trials was the same for the aided and unaided participants. They also found that in comparing the aided and unaided decision makers, the influence of the decision aid was greater in the harder trials than in the easier trials; that is, the level of agreement with the aid was significantly higher in the most ambiguous trials for the aided decision makers than for the unaided decision makers. These results suggest that, in a task of high complexity, a decision maker tends to rely more on the decision aid in comparison to a task of low complexity.

Through two experiments, Baron et al (1996) examined the effects of incentives for accuracy (task importance) and task complexity on social influence (reliance). In their experiments, the authors define task importance as the amount of pressure felt by participants to offer accurate judgments when performing the task. The dependent variable was conformity agreement with (i.e. reliance on) the confederates. In order to examine reliance, the confederates intentionally provided incorrect advice seven out of the thirteen trials. The authors found an interaction effect between task complexity and task importance. In the low task complexity condition, participants who were offered the incentive were more accurate than participants who were not offered the incentive as they were less likely to rely on the confederate's advice. In the high task complexity condition, participants who were offered the incentive were less accurate than participants who were not offered the incentive, as they were more likely to rely on the confederate's advice. This suggests that a significant interactive effect between task complexity and decision consequences on a participant's level of reliance on a decision aid exists. Conformity agreement was also found to be higher when the confederates projected confidence than when they projected lack of confidence.

Bui and Sivasankaran (1990) examined the effect of varying task complexity on decision quality, decision time, and user satisfaction using a group decision support system (GDSS). They manipulated task complexity using two existing cases published in prior research that satisfied the criteria for low and high complexity. They found that as task complexity increased, use of the GDSS increased decision quality and satisfaction. They also found that participants in the low task complexity treatment experienced less satisfaction due to using the GDSS. These findings indicate that decision aids are more beneficial for high complexity tasks. Further examination of these findings indicates that, given a choice between using or not using a decision aid, individuals performing a low complexity task would be less likely to use (rely on) a decision aid than participants performing a high complexity task.

In an examination of the influence of decision aids on audit sample size decisions, Kachelmeier and Messier (1990) conducted an experiment to study the magnitude and variability of audit sample size judgments in the presence or absence of a decision aid. They found that the sample sizes produced by the decision aid group were systematically larger than the unaided group. They also found that the decision aid improved decision accuracy by removing some of the judgment biases.

Similarly, as reviewed in Masha and Miller (2001), Hornik and Ruf (1997) examined the effects of an expert system on decision making. The degree to which participants' evaluations matched those of the expert system was used as their measure of decision accuracy. They found that participants exhibited greater decision accuracy in the expert system treatment as opposed to the non-expert system group. They also found support for another study, suggesting that decision aids improve accuracy as task complexity increases.

Also as reviewed in Masha and Miller (2001), in another study examining the task complexity and decision aids, Caplan and Schooler (1992) found that accuracy decreased when participants were provided with a decision aid to perform a simple task. They believe that this may have been caused by the decision aid overloading or boring the participants when performing a task that required few cognitive resources. Therefore, as task complexity increases, decision aids can help reduce the cognitive effort required to perform the task and improve decision accuracy.

The above discussion suggests that as the complexity of a task increases, the amount of effort required to perform the task also increases. When considering the use of decision aids in performing a task, Arnold et al (2004) suggest that if greater effort is required to perform the task without the decision aid than with the decision aid, the task is perceived to be of high complexity. Similarly, if less effort is required to perform the task without the decision aid than with the decision aid, the task is perceived to be of low complexity, thereby suggesting that task complexity is a relative concept, (Arnold et al 2004). Hence, a rational decision maker will avoid the extra effort required to perform a complex task by using a decision aid. Several studies have examined effects of effort aversion on decision making strategies (e.g. Hayes 2002; Payne et al 1990a, 1990b, 1992; Todd and Benbasat 1991, 1992, 1994, 1999, 2000), providing support for the notion that individuals tend to sacrifice accuracy for a reduced amount of effort unless performance contingent incentives are introduced for greater levels of accuracy. In an auditing context, since the accuracy of the decision is important, an auditor will tend to search for a smarter way of performing the task if it is highly complex, thus resulting in higher reliance on the decision aid's advice.

The above review of the task complexity and decision aid literature suggests that, in an auditing context when auditors are working on complex tasks, they will tend to rely on decision aids in their decision making process to improve the effectiveness of their performance. This leads to the following hypotheses:

- H2: There is a positive relationship between perceived task complexity and decision aid reliance.

2.4 Litigation Risk and Accountability

Negligence lawsuits are a serious problem facing the auditing profession. Accounting firms are increasingly becoming targets of litigation, reflecting a change in public opinion toward the role of auditors (Jennings et al. 1993).

Investors and creditors rely on audited financial statements in their decision making processes. When they incur losses, auditors are usually among the first set of constituents to be blamed, for investors and creditors can claim that their losses were a result of reliance on the audit opinion (Stice 1991).

Litigation is costly to auditors in several ways. Audit firms not only face potentially huge monetary payments due to litigation, but they must also contend with damaged reputations, which can lead investors to attribute lower quality to the services they provide. As a result of litigation effects, audit firms can be forced to downsize or declare bankruptcy (e.g. Palmrose 1988; Dalton et al. 1994, 1997). Because of the potentially severe deleterious effects of litigation, auditors regularly assess litigation risk in their audit planning process, which helps them align their audit investment with the possibility of audit failure: Brumfield et al. (1983) concluded that “this risk of litigation is a major factor in planning an audit” (Stice 1991, 518).

Audit failures occur when auditors do not detect, correct and/or reveal material misstatements or omissions of financial information. As noted by Palmrose (1998), while audit failures are a major source of litigation, auditors may also face law suits without such failures. In a typical audit engagement, auditors issue an opinion on a firm’s financial statements after performing an audit. These audited financial statements along with the auditor’s opinion provide users with a signal relating to the firm’s compliance with accounting principles (Stice 1991). Based on Palmrose (1998) and Stice (1991), Figure 2-2 illustrated the connection between client/user losses and the likelihood of a lawsuit being filed against an auditor.

Figure 2-2. Likelihood/Sequence of Auditor Litigation Cases
(Palmrose 1988; Stice 1991)

As shown in Figure 2-2, when clients or users of financial statements incur losses, these losses may or may not be a result of material misstatements or omissions from the financial statements, i.e. audit failures. Other litigation triggers, such as bankruptcies, do not necessarily involve misleading financial statements, yet audit firms are subjected to legal pressures from sources of this nature as well. In the case of audit failures, the most likely action users will take is to file a lawsuit against the auditor, which can result in payments to the plaintiff (Palmrose 1988). In rare instances, a lawsuit may not be filed, even though evidence may indicate an audit failure, if there is a lack of reliance on published financial statements or if the plaintiff is guilty of contributory negligence (Stice 1991). On the other hand, lawsuits may be filed even though there is no alleged audit failure. The motivation behind these lawsuits is that auditors are characterized as having “deep pockets” (Palmrose 1988; Stice 1991). However, the most likely scenario when there is no alleged audit failure is no lawsuit being filed.

The level of litigation risk, however, is not constant across all audit engagements. It varies with client attributes, audit firm characteristics, and global litigious environments. Several client characteristics that are associated with litigation risk have been identified in the auditing standards and literature. These characteristics affect the probability of the financial statements being materially in error, which may increase the likelihood of audit litigation risk. As noted in SAS 47, there is an increased risk of errors in accounts that require subjective judgment in determining their value. In addition, Stice (1991) argues that accounts whose balance represents a large percentage of total assets present a higher risk of potential litigation due to the fact that a material misstatement can result from a small percentage error in an account. He identifies the accounts receivable and inventory as two accounts that consistently meet both of these criteria. Several studies have provided evidence supporting the riskiness associated with accounts receivable and inventory (Ham et al. 1985; Kreutzfeldt and Wallace 1986; Simunic 1980; Stice 1991; Willingham and Write 1985; and St. Pierre and Anderson 1984). The results of these studies support the proposition that as the size of these two accounts increase relative to total assets, the probability of errors occurring in financial statements increases. This, in-turn, may increase the risk of litigation.

The effectiveness of a firm’s internal control system is another characteristic that affects the likelihood of material misstatements occurring in financial statements leading to potential litigation (Stice 1991). Studies show that there is a higher litigation risk associated with fast-growing firms if a firm’s internal control system is not able to properly process transactions or is not designed to handle growth (Hall and Renner 1988; Stice 1991).

The financial condition of a firm and the variability of a firm’s return are often used as indicators for misstated financial statements, primarily due to the tendency of management to resort to window dressing and earnings management (Stice 1991; Kinney and McDaniel 1989; Kreutzfeldt and Wallace 1986). These types of behavior are explained by Prakash and Rappaport (1977) in their ‘information inductance’ concept. According to this concept, which is based on the evaluation apprehension theory in the psychology literature, management knows that investors

will use financial statement information to evaluate management's performance. Knowing this, management will try to improve its performance to meet investors' expectations. If management performance falls short of the investors' expectations, managers might have the tendency to alter the description of performance by manipulating the information presented in the financial statements (Prakash and Rappaport 1977). This will result in a higher probability of the financial statements being significantly in error, suggesting that auditors may face a higher risk of litigation in auditing engagements with firms having a weak financial condition (Stice 1991).

In addition to the client characteristics, the risk of litigation is also affected by audit firm characteristics. For instance, the amount of resources available to the auditor and the tenure of the audit/client relationship are two important factors that contribute to the occurrence of audit failures (Stice 1991). Larger firms with more resources tend to provide higher quality audits and are, therefore, subject to lower litigation risk (Palmrose 1988). With respect to the tenure of the audit/client relationship, St. Pierre and Anderson (1984) show that there is a higher risk of litigation in the first year of the client/auditor relationship. This can be attributed to the effects of learning as the auditor becomes more familiar with the clients operations over the years.

Finally, different litigious legal environments across the world can affect audit litigation risk. Seetharaman et al. (2002) indicate that legal environments differ among countries. They find that UK auditors charge higher fees for the services they provide to clients that access US capital markets, but not non-US capital markets. Their findings show that these higher fees cannot be explained by the disclosure requirements mandated by the US securities laws. Their findings suggest that the higher audit fees reflect differences across liability regimes through adding a risk premium as a result of the higher risk of litigation in the US.

The above discussion shows that auditors may face different levels of litigation risk depending on client, auditor and environmental characteristics. When forming their judgments, auditors know that they will be held accountable for the decisions they make (Stice 1991; Messier et al. 1992). As stated by Ashton et al. (1989, 130), in auditing "because of the environment, the professional auditor must be prepared to justify, document, and take responsibility for his/her judgments and decisions" (Messier et al. 1992). This adds additional pressure on auditors to improve performance and take into consideration the possibility of having to justify their decisions to a supervisor or in court of arbitration or law. In a high litigation engagement, auditors will not only perform additional testing, but will also try to make the most defensible decisions in the eyes of a jury. This decision making process has been referred to by Staw (1980) as "prospective rationality" where individuals know in advance that they may have to defend their decisions to others. In these situations, auditors will try to identify the most defensible position and will devote substantial cognitive effort to do so (Tetlock 1985; Messier et al. 1992).

2.4.1 Litigation Risk and Decision Aids

In order to improve the quality of the audit and provide consistence of such quality, several audit firms have adopted more structured methods of operation (Jennings et al. 1993). One approach to enhance an auditor's decision-making and/or performance in such highly structured environments is to use cost-effective decision aids. Prior decision aid research indicates that the use of these decision aids generally increases the decision accuracy and performance of decision makers (e.g. Benbasat and Nault 1990; Ashton 1992), and reduces the likelihood of auditors making inconsistent decisions in similar situations (Jennings et al. 1993). Decision aids may also be used to reduce negative outcomes of litigation (Lowe and Reckers 2000).

When a lawsuit is filed against an auditor by a client/user claiming losses, a jury is faced with the task of determining whether the auditor was the cause, or if it was due to economic conditions or the fault of the client/user. A jury's attribution of responsibility for an audit failure is affected by their belief about what other auditors would have done when faced with the same situation (Jennings et al. 1993; Kelley and Michela 1980). Kelley and Michela (1980) argue that when individuals make attributions for failed performance, they tend to rely on consistency and distinctiveness information. Therefore, a jury will tend to look at an auditor's consistency and distinctiveness as they relate to prior behavior when faced with similar situations.

Decision aids provide auditors with a means by which they can reach the same conclusion when met with similar situations at different times (consistency), and reach different conclusions in different situations (distinctiveness). In a legal environment, jurists tend to consider audit decision aids as a form of internal guidance and a surrogate standard of performance provided by accounting firms and they not only look at the size of the error, but also look at the materiality of the auditor's departure from the decision aid in their determination of auditor liability (Jennings et al. 1993). If there is a material misstatement and a large departure from the decision aid, a jury will assess higher liability to the auditor. That is, a judge or jury might feel that the auditor violated a standard leading to an increased perception of culpability and liability (Jennings et al. 1993). On the other hand, if there is little deviation from the audit decision aid (internal guidance), a judge or jury may consider adherence to the decision aid (structured guidance) as a positive signal of the auditor's due diligence and responsibility (Jennings et al. 1993). This suggests that, when faced with high perceived litigation risk, auditors are expected to rely more on a decision aid to be in a better position to defend themselves if faced with litigation.

Several researchers have studied the effect of decision consequences on a user's level of reliance on a decision aid (e.g. Arkes et al. 1986; Ashton 1990; and Boatsman et al. 1997). Arkes et al. (1986) conducted two experiments to examine users' decision aid reliance. In their experiments they examined conditions under which a decision aid was used or ignored under different incentive schemes, and the presence or absence of negative outcome feedback. They used three incentive levels

in their experiment: none, a dime for each correct answer, or a tournament-style award. Their results indicate that individuals in the tournament-style incentive group tended to deviate more from the decision aid's advice than the other groups. This result is expected since participants in this group will need to deviate from the advice given to all participants in an attempt to outperform the participants following the decision aid's advice. The authors also manipulated the consequences of ignoring the decision aid. One of the groups was warned of the negative consequences of ignoring the decision aid while the other was encouraged to try to beat the decision aid. Their results show that the manipulation of decision consequences can increase the level of reliance on a decision aid.

Ashton (1990) examined the effects of incentives, feedback, justification, and a decision aid on decision making. He conducted three experiments using professional auditors to predict bond ratings based on financial ratios. In his study, he adopted the pressure-arousal-framework to explain the effects of the pressures generated by incentives, feedback and justification in the decision making process. Using this framework, Ashton suggested that each of these three factors adds pressure on the decision maker that increases attention and effort, and in-turn improves performance, up to a point after which too much pressure will lead to anxiety that would lead to worse performance. In his experiments, Ashton used a tournament-style incentive scheme and used a decision aid with an accuracy rating of 50%; however, he later manipulated the decision aid's face validity as well. His results show that offering incentives aroused participants to perform better and providing them with a decision aid significantly improved performance. He also found that when a decision aid with a high implicit performance standard is provided, participants tend to use it to assist in their decision making processes. However, when the three factors, incentives, feedback, and justification were available, he noticed decreased reliance on the decision aid and reduced mean accuracy. These results are expected due to the tournament-style incentive scheme used and the low face validity of the decision aid used in these experiments.

Boatsman et al (1997) examined the effects of decision consequences, such as continued employment, raises, loss of reputation and litigation costs, on a user's level of reliance on a decision aid. In their experiment, they used professional auditors in a management fraud assessment task. The authors manipulated the decision consequences using five types of decision consequences: penalty for audit failure, penalty for over-auditing, penalty for both audit failure and over-auditing, penalty for incorrectly overriding the decision aid's recommendation, and increasing the focus on the cost of an extended audit. They found that increasing the penalty for audit failures, over-auditing and incorrectly overriding the decision aid's advice increased the user's level of reliance on a decision aid. Their results suggest that auditors tend to rely on decision aids when there is a higher cost of audit failure.

In a more recent study, Lowe and Reckers (2000) characterized audit litigation in terms of hindsight and foresight judgments. They argue that in the "current legal system, hindsight judgments are used to evaluate auditor decisions performed in foresight" (Lowe and Reckers 2000, 98). Since judges and jurors "have outcome

knowledge that may limit their ability to (1) mentally create the situation the auditor faced in foresight, or (2) reestablish the *ex ante* predictability of subsequent events. They suggest that the effect of outcome knowledge is to create a gap between hindsight and foresight perspectives such that a 'surprise' is elicited (Lowe and Reckers 2000, 98). Lowe and Reckers (2000) argue that in order for the auditor to minimize that gap and, therefore reduce the negative outcome of litigation, he/she needs to use a foresight decision aid that helps him/her focus on possible negative outcomes. They argue that foresight decision aids could be "useful to auditors who are aware that (1) extreme negative outcomes may befall the CPA firm as a result of their incorrect judgment, (2) their performance will be judged in hindsight by external parties, and (3) it may be difficult to influence the hindsight evaluation of external, *ex post* evaluators" (Lowe and Reckers 2000, 100). To test for their hypotheses, Lowe and Reckers (2000) conducted an experiment in which the participants were 131 audit seniors of one of the Big 5 CPA firms. Their results indicated that using a foresight decision aid directed the auditors to explicitly consider negative outcome of a possible litigation when planning their audit and forming their judgment. They concluded that the "foresight decision aids can be used to encourage auditors to consider their *ex ante* judgments in light of potential legal exposure to their firm" (Lowe and Reckers 2000, 114). The tendency to use a foresight decision aid is expected to be higher when an auditor is faced with a high litigation risk in an audit engagement.

Combining the results of decision aid literature with those of the litigation risk suggests that auditors in a high litigation risk environment will tend to rely more on decision aids than auditors in a low litigation risk environment, as auditors in a high litigation environment are trying to improve and ensure audit effectiveness. This leads to the third hypothesis:

H3: There is a positive relationship between perceived litigation risk and decision aid reliance.

2.5 Predicted Interactive Effects of Time Pressure, Task Complexity and Litigation Risk

Rational auditors will continuously try to improve the effectiveness and efficiency of their performance in an audit engagement. Each of the three factors examined herein (time pressure, task complexity, and litigation risk) creates 'pressure' on an auditor to either improve audit efficiency or audit effectiveness. Assuming that the pressures created by these factors are linear and equally weighted, one can think about such pressures in the form of 'DA reliance motivator units'. While the assumptions of linearity and equal weighting may not be precisely correct, since there is no empirical evidence to the contrary, these assumptions reflect a "first approximation" of how various combinations of these pressures jointly motivate auditors to perform better through the decision aid reliance.

