AN EXAMINATION OF THE FACTORS THAT INFLUENCE AN AUDITOR'S DECISION

TO USE A DECISION AID IN THEIR ASSESSMENT OF MANAGEMENT FRAUD

Thomas Patrick Hayes, Jr., B.A., M.Acc.

Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

May 2006

APPROVED:

Mary B. Curtis, Major Professor
Fred H. Wu, Committee Member
Martin L. Bink, Committee Member
Mark A. Davis, Committee Member
Barbara D. Merino, Doctoral Program
    Coordinator
O. Finley Graves, Chair of the Department of
    Accounting
Derrick D'Souza, Associate Dean for Graduate
    Programs
Sandra L. Terrell, Dean of the Robert B.
    Toulouse School of Graduate Studies

Hayes, Thomas Patrick, Jr., <u>An examination of the factors that influence an auditor's decision to use a decision aid in their assessment of management fraud</u>. Doctor of Philosophy (Accounting), May 2006, 96 pp., 5 tables, 9 figures, references, 103 titles.

In recent years, the accounting profession has faced increased scrutiny because of scandals involving management fraud (e.g., Enron, WorldCom). In response, Statement on Auditing Standards (SAS) #99 has expanded auditors' responsibility for detecting fraud, requiring auditors to gather significantly more information in their assessment of fraud. In addition, the Public Company Accounting Oversight Board (PCAOB) will focus on fraud detection through their inspections of registered accounting firms. In light of the increased emphasis on auditors' responsibility for detecting fraud, public accounting firms face the challenge of improving their fraud detection process, including their assessment of management fraud risk.

Decision aids are one way for auditors to improve their assessment of management fraud risk. In fact, several studies from the decision aid literature suggest that aids are useful tools for a variety of tasks, including fraud risk assessment. At the same time, another stream of the decision aid reliance literature, which looks at people's willingness to rely on decision aids, suggests that individuals tend to be reluctant to accept the output given by an aid. Thus, the primary focus of this paper is on uncovering factors that would encourage one to voluntarily use and rely upon a decision aid.

Toward that end, 132 senior-level auditors participated in an experiment that examined how several factors (confidence, perceived usefulness, client size, and

conformity pressure) affect decision aid usage and reliance. The results show that perceived usefulness and decision aid reliance are significantly related. Further, the results suggest that perceived usefulness affects reliance more than variables examined in prior studies (e.g., confidence). Finally, the results suggest that decision aid usage mediates the relationship between perceived usefulness and reliance.

The results of the current study have important implications for research in both the information systems and decision aid reliance areas. First, the study shows that perceived usefulness, a significant construct from the Technology Acceptance Model (TAM) literature, is also a significant factor in determining decision aid usage and reliance. Second, the study further delineates how certain factors affect decision aid reliance.

ACKNOWLEDGMENTS

I would like to thank my dissertation chair, Mary Curtis, for being a true mentor throughout my doctoral studies. I have not only learned much about research, but also life as an academic. Most importantly, I want to thank Mary for always treating me as a colleague, rather than a student.

I also would like to thank the other members of my committee, Fred Wu, Mark Davis, and Marty Bink for their support. I am grateful to them for reading previous versions of my dissertations and providing useful comments and suggestions. I am particularly thankful to Marty Bink, who has continued to serve on my committee since my proposal defense.

Finally, I would like to express my deepest gratitude to my family for their continued support. My wife Jeannie has always been there for me through both the good and bad days. I would not be here now without her constant love and understanding.   I'm also grateful to my boys, Zach and Luke, for letting me watch them grow. Having them in my life has often given me that "extra push" I needed to keep going.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

In recent years, the accounting profession has faced increased scrutiny because of scandals involving management fraud (e.g., Enron, WorldCom). These events have had a profound impact on the profession, leading to the disbanding of the Public Oversight Board (Mulligan 2002) and the collapse of Arthur Andersen, one of the world's largest accounting firms (Bayer 2002; Cote 2002). New legislation (e.g., Sarbanes-Oxley Act of 2002) and a new oversight board [i.e., Public Company Accounting Oversight Board (PCAOB)] are just a few of the effects resulting from these scandals. Repercussions are still being felt, as the profession and the SEC move to restore public confidence.

More importantly, these incidents continue to highlight the importance of assessing management fraud on audit engagements. For example, the Auditing Standards Board (ASB) has responded with a new accounting standard, Statement on Auditing Standards (SAS) #99, which expands the auditor's responsibility for detecting fraud and requires the auditor to gather significantly more information in their assessment of fraud (Ramos 2003). Additionally, the PCAOB will focus on fraud detection through their inspections of registered accounting firms, emphasizing auditors' responsibility for detecting fraud (Farrell and Shadab 2005). Clearly, the need for auditors to effectively evaluate management fraud will be increasingly important.

There are several reasons why auditors should have an interest in improving their assessment of management fraud. An obvious reason is that auditors have a potential legal liability when they fail to detect such fraud. The failure to detect fraud

often leads to investor losses, which, in turn, may lead to lawsuits against the auditor. Consequently, audit firms should have a vested interest in improving fraud assessment to help deter potential lawsuits.

Auditors also have the task of providing assurance that financial statements are not materially misleading, thus making them reliable for decision-making. When auditors fail in their assessment of fraud, the usefulness of the audit is damaged as investors make decisions using unreliable information. The potential result is an inefficient allocation of capital, which may ultimately slow economic growth (Elliott and Willingham 1980).

Additionally, auditors should have an interest in improving fraud detection because of the deleterious effect fraud has on their credibility as professionals. The role of auditors in our society is to improve reliability to financial reporting. Their ability to do so, however, is limited to the extent that the public views the audit profession as a credible group. Management fraud damages this credibility by eroding the auditor's reputation (Elliott and Willingham 1980). The demise of Andersen provides an excellent example of this. Overall, it is important for auditors to improve fraud assessment on audit engagements. Moreover, it is important to identify tools that may improve the process of assessing management fraud.