As discussed in previous sections, when auditors experience a high level of time pressure, they are concerned with completing the audit within the amount of time allowed; in such instances, they will be motivated to improve their performance to gain audit *efficiency*, thereby resulting in one DA reliance motivator unit. Auditors who are faced with high litigation risk will be concerned with the accuracy of their judgment; hence, they will be motivated to improve their performance to gain audit *effectiveness*, thus reflecting another motivational unit of DA reliance. When auditors are faced with performing a complex task, they will also be concerned with the *effectiveness* of their performance; thus giving rise to a third motivational unit of DA reliance. Table 2-1 summarizes the DA reliance motivator units associated with various combinations of relatively high time pressure, litigation risk and task complexity.

Table 2-1: DA Reliance Motivator Units

Variable*	Efficiency	Effectiveness	Total DA Reliance Motivator Units
TP	1	0	1
TC	0	1	1
LR	0	1	1
TP x TC	1	1	2
TC x LR	0	2	2
TP x LR	1	1	2
TP x TC x LR	1	2	3

* TP = High Time Pressure
 TC = High Task Complexity
 LR = High Litigation Risk

The joint and interactive effect of these three variables on auditors' decision aid reliance is examined in the following sections.

2.5.1 Time Pressure and Task Complexity

Time pressure and task complexity may jointly affect decision aid reliance. Several studies have shown the effects of time pressure (e.g. Payne et al 1988, 1996, Arnold et al 2000, Rieskamp and Hofferage 2002) and task complexity (e.g. Baron et al 1996; Payne et al 1990a; Bui and Sivasankaran 1990) on decision making and decision aid use. These studies have shown that the time pressure felt by decision makers affects their decision making process. A high level of time pressure disrupts the decision making process by increasing the psychological pressure the decision maker experiences. Decision makers under high time pressure tend to sacrifice accuracy, unless incentives for greater accuracy are introduced. When accuracy is important, decision makers tend to search for strategies that will enable them to make accurate decisions in the available time. These incentives for greater accuracy motivate the decision maker to improve performance to improve the *efficiency* of their decision making process (i.e. decision makers will have one DA reliance motivator unit to improve decision making *efficiency*). The use of

decision aids has been used as one of these strategies. Therefore, auditors will tend to rely more on a decision aid to gain audit *efficiency* when working under time pressure.

These studies have also shown that the complexity of a task affects the strategies used by decision makers in their decision making process. As the complexity of a task increases, the effort required to perform the task also increases. Decision makers tend to avoid the extra effort required to perform a complex task sacrificing accuracy for a reduced amount of effort unless performance contingent incentives are introduced for greater levels of accuracy. These incentives for greater accuracy motivate the decision maker to improve performance to improve the *effectiveness* of their decision making process (i.e. decision makers will have one DA reliance motivator unit to improve decision making *effectiveness*). In an auditing context, since the accuracy of the decision is important, an auditor will tend to search for a smarter way of performing the task if it is highly complex.

The use of decision aids is one method used to improve the decision accuracy of decision makers performing complex decision tasks. The pressure on a decision maker performing a complex task under high time pressure results in a cognitive overload forcing them to search for strategies that enable them to perform the task and make accurate decision. Using decision aids alleviates some of this pressure by reducing the cognitive load on decision makers enabling them to improve the accuracy of their decisions.

Byström and Järvelin (1995) show that as the complexity of a task increases, individuals tend to look for sources to help perform the task. The increased pressure resulting from the perceived time pressure and the cognitive overload caused by the perceived task complexity leads auditors to search for sources to help *effectively* and *efficiently* complete the audit task resulting in higher reliance on a decision aid's advice.

The above review of the time pressure, task complexity and decision aid literature suggests that, in an auditing context where auditors are frequently faced with complex decision-making situations under time pressure, they will tend to rely on decision aids in their decision making process to improve the *efficiency* and *effectiveness* of their performance. In the absence or at a reduced level of perceived time pressure and perceived task complexity, the motivation auditors have to search for sources to help effectively and efficiently complete the auditing task decreases. This, in-turn, leads auditors to rely less on decision aids to improve the efficiency and effectiveness of their decision making process. However, assuming that each of the DA reliance motivator units to improve efficiency or effectiveness provides a fairly equal incentive to rely on a decision aid, no interaction is expected between the two variables.

2.5.2 Time Pressure and Litigation Risk

In a typical audit engagement, rational auditors will try to improve the effectiveness and efficiency of their performance. When operating under a relatively high time pressure, auditors will be mainly concerned with completing their tasks within the time budget allowed (i.e. auditors will have one DA reliance motivator unit to improve audit *efficiency*). In such a case, they will be motivated to rely on decision aids to gain audit *efficiency*. Auditors faced with high litigation risk will be more concerned with the accuracy of their judgment (i.e. they will have one DA reliance motivator unit to gain audit effectiveness) and, hence, will be motivated to use decision aids to improve audit *effectiveness* (i.e. judgment accuracy).

Therefore, it is expected that when auditors are working under high perceived time pressure and are facing relatively high perceived litigation risk, their motivation to rely on decision aids will be quite strong, as they will be attempting to increase both the *efficiency* (time pressure effect) and *effectiveness* (litigation risk effect) of their performance. On the other hand, when auditors are provided with ample time to perform the audit (i.e., relatively low perceived time pressure) and evaluate relatively low perceived litigation risk, they will have less motivation to increase audit efficiency and effectiveness. As with the prior section, assuming that each of the DA reliance motivator units to improve efficiency or effectiveness provides a fairly equal incentive to rely on a decision aid, no interaction is expected between these two variables.

2.5.3 Task Complexity and Litigation Risk

An auditor's level of reliance on a decision aid can also be affected by the combined influences of the complexity of the task at hand and the consequences of making a wrong decision (litigation risk). The pressure to rely on a decision aid created by either task complexity or litigation risk arises from the same motivational source—to be more *effective*. The empirical and theoretical question here is: Do two effectiveness DA reliance motivators exhibit an additive or interactive effect?

There are two ways to consider the impact of two effectiveness motivators. On one hand, as with the prior two sections, one can assume that each of the DA reliance motivator units to improve effectiveness provides a fairly equal (i.e. additive) incentive to rely on a decision aid, thus, no interaction would be expected between the two variables, as the effect is additive. On the other hand, providing two incentives to improve audit effectiveness might not result in an additive increase in the level of decision aid reliance.

For example, if auditors are faced with performing an audit in a high litigation risk or high task complexity environment, either source of pressure will motivate them to improve the accuracy of their decisions (i.e. they will have one DA reliance motivator unit to improve audit *effectiveness*). When auditors are simultaneously

faced with a second motivator to be more effective (e.g. either high task complexity or high litigation risk), they will again be motivated to increase audit effectiveness (i.e. they will have another DA reliance motivator unit to improve audit *effectiveness*). In either case, adding a second motivator to improve audit effectiveness might not necessarily lead to a higher level of decision aid reliance, as the auditor will already be putting forth extra effort to improve audit effectiveness, including relying on the decision. This leads to the following interaction hypothesis considering decision aid reliance when perceived task complexity and perceived litigation risk are jointly high or low (see Figure 2-3):

H4: Decision aid reliance is lower when perceived task complexity and perceived litigation risk are low and higher when perceived task complexity and/or perceived litigation risk are/is high.

Figure 2-3. Illustration of Expected Interaction between Litigation Risk and Task Complexity: Assuming that two DA Motivator Units arising from the same source (Effectiveness) are not Additive.

2.5.4 Time Pressure, Task Complexity and Litigation Risk

If each DA reliance motivator is additive, there should be no three-way interaction. However, as expressed in H4 above, there is reason to expect a two-way interaction between task complexity and litigation risk, thus giving rise to a possible three-way interaction.

Considering H4 and holding time pressure low (no incentive to be more efficient), one would expect the same result as predicted in H4, as next hypothesized:

H5a: When time pressure is low, decision aid reliance is lower when perceived task complexity and perceived litigation risk are low and higher when perceived task complexity and/or perceived litigation risk are/is high.

Next, assume H4 and hold time pressure high (one DA reliance unit based on *efficiency*). One would expect the same pattern of results as predicted in H4 and H5a, only the levels should be higher due to the constant inducement of time pressure to be more effective (see Figure 2-4). This leads to the final hypothesis:

H5b: When time pressure is high, the same decision aid reliance pattern predicted in H5a will be attained; however, the pattern will be significantly higher due to the constant DA reliance motivator of time pressure.

2.6 Summary and Conclusion

This chapter analyzes three sources of perceived pressure that can affect auditor behavior related to reliance on a decision aid when making audit judgment: time pressure, task complexity and litigation risk. The extant literature related to these three sources of pressure has been reviewed. The results of prior research have been analyzed to establish the underlying theory needed to develop the seven hypotheses of the study. The analysis established theoretical links for each of the three sources of pressure individually, and their potential two-way and three-way effects, to auditors' reliance on a decision aid.

The first hypothesis (H1) relates to the effects of time pressure on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when working under high perceived time pressure to achieve audit efficiency. The second hypothesis (H2) deals with the effect of task complexity on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when they perceive the task to be highly complex to accomplish audit effectiveness. The third hypothesis (H3) relates to the effects of litigation risk on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when they perceive litigation risk to be high, again, to gain audit effectiveness.

Figure 2-4. Illustration of Expected Joint Effects of Litigation Risk, Task Complexity and Time Pressure: Assuming that two DA Motivator Units arising from the same source (Effectiveness) are not Additive

Hypothesis H4 deals with the interactive effect of litigation risk and task complexity. Specifically, hypothesis H4 predicts that decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high. This hypothesis assumes that two units arising from the same source (efficiency) are not additive.

The final two hypotheses (H5a and H5b) predict possible interactive effects among all three pressures sources, first holding time pressure low and then holding time pressure high. Table 2-2 presents a summary of the hypotheses.

Table 2-2: Summary of Hypotheses

	Hypothesis
H1	There will be a positive relationship between perceived time pressure and decision aid reliance.
H2	There will be a positive relationship between perceived task complexity and decision aid reliance.
H3	There will be a positive relationship between perceived litigation risk and decision aid reliance.
H4	Decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.
H5a	Holding time pressure low, decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.
H5b	Holding time pressure high, the same decision aid reliance pattern predicted in H5a will be attained; however, the pattern will be significantly higher due to the constant DA reliance motivator of time pressure.

Figure 2-5 presents the research model relating the seven hypotheses to the variables examined in the current study. The three variables of interest: time pressure, task complexity, and litigation risk are presented. The figure summarizes the hypothesized relation of the three variables, and their interaction, to decision aid reliance.

Figure 2-5. Research Model

CHAPTER 3

RESEARCH METHOD AND CONDUCT OF THE EXPERIMENT

3.1 Introduction

The previous chapter described the theory and hypotheses related to time pressure, task complexity and litigation risk, and their relation to decision aid reliance. This chapter presents the research method used to test the seven hypotheses previously articulated. It describes the research design, development of the experimental instruments, dependent variables, independent variables, and manipulation checks.

3.2 Research Design

In order to examine the effect of time pressure, task complexity and litigation risk on auditor's reliance on a decision aid, an experiment was conducted in a controlled environment using software specially designed for the experiment. Computerized automation of the experiment enabled more control over participants and experimental manipulations during task performance. The software provided all experimental information to the participants and allowed for recording of responses during the experiment.

The experiment involved a $2 \times 2 \times 2$ between subjects design. The three independent variables were time pressure, task complexity and litigation risk. Each factor was manipulated between-subjects at two levels (high or low), resulting in eight treatment conditions. Figure 3-1 presents the experimental design used in the experiment.

3.3 Participants

This study solicited the participation of audit seniors and managers from two of the Big-4 public accounting firms in the United States (U.S.). Participants from the U.S., rather than Europe, were used because the litigation risk manipulation is different across countries, and such risk is arguably higher in the U.S. than Europe. Thus, the manipulation of litigation risk would likely be much more sensitive in the U.S.

Figure 3-1. Research Design

3.4 Pilot Testing

Three pilot tests were conducted to develop and refine the test instruments. The first pilot test was conducted during a research seminar offered in a large research university in the Netherlands. Eighteen Ph.D. students from various European universities participated in the pilot test. The aim of the first pilot test was to examine the task complexity manipulation in order to make any necessary changes to the instrument. Based on the first pilot test, several changes were made to the test instrument, mainly to lower the complexity of the ‘high task complexity’ materials, as the complexity was perceived to be too high.

A second pilot test was conducted to determine the mean amount of time it took participants to complete the high and low complex tasks, and examine the effectiveness of the task complexity and litigation risk manipulations. During this pilot test the amount of time required to complete the tasks was recorded and the

mean completion time for the task was calculated. Twenty-one audit seniors and managers from a Big-4 public accounting firm in the United States participated in the pilot test. The results of the second pilot test indicated an effective manipulation of the perceived task complexity and perceived litigation risk variables, and made possible the determination of "perceived time pressure" for the next pilot test.

The first two pilot tests used paper-based materials. In order to provide more experimental control during the administration of the experiment, a computerized version of the test instrument was developed. A third pilot test was conducted to determine the effectiveness of the perceived time pressure manipulation in the high and low task complexity conditions, and to test the computerized version of the experiment. Twenty-two audit seniors and managers from a Big-4 public accounting firm in the United States participated in this pilot test. In the high time pressure condition, the participants were given a time limit calculated by subtracting two standard deviations from the mean completion time to perform the task determined in the second pilot test. Participants in the low time pressure condition were given a time limit calculated by adding two standard deviations to the mean completion time to perform the task. Results of time pressure manipulation check questions revealed that the participants did perceive high time pressure and low time pressure in the appropriate task complexity conditions. Also, the software worked as planned on the firm's network.

3.5 Task

Participants were provided with a set of information containing instructions (see Appendix A) and case materials (see Appendix B). The instructions emphasized the importance of their participation, and made clear that their responses would be strictly confidential and be used solely for the purpose of this study. Participants were also provided with information about the time allowed to perform the task (see Appendix A). This was done to facilitate the manipulation of high (low) time constraint, as well as perceived time pressure.

The case material describes a large manufacturing corporation in which accounts receivables represent a significant percentage of current assets. Participants were provided with management's estimate of the allowance for uncollectible accounts and the aging of accounts receivable schedules for the previous five years. They were also told that management and the audit committee of the board of directors believe that management's estimate fairly represents the amount of uncollectible accounts at the end of the year and that both management and the audit committee are reluctant to change the allowance amount. After reviewing the case materials, participants were asked to provide an estimate of the dollar amount of uncollectible accounts at the end of the year and to declare the amount of year-end adjusting journal entry they would require of management, if any. Embedded within the case materials, were manipulations of time pressure, task complexity and litigation risk, as more fully explained in upcoming sections.

All participants were then provided with the advice of a decision aid (see Appendix C). The decision aid was designed to assist in evaluating the reasonableness of the allowance for doubtful accounts. Participants were told that using the decision aid output was intended to be advisory only (more detail about the decision aid is forthcoming in a subsequent section). After reviewing the decision aid's advice, and given an option to re-examine the client's financial information, participants provided a second assessment of the dollar amount of uncollectible accounts and year-end adjusting journal entry recommendation. They were fully aware that they did not have to change their initial responses, or they could change the initial amounts in any direction or magnitude they deemed appropriate.

3.6 Procedure

The experiment software was installed on the intranet and extranet servers of each of the participating public accounting firms. The experiment was simultaneously run in all participating firms for a period of one week. At the beginning of the experiment, each participant was randomly assigned one of the eight treatments as shown in Figure 3-1: (1) High time pressure/high litigation risk/high task complexity, (2) high time pressure/high litigation risk/low task complexity, (3) high time pressure/low litigation risk/high task complexity, (4) high time pressure/low litigation risk/low task complexity, (5) low time pressure/high litigation risk/high task complexity, (6) low time pressure/high litigation risk/low task complexity, (7) low time pressure/low litigation risk/high task complexity, and (8) low time pressure/low litigation risk/low task complexity.

All participants in each condition were presented with a set of instructions on their screens (Appendix A), followed by the case materials (Appendix B). The experiment software controlled the amount of time allowed to complete the task and recorded the participants' responses into an Access database. Upon the completion of the task, participants were asked to fill out a post-experiment questionnaire.

3.7 Experimental incentives

Participation in the experiment was voluntary. A financial incentive system was used to encourage participation. Participants were informed that \$50 would be donated to the charity of their choice for their participation.

3.8 Experimental variables

The following subsections explain the independent variables, decision aid treatment, and dependent variable in more detail.

3.8.1 Independent Variables

Three independent variables manipulated in this study are: perceived time pressure, perceived task complexity and perceived litigation risk. Each of these variables is discussed below.

3.8.1.1 Time Pressure

Researchers studying time pressure typically measure such pressure by allocating specific time to perform a task (e.g. McDaniel 1990; Ahituv 1998). However, a distinction needs to be made between absolute time and time pressure (Fisher et al. 2003). Fisher et al. (2003, 174) define a time constraint as “a specific allotment of time for making a decision, while time pressure is a subjective reaction to the amount of time allotted.” Additionally, Svenson and Edland (1987) explain that individuals experience time pressure whenever they perceive the time available to complete a task as being shorter than what would normally be required to complete the task. Time pressure may be felt by some individuals in an objectively high time pressure condition, while others might not feel time pressure under the same condition (Fisher et al. 2003). Since the participants’ reliance on the decision aid’s advice will be affected not only by the amount of time given to perform the task but also by their perception of time pressure, participant’s perceived time pressure was used to determine the extent to which the time pressure manipulation was successful.

In order to determine the appropriate time constraints, a pilot test was conducted to record the mean amount of time required to complete the high and low complexity tasks. Once this pilot was completed, a follow-up pilot test was administered. For each of the two levels of task complexity, participants in the high time pressure condition were given a time limit calculated by subtracting two standard deviations from the mean completion time to perform the task. Participants in the low time pressure condition were given a time limit calculated by adding two standard deviations to the mean completion time to perform the task. This resulted in a set of four absolute time constraints (low task complexity by low time pressure, low task complexity by high time pressure, high task complexity by low time pressure, and high time pressure by high time pressure). The pilot test for time pressure was successful, as the manipulation checks for high and low perceived pressure were in the expected direction and significantly different from each other. More specific information about this pilot test results is provided in the upcoming results section.

3.8.1.2 Task Complexity

Task complexity was varied by manipulating the clarity of input, which has been defined and used by many researchers as a manipulation of task complexity

(e.g. Moriarity 1979; Rumis 1984, 1987; Payne, et al 1990a, 1990b, 1992; Bonner 1994). In the current study, task complexity was manipulated at two levels, high and low. In the high task complexity condition, participants were presented with the financial ratios and accounts receivable aging schedules in narrative form (see Appendix B). For example, in the high task complexity condition, the financial ratios and the aging schedule were presented as follows:

AMI's key ratios for the current year (2004) are as follows: current ratio 1.69; quick ratio 0.72; cash ratio 0.24; operating cash flow ratio 0.30; and debt-to-equity ratio 0.71. Key ratios for the preceding year (2003) are as follows: current ratio 2.19; quick ratio 1.07; cash ratio 0.35; operating cash flow ratio 0.74; and debt-to-equity ratio 0.45.

Aging of accounts receivable for 1999: 0 – 30 days \$9,032,258; 31 – 60 days \$2,709,677; 61 – 90 day \$1,806,452; over 90 days \$451,613. Actual write-offs for the same period were: 0 – 30 days \$64,000; 31 – 60 days \$96,000; 61 – 90 day \$128,000; over 90 days \$160,000.

For the low task complexity conditions, participants were provided with exactly the same information; however the financial ratios and accounts receivable aging schedules were presented in tabular form (see Appendix B). For example, the financial ratios and the aging schedule were presented as follows:

<u>Ratio</u>	<u>Preceding Year</u>		<u>Current Year</u>	
Current ratio	2.19		1.69	
Quick ratio	1.07		0.72	
Cash ratio	0.35		0.24	
Operating cash flow ratio	0.74		0.30	
Debt-to-equity ratio	0.45		0.71	

<u>Age of Accounts Receivable Schedule for 1999</u>					
	<u>0 – 30</u>	<u>31 – 60</u>	<u>61 – 90</u>	<u>Over 90</u>	<u>Total</u>
	<u>Days</u>	<u>Days</u>	<u>Days</u>	<u>Days</u>	
Account Receivable	\$9,032,258	\$2,709,677	\$1,806,452	\$451,613	\$14,000,000
Actual Write-off	\$64,000	\$96,000	\$128,000	\$160,000	\$448,000
Percent	0.7%	3.5%	7.1%	35.4%	3.2%

3.8.1.3 Litigation Risk

Litigation risk was manipulated at two levels, high and low (see Appendix B). In the high litigation risk condition participants were given information about the outcomes of failing to reach the appropriate judgment regarding the allowance for

doubtful accounts and the possible legal consequences. They were presented the following statement in the case.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very high should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 95%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 90%. If the suit is successful, the fine and penalties imposed on your firm would be extremely high.

In the low litigation risk condition, participants were given similar information; however, the probability of being sued and the consequences of being sued will be only a fraction of the high litigation case. Thus, they were presented with the following statement in the case.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very low should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 5%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 10%. If the suit is successful, the fine and penalties imposed on your firm would be extremely low.

3.8.2 Decision Aid

To measure the effects of a decision aid on participants' judgment decisions, the output of a decision aid was provided after participants provided their initial judgment (Appendix C). They were then asked to provide their final judgment. The participants were told that the decision aid is provided to assist them during their audit. In addition, they were told that the output of the decision is intended to be advisory only and that the ultimate decision regarding the estimate of the allowance for uncollectible accounts is their judgment call. Information on what the decision aid analyzed was provided before providing its estimate of the allowance for uncollectible accounts. Participants were told that the decision aid was correct 8 out of 10 times in the past, yielding an 80% reliability score. The reliability of 80% was chosen as prior decision aid reliance research showed that providing participants with a decision aid with very low reliability leads to non-reliance, as participants feel that they will always perform better than the decision aid. Prior research also indicated that providing participants with a decision aid that is highly reliable (e.g. 95% to 100%) leads to over-reliance, as participants feel that using the decision aid will yield correct results every time. Therefore, to measure the effects of the decision aid on judgment decisions, a reliability of 80% is commonly used in decision aid reliance research.

3.8.3 Dependent Variable

The dependent variable in this study is the level of auditor's reliance on a decision aid. Agreement with the decision aid's advice has been used by many researchers (e.g. Arkes et al. 1986; Ashton 1990, 1992; Barron et al. 1996; Brown & Jones 1998; and Jones et al. 1999) as a measure of reliance. This measure of reliance, however, has been subject to criticism as it does not tell us if reliance occurred when an experienced individual reaches the same conclusion as the decision aid (Rose 2002). In an attempt to refine this measure of reliance, Hayes (2002) examined a different measure of reliance based on the amount the participants change their prediction to agree with the decision aid's advice. This measure will show how much the decision aid's advice influenced the participant's final response and will be used as the measure of reliance in the current study. It is calculated as follows:

Decision Aid Reliance =

$$\frac{\text{Final Recommended Adjustment} - \text{Initial Recommended Adjustment}}{\text{Decision Aid's Recommendation} - \text{Initial Recommended Adjustment}}$$

Decision Aid's Recommendation - Initial Recommended Adjustment

In the experimental task, participants are asked to estimate the allowance for uncollectible accounts based on the information provided in the case. They are then asked to calculate the difference between their adjustment and management's estimate, and provide an initial recommendation on how much of the difference they would recommend as an adjustment to the financial statements. After making their initial recommendation, the participants are provided with information on a computerized decision aid and its estimate of the allowance for uncollectible accounts. They are then asked to provide their estimate of the allowance for uncollectible accounts, the difference between their estimate and managements estimate, and a final recommendation on how much of the difference they would recommend as an adjustment to the financial statements. By comparing the difference between the participant's initial and final recommendations to the difference between the decision aid's advice and the participant's initial recommendation, the reliance function is able to show how much the decision aid's advice influenced the participant's final recommendation. The participant's recommended adjustment, as opposed the participant's estimate of uncollectible accounts, was used in the reliance function as it took into account not only how the decision aid affected their estimate of the allowance for uncollectible accounts, but also the effect it had on their recommended adjustment for uncollectible accounts.

3.9 Manipulation Checks

One manipulation check question asks participants the extent to which the audit might be a target of future litigation. To assess perceived litigation risk, the following question was asked:

Should the audit fail to detect a material misstatement of the financial statements, the risk of being sued on this engagement is:

To assess the success of the litigation risk manipulation, a t-test will be conducted between the high and low conditions. If the high and low means are significantly different from each other and in the anticipated direction, the manipulation will be considered successful.

The next treatment involves time pressure. As discussed earlier, participants in the high task complexity/high (low) time pressure condition were allowed 16 (23) minutes to complete the task. Participants in the low task complexity/high (low) time pressure condition were allowed 13 (18) minutes to complete the task. A display of the time remaining to complete the task was constantly on the participants screen to reinforce the time constraint. One manipulation check question asked:

How many minutes were you allowed to complete screens one and two?

- Please Select - ▼

23 minutes

18 minutes

16 minutes

13 minutes

If participants pick the correct number of minutes in accordance with their treatment condition, the time constraint manipulation was considered successful from an objective perspective (i.e., minutes). However, as discussed earlier, the underlying construct here is not the absolute amount of time, but perceived or felt time pressure. That is, if participants in the high time pressure condition also subjectively 'feel' more time pressure than the low time pressure condition, than the treatment will have had its intended effect. Thus, a second question was asked as follows:

How do you feel about the time you had to complete the performance task?

In the Fisher et al. (2003) study, the authors examined the impact of perceived time pressure on their results through a direct comparison of the choices made by the groups who felt time pressure and those who did not. The current study will use a t-test to determine if there is a mean difference between the high and low time pressure conditions on the above question. If the high and low means are significantly different from each other and in the anticipated direction, the manipulation will be considered successful. Further, to follow the most conservative approach to hypotheses testing, the study will leave participants in their randomly assigned time pressure conditions, even if they miss the first time constraint question involving minutes and/or if they are on the unexpected end of the time pressure continuum.¹

For the task complexity treatments, a manipulation check question asked participants about the extent to which they felt the task was complex. To access perceived task complexity, the following manipulation check question was asked:

For this client, how would you rate the complexity of the task of estimating the allowance for uncollectible accounts?

A t-test will be conducted on the means across the high and low task complexity conditions. If the high and low means are significantly different from each other and in the anticipated direction, the manipulation will be considered successful.

¹ This would be a conservative approach because any mismatches of these time constraint/pressure questions will add statistical noise to the hypotheses analysis. Supplemental sensitivity/robustness testing will be performed to determine the extent to which a mismatch between time constraint and time pressure affects decision aid reliance by placing 'felt' time pressure into high and low groups. If the results are substantially unchanged leaving in the participants who offered mismatched responses, they will be left in their manipulated conditions.

3.10 Summary and Conclusion

This chapter described the methodology used in the experiment. A $2 \times 2 \times 2$ between subjects design was used to test the hypotheses of the study. The three independent variables are the level of time pressure, task complexity and litigation risk each manipulated between subjects at two levels (high or low), resulting in eight treatment conditions.

In order to refine the test instruments, several pilot tests were conducted. The experiment was conducted using computer software that recorded the responses of the participants. The experimental task was to assess the amount (if any) that they will recommend as adjustment to the allowance for doubtful accounts, before and after exposure to a decision aid, to provide an unqualified opinion. Participants were experienced auditors from various offices of two Big 4 public accounting firms located in five large cities in the United States.

A summary of the hypotheses, dependent and independent variables are presented in Table 3-1. Manipulation check questions were used to test the success of the manipulations.

Table 3-1: Summary of Hypotheses and Experiment Variables

	Hypothesis	Dependent Variable	Independent Variable
H1	There will be a positive relationship between perceived time pressure and decision aid reliance.	RELIANCE	TIME PRESSURE
H2	There will be a positive relationship between perceived task complexity and decision aid reliance.	RELIANCE	TASK COMPLEXITY
H3	There will be a positive relationship between perceived litigation risk and decision aid reliance.	RELIANCE	LITIGATION RISK
H4	Decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.	RELIANCE	TASK COMPLEXITY, LITIGATION RISK
H5a	Holding time pressure low, decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.	RELIANCE	TIME PRESSURE, TASK COMPLEXITY, LITIGATION RISK
H5b	Holding time pressure high, the same decision aid reliance pattern predicted in H5a will be attained; however, the pattern will be significantly higher due to the constant DA reliance motivator of time pressure.	RELIANCE	TIME PRESSURE, TASK COMPLEXITY, LITIGATION RISK

CHAPTER 4

RESULTS

4.1 Introduction

This chapter presents the results of pilot testing and the main experiment. The chapter begins with the results of the second of three pilot tests, as the first pilot test did not include data collection. The results of the main experiment are then presented and discussed. Descriptive statistics of the participants of the experiment are presented, followed by the participant information and preliminary analysis of the data. This analysis includes manipulation checks, testing for potential covariates, and assumption testing. The tests of the hypotheses are then presented followed by a discussion of the results and concluding remarks.

4.2 Results of the Pilot Tests

4.2.1 Pilot Test II

The second pilot test manipulated task complexity (low and high) and litigation risk (low and high) in a factorial between-participants design. The purposes of the second pilot test were to assess the effectiveness of the task complexity and litigation risk manipulations, and determine the mean amount of time it took participants to complete the experiment in four manipulated conditions. The observed completion times provided benchmarks by which to estimate how much absolute time to give participants in the main experiment to induce perceptions of low and high time pressure.

4.2.1.1 Participant Data

A total of 21 audit seniors and managers from a Big 4 public accounting firm in the United States participated in this pilot. Table 4-1 presents the demographic statistics of the participants.

Table 4-1: Demographic Statistics -- Pilot II Participants

Gender	Male	11
	Female	10
	Total	21
Age	26 to 30	10
	31 to 35	10
	36 to 40	1
	Total	21
Years of Experience	Minimum	2
	Maximum	8
	Mean	4.33
	Standard Deviation	1.83
Position/Level	Senior	16
	Manager	5
	Total	21

4.2.1.2 Descriptive Statistics

The data provided the amount of time taken to perform the task. By calculating the mean and standard deviation of the time taken for each of the four treatments, the determination of appropriate time constraints was made. The mean (standard deviation) time required to complete the low litigation low/task complexity task was 14.40 (1.14), the low litigation risk/high task complexity task was 19.40 (1.95), the high litigation risk/ low task complexity task was 15.67 (1.03) and the high litigation risk/high task complexity task was 18.80 (1.64).

The data suggest that differences in absolute time arose from high/low task complexity, not high/low litigation risk; thus, the absolute amount of time to give participants in the main experiment to induce perceptions of high and low time pressure would differ within each task complexity condition. The time constraints for the high time pressure treatments were determined by subtracting two standard deviations from the mean time required to complete the task relative to task complexity. This resulted in a high time pressure constraint of 13 minutes for the low task complexity treatments and 16 minutes for the high task complexity conditions. The time constraints for the low time pressure treatments was determined by adding two standard deviations from the mean time required to complete the task relative to task complexity. This resulted in a low time pressure constraint of 18 minutes for the low task complexity treatments and 23 minutes for the high task complexity conditions. Results of the second pilot test are summarized in Table 4-2.

Table 4-2: Descriptive Statistics -- Pilot II

Treatment Condition*		LLR LTC	LLR HTC	HLR LTC	HLR HTC	All
Initial. Estimate	Min	\$ 685,000	\$ 645,000	\$ 690,000	\$ 650,000	\$ 645,000
	Max	725,000	780,000	730,000	780,000	780,000
	Mean	708,400	713,000	711,500	717,000	712,429
	Std Dev.	16,134	61,604	15,017	51,672	37,564
Initial. Recommend.	Min	\$ 50,000	\$ 0	\$ 50,000	\$ 40,000	\$ 0
	Max	125,000	100,000	130,000	80,000	130,000
	Mean	95,000	55,000	96,667	59,000	77,381
	Std Dev.	30,882	44,721	25,820	17,464	34,879
Final. Estimate	Min	\$ 700,000	\$ 750,000	\$ 800,000	\$ 825,000	\$ 700,000
	Max	750,000	875,000	860,000	890,000	890,000
	Mean	724,000	805,000	835,833	858,000	807,143
	Std Dev.	23,022	57,009	22,004	25,150	60,220
Final. Recommend.	Min	\$ 75,000	\$ 50,000	\$ 180,000	\$ 200,000	\$ 50,000
	Max	125,000	250,000	250,000	285,000	285,000
	Mean	104,000	150,000	218,333	247,000	181,667
	Std Dev.	19,882	72,887	24,631	30,332	68,599
Materiality Level	Min	\$ 450,000	\$ 450,000	\$ 480,000	\$ 450,000	\$ 450,000
	Max	540,000	550,000	530,000	550,000	550,000
	Mean	502,000	507,000	507,500	504,000	505,238
	Std Dev.	33,466	37,014	18,371	38,471	29,727
Task Time (minutes)	Min	13	17	14	17	13
	Max	16	22	17	21	22
	Mean	14.40	19.40	15.67	18.80	17.00
	Std Dev.	1.14	1.95	1.03	1.64	2.51

* LLR = Low litigation risk

HLR = High litigation risk

LTC = Low task complexity

HTC = High task complexity

Although the sample size was small, the pattern of decision aid reliance was in the hypothesized direction. The results showed that reliance was highest in the high litigation risk/high task complexity condition (0.55) and lowest in the low litigation risk/low task complexity condition (0.03). Table 4-3 presents a summary of the decision aid reliance variable determined in pilot II.

Table 4-3: Decision Aid Reliance -- Pilot II

Treatment Condition*		LLR LTC	LLR HTC	HLR LTC	HLR HTC
Decision Aid Reliance	Mean	0.03	0.28	0.40	0.55
	Std Dev.	0.04	0.17	0.09	0.08

DA Reliance = (Final Recommend – Initial Recommend)/(DA Recommend – Initial Recommend)

* LLR = Low litigation risk

HLR = High litigation risk

LTC = Low task complexity

HTC = High task complexity

4.2.1.3 Manipulation Checks

The results of the second pilot test indicated an effective manipulation of the task complexity and litigation risk variables. One manipulation check question asked participants about their perceived litigation risk. The mean (standard deviation) perceived litigation risk in the low litigation risk treatments were 1.60 (0.55) and 1.80 (0.84) in the low and high task complexity cases, respectively, for an overall mean (standard deviation) of 1.70 (0.67) in the low risk condition. The mean (standard deviation) perceived litigation risk in the high litigation risk treatments were 7.00 (3.03) and 8.80 (0.45) the low and high task complexity cases, respectively, for an overall mean (standard deviation) of 7.81 (2.36) in the high risk condition. The overall means between the low and high litigation risk conditions were significantly different from each other ($t = 7.897, p = 0.000$), indicating the successful manipulation of litigation risk.

Another manipulation check question asked participants how they felt about the complexity of the task. The mean (standard deviation) perceived task complexity in the low task complexity treatments were 2.20 (0.84) and 1.83 (0.75) in the low and high litigation risk cases, respectively, for an overall mean (standard deviation) of 2.00 (0.77) in the low complexity condition. The mean (standard deviation) perceived task complexity in the high task complexity treatments were 7.00 (0.71) and 7.80 (0.84) in the low and high litigation risk cases, respectively, for an overall mean (standard deviation) of 7.40 (0.84) in the high complexity condition. The significant difference between the overall means of the two treatments ($t = 15.298, p = 0.000$) indicates the successful manipulation of task complexity. Therefore, the manipulation of both variables was deemed successful.