Decision aids are one such tool that has this potential. Indeed, decision aids have been shown to outperform human decision makers in a variety of tasks (e.g., Peterson & Pitz 1986; Davis and Kottemann 1995), including fraud detection (e.g., Eining et al. 1997). Additionally, to the extent that decision aids provide extensive documentation, they may also offer an effective defense in the event of a lawsuit (Lys &

Watts 1994). Taken as a whole, it is the contention of past researchers that decision aids can be effective tools for improving the fraud detection process and overall audit quality.

However, evidence suggests that auditors may be reluctant to rely on decision aids for a variety of reasons. For example, in two different judgment tasks, Arkes et al. (1986) found that students were reluctant to accept the output of a decision aid because of overconfidence in their own judgments. In another example, Boatsman et al. (1997) found that auditors were generally reluctant to rely on the decision aid when a penalty scheme was implemented.

Given prior research that suggests that decision aids are helpful tools, and that auditors are reluctant to rely on them, it is important to identify the conditions that may mitigate this reluctance. Reducing auditors' reluctance to rely on decision aids may help them improve their assessment of management fraud by encouraging them to utilize such aids in assessing fraud. Ultimately, increased use of decision aids to assess management fraud may reduce audit failures in the future. The focus of this paper is on uncovering those factors that encourage an auditor to use and rely on a decision aid. Thus, I offer the following research question:

> What factors influence an auditor's decision to use and rely on a decision
> aid?

This research question is developed more thoroughly in Chapter 2.

The remainder of the paper is organized as follows. In Chapter 2, I provide a review of the management fraud literature, specifically, those studies that look at how auditors assess management fraud risk. Based on the notion that decision aids may be helpful in assessing fraud risk, I also present a review of the decision aid literature,

including the stream that deals with decision aid reliance. I then posit several factors (confidence, perceived usefulness, client size, and conformity pressure) that may affect an auditor's decision to use and rely on an aid. In Chapter 3, I present the research methodology, including the experimental design and a discussion of the experimental session. In Chapter 4, I discuss the analytical techniques used in the study as well as the results of the experiment. Finally, in Chapter 5, I offer concluding remarks, including limitations of the study and opportunities for future research.

CHAPTER 2

LITERATURE REVIEW

The main purpose of the current study is to further our understanding of how an auditor determines whether they use and rely on a decision aid, including the factors that impact that decision. The underlying argument is that decision aids can be a useful tool in the assessment of management fraud and may ultimately reduce audit failures in the future. Toward that end, I provide a review of the management fraud literature, focusing on those studies that examine how auditors assess management fraud risk. Next, I provide a review of the decision aid literature, including the stream that deals with decision aid reliance. Then, I develop hypotheses, positing several factors (confidence, perceived usefulness, client size, and conformity pressure) that may affect whether an auditor uses and relies on a decision aid.

Management Fraud

Fraud, as it is currently defined in accounting standards, refers to "an intentional act that results in a material misstatement in financial statements that are the subject of an audit" (AICPA 2003: 106). There are two ways in which a material misstatement could occur with respect to fraud: a misappropriation of assets (i.e., employee theft) and fraudulent financial reporting. A misappropriation of assets, as the name suggests, refers to the theft of company assets that may result in the company's financial statements being materially misstated (AICPA 2003). Specific examples include embezzling receipts, stealing assets (e.g., cash, merchandise, etc.), or getting customers to pay for goods and services not yet received. Fraudulent financial

reporting (i.e., management fraud[1] or fraud[2]) is the focus of this study. Examples include the manipulation or altering of accounting records, intentional misapplication of accounting principles, and intentional omission or misrepresentation of significant information in the financial statements.

The body of literature that deals with management fraud is quite large. In a comprehensive review of this literature, for example, Nieschwietz et al. (2000) highlighted more than 30 studies that examine various aspects of management fraud, from identifying factors that predict fraud (e.g., Albrecht and Romney 1986; Loebbecke et al. 1989; Saksena 2001) to investigating how well auditors assess fraud with or without a decision aid (e.g., Pincus 1989; Hackenbrack 1992; Zimbelman 1997; Eining et al. 1997). My review of the literature will focus only on those articles pertinent to the current study.

The specific audit area that the present study addresses is fraud risk assessment, which occurs in the planning phase of the audit. Fraud risk assessment includes a variety of tasks, such as brainstorming among audit members regarding how fraud could be concealed, inquiring of management and others about the risks of fraud, and performing analytical procedures to look for unusual transactions (AICPA 2003). Of those studies that deal with fraud risk assessment, several utilize decision aids for the task and several do not.

Accordingly, the next two sections discuss fraud risk assessment under two conditions: one in the absence of an aid and the other when an aid is provided to the user. Specifically, the next section discusses fraud risk assessments in the absence of

---

[1] In the literature, the term "management fraud" is used instead of fraudulent financial reporting.
[2] Given that I focus only on management fraud in this study, I use the terms management fraud and fraud interchangeably.

an aid, noting some of the potential limitations on individuals' ability to perform this type of task. Then, the following section discusses fraud risk assessment with the use of an aid, noting the potential of decision aids for improving the process of assessing fraud risk.

Unaided Fraud Risk Assessments

Several studies have focused on what cues auditors consider and how they weigh those cues in making assessments of fraud. Hackenbrack (1992), for example, tested the impact of non-diagnostic (i.e., extraneous) information on auditors' assessment of a company's exposure to fraud. He found that auditors' assessments were less extreme when provided this irrelevant information, supporting the notion that this type of information has a dilutive effect on subjects.