Table 4-4: Manipulation Check Group Means – Pilot II

Treatment Condition		Low	High	<i>t</i>	<i>p</i>
Perceived Litigation Risk	Mean	1.70	7.81	7.897	0.000
	Std Dev.	0.67	2.36		
Perceived Task Complexity	Mean	2.00	7.40	15.298	0.000
	Std Dev.	0.77	0.84		

Table 4-5: Manipulation Checks -- Pilot II

Treatment Condition*		LLR LTC	LLR HTC	HLR LTC	HLR HTC
Perceived Litigation Risk	Mean	1.60	1.80	7.00	8.80
	Std Dev.	0.55	0.84	3.03	0.45
Perceived TC Task Complexity	Mean	2.20	7.00	1.83	7.80
	Std Dev.	0.84	0.71	0.75	0.84
1 = Low 9 = High		* LLR = Low litigation risk HLR = High litigation risk		LTC = Low task complexity HTC = High task complexity	

4.2.2 Pilot Test III

The third pilot test was conducted to determine the effectiveness of the time pressure manipulation and test the computerized version of the experiment. This pilot test was also important to ensure that time pressure and task complexity were manipulated at appropriate levels to be able to separate the effects of each of these variables on participants' behavior. If the task was too complex, participants will feel that they are not able to complete the task in the allotted time and will therefore feel a higher level of time pressure. Similarly, if the time pressure was too high, participants will feel that the task was too complex to complete. Therefore, it was important to ensure the appropriate manipulation of these variables to be able to tease out the effects of each on participants' behavior.

4.2.2.1 Participant Data

A total of 22 audit seniors, managers, and partners from a Big 4 public accounting firm in the United States participated in the study. Table 4-6 presents the demographic statistics of the participants.

Table 4-6: Demographic Statistics -- Pilot III Participants

Gender	Male	11
	Female	11
	Total	22
Age	21 to 25	2
	26 to 31	9
	36 to 40	8
	41 to 45	3
	Total	22
Years of Experience	Minimum	3
	Maximum	7
	Mean	4.73
	Standard Deviation	0.98
Position/Level	Senior	13
	Manager	8
	Partner	1
	Total	22

4.2.2.2. Descriptive Statistics

In the third pilot, four treatment conditions were tested: (1) low time pressure/low litigation risk/low task complexity, (2) low time pressure/high litigation risk/high task complexity, (3) high time pressure/low litigation risk/low task complexity, and (4) high time pressure/ high litigation risk/high task complexity. These four treatments were chosen to provide the best indication of the effectiveness of the time pressure manipulation, and would make clear any potential

interaction problems between the time pressure manipulation and the task complexity manipulation. As in pilot II, initial observation of the data showed a large increase in the mean amount of the recommended adjustment indicating that providing the decision aid's advice had some effect on the auditors' judgment.

Table 4-7: Descriptive Statistics -- Pilot III

Treatment Condition*		LTP LLR LTC	LTP HLR HTC	HTP LLR LTC	HTP HLR HTC	All
Initial. Estimate	Min	\$ 650,000	\$ 700,000	\$ 650,000	\$ 650,000	\$ 650,000
	Max	720,000	725,000	720,000	710,000	725,000
	Mean	684,167	711,000	686,000	685,000	690,909
	Std Dev.	25,965	11,402	28,592	22,361	24,184
Initial. Recommend.	Min	\$ 50,000	\$ 35,000	\$ 25,000	\$ 15,000	\$ 15,000
	Max	110,000	80,000	50,000	20,000	110,000
	Mean	77,500	51,000	35,600	17,917	45,705
	Std Dev.	20,433	17,464	11,149	2,060	26,882
Final. Estimate	Min	\$ 700,000	\$ 750,000	\$ 720,000	\$ 890,000	\$ 700,000
	Max	750,000	790,000	760,000	950,000	950,000
	Mean	715,833	772,000	744,000	921,667	791,136
	Std Dev.	19,083	15,248	15,166	27,869	86,395
Final. Recommend.	Min	\$ 80,000	\$ 140,000	\$ 100,000	\$ 290,000	\$ 80,000
	Max	130,000	180,000	150,000	350,000	350,000
	Mean	98,333	162,000	129,000	321,667	180,682
	Std Dev.	19,408	16,808	19,494	27,869	93,469
Materiality Level	Min	\$ 485,000	\$ 500,000	\$ 500,000	\$ 500,000	\$ 485,000
	Max	535,000	600,000	550,000	600,000	600,000
	Mean	510,833	540,000	518,000	540,833	527,273
	Std Dev.	18,819	38,079	20,797	38,912	31,499

* LLR = Low litigation risk

HLR = High litigation risk

LTP = Low time pressure

HTP = High time pressure

LTC = Low task complexity

HTC = High task complexity

Despite the small size of the sample, the pattern of decision aid reliance was in the hypothesized direction. The results showed that reliance was highest in the high litigation risk/high task complexity condition (0.80) and lowest in the low litigation risk/low task complexity condition (0.06). Table 4-8 presents a summary of the decision aid reliance variable determined in pilot III.

Table 4-8: Decision Aid Reliance -- Pilot III

Treatment Condition*		LTP LLR LTC	LTP HLR HTC	HTP LLR LTC	HTP HLR HTC
Decision Aid Reliance	Mean	0.06	0.32	.026	0.80
	Std Dev.	0.05	0.05	0.07	0.07

DA Reliance = (Final Recommend - Initial Recommend)/(DA Recommend - Initial Recommend)

* LLR = Low litigation risk

HLR = High litigation risk

LTP = Low time pressure

HTP = High time pressure

LTC = Low task complexity

HTC = High task complexity

4.2.2.3 Manipulation Checks

The results of the third pilot test indicated an effective manipulation of the three independent variables. One manipulation check question asked participants about their perceived litigation risk. The overall mean (standard deviation) perceived litigation risk in the low litigation risk treatments was 2.10 (0.83). The overall mean (standard deviation) perceived litigation risk in the high litigation risk treatments was 7.98 (0.77). The significant difference between the means of the two treatments ($t = 17.249, p = 0.000$) indicates the successful manipulation of litigation risk.

Another manipulation check question asked participants how they felt about the complexity of the task. The overall mean (standard deviation) perceived task complexity in the low task complexity treatments was 3.62 (0.92). The overall mean perceived task complexity in the high task complexity treatments was 7.38 (0.67). The significant difference between the means of the two treatments ($t = 10.804, p = 0.000$) indicates the successful manipulation of task complexity.

As discussed in chapter 3, two time pressure manipulation check questions were asked. One question asked the participants how much time they were given to complete the task. All participants answered this question correctly. Therefore from an objective point of view, the time constraint manipulation was successful. However, the construct of interest here is subjective time pressure, not absolute time constraints. Therefore, another manipulation check question asked how the much pressure participants 'felt' about the time they had to complete the task. The overall mean perceived time pressure in the low time pressure treatments was 2.87 (1.25). The overall mean perceived time pressure in the high time pressure treatments was 8.18 (0.75). The significant difference between the means of the two treatments ($t = 12.197, p = 0.000$) indicates the successful manipulation of time pressure.

In addition to these tests, two separate ANOVAs were run to determine if there was an interaction between time pressure and task complexity. The results of the two ANOVAs verified the successful manipulation of the time pressure and task complexity variables showing no significant interaction between the two independent variables ($p = 1.000$). Therefore, the manipulation of all three variables was deemed successful. Tables 4-9 and 4-10 present a summary of the results of the manipulation check questions.

Table 4-9: Manipulation Check Group Means – Pilot III

Treatment Condition		Low	High	<i>t</i>	<i>p</i>
Perceived	Mean	2.10	7.98	17.294	0.000
Litigation Risk	Std Dev.	0.83	0.77		
Perceived	Mean	3.62	7.38	10.804	0.000
Task Complexity	Std Dev.	0.92	0.67		
Perceived	Mean	2.87	8.18	12.197	0.000
Time Pressure	Std Dev.	1.25	0.75		
Time Pressure	Number Missed	0	0		

Table 4-10: Manipulation Checks -- Pilot III

Treatment Condition*		LTP	LTP	HTP	HTP
		LLR	HLR	LLR	HLR
		LTC	HTC	LTC	HTC
Perceived	Mean	2.00	7.80	2.20	8.17
Litigation risk	Std Dev.	0.89	0.84	0.84	.075
Perceived	Mean	3.83	7.60	3.40	7.17
Task Complexity	Std Dev.	0.75	0.55	1.14	0.75
Perceived	Mean	2.67	3.00	8.00	8.33
Time Pressure	Std Dev.	1.03	1.58	0.71	0.82
Time Pressure	Number Missed	0	0	0	0

1 = Low * LLR = Low litigation risk HLR = High litigation risk
 9 = High LTP = Low time pressure HTP = High time pressure
 LTC = Low task complexity HTC = High task complexity

4.3 Results of the Main Experiment

4.3.1 Participant data

A total of 235 auditors, including seniors and managers from two of the Big 4 public accounting firms participated in the study. Participants were from various offices of these two firms located in five large cities in the United States. The mean (median) age range of the participants was 31 to 40 (31 to 35) years.

Table 4-11: Descriptive Statistics -- Experiment Participants

Gender	Male	89
	Female	146
	Total	235
Age	31 to 35	181
	36 to 40	51
	41 to 45	3
	Total	235
Years of Experience	Minimum	4
	Maximum	8
	Mean	5.11
	Standard Deviation	0.855
Position/Level	Senior	203
	Managers	32
	Total	235

4.3.2 Preliminary Data Analysis

The following two tables present descriptive statistics for the different treatment conditions and a summary of the experiment results.

Table 4-12: Mean (Standard Deviation) Responses – Main Experiment

Panel A: Low Time Pressure

Task Complexity	Litigation Risk		Main Task Complexity Effect
	Low	High	
Low	0.08 (0.04)	0.34 (0.10)	0.22 (0.15)
High	0.22 (0.10)	0.55 (0.17)	0.38 (0.20)
Main Litigation Risk Effect	0.15 (0.11)	0.45 (0.15)	

Panel B: High Time Pressure

Task Complexity	Litigation Risk		Main Task Complexity Effect
	Low	High	
Low	0.47 (0.12)	0.81 (0.08)	0.63 (0.22)
High	0.69 (0.10)	0.92 (0.12)	0.81 (0.16)
Main Litigation Risk Effect	0.58 (0.18)	0.87 (0.11)	

4.3.2.1 Manipulation Checks

The manipulation checks described in Section 3.9 test the ability of the participants to identify the three manipulated experimental factors: litigation risk, time pressure, and task complexity. The participants were asked about their perceptions of litigation risk, time pressure and task complexity. In addition, participants were asked about the amount of time given to complete the task.

The first manipulation check question tested participants' perceived litigation risk. It asked participants the extent to which the case audit might be a target of future litigation. The statement was worded as follows: "Should the audit fail to detect a material misstatement of the financial statements, the risk of being sued on this engagement is:" On a nine point Likert scale, where 1 was "Very Low Risk", 5 was "Moderate Risk" and 9 was "Very High Risk", participants' overall mean (standard deviation) for the low litigation risk and high litigation risk groups were 3.67 (0.603) and 8.69 (0.515), respectively (Table 4-14). The significant difference between the means of the two treatments ($t = 68.739$, $p = 0.000$) indicates the successful manipulation of litigation risk.

The second manipulation check question tested perceived task complexity. It asked participants the extent to which they felt the task was complex. The question was worded as follows: "For this client, how would you rate the complexity of the task of estimating the allowance for uncollectible accounts?" On a nine point Likert scale, where 1 was "Very Low Complexity", 5 was "Moderate Complexity" and 9 was "Very High Complexity", participants' overall mean (standard deviation) for the low task complexity and high task complexity groups were 3.43 (0.779) and 8.89 (0.309), respectively (Table 4-14). The significant difference between the means of the two treatments ($t = 69.3423$, $p = 0.000$) indicates the successful manipulation of task complexity.

Two manipulation check questions were asked for the time pressure manipulation. The first question was used to assess the time pressure manipulation from an objective perspective. The question was stated as follows: "How many minutes were you allowed to complete screens one and two?" None of the participants answered this question incorrectly. Therefore, the time constraint manipulation was considered successful from an objective point of view. However, the underlying construct of interest in the experiment is not necessarily time constraint, but more importantly perceived time pressure. In order to assess how participants subjectively felt about the amount of time given to perform the task, participants were asked "How do you feel about the time you had to complete the performance task?" On a nine point Likert scale, where 1 was "I felt a low level of time pressure", 5 was "I felt a moderate level of time pressure" and 9 was "I felt a high level of time pressure", participants' overall mean (standard deviation) for the low time pressure and high time pressure groups were 2.74 (0.494) and 8.83 (0.420) respectively (Table 4-14). The significant difference between the means of the two treatments ($t = 101.752$, $p = 0.000$) indicates the successful manipulation of time pressure.

Table 4-14: Manipulation Check Overall Group Means (Std Dev.) -- Main Experiment

Treatment Condition		Low	High	<i>t</i>	<i>p</i>
Perceived Litigation Risk	Mean	3.67	8.69	68.793	0.000
	Std Dev.	0.515	0.603		
Perceived Task Complexity	Mean	3.43	8.89	69.423	0.000
	Std Dev.	0.779	0.309		
Perceived Time Pressure	Mean	2.74	8.83	101.752	0.000
	Std Dev.	0.494	0.420		
Time Pressure Missed		0	0		

Tables 4-15 presents the means and standard deviations of the manipulation check questions presented in the post-task questionnaire for each of the eight treatment conditions:

Table 4-15: Manipulation Check Treatment Means (Std Dev.) -- Main Experiment

Treatment Condition*		LTP	LTP	LTP	LTP	HTP	HTP	HTP	HTP
		LLR	LLR	HLR	HLR	LLR	LLR	HLR	HLR
		LTC	HTC	LTC	HTC	LTC	HTC	LTC	HTC
Perceived Litigation Risk	Mean	3.56	3.80	8.69	3.64	3.67	8.71	8.63	8.74
	Std Dev.	0.70	0.41	0.54	0.56	0.71	0.53	0.55	0.44
Perceived Task Complexity	Mean	3.11	8.90	3.31	3.64	8.90	3.64	8.81	8.97
	Std Dev.	1.01	0.31	0.76	0.68	0.31	0.49	0.40	0.18
Perceived Time Pressure	Mean	2.74	2.70	2.72	8.86	8.83	8.82	8.81	2.81
	Std Dev.	0.45	0.60	0.45	0.36	0.46	0.48	0.40	0.48
Time Pressure Missed		0	0	0	0	0	0	0	0

* LLR = Low litigation risk

HLR = High litigation risk

LTP = Low time pressure

HTP = High time pressure

LTC = Low task complexity

HTC = High task complexity

4.3.2.2 Sample Equivalence between Treatments

A MANOVA analysis was conducted to determine if experience and age differ across treatment conditions. No significant differences in participants' experience or age across treatment conditions was found (MANOVA Wilkes Lambda $F = 0.982$, $p = 0.471$). Also, a chi-squared test of proportions was used to test whether gender differs across treatment conditions.² Gender did not significantly differ across treatment conditions ($\chi^2 = 0.508$, $df = 7$, $p = 0.999$).

² These analyses test the efficacy of the randomization procedure.

4.3.2.3 Covariates

Given that the participants in this study all have a high level of auditing experience, there was no reason to expect that 'experience' would be a significant covariate. Also, since the age range of the participants is expected to be quite small, there was no reason to anticipate that age would be a significant covariate. There was also no theoretical reason to expect that gender will be a significant covariate. However, risk propensity might be a significant covariate, since the relationship between litigation risk and decision aid reliance could be moderated by individual risk propensity. Accordingly, risk propensity was measured using a standard two-outcome lottery scenario in the same manner as Young (1985) and Hunton et al. (2003), as shown in Appendix C.

Regarding the covariates, the parametric assumption is that the covariate and the dependent variable are linearly related. This assumption was tested by visual observation of the scatter plot of the covariate and dependent variable, and by running a simple regression and examining the residuals. The results of examining the scatter plot and the regression residuals indicate a non-linear relationship between the participants' age, gender, experience or risk propensity and their decision aid reliance. Table 4-16 presents the regression results. Therefore, these variables will not be included as covariates in the analysis, as they violated the parametric assumption of linearity.

Table 4-16: Regression Results

Model	Unstandardized Coefficients	Standardized Coefficients	Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.577	.226		2.554	.011
Risk Propensity	-.001	.001	-.078	-1.175	.241
Gender	.003	.040	.004	.067	.947
Age	.004	.042	.007	.100	.920
Experience	.003	.023	.008	.124	.901

Dependent variable: Reliance

4.3.2.4 Assumption Testing

The following ANOVA³ assumptions of independence, normality and homogeneity must be examined. The independence assumption is met in this experiment, as participants were not allowed to interact with one another during the experiment. The normality assumption was tested using the Shapiro-Wilkes test. The test statistic indicated that the dependent variable was relatively normally

³ I recognize that one of the assumptions of ANOVA is interval scaling; however, I will not interpret the results under the assumption that the scales are interval scale; rather, I will interpret the results assuming that the scales are ordinal scale.

distributed in all groups, with the exception of the high time pressure/high task complexity/high litigation risk treatment (Shapiro-Wilkes Statistic = 0.876, $p = 0.002$). Further examination of histograms illustrating the frequency distributions for the dependent variable in each group indicated that the deviation from normality in that group was due to skewness of the data. Since ANOVA is robust to moderate violations of the normality assumption, as long as the violations are caused by skewness in the data and not the presence of outliers (Hair et al 1995; Box 1953), no further analysis of the departure of the data from normality was conducted.

The homogeneity assumption was examined by the Levene test. The test statistic indicated that the group variances are unequal ($F = 10.467$, $p = 0.002$). Further examination of the box plots and examination of the variance within each group indicated that the difference was due to a slightly smaller variance at the two extremes (the low time pressure/low task complexity/low litigation risk group and the high time pressure/high task complexity/high litigation risk group). However, ANOVA is robust to small and even moderate departures from homogeneity of variance as long as the group sizes are relatively equal (Box 1954), as is the case in the data gathered in this study. Therefore, an ANOVA will be used to test the hypotheses of the study. In addition non-parametric tests will be conducted to test the hypotheses and provide additional support for the results of the ANOVA. The appropriate non-parametric tests are the Mann-Whitney test for comparing two means and the Kruskal-Wallis test for comparing multiple means.

4.4 Hypotheses Testing

An ANOVA was used to test the statistical significance of differences among means. In addition, the Mann-Whitney test and the Kruskal-Wallis test were conducted to support the results obtained using the ANOVA. The results of the ANOVA indicated significant main effects on the three variables of interest and their three way interaction. The results of the ANOVA are presented in Table 4-17. The Kruskal-Wallis test indicated that the means of at least two of the treatment conditions were significantly different ($\chi^2 = 202.505$, $p = 0.000$).