Moreover, Zimbelman (1997) provided a unique insight into how a requirement to separately assess fraud risk from audit risk affected the time auditors spent reading and evaluating fraud cues. [A new standard at the time, SAS No. 82, required auditors to assess the risk of fraud separately from their overall audit risk assessment (AICPA 1997).] He found that auditors faced with the new requirement of separately assessing fraud risk did pay more attention to fraud cues, spending more time reading the red flag clues than those subjects not faced with the new requirement. He also found that auditors faced with the new requirement did not differentiate between the fraud and non-fraud cases, budgeting more audit hours to both cases than subjects not given the requirement.

A couple of studies have also looked at auditors' performance in assessing fraud risk without an aid. Ponemon (1993), for example, examined the effect of auditors' level of ethical reasoning on their ability to judge management competence and integrity. The study builds upon early research in psychology [i.e., Piaget (1932), 1966; Kohlberg 1969] that presented a model for explaining how individuals grow with respect to morality. For instance, an individual at the postconventional level of the model is more ethical (e.g. follows self-chosen ethical principles) than an individual at the preconventional level (e.g., follows rules if they are in one's self-interest) (Ponemon 1993: 6). Ponemon (1993) found that auditors at higher levels of ethical reasoning are more sensitive to cues that suggest management to be of low integrity. In turn, this suggests that auditors with a higher level of ethical reasoning may make more accurate assessments of fraud risk because they are more sensitive to the factors that indicate the presence of fraud. Along similar lines, Knapp and Knapp (2001) tested whether audit managers were more effective at using analytical procedures to detect fraud risk factors than audit seniors. The authors found that managers performed significantly better than seniors, suggesting that auditors are better at uncovering fraud risk factors as their level of experience increases.

In summary, this stream of literature suggests that auditors' ability to assess fraud risk is affected by a variety of factors, including the presence of extraneous information, new regulatory requirements, and the auditor's level of ethical reasoning. More importantly, however, these studies suggest that auditors may be limited in their ability to adequately assess fraud risk. For example, auditors tend to weigh diagnostic

information as less important when extraneous information is present (Hackenbrack 1992).

As mentioned previously, it has been suggested that decision aids can improve decision quality (Kleinmuntz 1990). In particular, there are several studies that provide evidence that decision aids are helpful in assessing fraud risk (e.g., Loebbecke et al. 1989; Eining et al. 1997). Therefore, it is important to consider how decision aids help auditors in performing these assessments. In the next section, I provide a synopsis of the literature that examines auditors' fraud risk assessments in the presence of an aid.

Aided Fraud Risk Assessments

Several studies have examined auditors' ability to assess management fraud when provided an aid (e.g., Pincus 1989; Loebbecke et al. 1989; Hansen et al. 1996; Eining et al. 1997). This stream of literature is particularly important to the current study as it underscores the potential of using decision aids to improve fraud risk assessment. Pincus (1989), for example, examined the effects of a red flag questionnaire on auditors' assessment of fraud risk. Similar to the checklist used in the current study, a red flag questionnaire acts as a guide, providing a list of situational factors that indicate fraud may be present. Using a red flag approach has the advantage of making data acquisition more complete and consistent, thus facilitating the gathering of factors relevant to audit decisions (Pincus 1989: 155). A wealth of examples of red flags exists, including management's tendency to exert pressure on executives to meet budgets and progressive deterioration in the quality of earnings (Sorenson and Sorenson 1980; Albrecht et al. 1980; AICPA 2003). In her study, Pincus (1989) looked at subjects'

acquisition of these factors, where some subjects were provided a red flags

questionnaire and others were not. She found that subjects provided with the

questionnaire were more uniform and comprehensive in their data acquisition. That is,

subjects provided with the questionnaire were more consistent in the number of red

flags they identified.

Along similar lines, Loebbecke et al. (1989) conducted a field survey to further

validate a model that auditors may use in their assessment of fraud. The model

expresses the likelihood of management fraud as a function of three factors: the degree

to which an opportunity for management fraud exists, the degree to which individuals

have the motivation to engage in management fraud, and the degree to which

individuals' ethical values allow them to rationalize their fraudulent behavior. In their

study, the authors surveyed audit partners to document their experiences with

management fraud and to assess the applicability of the aforementioned model in audit

planning (Loebbecke et al. 1989: 8). One of the most significant findings was that due

to the low incidence of fraud, auditors have little opportunity to learn from experience.

Based on these findings, the authors argue that it is important to provide auditors with a

tool that aids in their assessment of fraud risk. They also conclude that the results

support the contention that their model may be a useful engagement tool.

In a widely cited study, Eining et al. (1997) examined how reliance on a decision

aid ultimately affects users' performance on a fraud assessment task. This study is

particularly valuable to the current study because it supports the argument that decision

aids can improve overall decision making, but only if auditors use and rely on them.

Discussed in more detail later, Eining et al. (1997) found that when auditors relied on the aid, they could better discriminate between situations with varying levels of fraud.

Overall, this area of the fraud literature suggests that users are more consistent and complete in gathering the information needed to assess fraud when provided with an aid (e.g., Pincus 1989). Further, the literature suggests that providing auditors with tools for assessing fraud may be useful given that auditors are rarely exposed to fraud (e.g., Loebbecke et al. 1989). Finally, the literature underscores the role that reliance plays in improving fraud risk assessment (e.g., Eining et al. 1997). Namely, decision aids can be useful tools for assessing fraud, but only if the auditor relies on them.

Given the importance of identifying management fraud and the potential of using decision aids to detect such fraud, it becomes necessary to know more about decision aids. Specifically, it is important to not only know how decision aids affect decision quality, but also how they affect the individuals using them. Toward that end, the next section provides background on decision aids, including how they are defined and a synopsis of past literature. First, early research on decision aids is discussed, including how the literature has shifted from a descriptive/normative focus to a theoretical focus. Second, a brief summary of the decision quality and user learning streams is provided. Finally, since decision aids are only useful to the extent that auditors use and rely on them, the last subsection documents that area of the literature that examines reliance on decision aids.