The first hypothesis (H1) relates to the effects of time pressure on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when working under high, as compared to low, perceived time pressure to achieve audit efficiency. The ANOVA main effect indicated that perceived time pressure was significant ($p = 0.000$); that is, participants in the high time pressure treatment on average relied more on the decision aid (mean = 0.728, $\sigma = 0.2049$) than participants in the low time pressure condition (mean = 0.3059, $\sigma = 0.19815$). Further, a Mann-Whitney test indicated a significant difference between the two groups (Mann-Whitney $U = 1117$, $p = 0.000$). Therefore, H1 was supported.

Table 4-17: Tests of Between Subjects Effects

Dependent Variable: Reliance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	61.059	1	61.059	5111.498	.000
TP	10.528	1	10.528	881.369	.000
LR	4.933	1	4.933	412.936	.000
TC	1.716	1	1.716	143.641	.000
TP x LR	.002	1	.002	.128	.721
TP x TC	.001	1	.001	.117	.732
LR x TC	.006	1	.006	.489	.485
TP x LR x TC	.090	1	.090	7.562	.006
Error	2.712	227	.012		

TP = Time Pressure

TC = Task Complexity

LR = Litigation Risk

The second hypothesis (H2) deals with the effect of task complexity on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when they perceive the task complexity to be high, as compared to low, to accomplish audit effectiveness. The main effect from the ANOVA model indicated that perceived task complexity was significant ($p = 0.000$), indicating that participants in the high task complexity treatment on average relied more on the decision aid (mean = 0.601, $\sigma = 0.27549$) than participants in the low task complexity condition (mean = 0.4273, $\sigma = 0.28377$). In addition, a Mann-Whitney test indicated a significant difference between the two groups (Mann-Whitney $U = 4513.5$, $p = 0.000$). Accordingly, H2 was supported.

The third hypothesis (H3) relates to the effects of litigation risk on auditors' reliance on decision aids. It predicts that auditors will rely more on decision aids when they perceive litigation risk to be high, as compared to low, to gain audit effectiveness. The ANOVA main effect indicated that perceived litigation risk was significant ($p = 0.000$), suggesting that the group mean in the high litigation risk treatment (mean = 0.6592, $\sigma = 0.24772$) was greater than the low litigation risk condition (mean = 0.3710, $\sigma = 0.26136$). Further supporting the parametric result, a Mann-Whitney test indicated a significant difference between the two groups (Mann-Whitney $U = 2966.5$, $p = 0.000$). Hence, H3 was supported.

Table 4-18 presents the results of multiple pairwise comparisons, using the Bonferroni procedure. The purpose of this test is to compare all treatment means to each other, averaged over the time pressure conditions, while controlling for the overall experiment-wide error. These results will be helpful in determining which means are different from the others when analyzing the two-way interaction hypothesis (H4).

Table 4-18: Bonferroni Multiple Comparisons – Averaged Over Time Pressure Conditions

Dependent Variable: Reliance

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.17754*	.04486	.001	-.2969	-.0582
	3	-.29251*	.04542	.000	-.4134	-.1716
	4	-.46071*	.04434	.000	-.5787	-.3427
2	1	.17754*	.04486	.001	.0582	.2969
	3	-.11497	.04444	.062	-.2332	.0033
	4	-.28317*	.04335	.000	-.3985	-.1678
3	1	.29251*	.04542	.000	.1716	.4134
	2	.11497	.04444	.062	-.0033	.2332
	4	-.16820*	.04393	.001	-.2851	-.0513
4	1	.46071*	.04434	.000	.3427	.5787
	3	.28317*	.04335	.000	.1678	.3985
	2	.16820*	.04393	.001	.0513	.2851

* The mean difference is significant at the .05 level.

1 = Low Litigation Risk/Low Task Complexity

2 = Low Litigation Risk/High Task Complexity

3 = High Litigation Risk/Low Task Complexity

4 = High Litigation Risk/High Task Complexity

Hypothesis H4 deals with the potential interactive effect of litigation risk and task complexity. Specifically, hypothesis H4 predicts that decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low, and highest when either or both perceived task complexity and perceived litigation risk are high. A comparison of the four group means indicated that participants in the high task complexity/high litigation risk treatment relied more on the decision aid (mean = 0.7391, $\sigma = 0.21414$) than participants in the low task complexity/high litigation risk treatment (mean = 0.5709, $\sigma = 0.25399$), which relied more than participants in the high task complexity/low litigation risk treatment (mean = 0.4559, $\sigma = 0.2588$). The lowest level of reliance was in the low task complexity/low litigation risk treatment (mean = 0.2784, $\sigma = 0.23297$). The Bonferroni multiple pairwise comparison test (Table 4-18) indicated that all means were significantly different from each other at $p \leq 0.062$. In addition Mann-Whitney tests indicated significant differences between the groups ($p = 0.000$). The results of the ANOVA indicate that the interaction between litigation risk and task complexity is not significant ($p = 0.485$). Therefore, H4 is not supported, suggesting that the effects of the two factors are not multiplicative; rather, the effects are additive. Figure 4-1 illustrates the joint effect of the two variables.

Figure 4-1. Joint Effect of Litigation risk and Task Complexity

Table 4-19 presents the results of multiple pairwise comparisons, using the Bonferroni procedure, for all eight treatment means. The purpose of this test is to compare all means to each other, while controlling for the overall experiment-wide error. These results will be helpful in determining which means are different from the others when analyzing the three-way interaction hypotheses.

The final two hypotheses (H5a and H5b) predict possible joint effects among all three pressure sources, first holding time pressure low and then holding time pressure high. The ANOVA results presented in table 4-17 indicate a significant three-way interaction ($p = 0.006$). In order to further analyze and determine the nature of the interaction, two additional ANOVA models were run, one holding time pressure high and the second holding time pressure low. The results of the ANOVAs are presented in tables 4-19 and 4-20.

Table 4-19: Bonferroni Multiple Comparisons

Dependent Variable: Reliance

(I) Treatment	(J) Treatment	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.14675*	.02899	.000	-.2384	-.0551
	3	-.26600*	.02923	.000	-.3584	-.1736
	4	-.47133*	.02877	.000	-.5623	-.3804
	5	-.39467*	.02948	.000	-.4879	-.3015
	6	-.61017*	.02899	.000	-.7018	-.5185
	7	-.72899*	.02948	.000	-.8222	-.6358
	8	-.84599*	.02856	.000	-.9363	-.7557
2	1	.14675*	.02899	.000	.0551	.2384
	3	-.11925*	.02846	.001	-.2092	-.0293
	4	-.32457*	.02799	.000	-.4131	-.2361
	5	-.24792*	.02872	.000	-.3387	-.1571
	6	-.46342*	.02822	.000	-.5526	-.3742
	7	-.58224*	.02872	.000	-.6730	-.4915
	8	-.69924*	.02778	.000	-.7870	-.6114
3	1	.26600*	.02923	.000	.1736	.3584
	2	.11925*	.02846	.001	.0293	.2092
	4	-.20532*	.02824	.000	-.2946	-.1161
	5	-.12867*	.02896	.000	-.2202	-.0371
	6	-.34417*	.02846	.000	-.4341	-.2542
	7	-.46299*	.02896	.000	-.5545	-.3714
	8	-.57999*	.02802	.000	-.6686	-.4914
4	1	.47133*	.02877	.000	.3804	.5623
	2	.32457*	.02799	.000	.2361	.4131
	3	.20532*	.02824	.000	.1161	.2946
	5	.07665	.02849	.215	-.0134	.1667
	6	-.13885*	.02799	.000	-.2273	-.0504
	7	-.25766*	.02849	.000	-.3477	-.1676
	8	-.37466*	.02754	.000	-.4617	-.2876
5	1	.39467*	.02948	.000	.3015	.4879
	2	.24792*	.02872	.000	.1571	.3387
	3	.12867*	.02896	.000	.0371	.2202
	4	-.07665	.02849	.215	-.1667	.0134
	6	-.21550*	.02872	.000	-.3063	-.1247
	7	-.33431*	.02921	.000	-.4267	-.2420
	8	-.45131*	.02828	.000	-.5407	-.3619
6	1	.61017*	.02899	.000	.5185	.7018
	2	.46342*	.02822	.000	.3742	.5526
	3	.34417*	.02846	.000	.2542	.4341
	4	.13885*	.02799	.000	.0504	.2273
	5	.21550*	.02872	.000	.1247	.3063
	7	-.11882*	.02872	.001	-.2096	-.0280
	8	-.23582*	.02778	.000	-.3236	-.1480

7	1	.72899*	.02948	.000	.6358	.8222
	2	.58224*	.02872	.000	.4915	.6730
	3	.46299*	.02896	.000	.3714	.5545
	4	.25766*	.02849	.000	.1676	.3477
	5	.33431*	.02921	.000	.2420	.4267
	6	.11882*	.02872	.001	.0280	.2096
	8	-.11700*	.02828	.001	-.2064	-.0276
8	1	.84599*	.02856	.000	.7557	.9363
	2	.69924*	.02778	.000	.6114	.7870
	3	.57999*	.02802	.000	.4914	.6686
	4	.37466*	.02754	.000	.2876	.4617
	5	.45131*	.02828	.000	.3619	.5407
	6	.23582*	.02778	.000	.1480	.3236
	7	.11700*	.02828	.001	.0276	.2064

* The mean difference is significant at the .05 level.

1 = Low Time Pressure/Low Litigation Risk/Low Task Complexity

2 = Low Time Pressure/Low Litigation Risk/High Task Complexity

3 = Low Time Pressure/High Litigation Risk/Low Task Complexity

4 = Low Time Pressure/High Litigation Risk/High Task Complexity

5 = High Time Pressure/Low Litigation Risk/Low Task Complexity

6 = High Time Pressure/Low Litigation Risk/High Task Complexity

7 = High Time Pressure/High Litigation Risk/Low Task Complexity

8 = High Time Pressure/High Litigation Risk/High Task Complexity

Table 4-19: Tests of Between Subjects Effects Holding Time Pressure Low

Dependent Variable: Reliance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	10.397	1	10.397	1092.432	.000
LR	2.544	1	2.544	267.270	.000
TC	.904	1	.904	94.988	.000
LR x TC	.025	1	.025	2.629	.108
Error	2.712	113	.010		

TC = Task Complexity

LR = Litigation Risk

The results of the analysis holding time pressure low indicate that there is no significant interaction between litigation risk and task complexity ($p = 0.108$). Comparison of the group means indicated that participants in the high task complexity/ high litigation risk treatment relied more on the decision aid (mean = 0.548803, $\sigma = 0.122695$) than participants in the low task complexity/high litigation risk treatment (mean = 0.343479, $\sigma = 0.100576$), which relied more than participants in the high task complexity/low litigation risk treatment (mean = 0.224228, $\sigma = 0.1011$). The lowest level of reliance was in the low task complexity/low litigation risk treatment (mean = 0.077476, $\sigma = 0.041243$). A Bonferroni multiple pairwise comparison test (Table 4-18) indicated that the means were significantly different from each other ($p = 0.05$). In addition Mann-Whitney tests indicated significant differences between the groups ($p = 0.000$). Therefore, H5a was not supported, indicating that the effect of the two factors is additive.

Figure 4-2 illustrates the combined effect of these two factors holding time pressure low.

Figure 4-2. Joint Effect of Litigation Risk and Task Complexity Holding Time Pressure Low

Table 4-20: Tests of Between Subjects Effects Holding Time Pressure High

Dependent Variable: Reliance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	61.396	1	61.396	4277.836	.000
LR	2.390	1	2.390	166.517	.000
TC	.813	1	.813	56.636	.000
LR x TC	.071	1	.071	4.970	.028
Error	1.636	113	.014		

TC = Task Complexity
LR = Litigation Risk

The results of the analysis holding time pressure high indicate a significant interactive effect between litigation risk and task complexity ($p = 0.28$). The highest

level of reliance was in the high litigation risk/high task complexity treatment (mean = 0.923465, $\sigma = 0.076447$) and the lowest level of reliance was in the low litigation risk/low task complexity treatments (mean = 0.472151, $\sigma = 0.166162$), and they were significantly different (Table 4-18). Further, the significant interaction results show that the effect of the two factors is multiplicative. Therefore, H5b is supported. Figure 4-3 illustrates the interactive effect of these two factors, holding time pressure high. This result demonstrates an important contribution to the literature, as it suggests that the two 'effectiveness' factors examined in this study can result in an interaction, in the presence of a perceived time pressure motivation to be more efficient.

Figure 4-3. Interactive Effect of Litigation Risk and Task Complexity Holding Time Pressure High

4.4.1 Supplemental Analysis of H5b

In order to further analyze H5b, a contrast test was conducted. The purpose of this test was compare the difference between the means of the high litigation risk and low litigation risk conditions holding task complexity low ('A' in figure 4-3) to the difference between the means of the high litigation risk and low litigation risk treatments holding task complexity high ('B' in figure 4-3) in the high time pressure condition. The results of the test indicated a significant difference between

'A' and 'B' (Contrast Estimate = 0.33, $t = 7.53$, $p = 0.00$). Therefore, the effect of adding a third pressure inducer led to a higher level of decision aid reliance; however, the increase in reliance was comparatively marginal.

4.5 Conclusion

This chapter described the results of the experiment. First, it presented and explained the results of the pilot tests. It then presented the descriptive statistics of the participants of the experiment and the experiment data. The tests of the hypotheses set out in chapter 2 were also presented. Table 4-21 presents a summary of the hypotheses and the results.

Table 4-21: Summary of Hypotheses and Results

	Hypothesis	Dependent Variable	Independent Variable	Hyp. Support
H1	There will be a positive relationship between perceived time pressure and decision aid reliance.	RELIANCE	TIME PRESSURE	Yes
H2	There will be a positive relationship between perceived task complexity and decision aid reliance.	RELIANCE	TASK COMPLEXITY	Yes
H3	There will be a positive relationship between perceived litigation risk and decision aid reliance.	RELIANCE	LITIGATION RISK	Yes
H4	Decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.	RELIANCE	TASK COMPLEXITY, LITIGATION RISK	No
H5a	Holding time pressure low, decision aid reliance will be lowest when perceived task complexity and perceived litigation risk are low and highest when perceived task complexity and/or perceived litigation risk are/is high.	RELIANCE	TIME PRESSURE, TASK COMPLEXITY, LITIGATION RISK	No

H5b	Holding time pressure high, the same decision aid reliance pattern predicted in H5a will be attained; however, the pattern will be significantly higher due to the constant DA reliance motivator of time pressure.	RELIANCE	TIME PRESSURE, TASK COMPLEXITY, LITIGATION RISK	Yes
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CHAPTER 5

CONCLUSIONS, LIMITATIONS, FUTURE RESEARCH AND CONTRIBUTIONS

5.1 Introduction

This chapter summarizes the study and discusses some of the limitations of the experiment used to test the hypotheses of the study. This chapter also outlines the contributions of the study and discusses some future research ideas that can be used to extend this study.

5.2 Summary and Conclusions

It is generally argued that proper use of decision aids can improve decision accuracy, thus audit effectiveness (Benbasat and Nault 1990; Ashton 1992). Extant literature, however, shows that auditors are somewhat reluctant to rely on decision aids throughout the audit process (Pincus 1989; Rose 2002). Audit research in the area of decision aid reliance has mainly been limited to the effect of incentives, feedback, expertise, knowledge and justification (e.g., Ashton 1990; Boatsman et al. 1997; and Rose 2002). The current study furthers this line of research by examining the main and interactive effects of three additional factors that have received much attention in audit research, but little consideration in the auditing decision aid literature – litigation risk, time pressure and task complexity (e.g., Palmrose 1988; Dalton et al. 1994, 1997; Alderman and Deitrick 1982; Arnold et al. 1997; Bonner 1994; Kelly and Margheim 1990).

Time pressure can arise from budget constraints in an audit environment. Several studies have indicated that when auditors work under excessive time pressure, audit performance can deteriorate (e.g., Alderman and Deitrick 1982; Arnold et al. 1997). When time is a constraint, decision aids can enhance the efficiency, and some would argue the effectiveness, of auditors' decision-making processes, especially in highly structured environments.

Another important factor in the decision aid reliance equation is audit task complexity. Many audit tasks are highly complex and the intricacy of such tasks can have a major impact on audit judgments (Bonner 1994; Libby 1985). The use of decision aids in the decision making process can help improve judgment quality when task complexity increases.

Audit litigation risk is the third decision aid reliance factor examined in this study. The seriousness of the problem is evident by the increasing number of lawsuits filed against audit firms (St. Pierre and Anderson 1984; Palmrose 1988; and Stice 1991), which serves to heighten auditors awareness that they need to pay a great deal of attention to audit quality. When faced with a high risk of litigation, the use of a decision aid can improve audit effectiveness and help auditors justify their judgment decisions should a lawsuit be filed (Lowe and Reckers 2002).

Despite potential improvement in decision accuracy provided by the use of decision aids, current practices show that auditors rely more on their judgment than on decision aids in the different stages of the auditing process (Pincus 1989; Rose 2002). Existing empirical research provides little explanation for such behavior. The current study proposes that under-reliance might be explained by a lack of sufficient exogenous pressure, and argues that client litigation risk has become so dominate and costly in the U.S. that auditors are now more consciously aware than ever of the benefits of decision aids.

The objective of this study is to investigate the effects of time pressure, task complexity and litigation risk on auditors' reliance on decision aids. Six hypotheses were developed in this study linking each of these factors to decision aid reliance. A 2 x 2 x 2 between subjects design was used to test the hypotheses of the study using experimental research methodology. The following three independent variables were manipulated in this experiment: time pressure (high, low), task complexity (high, low) and litigation risk (high, low). The dependent variable reflects the level of auditor's reliance on a decision aid. The results of this study show a positive relationship between perceived time pressure, perceived task complexity and perceived litigation risk and auditors' reliance on a decision aid. These results confirm the findings of prior studies examining the effects of task complexity on decision aid reliance, and further explain auditors' decision aid reliance behavior when faced with time pressure or litigation risk.