Decision Aids

Decision aids come in many different forms. Rohrmann (1986) generally defined a decision aid as "any explicit procedure for the generation, evaluation and selection of alternatives (courses of action) that is designed for practical application and multiple uses" (365). Such a broad definition incorporates the full gamut of decision aids, from the basic (e.g., checklist) to the complex (e.g., expert systems).

Thus, two ways to classify decision aids is whether they are simple or intelligent (Davis 1998) and whether or not they are computerized. Per Davis (1998) simple aids are intended to provide structure to and improve the efficiency of the assigned task. Simple aids include checklists, work programs, and simple linear models (Davis 1998: 36) and can be computerized or manual. Intelligent decision aids (e.g., decision support systems, expert systems) tend to be computerized and are intended to compensate for user deficiencies (e.g., lack of experience) such that they can effectively complete the task.

Early research on decision aids focused on decision characteristics, and thus was classified in literature reviews accordingly, using such frameworks as those developed by Gorry and Scott-Morton (1971) and Ives et al. (1980). In his review of the literature, for example, Abdolmohammadi (1987) presented a model that combines the various decision making phases and levels of task structure with the level of expertise required and the corresponding decision aid needed for the task. The development of such models underscores the focus of early research on classifying when to use a particular decision aid.

Classifying studies in this manner, however, ignores the theoretical contributions these studies make (Rose 2002). Rather, Rose (2002) argues that the primary focus of current and future decision aid research is to better understand the effects of decision aids on users and decisions. Indeed, research in the past twenty years has shifted from being descriptive and/or normative to being theoretically based. Using Rose's (2002) framework as a guide, I have organized the review of the decision aid literature into two theoretical streams: decision quality/knowledge acquisition and decision aid reliance.

<u>Decision Quality/Knowledge Acquisition</u>

Research on decision quality builds upon findings from psychology that suggest that when they are available, decision aids tend to outperform human subjects and improve overall decision making (Kleinmuntz 1990). Several studies offer evidence that decision aids tend to improve prediction accuracy and consensus (e.g., Peterson and Pitz 1986; Ashton 1992) as well as enhancing users' ability to use base rate data (e.g., Butler 1985). For example, in their study, Peterson and Pitz (1986) examined how the output from a mechanical model (simple computerized decision aid) affected users' overall predictions in a task where students predicted how many games a team won based on a variety of statistics. The authors found that subjects provided with the aid's output were more accurate in their predictions, though less accurate than the model itself.

Along similar lines, Ashton (1992) examined how the requirement to justify one's decision and the availability of a decision aid affected subjects' performance. Similar to Peterson and Pitz (1986), Ashton (1992) used a mechanical model for a bond rating

prediction task. The author found that the requirement to justify and the availability of a

decision aid did improve the auditors' performance and consistency.

Research on knowledge acquisition focuses on the effects of decision aids on

user learning. Much of the literature provides evidence that subjects tend to learn more

without a decision aid. Glover et al. (1997), for example, examined whether a decision

aid impedes knowledge acquisition among inexperienced decision makers. In a task

where students were required to determine a taxpayer's liability, the authors found that

subjects provided with a simple computerized aid gained less experiential knowledge

about the task than those not provided with the aid. Further, they found that subjects

given the aid tended to overrely on the aid, in spite of its limited accuracy.

The Todd and Benbasat studies (1991, 1992, 1994) also examined how a

decision aid impacts user learning. Using an apartment selection task, they consistently

found that the presence of a decision support system (intelligent aid) had the adverse

effect of encouraging subjects to minimize their cognitive effort on a particular task.

Specifically, user learning was inhibited by subjects utilizing the aid because they did

not take the time to better learn the task.

Additionally, several studies examined whether or not providing users with

explanations for the decision aid output affected learning. For example, Eining and Dorr

(1991) found that in an internal control evaluation task, providing subjects with an

explanation facility from an expert system (intelligent aid) did not affect their learning. In

a production-scheduling task where she manipulated the placement of explanations,

Moffitt (1994) found similar results as Eining and Dorr (1991).

In sum, these areas of the decision aid literature provide useful insight into how decision aids affect users and the quality of decision-making. For the most part, the decision quality stream suggests that decision aids can increase decision accuracy, which would be highly useful in assessing fraud risk. The knowledge acquisition stream, however, suggests that user learning is not significantly affected, and in some cases, negatively affected, by the presence of a decision aid.

The results from the knowledge acquisition stream are problematic, particularly if the goal is to create decision aids that accelerate users' ability to assess management fraud risk. Still, it is important to remember that the goal of the current study is not to substitute decision aids for auditor judgment. Rather, the goal is to provide the auditor with a tool that will improve their assessment of management fraud. It is also important to note that the above studies did not use auditors as subjects. Auditors follow a code of conduct that precludes them from subordinating their judgment to others, which would include the results of a decision aid. Further, auditors generally face greater consequences on job assignments such that they would be less likely to overrely on a decision aid to simply reduce cognitive effort.

Decision Aid Reliance

The decision aid reliance stream of literature, which provides the motivation for this study, focuses on better understanding the factors that affect a user's decision to rely on a particular aid[3]. Decision aid reliance has two components: usage of the aid as an input to the decision and acceptance of the aid's output as part of the overall

---

[3] Table 1 (p. 22) provides a comprehensive list of those studies that examine some aspect of decision aid reliance.

decision-making process (Arnold and Sutton 1998). The decision aid reliance literature tends to focus on this latter aspect of reliance. Research on decision aid reliance can be further broken down into three areas: studies that focus on underreliance, those that take a user process perspective, and those that deal with issues of forced reliance and overreliance (Rose 2002).

As the name suggests, underreliance refers to a subject's tendency to not accept the results of a decision aid. Arkes et al. (1986) is perhaps the first major study to examine underreliance. In the first task using a simple classification rule (simple, noncomputerized aid), they found that compensation reduced subjects' reliance on the aid. They used a simple classification rule in the second task as well, finding that confidence in one's abilities reduced reliance on decision aids, providing evidence to support Dawe's (1976) notion of "cognitive conceit." It is important to note that like most subsequent studies in the reliance literature, the authors defined reliance by whether or not the subject accepted the output of the aid in making their decision.

Whitecotton (1996) furthered the work of Arkes et al. (1986) by developing a causal model to help explain decision aid reliance. Under this model, reliance was affected by three factors: users' confidence, experience, and agreement with the aid. In an earnings forecast task where subjects used a probit model (simple, computerized aid), the author further supported Arkes et al. (1986), reporting that subjects' level of reliance was inversely related to their level of confidence. She also found that subjects having prior experience with decision aids were more likely to rely on the aid than those who did not. Agreement with the aid and general experience, however, did not affect reliance.

Several other researchers have developed models to help explain reliance. In their Theory of Technology Dominance, Arnold and Sutton (1998) contend that reliance is a function of four factors: task experience, task complexity, decision aid familiarity, and cognitive fit. Brown and Jones (1998) also offer a model of reliance, stating that reliance is affected by characteristics of the aid itself, the decision maker, and the decision task, as well as strategy evaluation factors (i.e., how a user determines what strategy to take for a particular decision). The authors go a step further, however, and test their model. In a computer selection task where subjects used a simple computerized aid to perform the task, the authors found that revealing the aid's algorithm (a decision aid characteristic) and the framing context (a strategy evaluation factor) had no effect on decision aid reliance. They did find, however, that as the task became more complex, users tended to rely less on the decision aid[4].

Brown and Jones (1998) also contribute to the literature by further delineating the concept of reliance. Specifically, they identify four distinct levels of reliance: complete reliance, partial reliance, zero reliance, and negative reliance. <u>Complete</u> reliance refers to the situation where the user simply relies on the aid. People exhibit <u>partial</u> reliance when they use the decision aid as a tiebreaker or as part of an anchor and adjust strategy. <u>Zero</u> reliance occurs when the individual ignores the aid. Finally, when users attempt to outsmart the aid, they are exhibiting <u>negative</u> reliance.

Davis (1998) looks at two of these levels of reliance, namely, partial reliance and zero reliance. In her study, she examines the extent to which structural characteristics of the aid, such as different sources of inputs and face validity, affect reliance on the aid. She utilized two different simple decision aids, an enhanced checklist and a

---

[4] The decision maker factor was not manipulated in their experiment.

statistical model (both noncomputerized). Using a going concern evaluation task, she found that auditors ignored the statistical model but exhibited partial reliance on the enhanced checklist.

Similar to Davis (1998), Eining et al. (1997) compare decision aid reliance across different types of aids. They examine how two computerized simple aids (checklist and logit model) and an intelligent aid (expert system) affect auditors' assessment of management fraud. Their main assertion is that the constructive dialogue incorporated in the expert system will increase users' reliance on the system, which, in turn, will increase their accuracy. The authors find evidence to support this assertion, namely, that auditors that were given the expert system (intelligent aid) did better at assessing the likelihood of fraud than those auditors given the logit model, who did better than those given the checklist or nothing at all. Per the authors, subjects given the expert system performed better because they relied on the output given by the aid.

While the results with respect to the checklist and logit model seem to contradict Davis (1998), it is important to note the difference between the types of checklists used in each study. Eining et al. (1997) employed a simple checklist that did not have a combination rule for use in their fraud risk assessment task. Davis (1998) used an enhanced checklist, which included a combination rule for use in the task. Davis (1998) notes that a benefit of the enhanced checklist was that the combination rule for the enhanced checklist was easy to verify, while the rule for the statistical model was not. As such, it made the enhanced checklist appear more credible to subjects.

Other factors that tend to reduce reliance on a decision aid include external pressures, such as the requirement to justify one's decision. For example, Ashton

(1990) found that in a bond-rating task where a mechanical model (simple, noncomputerized aid) is provided, subjects relied less on the aid when faced with a justification requirement. However, when they were provided with the aid without other conditions (e.g., justification requirement) subjects did rely on the aid (Ashton 1990)[5]. It was only when other factors were included (e.g., incentives, justification requirements) that subjects exhibited reduced reliance on the decision aid.

Boatsman et al. (1997) go a step further, examining how decision consequences affect decision aid reliance. Specifically, they introduced a penalty scheme where auditors assessed the likelihood of management fraud and chose an appropriate audit plan. In their study, which used a computerized checklist (simple, computerized aid), the authors found that subjects tended to ignore the decision aid's recommendation when a penalty scheme was implemented.

A few studies have also examined decision aid reliance from a user preference perspective, looking at factors that may mitigate users' reluctance to rely on decision aids. For example, Eining et al. (1997) concluded that their expert system's dialogue with the user encouraged reliance on the aid. Along similar lines, Whitecotton and Butler (1998) and Kaplan et al. (2001) found that users relied more on the decision aid when they were involved in its development.

Other studies have examined factors that affect how users perceive the benefits of decision aids and their perceived ability as a result of relying on aids. For example, users perceived the decision support system (intelligent aid) as very useful when they were provided with a what-if analysis as part of the system (Davis and Kottemann

---

[5] Ashton (1992) also found that when subjects had access to a decision aid, they did exhibit reliance.

1994). Further, providing subjects with this analysis increased their perceived ability to accomplish the task (Kottemann et al. 1994).

In addition to research that examines underreliance, several studies have focused on the issues of forced reliance and overreliance on a decision aid. For example, Kachelmeier and Messier (1990) examined the effects of a prescribed sampling formula (simple, noncomputerized aid) on auditors' sampling size judgments. In a task where auditors provided a sample size for supplies inventory, the authors found that when subjects were forced to rely on the decision aid, they came up with a sample size on their own and then "worked backwards" such that the aid gave the desired result.