Regarding perceived time pressure, study evidence suggests that auditors will tend to rely more on decision aids in their decision making process when working under time pressure. Prior decision aid research documents that using decision aids when making decisions under time pressure does not only improve the accuracy of decisions, but also enhances the efficiency of the decision making process (Kumar 1997; Smith et al. 1998; Chu and Spiers 2003; and Arnold et al 2000). Therefore, given the importance of decisions made by auditors, these results are expected as auditors will tend to rely more on decision aids to improve the efficiency of their judgment decisions.

The positive relationship between litigation risk and auditors' decision aid reliance behavior was also expected, however, to a lesser degree. The presence of a decision aid in and of itself creates litigation risk. When a law suit is filed, a judge or jury may consider adherence to a decision aid (structured guidance) as a positive signal of the auditor's due diligence and responsibility (Jennings et al. 1993). However, if an auditor relies on possibly incorrect output of a decision aid, the potential liability would, under normal circumstances, fall on the auditor, placing

additional pressure on the auditor to prevent and detect decision errors when using a decision aid (Sutton et al 1995). Thus, the legal liability that results from audit decision aids creates a 'catch-22' situation where there is litigation risk to using a decision aid, a risk in not using it, a risk in not following its output, and a risk in not overruling its output and exhibiting professional due care (Sutton et al 1995).

Prior research studying the effects of decision consequences on a user's level of reliance on decision aids document a positive relationship between decision consequences and decision aid reliance (e.g. Arkes et al 1986; and Boatman et al 1997). In an auditing engagement, an auditor's judgment decisions are important. When faced with a high risk of litigation, the consequences of making incorrect decisions increases. Therefore, in this situation, auditors need to make decisions that are accurate and defensible. Evidence gathered from this study suggests that when faced with high perceived litigation risk, auditors are expected to rely more on a decision aid, seeking the decision aid's benefits of consistency and effectiveness, to be in a better position to defend themselves if faced with litigation.

The study also finds that the combination of any of these factors led to higher levels of reliance. These results, however, contradict the findings of Ashton (1990) who showed that increasing pressure to improve performance lead to decreased reliance on a decision aid. However, some have argued that the results obtained in his study can be partially explained by the tournament-style incentive scheme used and the low face validity (50%) of the decision aid he used in his experiments (Heiman 1990b). In response to the methodological criticisms levied on the Ashton studies, the current experiment used a fixed incentive system and a decision aid with relatively high face validity (80%).

The current study further suggests that the effects of combining the three factors were not additive in all combinations. Specifically whether litigation risk and task complexity interacted depended on the level of time pressure the auditors faced. When working under high time pressure, the presence of litigation risk and a highly complex task resulted in an interaction between these two factors. Additional analysis showed that adding any one of the three pressure inducers (i.e., high time pressure, litigation risk or task complexity) leads to an interaction between the remaining two. These results can be partially explained using marginal utility theory.

Marginal utility reflects the additional subjective utility (measured in terms of satisfaction or benefit) an individual receives from one more unit of a commodity or service (Perloff 2001). Economic theory suggests that there is an inflection point after which a one unit increase in the commodity or service will yield lower subjective utility than earlier units (diminishing marginal utility). After a while, continued exposure to multiple units of the commodity or service can result in an asymptotic marginal utility curve or the curve can even turn negative.

For example, consider the case of a very hungry individual at a buffet-style restaurant. The first plate of food the individual eats satisfies his/her hunger quite well. The second plate of food also begets a similar level of hunger satiation. In this case, the "hunger effect" of each of the two plates of food is equivalent or additive.

The third plate of food also satisfies his/her hunger, but to a lesser extent than the first two. At this point, the individual is experiencing marginal diminishing returns from eating food. If the individual ate a fourth or fifth plate of food, he/she would likely become over-satiated and perhaps sick, thereby leading to dissatisfaction and a drop in total utility.

Extending this logic to the decision aid reliance effects found in the current study leads to the following line of reasoning. Regardless of which single pressure inducer was present, auditors relied to some extent on the decision aid. Participants who were exposed to any combination of two pressure inducers displayed an equivalent degree of reliance (utility) on each, thereby accounting for the observed additive effect of any pair of the three pressure inducers. Adding a third pressure inducer to rely on the decision aid also triggered increased reliance, but at a diminishing rate than the first two. It is the marginal utility of the third factor that explains the H5b results obtained in the current study. This finding suggests several avenues for future research in this area, as articulated below.

5.3 Limitations of the Study

This study is subject to some limitations. As in any controlled experiment, the experimental environment and the audit tasks might not fully reflect real life conditions. This necessary experimental restriction can affect generalizability of the results beyond the experimental setting. However, the main and interactive effects of litigation risk, time pressure, and task complexity on decision aid reliance allows us to draw causal inferences to other settings, times and participants through theory.

In addition, the experiment examined reliance on a decision aid during one phase of the audit using a single level of reliability (80%). However, there are several types of decision aids used at different stages of the audit. Therefore, these reliance results might not generalize to decision aids designed for other decision phases or with higher or lower levels of reliability.

5.4 Contributions of the Study and Future Research

The importance of this study stems from the need to understand the effects of *pressure inducers* created by time pressure, task complexity and litigation risk on auditors' decisions to incorporate the advice of a decision aid into their decision making processes, and in-turn, on audit judgment. Study findings are particularly important in light of the increased litigation cost in the auditing industry. Although some research has examined the effect of time pressure and task complexity on auditors' use of decision aids, this study is the first to investigate the effect of litigation risk and the joint effect of these sources of pressure on the level of auditors' reliance on decision aids.

Findings from this study can help provide further explanation of auditors' behaviors with respect to reliance on decision aids and open the door for other future research in this area. Future research might replicate the current study using different measures of auditor's reliance on decision aids. This study limits the manipulation of independent variables to two levels (high and low); other studies might try to examine the hypothesized relationships using more than two levels of litigation risk and time pressure. Another interesting area of future research relates to the interaction effect found in this study. For instance, does the observed marginal utility effect indicate that any two endogenous and/or exogenous pressure inducers are sufficient to gain optimal value from the decision aid, could the results obtained herein be methodologically driven by the nature of the manipulated pressures, and/or is the marginal utility effect confounded with the face validity of the decision aid? These and related questions could lead to an entire program of research in this area. Finally, although this study theoretically infers the motivation for relying on a decision aid (to improve audit effectiveness or efficiency), future studies could delve more deeply into such motivation.

APPENDIX A

GENERAL INSTRUCTIONS

Audit Judgment and Decision Making

This questionnaire is part of a study designed to investigate various factors that affect auditors' judgment and decision making during an audit engagement. Your participation in this study is very valuable and we appreciate your involvement. Please read the following case materials and answer all questions carefully in the order presented. There are no right or wrong answers to the questions, as they are a matter of professional judgment. Thus, please respond to the questions openly and candidly.

Your individual responses will not be reported; rather, only aggregated responses of all participants will be revealed. All information obtained in this study is strictly confidential.

Your decision to participate in this research study is completely voluntary. You are free to participate in this study or to withdraw at any time. If you decide to withdraw, any information you provide up to that point will be deleted.

Thank you for your help.

☐ I Decline to Participate in this Study.

☐ I Agree to Participate in this Study.

High Time Pressure/Low Task Complexity Treatments

The following questionnaire consists of three parts.

Part 1: On screen one, you will be provided with financial information about a manufacturing company. Your task will be to examine the information and answer four questions related to the company.

Part 2: On screen two, you will be provided with additional information followed by four more questions.

You will be given 13 minutes to complete screen one and screen two.

Part 3: On screen three, you will be asked to complete some general questions.

Begin Screen 1

High Time Pressure/High Task Complexity Treatments

The following questionnaire consists of three parts.

Part 1: On screen one, you will be provided with financial information about a manufacturing company. Your task will be to examine the information and answer four questions related to the company.

Part 2: On screen two, you will be provided with additional information followed by four more questions.

You will be given 16 minutes to complete screen one and screen two.

Part 3: On screen three, you will be asked to complete some general questions.

Begin Screen 1

Low Time Pressure/Low Task Complexity Treatments

The following questionnaire consists of three parts.

Part 1: On screen one, you will be provided with financial information about a manufacturing company. Your task will be to examine the information and answer four questions related to the company.

Part 2: On screen two, you will be provided with additional information followed by four more questions.

You will be given 18 minutes to complete screen one and screen two.

Part 3: On screen three, you will be asked to complete some general questions.

Begin Screen 1

Low Time Pressure/High Task Complexity Treatments

The following questionnaire consists of three parts.

Part 1: On screen one, you will be provided with financial information about a manufacturing company. Your task will be to examine the information and answer four questions related to the company.

Part 2: On screen two, you will be provided with additional information followed by four more questions.

You will be given 23 minutes to complete screen one and screen two.

Part 3: On screen three, you will be asked to complete some general questions.

Begin Screen 1

APPENDIX B

CASES PRESENTED TO THE EIGHT TREATMENT CONDITIONS

Low Litigation Risk/Low Task Complexity Treatments

Screen1	Time left to complete Screen 1 and Screen 2	17:37
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Amalgamated Manufacturing, Incorporated

Amalgamated Manufacturing, Incorporated (AMI) is a manufacturing corporation that is involved in producing and selling high tech equipment. Your CPA firm is engaged to audit the financial statements of the company for the current year, 2004.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very low should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 5%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 10%. If the suit is successful, the fine and penalties imposed on your firm would be extremely low.

AMI's key ratios for the current and preceding years are as follows:

<u>Ratio</u>	<u>Preceding Year</u>	<u>Current Year</u>
Current ratio	2.19	1.69
Quick ratio	1.07	0.72
Cash ratio	0.35	0.24
Operating cash flow ratio	0.74	0.30
Debt-to-equity ratio	0.45	0.71

AMI's Summary Balance Sheet and Summary Income Statement are as follows:

Amalgamated Manufacturing, Incorporated Summary Balance Sheet As of December 31st 2004

ASSETS

Cash, cash equivalents, and investments in marketable debt securities.....		\$ 7,525,300
Accounts receivable, gross.....	15,500,000	
Less: Allowance for uncollectible accounts.....	<u>(600,000)</u>	14,900,000
Materials inventory.....		14,355,250
Finished goods inventory.....		16,050,330
Property, plant and equipment, net.....		119,954,370
Intangible assets, net.....		4,504,005
Other assets, net.....		<u>4,159,951</u>
Total assets.....		<u>\$181,449,206</u>

LIABILITIES AND OWNERS' EQUITY

Liabilities:		
Accounts payable.....		\$ 31,146,250
Long term liabilities.....		<u>44,192,310</u>
Total liabilities.....		<u>\$ 75,338,560</u>
Stockholders' equity.....		<u>106,110,646</u>
Total liabilities and stockholders' equity.....		<u>\$181,449,206</u>

Screen 1	Time left to complete Screen 1 and Screen 2 16:32
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Amalgamated Manufacturing, Incorporated
Summary Income Statement
For the year ended December 31st 2004

Sales.....	\$ 32,993,606
Less cost of goods sold	19,736,302
Gross margin.....	13,257,304
Less operating expenses:	
Selling and administrative expenses.....	39,927,017
Income from operations.....	9,330,023
Other revenues and expenses.....	830,287
Net income.....	\$ 8,500,000

Management estimates the allowance for uncollectible accounts to be \$600,000, which is calculated as follows:

Age of Accounts Receivable Schedule for 2004				
	0 – 30 Days	31 – 60 Days	61 – 90 Days	Over 90 Days
Account Receivable	\$10,000,000	\$3,000,000	\$2,000,000	\$500,000
Est. \$ of Uncollectible	\$30,000	\$150,000	\$200,000	\$200,000
Est. Percent Uncollectible	0.3%	5%	10%	40%

Management and the audit committee of the board of directors at AMI believe that the amount of \$600,000 fairly represents the expected amount of uncollectible accounts as of December 31st, 2004. Both management and the audit committee are reluctant to change the allowance amount.

You have gathered the following information pertaining to AMI's accounts receivable and actual write-offs for the preceding five years:

Age of Accounts Receivable Schedule for 1999				
	0 – 30 Days	31 – 60 Days	61 – 90 Days	Over 90 Days
Account Receivable	\$9,032,238	\$2,709,677	\$1,806,452	\$451,613
Actual Write-off	\$64,000	\$96,000	\$128,000	\$160,000
Percent	0.7%	3.5%	7.1%	35.4%

Age of Accounts Receivable Schedule for 2000				
	0 – 30 Days	31 – 60 Days	61 – 90 Days	Over 90 Days
Account Receivable	\$9,354,839	\$2,806,452	\$1,870,968	\$467,742
Actual Write-off	\$71,714	\$107,571	\$143,429	\$179,286
Percent	0.8%	3.8%	7.7%	38.3%

Age of Accounts Receivable Schedule for 2001				
	0 – 30 Days	31 – 60 Days	61 – 90 Days	Over 90 Days
Account Receivable	\$9,612,903	\$2,883,871	\$1,922,581	\$480,643
Actual Write-off	\$79,000	\$118,500	\$138,000	\$197,500
Percent	0.8%	4.1%	8.2%	41.1%

High Litigation Risk/High Task Complexity Treatments

Screen1	Time left to complete Screen 1 and Screen 2	22:39
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Amalgamated Manufacturing, Incorporated

Amalgamated Manufacturing, Incorporated (AMI) is a manufacturing corporation that is involved in producing and selling high tech equipment. Your CPA firm is engaged to audit the financial statements of the company for the current year, 2004.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very high should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 95%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 90%. If the suit is successful, the fine and penalties imposed on your firm would be extremely high.

AMI's key ratios for the current year (2004) are as follows: current ratio 1.69; quick ratio 0.72; cash ratio 0.24; operating cash flow ratio 0.30; and debt-to-equity ratio 0.71. Key ratios for the preceding year (2003) are as follows: current ratio 2.19; quick ratio 1.07; cash ratio 0.35; operating cash flow ratio 0.74; and debt-to-equity ratio 0.45.

AMI's Summary Balance Sheet and Summary Income Statement are as follows:

Amalgamated Manufacturing, Incorporated
Summary Balance Sheet
As of December 31st 2004

ASSETS

Cash, cash equivalents, and investments in marketable debt securities		\$ 7,525,300
Accounts receivable, gross	15,500,000	
Less: Allowance for uncollectible accounts	<u>(600,000)</u>	14,900,000
Materials inventory		14,355,250
Finished goods inventory		16,050,330
Property, plant and equipment, net		119,954,370
Intangible assets, net		4,504,005
Other assets, net		<u>4,159,951</u>
Total assets		<u>\$181,449,206</u>

LIABILITIES AND OWNERS' EQUITY

Liabilities:		
Accounts payable		\$ 31,146,250
Long term liabilities		<u>44,192,310</u>
Total liabilities		<u>\$ 75,338,560</u>
Stockholders' equity		<u>106,110,646</u>
Total liabilities and stockholders' equity		<u>\$181,449,206</u>

Cases Presented to the Eight Treatment Conditions

Screen1

Time left to complete Screen 1 and Screen 2 21:17

Amalgamated Manufacturing, Incorporated Summary Income Statement For the year ended December 31st 2004

Sales.....	\$ 32,993,606
Less cost of goods sold.....	19,736,302
Gross margin.....	13,257,304
Less operating expenses:	
Selling and administrative expenses.....	39,927,017
Income from operations.....	9,330,023
Other revenues and expenses.....	830,287
Net income.....	<u>\$ 8,500,000</u>

Management estimates the allowance for uncollectible accounts to be \$600,000, which is calculated as follows:

Age of Accounts Receivable Schedule for 2004					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$10,000,000	\$3,000,000	\$2,000,000	\$500,000	\$15,500,000
Est. \$ of Uncollectible	\$50,000	\$150,000	\$200,000	\$200,000	\$600,000
Est. Percent Uncollectible	0.5%	5%	10%	40%	3.9%

Management and the audit committee of the board of directors at AMI believe that the amount of \$600,000 fairly represents the expected amount of uncollectible accounts as of December 31st, 2004. Both management and the audit committee are reluctant to change the allowance amount.

You have gathered the following information pertaining to AMI's accounts receivable and actual write-offs for the preceding five years:

Aging of accounts receivable for 1999: 0 - 30 days \$9,032,258; 31 - 60 days \$2,709,677; 61 - 90 day \$1,806,452; over 90 days \$451,613. Actual write-offs for the same period were: 0 - 30 days \$64,000; 31 - 60 days \$96,000; 61 - 90 day \$128,000; over 90 days \$160,000.

Aging of accounts receivable for 2000: 0 - 30 days \$9,354,839; 31 - 60 days \$2,806,452; 61 - 90 day \$1,870,968; over 90 days \$467,742. Actual write-offs for the same period were: 0 - 30 days \$71,714; 31 - 60 days \$107,571; 61 - 90 day \$143,429; over 90 days \$179,286.

Appendix B

Screen 1	Time left to complete Screen 1 and Screen 2	20:22
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Aging of accounts receivable for 2001: 0 – 30 days \$9,612,903; 31 – 60 days \$2,883,871; 61 – 90 day \$1,922,581; over 90 days \$480,645. Actual write-offs for the same period were: 0 – 30 days \$79,000; 31 – 60 days \$118,500; 61 – 90 day \$158,000; over 90 days \$197,500.

Aging of accounts receivable for 2002: 0 – 30 days \$9,741,935; 31 – 60 days \$2,922,581; 61 – 90 day \$1,948,387; over 90 days \$487,097. Actual write-offs for the same period were: 0 – 30 days \$85,429; 31 – 60 days \$128,143; 61 – 90 day \$170,857; over 90 days \$213,571.

Aging of accounts receivable for 2003: 0 – 30 days \$9,870,968; 31 – 60 days \$2,961,290; 61 – 90 day \$1,974,194; over 90 days \$493,548. Actual write-offs for the same period were: 0 – 30 days \$92,429; 31 – 60 days \$138,643; 61 – 90 day \$184,857; over 90 days \$231,071.

1. What is your estimate of the allowance for uncollectible accounts as of December 31st, 2004?

2. How much confidence do you have in your estimate of the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Confidence		Moderate Confidence				Very High Confidence		

3. What is the difference between your estimate and management's estimate of the allowance for uncollectible accounts?

4. How much of the difference (above), if any, would you recommend to management as an adjustment to the financial statements?

(Once you move on to the next screen you cannot return to this screen)

Low Litigation Risk/High Task Complexity Treatments

Screen 1

Time left to complete Screen 1 and Screen 2 14:45

Amalgamated Manufacturing, Incorporated

Amalgamated Manufacturing, Incorporated (AMI) is a manufacturing corporation that is involved in producing and selling high tech equipment. Your CPA firm is engaged to audit the financial statements of the company for the current year, 2004.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very low should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 5%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 10%. If the suit is successful, the fine and penalties imposed on your firm would be extremely low.

AMI's key ratios for the current year (2004) are as follows: current ratio 1.69; quick ratio 0.72; cash ratio 0.24; operating cash flow ratio 0.30; and debt-to-equity ratio 0.71. Key ratios for the preceding year (2003) are as follows: current ratio 2.19; quick ratio 1.07; cash ratio 0.35; operating cash flow ratio 0.74; and debt-to-equity ratio 0.45.

AMI's Summary Balance Sheet and Summary Income Statement are as follows:

Amalgamated Manufacturing, Incorporated Summary Balance Sheet As of December 31st 2004

ASSETS

Cash, cash equivalents, and investments in marketable debt securities.....		\$ 7,525,300
Accounts receivable, gross.....	15,500,000	
Less: Allowance for uncollectible accounts.....	<u>(600,000)</u>	14,900,000
Materials inventory.....		14,355,250
Finished goods inventory.....		16,050,330
Property, plant and equipment, net.....		119,954,370
Intangible assets, net.....		4,504,005
Other assets, net.....		<u>4,159,951</u>
Total assets.....		<u>\$181,449,206</u>

LIABILITIES AND OWNERS' EQUITY

Liabilities:		
Accounts payable.....		\$ 31,146,250
Long term liabilities.....		<u>44,192,310</u>
Total liabilities.....		<u>\$ 75,338,560</u>
Stockholders' equity.....		<u>106,110,646</u>
Total liabilities and stockholders' equity.....		<u>\$181,449,206</u>

Screen 1	Time left to complete Screen 1 and Screen 2	13:36
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Amalgamated Manufacturing, Incorporated
Summary Income Statement
For the year ended December 31st 2004

Sales.....	\$ 32,993,606
Less cost of goods sold.....	<u>19,736,302</u>
Gross margin.....	13,257,304
Less operating expenses:	
Selling and administrative expenses.....	<u>39,927,017</u>
Income from operations.....	9,330,023
Other revenues and expenses.....	<u>830,287</u>
Net income.....	<u>\$ 8,500,000</u>

Management estimates the allowance for uncollectible accounts to be \$600,000, which is calculated as follows:

	Age of Accounts Receivable Schedule for 2004				Total
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	
Account Receivable	\$10,000,000	\$3,000,000	\$2,000,000	\$500,000	\$15,500,000
Est. \$ of Uncollectible	\$50,000	\$150,000	\$200,000	\$200,000	\$600,000
Est. Percent Uncollectible	0.5%	5%	10%	40%	3.9%

Management and the audit committee of the board of directors at AMI believe that the amount of \$600,000 fairly represents the expected amount of uncollectible accounts as of December 31st, 2004. Both management and the audit committee are reluctant to change the allowance amount.

You have gathered the following information pertaining to AMI's accounts receivable and actual write-offs for the preceding five years:

Aging of accounts receivable for 1999: 0 - 30 days \$9,032,258; 31 - 60 days \$2,709,677; 61 - 90 day \$1,806,452; over 90 days \$451,613. Actual write-offs for the same period were: 0 - 30 days \$64,000; 31 - 60 days \$96,000; 61 - 90 day \$128,000; over 90 days \$160,000.

Aging of accounts receivable for 2000: 0 - 30 days \$9,354,839; 31 - 60 days \$2,806,452; 61 - 90 day \$1,870,968; over 90 days \$467,742. Actual write-offs for the same period were: 0 - 30 days \$71,714; 31 - 60 days \$107,571; 61 - 90 day \$143,429; over 90 days \$179,286.

Cases Presented to the Eight Treatment Conditions

Screen 1	Time left to complete Screen 1 and Screen 2	07:55
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Aging of accounts receivable for 2001: 0 – 30 days \$9,612,903; 31 – 60 days \$2,883,871; 61 – 90 day \$1,922,581; over 90 days \$480,645. Actual write-offs for the same period were: 0 – 30 days \$79,000; 31 – 60 days \$118,500; 61 – 90 day \$158,000; over 90 days \$197,500.

Aging of accounts receivable for 2002: 0 – 30 days \$9,741,935; 31 – 60 days \$2,922,581; 61 – 90 day \$1,948,387; over 90 days \$487,097. Actual write-offs for the same period were: 0 – 30 days \$85,429; 31 – 60 days \$128,143; 61 – 90 day \$170,857; over 90 days \$213,571.

Aging of accounts receivable for 2003: 0 – 30 days \$9,870,968; 31 – 60 days \$2,961,290; 61 – 90 day \$1,974,194; over 90 days \$493,548. Actual write-offs for the same period were: 0 – 30 days \$92,429; 31 – 60 days \$138,643; 61 – 90 day \$184,857; over 90 days \$231,071.

1. What is your estimate of the allowance for uncollectible accounts as of December 31st, 2004?

2. How much confidence do you have in your estimate of the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Confidence			Moderate Confidence			Very High Confidence		

3. What is the difference between your estimate and management's estimate of the allowance for uncollectible accounts?

4. How much of the difference (above), if any, would you recommend to management as an adjustment to the financial statements?

High Litigation Risk/Low Task Complexity Treatments

Screen 1	Time left to complete Screen 1 and Screen 2	12:42
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Amalgamated Manufacturing, Incorporated

Amalgamated Manufacturing, Incorporated (AMI) is a manufacturing corporation that is involved in producing and selling high tech equipment. Your CPA firm is engaged to audit the financial statements of the company for the current year, 2004.

Your legal department has indicated to you that the risk of your CPA firm being sued as a result of this engagement is very high should the financial statements be materially misstated. Specifically, your legal department has evaluated the likelihood of being sued at 95%. If your firm is sued, the likelihood of the plaintiffs winning the suit is 90%. If the suit is successful, the fine and penalties imposed on your firm would be extremely high.

AMI's key ratios for the current and preceding years are as follows:

<u>Ratio</u>	<u>Preceding Year</u>	<u>Current Year</u>
Current ratio	2.19	1.69
Quick ratio	1.07	0.72
Cash ratio	0.35	0.24
Operating cash flow ratio	0.74	0.30
Debt-to-equity ratio	0.45	0.71

AMI's Summary Balance Sheet and Summary Income Statement are as follows:

Amalgamated Manufacturing, Incorporated
Summary Balance Sheet
As of December 31st 2004

ASSETS

Cash, cash equivalents, and investments		
in marketable debt securities.....		\$ 7,525,300
Accounts receivable, gross.....	15,500,000	
Less: Allowance for uncollectible accounts.....	<u>(600,000)</u>	14,900,000
Materials inventory.....		14,355,250
Finished goods inventory.....		16,050,330
Property, plant and equipment, net.....		119,954,370
Intangible assets, net.....		4,504,005
Other assets, net.....		<u>4,159,951</u>
Total assets.....		<u>\$181,449,206</u>

LIABILITIES AND OWNERS' EQUITY

Liabilities:		
Accounts payable.....		\$ 31,146,250
Long term liabilities.....		<u>44,192,310</u>
Total liabilities.....		<u>\$ 75,338,560</u>
Stockholders' equity.....		<u>106,110,646</u>
Total liabilities and stockholders' equity.....		<u>\$181,449,206</u>

Cases Presented to the Eight Treatment Conditions

Screen 1

Time left to complete Screen 1 and Screen 2 08:45

Amalgamated Manufacturing, Incorporated Summary Income Statement For the year ended December 31st 2004

Sales.....	\$ 32,993,606
Less cost of goods sold.....	<u>19,736,302</u>
Gross margin.....	13,257,304
Less operating expenses:	
Selling and administrative expenses.....	<u>39,927,017</u>
Income from operations.....	9,330,023
Other revenues and expenses.....	<u>830,287</u>
Net income.....	<u>\$ 8,500,000</u>

Management estimates the allowance for uncollectible accounts to be \$600,000, which is calculated as follows:

Age of Accounts Receivable Schedule for 2004					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$10,000,000	\$3,000,000	\$2,000,000	\$500,000	\$15,500,000
Est. \$ of Uncollectible	\$50,000	\$150,000	\$200,000	\$200,000	\$600,000
Est. Percent Uncollectible	0.5%	5%	10%	40%	3.9%

Management and the audit committee of the board of directors at AMI believe that the amount of \$600,000 fairly represents the expected amount of uncollectible accounts as of December 31st, 2004. Both management and the audit committee are reluctant to change the allowance amount.

You have gathered the following information pertaining to AMI's accounts receivable and actual write-offs for the preceding five years:

Age of Accounts Receivable Schedule for 1999					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,032,258	\$2,709,677	\$1,806,452	\$451,613	\$14,000,000
Actual Write-off	\$64,000	\$96,000	\$128,000	\$160,000	\$448,000
Percent	0.7%	3.5%	7.1%	35.4%	3.2%

Age of Accounts Receivable Schedule for 2000					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,354,839	\$2,806,452	\$1,870,968	\$467,742	\$14,500,000
Actual Write-off	\$71,714	\$107,571	\$143,429	\$179,286	\$502,000
Percent	0.8%	3.8%	7.7%	38.3%	3.5%

Age of Accounts Receivable Schedule for 2001					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,612,903	\$2,883,871	\$1,922,581	\$480,645	\$14,900,000
Actual Write-off	\$79,000	\$118,500	\$158,000	\$197,500	\$553,000
Percent	0.8%	4.1%	8.2%	41.1%	3.7%

Screen1	Time left to complete Screen 1 and Screen 2	07:47
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Age of Accounts Receivable Schedule for 2002					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,741,933	\$2,922,581	\$1,948,387	\$487,097	\$15,100,000
Actual Write-off	\$85,429	\$128,143	\$170,857	\$213,571	\$598,000
Percent	0.9%	4.4%	8.8%	43.8%	40%

Age of Accounts Receivable Schedule for 2003					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,870,968	\$2,961,290	\$1,974,194	\$493,548	\$15,300,000
Actual Write-off	\$92,429	\$138,643	\$184,857	\$231,071	\$647,000
Percent	0.9%	4.7%	9.4%	46.8%	4.2%

- What is your estimate of the allowance for uncollectible accounts as of December 31st, 2004?
- How much confidence do you have in your estimate of the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Confidence			Moderate Confidence			Very High Confidence		
- What is the difference between your estimate and management's estimate of the allowance for uncollectible accounts?
- How much of the difference (above), if any, would you recommend to management as an adjustment to the financial statements?

(Once you move on to the next screen you cannot return to this screen)

APPENDIX C

DECISION AID PRESENTED TO ALL TREATMENTS

Screen 2

Time left to complete Screen 1 and Screen 2 04:21

Amalgamated Manufacturing, Incorporated

Your firm has provided you with a computerized decision aid to assist you during the audit of AMI. The output of the decision aid is intended to be advisory only, as the ultimate decision regarding the estimate of the allowance for uncollectible accounts is your judgment call.

In addition to analyzing AMI's historical financial records, the decision aid incorporates current economic conditions in its estimate of uncollectible accounts. In the past, the decision aid has been correct 8 out of every 10 times, yielding an 80% reliability score.

The decision aid has just estimated AMI's allowance for uncollectible accounts as of December 31st, 2004 at \$1,000,000.

At this point, please answer the following questions: You may go back and review AMI's case materials by clicking on the following buttons.

If you wish to stick with your initial responses, please answer the following questions the same way you did on the previous page. Else, you may answer the following questions differently than you did earlier.

1. What is your current estimate of the allowance for uncollectible accounts as of December 31st, 2004?

Your initial estimate was: \$700,000

2. How much confidence do you have in your current estimate of the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Confidence			Moderate Confidence			Very High Confidence		

3. What is the difference between your current estimate and management's initial estimate of the allowance for uncollectible accounts?

4. How much of the difference (above), if any, would you recommend to management as an adjustment to the financial statements?

End Main Questionnaire

Warning when One Minute is remaining to Complete Screens 1 and 2.

Screen 2 if Time Runs Out.

Screen 2	Time left to complete Screen 1 and Screen 2	00:50
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Your time to complete screens one and two has run out. You have one more minute to complete the remaining questions. Please answer the remaining questions and move on to the next screen.

1. What is your current estimate of the allowance for uncollectible accounts as of December 31st, 2004?
-
- Your initial estimate was: \$700,000*

2. How much confidence do you have in your current estimate of the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Confidence			Moderate Confidence			Very High Confidence		

3. What is the difference between your current estimate and management's initial estimate of the allowance for uncollectible accounts?
-
4. How much of the difference (above), if any, would you recommend to management as an adjustment to the financial statements?
-

End Main Questionnaire

Case Material Presented when Buttons are pressed on Screen 2.

The screenshot shows a Microsoft Internet Explorer window with the title bar "http://84.82.252.230 - AMI Ratios - Microsoft Internet Explorer". The address bar contains the same URL. The main content area displays a table with three columns: "Ratio", "Preceding Year", and "Current Year". The table lists five financial ratios: Current ratio, Quick ratio, Cash ratio, Operating cash flow ratio, and Debt-to-equity ratio, with their respective values for the preceding and current years. The status bar at the bottom shows "Done" and "Internet".

<u>Ratio</u>	<u>Preceding Year</u>	<u>Current Year</u>
Current ratio	2.19	1.69
Quick ratio	1.07	0.72
Cash ratio	0.35	0.24
Operating cash flow ratio	0.74	0.30
Debt-to-equity ratio	0.45	0.71

The screenshot shows a Microsoft Internet Explorer window with the title bar "http://84.82.252.230 - AMI Ratios - Microsoft In...". The address bar contains the same URL. The main content area displays a text summary of AMI's key ratios for the current year (2004) and the preceding year (2003). The status bar at the bottom shows "Done" and "Internet".

AMI's key ratios for the current year (2004) are as follows:
current ratio 1.69; quick ratio 0.72; cash ratio 0.24;
operating cash flow ratio 0.30; and debt-to-equity ratio 0.71.
Key ratios for the preceding year (2003) are as follows:
current ratio 2.19; quick ratio 1.07; cash ratio 0.35;
operating cash flow ratio 0.74; and debt-to-equity ratio 0.45.

http://84.82.252.230 - Amalgamated Manufacturing - Microsoft Internet Explorer	
Amalgamated Manufacturing, Incorporated	
Summary Balance Sheet	
As of December 31 st 2004	
ASSETS	
Cash, cash equivalents, and investments in marketable debt securities.....	\$ 7,525,300
Accounts receivable, gross.....	15,500,000
Less: Allowance for uncollectible accounts.....	<u>(600,000)</u>
Materials inventory.....	14,355,250
Finished goods inventory.....	16,050,330
Property, plant and equipment, net.....	119,954,370
Intangible assets, net.....	4,504,005
Other assets, net.....	<u>4,159,951</u>
Total assets.....	<u>\$181,449,206</u>
LIABILITIES AND OWNERS' EQUITY	
Liabilities:	
Accounts payable.....	\$ 31,146,250
Long term liabilities.....	<u>44,192,310</u>
Total liabilities.....	<u>\$ 75,338,560</u>
Stockholders' equity.....	<u>106,110,646</u>
Total liabilities and stockholders' equity.....	<u>\$181,449,206</u>
Done	Internet

http://84.82.252.230 - AMI Income Statement - Microsoft Internet Explorer	
Amalgamated Manufacturing, Incorporated	
Summary Income Statement	
For the year ended December 31 st 2004	
Sales.....	\$ 32,993,606
Less cost of goods sold.....	<u>19,736,302</u>
Gross margin.....	13,257,304
Less operating expenses:	
Selling and administrative expenses.....	<u>39,927,017</u>
Income from operations.....	9,330,023
Other revenues and expenses.....	<u>830,287</u>
Net income.....	<u>\$ 8,500,000</u>
Done	Internet

http://84.82.252.230 - Age of Accounts Receivable Schedule - Microsoft Internet Explorer

Age of Accounts Receivable Schedule for 1999					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,032,258	\$2,709,677	\$1,806,452	\$431,613	\$14,000,000
Actual Write-off	\$64,000	\$96,000	\$128,000	\$160,000	\$448,000
Percent	0.7%	3.5%	7.1%	35.4%	3.2%

Age of Accounts Receivable Schedule for 2000					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,354,839	\$2,806,452	\$1,870,968	\$467,742	\$14,500,000
Actual Write-off	\$71,714	\$107,571	\$143,429	\$179,286	\$502,000
Percent	0.8%	3.8%	7.7%	38.3%	3.5%

Age of Accounts Receivable Schedule for 2001					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,612,903	\$2,883,871	\$1,922,581	\$480,645	\$14,900,000
Actual Write-off	\$79,000	\$118,500	\$158,000	\$197,500	\$553,000
Percent	0.8%	4.1%	8.2%	41.1%	3.7%

Age of Accounts Receivable Schedule for 2002					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,741,935	\$2,922,581	\$1,948,387	\$487,097	\$15,100,000
Actual Write-off	\$85,429	\$128,143	\$170,857	\$213,571	\$598,000
Percent	0.9%	4.4%	8.8%	43.8%	4.0%

Age of Accounts Receivable Schedule for 2003					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$9,870,968	\$2,961,290	\$1,974,194	\$493,548	\$15,300,000
Actual Write-off	\$92,429	\$138,643	\$184,857	\$231,071	\$647,000
Percent	0.9%	4.7%	9.4%	46.8%	4.2%

Done Internet

http://84.82.252.230 - Aging of accounts receivable for 1999 - Microsoft Intern...

Aging of accounts receivable for 1999: 0 - 30 days \$9,032,258; 31 - 60 days \$2,709,677; 61 - 90 day \$1,806,452; over 90 days \$451,613. Actual write-offs for the same period were: 0 - 30 days \$64,000; 31 - 60 days \$96,000; 61 - 90 day \$128,000; over 90 days \$160,000.

Aging of accounts receivable for 2000: 0 - 30 days \$9,354,839; 31 - 60 days \$2,806,452; 61 - 90 day \$1,870,968; over 90 days \$467,742. Actual write-offs for the same period were: 0 - 30 days \$71,714; 31 - 60 days \$107,571; 61 - 90 day \$143,429; over 90 days \$179,286.