Finally, Swinney (1999) examined whether or not auditors overrely (i.e., inappropriately rely) on expert systems, and whether this overreliance is affected more by negative than positive output. In a task where auditors evaluated loan loss reserves using an expert system (intelligent aid), the author found that auditors tend to overrely on the system's output, and that this effect is more pronounced when the output is negative. Glover et al. (1997) also found evidence of overreliance, reporting that inexperienced subjects relied on a computerized worksheet (simple, computerized aid) even when the aid was significantly inaccurate at calculating tax liabilities.

As mentioned previously, the decision aid reliance literature has focused on users' acceptance of the aid, usually measured in terms of direct agreement with the aid, or indirect agreement (e.g., performance accuracy). Further, prior research has found several factors that affect users' reliance on a decision aid. Little is known, however, about the details of these linkages. For instance, it is uncertain whether

confidence directly affects reliance (i.e., accepting the aid's results), indirectly affects reliance through the decision to use the aid, or both. Thus, an objective of this study is to disentangle this linkage in an effort to better understand how auditors make the decision to rely on a decision aid.

Additionally, there is little research that examines the factors that affect an auditor's decision to <u>use</u> an aid. If subjects do "work backwards" when forced to use an aid, as Kachelmeier and Messier (1990) suggest, then it is apparent that forced reliance may defeat the purpose of providing a decision aid. Thus, another objective of the current study is to examine factors that may encourage the use of an aid. There are potentially many factors that affect use; the current study examines four factors, namely, confidence, perceived usefulness, client size, and conformity pressure.

In the next section, assertions are developed to delineate the specific relationship between decision aid reliance and decision aid use. An important component of this assertion is that use ultimately leads to reliance. Thus, based on escalation of commitment theory, cognitive dissonance theory, and tests of the Technology Acceptance Model (TAM), it is hypothesized that the voluntary decision to use an aid greatly increases reliance. Additionally, the four factors previously mentioned, namely, confidence, perceived usefulness, client size, and conformity pressure, are asserted to have an effect on one's decision to use, and ultimately rely on, the decision aid.

Table 1

Decision Aid Reliance

Author(s)	Description	Type of aid	Subjects	Task	Results
Arkes et al. (1986)	2 experiments: examine whether reliance is affected by monetary compensation, disclosed warning about abandoning aid, and expertise	classification rule (simple, noncomputerized)	E1: 226 students E2: 42 students	E1: Judge whether or not student graduated with honors; E2: Baseball judgment task (which players were MVP)	E1: Subjects that were warned, and those that were provided no monetary comp. performed the best of all groups; control group and "outperform" group performed equally poorly; lack of comp. with a warning led subjects to be more consistent, while other subjects changed strategies more frequently. E2: Subjects with expertise or perceived expertise relied less on aid than those with less expertise (confidence).
Arnold and Sutton (1998)	Propose theory of Technology Dominance to explain decision aid reliance [Three stages: factors that determine likelihood of reliance (reliance = f(task experience, task complexity, decision aid familiarity, cognitive fit), conditions under which a decision maker is susceptible to technology dominance, & deskilling workers and impeding epistemological evolution due to extended use of decision aids]	NA	NA	NA	NA
Ashton (1990)	Examines the influence of three factors (incentive, feedback, and justification) on subjects' accuracy and consistency in the absence and presence of a decision aid	mechanical model (simple, noncomputerized)	182 auditors	Bond rating prediction	Subjects performed better and were more consistent when provided with an incentive, feedback, or justification requirement; subjects exhibited partial reliance on an aid when available proportional to the aid's face validity. When one of the three former factors is combined with the presence of the decision aid, reliance, accuracy, and consistency all decrease.
Ashton (1992)	Examines the effect of justification and availability of decision aid on judgment performance	mechanical model (simple, noncomputerized)	59 auditors	Bond rating prediction	Auditors' judgments were more accurate (& more consistent) in both treatment groups (those that were forced to justify their decision and those that were provided with a decision aid - that is, subjects relied on aid).

Table 1 (continued)

Author(s)	Description	Type of aid	Subjects	Task	Results
Boatsman et al. (1997)	Examine how decision consequences affect reliance	Computerized enhanced checklist (simple)	118 auditors	Assess likelihood of management fraud & selection of appropriate audit plan	Found that subjects engaged in intentional shifting away from aid's decision when a penalty scheme is implemented; scheme ineffective at preventing one from ignoring the aid unless penalty imposed for over & under auditing, or contingent penalty for overriding aid
Brown and Jones (1998)	Offer a model to better understand factors underlying reliance: extent of reliance is an attribute of the user's decision strategy & level of agreement is determined by comparing user's decision with aid's output Per model, factors that affect reliance: decision aid char., decision-maker char., task char., and strategy evaluation factors	equally weighted attributes algorithm (simple, computerized)	116 students	Selection of best computer system for client	Neither revealing the algorithm nor the framing context (positive vs. negative) affected reliance; however, reliance on aid decreased with increase in task complexity
Davis (1998)	Examines the extent to which structural characteristics (e.g., different sources of inputs, face validity, etc.) of the aid affects reliance on the aid	enhanced checklist, statistical model (simple, noncomputerized)	206 auditors	Going-concern evaluation	Auditors provided with a statistical model appeared to ignore the aid, while those provided with the enhanced checklist did exhibit partial reliance on the aid
Davis and Kottemann (1994)	Examine whether or not a what-if analysis feature in a decision support system affects users' perceived usefulness of the system	what-if analysis (decision support system) (intelligent); quantitative decision rule (simple, computerized)	E1: 45 managers; E2: 52 MBA students	Determine production and workforce levels over multiple periods	E1: What-if analysis did not affect performance; however, subjects overestimated usefulness of the analysis even in the face of outcome feedback. E2: Subjects overestimated the value of the what-if analysis relative to the decision rule; feedback did mitigate these results.
Davis and Kottemann (1995)	Examine the effects of outcome feedback and rule description on perceived rule usefulness	Quantitative decision rule (simple, computerized)	157 MBA students	Determine production and workforce levels over multiple periods	Overall, subjects underestimated usefulness of decision rule and suffered poorer performance; providing outcome feedback, however, mitigated these effects; rule description positively affected rule use behavior and performance (not perceived usefulness), unless feedback was provided as well. The effects of feedback eclipsed the effects of rule description.