Aging of accounts receivable for 2001: 0 - 30 days \$9,612,903; 31 - 60 days \$2,883,871; 61 - 90 day \$1,922,581; over 90 days \$480,645. Actual write-offs for the same period were: 0 - 30 days \$79,000; 31 - 60 days \$118,500; 61 - 90 day \$158,000; over 90 days \$197,500.

Aging of accounts receivable for 2002: 0 - 30 days \$9,741,935; 31 - 60 days \$2,922,581; 61 - 90 day \$1,948,387; over 90 days \$487,097. Actual write-offs for the same period were: 0 - 30 days \$85,429; 31 - 60 days \$128,143; 61 - 90 day \$170,857; over 90 days \$213,571.

Aging of accounts receivable for 2003: 0 - 30 days \$9,870,968; 31 - 60 days \$2,961,290; 61 - 90 day \$1,974,194; over 90 days \$493,548. Actual write-offs for the same period were: 0 - 30 days \$92,429; 31 - 60 days \$138,643; 61 - 90 day \$184,857; over 90 days \$231,071.

Done Internet

http://84.82.252.230 - Age of Accounts Receivable Schedule for 2004 - Microsof...

Age of Accounts Receivable Schedule for 2004					
	0 - 30 Days	31 - 60 Days	61 - 90 Days	Over 90 Days	Total
Account Receivable	\$10,000,000	\$3,000,000	\$2,000,000	\$500,000	\$15,500,000
Est. \$ of Uncollectible	\$50,000	\$150,000	\$200,000	\$200,000	\$600,000
Est. Percent Uncollectible	0.5%	5%	10%	40%	3.9%

Done Internet

APPENDIX D

POST TASK QUESTIONNAIRE

Screen 3

Questionnaire

As a final step, please take a few minutes to answer the following questions.

1. Did you understand the task?

☐ Yes

☐ No (please explain what you did not understand)

2. Should the audit fail to detect a material misstatement of the financial statements, the risk of being sued on this engagement is

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Risk			Moderate Risk			Very High Risk		

3. For this client, how would you rate the complexity of the task of estimating the allowance for uncollectible accounts?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Complexity			Moderate Complexity			Very High Complexity		

4. How many minutes were you allowed to complete screens one and two?

5. How do you feel about the time you had to complete the performance task?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
I felt a low level of time pressure			I felt a moderate level of time pressure			I felt a high level of time pressure		

6. How reliable was the decision aid? % (e.g. XX%)

7. What is the dollar amount of the allowance for uncollectible accounts initially estimated by AMI's management?

Appendix D

Screen 3

8. What is the dollar amount of the allowance for uncollectible accounts indicated by the decision aid?
9. What is the difference between management's estimate of the allowance for uncollectible accounts and the amount indicated by the decision aid?

You may refer to the financial information when answering questions 10 and 11.

Financial Ratios

Summary Balance Sheet

Summary Income Statement

Five Year Accounts Receivable Aging Information

Management's Estimate of the Allowance for Uncollectible Accounts

10. Do you consider the difference (indicated above) to be material to the financial statements taken as a whole?
- ☐ Yes ☐ No
11. Based on the information you have, what dollar amount would you consider to be material to the financial statements taken as a whole?
12. Given the choice between receiving a guaranteed \$5 or a gamble of receiving \$10, there would have to be at least a % chance that I could win the gamble before I would accept the gamble.
13. What is your gender:
- ☐ Male ☐ Female
14. What is your age bracket: - Please Select -
15. How many years of auditing experience do you have (please round to the nearest whole year)?
16. What is your current position/title? - Please Select -

Assume that you are planning an audit for a client. You have set inherent risk at 1.0 and control risk at 0.50. Since you want to maintain an overall audit risk of .05, you have set detection risk to 0.10 ($1.0 \times 0.50 \times 0.10 = .05$). You have already planned your substantive tests; however, you have just learned that your legal department has assessed the risk of litigation for your client as very high should the financial statements be materially misstated.

17. How would the litigation risk information affect the extent of substantive testing you have already planned?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Considerably Less Substantive Testing			No Effect on Substantive Testing			Considerably More Substantive Testing		

18. How would the litigation risk information affect the extent to which you would rely on the advice of available decision aids during the course of the audit?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Considerably Less Reliance			The Same Reliance			Considerably More Reliance		

Screen 3

Assume that a CPA firm has audited a client and offered an unqualified opinion on the financial statements. However, during the subsequent year the CPA firm learns that the client materially overstated net income in the audited year. The overstatement arose because the client recorded fictitious sales. The sales transactions that the CPA firm sampled and verified during the audit were valid, and the sample did not include any of the fictitious sales. The senior auditor, Steve, who conducted the audit of sales transactions, believes that he did so with due care and diligence.

When selecting the sample of sales transactions, Steve could have used a decision aid that would have automatically determined the sample size, in accordance with specified risk parameters, and randomly selected specific sales transactions to audit from the total population of sales transactions. Rather than relying on the decision aid, Steve decided to sort the population of sales transactions from largest to smallest, based on the dollar value of each transaction, and audit all sales transactions comprising 80% of the total dollar value of annual sales. This procedure was in accordance with the CPA firm's policy. The decision of whether to rely on the decision aid or audit 80% of the dollar value of sales transactions was Steve's judgment call.

19. I believe that Steve's decision not to rely on the decision aid was a good judgment call on his part.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☒	☐	☐	☐	☐
Totally				Neither Agree				Totally
Disagree				Nor Disagree				Agree

20. Relying on the decision aid would have been in accordance with GAAS.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Totally				Neither Agree				Totally
Disagree				Nor Disagree				Agree

21. The sample selection procedure used by Steve was in accordance with GAAS.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Totally				Neither Agree				Totally
Disagree				Nor Disagree				Agree

22. In this same situation, I would have relied on the decision aid

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly				Not Sure				Strongly
Disagree								Agree

Next >>>

Screen 3

Questionnaire (Continued)

Steve now finds out that investors of the company have just filed a class action lawsuit and his audit firm is one of the defendants. Steve has been asked to explain and defend in court his sample selection procedure. His defense is that he selected the audit sample in accordance with firm policy, and audited the transactions with due care and diligence. Please answer the following two questions:

23. What is the likelihood that the jury will deem Steve's sampling procedure as acceptable?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Likelihood			Moderate Likelihood			Very High Likelihood		

24. Had Steve relied on the decision aid to select the sample, what is the likelihood that the jury would judge Steve's sampling procedure as acceptable?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Very Low Likelihood			Moderate Likelihood			Very High Likelihood		

25. The level of litigation risk is a major factor I consider when planning an audit.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly Disagree		Neutral					Strongly Agree	

26. Reliance on decision aids help me to be better prepared to defend myself if faced with litigation.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly Disagree		Neutral					Strongly Agree	

27. I tend to rely more on decision aids in high risk engagements.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly Disagree		Neutral					Strongly Agree	

Assume that you are planning an audit for a client. After determining the number of audit hours required, the partner in charge of the audit told you that he can not authorize as many hours as you requested. As a result, you are going to have to conduct the audit with fewer hours than you initially planned.

28. How would the reduced audit time budget affect the extent of your planned substantive testing?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Considerably Less Substantive Testing			No Effect on Substantive Testing			Considerably More Substantive Testing		

Screen 3

29. How would the reduced audit time budget affect the extent to which you plan to rely on available decision aids during the course of the audit?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Considerably Less Reliance			The Same Reliance			Considerably More Reliance		

30. I tend to rely more on decision aids when the complexity of the audit increases.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly Disagree			Neutral			Strongly Agree		

31. Relying on decision aids during a complex audit increases audit quality.

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Strongly Disagree			Neutral			Strongly Agree		

32. In previous audits, to what extent have you relied on computer assisted audit techniques (CAATS) (e.g. ACL, IDEA)?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Never Relied			Somewhat Relied			Extensively Relied		

33. To what extent have you relied on firm specific computerized audit decision aids?

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐
Never Relied			Somewhat Relied			Extensively Relied		

34. Prior to participating in this study had you discussed this survey with anyone?

☐ No

☐ Yes (Please explain what you discussed)

Finish

If you would like to receive information about the results of the study please contact Professor James E. Hunton at jhunton@bentley.edu.

Thank you for your participation!

Close

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SUMMARY OF THE DISSERTATION IN DUTCH

HET EFFECT VAN TIJDSDRUK, TAAKCOMPLEXITEIT EN CLAIMRISICO OP HET VERTROUWEN DAT ACCOUNTANTS STELLEN IN BESLISSINGSHULPMIDDELEN

Het gebruik van beslissingshulpmiddelen ('decision aids') bij de accountantscontrole kan de accuratesse van beslissingen verbeteren en aldus de effectiviteit van de controle (Benbasat en Nault 1990; Ashton 1992). Uit de literatuur blijkt echter dat accountants enigszins terughoudend zijn om te vertrouwen op beslissingshulpmiddelen (Pincus 1989; Ross 2002). Onderzoek op het gebied van de accountantscontrole is vooral gericht op het effect van prestatieprikkels, terugkoppeling, expertise, kennis en rechtvaardiging (bijv. Ashton 1990; Boatsman et al. 1997; en Rose 2002). Dit proefschrift breidt deze onderzoekstak uit door de effecten van drie additionele factoren te onderzoeken, die in het onderzoek naar het gebruik van beslissinghulpmiddelen bij de accountantscontrole nog weinig aandacht hebben gekregen, namelijk: tijdsdruk, taakcomplexiteit en claimrisico (bijv. Palmrose 1988; Alderman en Deitrick 1982; Arnold et al. 1997; Bonner 1994).

Tijdsdruk kan een gevolg zijn van budgettaire beperkingen bij de accountantscontrole. Verschillende studies hebben aangegeven dat de prestaties van accountants zullen afnemen als zij onder excessieve tijdsdruk moeten werken (bijv. Alderman en Deitrick 1982; Arnold et al. 1997). Als de beschikbare tijd een beperking is, dan kunnen beslissingshulpmiddelen de efficiency en mogelijk de effectiviteit van de beslissingsprocessen van de accountant vergroten, vooral in zeer gestructureerde omgevingen.

Veel taken in de accountantscontrole zijn uitermate complex. Taakcomplexiteit kan de kwaliteit van de beslissingen in sterke mate beïnvloeden (Bonner 1994; Libby 1985). Het gebruik van beslissingshulpmiddelen kan de kwaliteit van de beslissingsprocessen van de accountant verbeteren naarmate de taken complexer worden.

Claimrisico blijkt uit het toenemende aantal rechtszaken die tegen accountants naar aanleiding van de controle worden aangespannen (St. Pierre en Anderson 1984; Palmrose 1988; Stice 1991). Om claims te voorkomen moeten accountants veel aandacht schenken aan de kwaliteit van de controle. Als er een hoog claimrisico is, kan het gebruik van een beslissingshulpmiddel de effectiviteit van de controle vergroten en tevens in een eventuele rechtszaak dienen als rechtvaardiging voor genomen beslissingen (Lowe en Reckers 2002).

Ondanks de potentiële verbeteringen in de kwaliteit van beslissingen tengevolge van het gebruik van beslissingshulpmiddelen, blijkt dat accountants in de praktijk meer vertrouwen op hun vakkundige oordeelsvorming dan op beslissingshulpmiddelen in de verschillende fasen van de accountantscontrole (Pincus 1989; Ross 2002). Uit bestaand empirisch onderzoek blijkt niet waarom dat het geval is. Dit proefschrift stelt dat een gebrek aan vertrouwen in een beslissingshulpmiddel kan worden verklaard uit een gebrek aan exogene druk, en beargumenteert dat claimrisico een zodanig belang heeft gekregen in de Verenigde Staten dat accountants zich er nu meer van bewust zijn dat beslissingshulpmiddelen potentiële voordelen hebben.

Om het effect van de drie genoemde onafhankelijke variabelen op het vertrouwen dat accountants stellen in beslissingshulpmiddelen te onderzoeken is een experiment uitgevoerd in een gecontroleerde omgeving met behulp van software die specifiek voor dit experiment is ontwikkeld. Door deze geautomatiseerde uitvoering van het experiment konden de deelnemers en de experimentele manipulaties beter worden gecontroleerd. De software gaf alle benodigde informatie aan de deelnemers, registreerde alle antwoorden tijdens het experiment in een Access database, en regelde de tijd die beschikbaar was om de taak te vervullen. De software werd geïnstalleerd op de intranet- en extranet- servers van elk van de deelnemende kantoren.

Het experiment werd uitgevoerd in een 2x2x2 ontwerp. De drie onafhankelijke variabelen – tijdsdruk, taakcomplexiteit en claimrisico – werden gemanipuleerd tussen subjecten op twee niveaus (hoog of laag), resulterend in acht experimentele condities. Seniors, managers en partners van twee van de Big-4 accountantskantoren in de Verenigde Staten werden uitgenodigd deel te nemen. De reden om slechts deelnemers uit de VS te benaderen was dat het effect van claimrisico waarschijnlijk per land verschillend zal zijn, met voor de VS een groter effect dan bijvoorbeeld voor Nederland.

Het experiment werd gedurende een week simultaan uitgevoerd bij de deelnemende kantoren. Aan het begin van elke sessie werd een van de acht experimentele condities willekeurig toegewezen aan elke deelnemer. De deelnemers ontvingen instructies en de case via hun computerscherm. Na afloop van het experiment werd de deelnemers gevraagd een postexperimentele vragenlijst in te vullen. Deze vragenlijst werd ook via het computerscherm gepresenteerd.

De resultaten laten een positieve relatie zien tussen elk van de drie onafhankelijke variabelen en het vertrouwen in een beslissingshulpmiddel. Deze resultaten bevestigen de bevindingen van eerdere studies die het effect van taakcomplexiteit op het vertrouwen in beslissingshulpmiddelen hebben onderzocht, en verklaren het gedrag van accountants als ze worden geconfronteerd met tijdsdruk of claimrisico. De studie laat ook zien dat combinaties van deze factoren tot meer vertrouwen in beslissingshulpmiddelen leiden. Deze resultaten spreken echter de bevindingen van Ashton (1990) tegen. Hij liet zien dat een toenemende druk om te presteren tot minder vertrouwen in beslissingshulpmiddelen leidt. Kritiek op zijn studie komt er op neer dat zijn onverwachte resultaten kunnen worden verklaard uit

het feit dat hij een systeem van prestatieprikkels gebruikte waarbij steeds twee partijen tegenover elkaar kwamen te staan, alsmede uit het feit dat hij een lage betrouwbaarheid van het beslissingshulpmiddel (50%) hanteerde (Heiman 1990b). Om de methodologische kritiek op het werk van Ashton op te vangen, wordt in dit proefschrift een vaststaand prestatiebeloningssysteem gebruikt en een beslissingshulpmiddel met een relatief hoge betrouwbaarheid (80%). De combinaties van de drie factoren waren echter niet in alle gevallen additief. Vooral de mate van interactie van claimrisico en taakcomplexiteit was afhankelijk van de tijdsdruk waarmee de subjecten werden geconfronteerd. Onder een hoge tijdsdruk was er een hoge mate van interactie tussen claimrisico en taakcomplexiteit. Analyse toonde aan dat het toevoegen van om het even welke factor tot een interactie tussen de andere twee leidde. Deze resultaten kunnen voor een deel worden verklaard met behulp van 'marginal utility theory' omdat de verhoging van het vertrouwen in het beslissingshulpmiddel minder werd naarmate meer factoren werden toegevoegd die de druk om te presteren vergrootten.

De bijdrage van dit proefschrift is dat de effecten van toenemende druk om te presteren in de vorm van tijdsdruk, taakcomplexiteit en claimrisico op het vertrouwen in een beslissingshulpmiddel bij de accountantscontrole zichtbaar worden gemaakt. De bevindingen zijn des te relevanter in een tijd waarin accountants steeds meer te maken hebben claims.

Toekomstig onderzoek kan de huidige studie repliceren met verschillende maatstaven voor het meten van het vertrouwen dat accountants stellen. Voorts beperkt deze studie de manipulatie van de onafhankelijke variabelen tot twee niveaus (hoog en laag). Een uitbreiding zou kunnen zijn om de effecten van meer dan twee niveaus te onderzoeken. Een ander interessant onderzoeksterrein ligt in het interactie-effect dat in deze studie is gevonden. Bijvoorbeeld, geeft het gevonden grensnuteffect aan dat elke combinatie van twee endogene of exogene factoren voldoende is om het vertrouwen op het beslissingshulpmiddel te optimaliseren, kunnen de gevonden resultaten een gevolg zijn van de aard van de gemanipuleerde factoren, en wordt het grensnuteffect beïnvloed door de betrouwbaarheid van het beslissingshulpmiddel? Deze en andere gerelateerde vragen kunnen leiden tot een omvattend onderzoeksprogramma op dit terrein. Tenslotte, deze studie gaat uit van een inherent motief om te vertrouwen op een beslissingshulpmiddel, namelijk het verbeteren van de effectiviteit en de efficiency van de accountantscontrole, maar vervolgonderzoek zou nader kunnen ingaan op de motieven om te vertrouwen op een beslissingshulpmiddel.

PUBLICATIONS BY THE AUTHOR

“Understanding the Potential Impact of Information Technology on the Susceptibility of Organizations to Fraudulent Employee Behavior” (with Antoinette Lynch). *International Journal of Accounting Information Systems*, 4(2003).

BIOGRAPHICAL SKETCH

Mohamed Ismail Gomaa was born in Alexandria, Egypt on the 7th of August, 1975. He attended Alexandria University, Alexandria, Egypt, from which he graduated in June 1996 with a Bachelor of Commerce degree, majoring in accounting. Upon graduation, Mr. Gomaa was employed by the Arab Academy for Science and Technology in Alexandria as an instructor in the Department of Accounting.

Early in 1997, he left for the United States to pursue higher studies in accounting and information systems. He earned a masters degree in Decision and Information Sciences from the University of Florida and a Masters in Accounting (Accounting Information Systems track) from the University of South Florida. While attending the University of Florida and the University of South Florida, Mr. Gomaa worked as a graduate teaching and research assistant, where he taught several accounting and information systems courses. Mr. Gomaa, then, joined the Department of Accounting and Information Management at Universiteit Maastricht to complete his studies for the PhD. Degree in accounting.