Table 1 (continued)

Author(s)	Description	Type of aid	Subjects	Task	Results
Eining et al. (1997)	Examine how 3 different types of decision aids affect auditors' assessment of management fraud (prediction that the expert system's constructive dialogue feature enhances reliance on aid)	checklist, logit model (simple, computerized), expert system (intelligent)	93 auditors	Assess likelihood of management fraud	Auditors that used the expert system discriminated better between situations with varying levels of fraud than those provided with a logit model, a checklist, or no aid at all. Also, auditors selected more consistent subsequent decisions regarding appropriate audit actions than the other three conditions.
Glover et al. (1997)	Examine whether a decision aid impedes knowledge acquisition and encourages overreliance among inexperienced decision makers	Computerized worksheet (simple)	44 students	Determine taxpayer liability	Subjects provided with the aid gained less experiential knowledge about the task than those in the "No Aid" condition, and they also tended to inappropriately rely on the aid, in spite of the aid's limited accuracy.
Kachelmeier and Messier (1990)	Examine the effects of a decision aid on auditors' sampling size judgments	AICPA formula (simple, noncomputerized)	152 auditors	Determine nonstatistical sample size for supplies inventory	Sample sizes for the decision aid group were greater than those in the intuitive group; more importantly, a comparison of the parameters only and decision aid groups suggest that auditors "worked backwards" to arrive at a response consistent with the aid's response.
Kaplan et al. (2001)	2 experiments: examine whether reliance is affected by nondisclosure of aid's predictive ability, involvement with aid's development, & locus of control	mechanical model (simple, computerized)	E1: 91 auditors; E2: 61 masters' students	Bond rating prediction	E1: Subjects relied less when the aid's predictive ability was disclosed; those with an external locus of control relied more on DA than those with an internal locus of control. E2: Subjects involved in the aid's development relied more on aid, and there was a significant interaction between locus of control and involvement.
Kottemann et al. (1994)	Examine whether or not users properly assess their predictive ability/performance when using what-if analysis	what-if analysis (decision support system) (intelligent)	26 MBA students	Determine production and workforce levels over multiple periods	No difference between what-if and non what-if groups with respect to performance; however, what-if subjects perceived ability to be greater and their performance higher than those subjects in the non what-if group
Peterson and Pitz (1986)	Examine how mechanical model output affects decision makers' reliance and overall predictions	Statistical model (simple, noncomputerized)	20 MBA students	Predict how many games a baseball team won	Subjects more accurate with aid output than without, although still less accurate than model itself; lack of reliance on the model's prediction resulted in poorer and less consistent performance than model

Table 1 (continued)

Author(s)	Description	Type of aid	Subjects	Task	Results
Swinney (1999)	Examines whether or not auditors overrely on expert systems, and whether this overreliance is more pronounced for negative versus positive output	expert system (intelligent)	29 auditors	Evaluation of loan loss reserves	Auditors overrely on expert system output and rely more so when output is negative versus positive.
Todd and Benbasat (1992)	Examine the role of decision aids in subjects' use of information for decision making	decision support system (intelligent)	56 students	Apartment selection	Subjects provided with the aid did not use more information in making their decision; subjects relied on the aid as part of an effort minimization strategy.
Whitecotton (1996)	Develops a causal model that explains decision aid reliance as a result of three factors: users' confidence, experience, and agreement with aid	Probit statistical model (simple, computerized)	40 analysts; 35 students	Earnings forecast	Subjects' reliance on the aid was inversely related to their level of confidence; neither general experience nor agreement with the aid affected reliance; however, prior experience with the aid did affect reliance.
Whitecotton and Butler (1998)	Examine whether or not involvement with the decision aid's development mitigates users' reluctance to rely on the aid	decision support system (intelligent)	112 students	Bond rating prediction	Subjects given the choice of information to use relied more on aid's advice than those provided with the optimal aid; predictive accuracy decreased, however, with user input.
Ye and Johnson (1995)	Examine the influence of expert system (ES) explanation facilities on reliance	expert system (intelligent)	20 auditors	Analytical review	Auditors' held stronger beliefs in the ES' conclusions when provided explanations by the ES. Users requested a justification explanation most often.

Hypothesis Development

In this section, several hypotheses are developed with respect to decision aid reliance. The first subsection discusses the linkage between decision aid usage and reliance. This link is most important because it ties the decision aid reliance literature to the current study. The remainder of the chapter discusses several factors posited to affect decision aid reliance, namely, confidence, perceived usefulness, client size, and conformity pressure, indirectly via decision aid usage.

Decision Aid Reliance

As shown in Figure 1 (p. 36), the current study asserts a link between decision aid usage and decision aid reliance. As mentioned above, this link is important because it ties the current research into the decision aid reliance literature. While most studies in the decision aid reliance research stream tend to focus on a person's decision to accept the aid's output (i.e., directly affecting reliance), this study looks at the decision to use the aid prior to reliance. The underlying assumption is that if an individual uses the aid, they will be more likely to rely on its output.

The above link is also important because it more fully explains how an auditor determines whether to rely on a decision aid. In a practical setting, auditors do not generally receive output and then decide whether to accept the information. Rather, an auditor will first make a decision about whether to use an aid to perform a particular task. It is this decision (i.e., the choice to use the decision aid) that has the greatest influence on whether an auditor chooses to rely on an aid.

One theory that supports the link between decision aid usage and reliance is the notion of sunk costs with respect to decision-making, referred to in the psychology literature as escalation of commitment (Staw 1981). Simply put, escalation of commitment occurs when individuals do not ignore sunk costs and effectively "throw good money after bad" (Garland 1990). Arkes and Blumer (1985) suggest that individuals engage in this type of behavior to avoid appearing wasteful.

A similar situation exists with respect to an auditor's decision to rely on an aid's output they have chosen to use initially. In particular, auditors face time limitations such that it would appear wasteful to not rely on the output from a decision aid they have spent valuable time using. Rather than ignore the sunk cost of the spent time to use the aid, the auditor may see that time as wasted if he does not ultimately accept the aid's output.

Moreover, cognitive dissonance theory suggests that individuals justify to themselves the appropriateness of their actions (Aronson 1968). Whereas escalation of commitment has an external focus (e.g., An auditor will rely on the results of a decision aid he has chosen to use to not appear wasteful in the eyes of others.), cognitive dissonance has a more internal focus (e.g., An auditor who has chosen to use an aid will rationalize that his decision was appropriate, thus choose to accept the results of the aid).

Simply stated, Festinger's (1957) theory of cognitive dissonance says that when individuals have two inconsistent, (i.e., dissonant) pieces of information, they will attempt to reduce or remove the inconsistency. For example, Festinger (1957) used the example of a smoker hearing news that smoking leads to cancer. In that situation, the

smoker is uncomfortable with the fact that the news about smoking does not fit with his actions. Accordingly, the smoker will either change his behavior (i.e., stop smoking), or, as is more often the case, justify to himself why it is okay to continue smoking (e.g., The smoker may belittle evidence that links smoking to lung cancer.) (Festinger 1957).

Thus, the theory of cognitive dissonance rests on the notion that individuals are rationalizing animals, making an effort to appear rational to themselves and others (Aronson 1968). For example, Jermias (2001) found that even though individuals knew their decisions should be objective and rational, they were still biased toward their committed course of action (143). In an auditing context, cognitive dissonance theory suggests that auditors also justify to themselves decisions they have made. An auditor that uses a decision aid may assure himself that he has made the right decision by also accepting the results of the aid.

Finally, the Technology Acceptance Model (TAM) from the information systems literature (Davis 1989; Davis et al. 1989) and the Theory of Reasoned Action (TRA) from the social psychology literature (Fishbein and Ajzen 1975) contend that individuals' behavior is predicted by their intent to perform that behavior. For example, in their synthesis of several theories, including TRA and TAM, Venkatesh et al. (2003) found that individuals' intent to use a technology was a major determinant of their usage of that technology. Thus, in lieu of observing actual behavior, intent is considered an effective proxy (e.g., Warshaw 1980; Davis et al. 1989; Mathieson 1991; Taylor and Todd 1995a, 1995b; Venkatesh et al. 2003). Consistent with the TAM literature, the current study measures intent to use a decision aid, such that subjects who intend to use an aid will be more likely to rely on the output from the aid.

Consequently, I posit the following with respect to the auditor's decision to rely on the aid:

> H1: Auditors who intend to use a decision aid will be more likely to rely on the output given by the aid.

Kachelmeier and Messier (1990) examined the effects of forced reliance on decision aid usage. What is important to note about this study is that forcing subjects to use a decision aid effectively defeated its purpose, as subjects manipulated the inputs to the aid so it would reach the same conclusion they had already made manually. The conclusion from Kachelmeier and Messier (1990) suggests that forced reliance is not an appropriate way to incorporate decision aids into the audit process. Rather, it becomes important to understand the conditions under which auditors voluntarily use a decision aid.

In the spirit of Libby and Luft (1993) and Gibbins and Jamal (1993), the current study takes a holistic approach to identifying factors that affect decision aid usage. That is, the study aims to include several aspects of the auditor's decision to use and rely on an aid. In an auditing context, the decision to use a decision aid may be influenced by four types of factors: characteristics of the auditor (confidence), characteristics of the decision aid (perceived usefulness), characteristics of the client (size), and characteristics of the audit firm (conformity pressure).

<u>Confidence</u>

Confidence in one's ability (i.e., confidence), an auditor characteristic, was first attributed to decision aid reliance by Arkes et al. (1986). Specifically, the authors found

evidence to suggest that confidence is inversely related to reliance on a decision aid. A more recent study (i.e., Whitecotton 1996) continues to support this relationship. What remains unclear is how confidence affects decision aid usage.

As mentioned previously, Hypothesis 1 predicts that decision aid reliance is affected by the decision to use the aid. In contrast with prior literature that focuses on the decision to accept the output of a decision aid, the current study asserts that the most significant factor affecting reliance is the decision to use the aid first. Accordingly, the present study theorizes an indirect relationship between confidence and decision aid reliance mediated by decision aid usage. That is, individuals with high confidence in their abilities are less likely to rely on a decision aid because they choose not to use the aid initially. I posit the following hypothesis to test this relationship:

> H2: Auditors with greater (less) confidence in their ability to assess management fraud risk will be less (more) likely to use a decision aid.

<div align="center">Perceived Usefulness</div>

Another factor that may affect decision aid usage is perceived usefulness, a decision aid characteristic. A key variable in the Technology Acceptance Model (TAM) (Davis et al. 1989), perceived usefulness is posited to indirectly affect computer usage behavior. The TAM defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis 1989: 320).

Several studies (e.g., Szajna 1996; Venkatesh and Davis 2000; Wolfe et al. 2002; Venkatesh et al. 2003) provide evidence of the TAM's link between perceived

usefulness and usage behavior. For example, in a study where they synthesize several user acceptance theories (e.g., TAM), Venkatesh et al. (2003) examine whether perceived usefulness affects one's intent to use technology. Similar to past research, they found that perceived usefulness is a direct determinant of intent (Venkatesh et al. 2003: 467).

While prior studies have provided evidence to support the link between perceived usefulness and the decision to use information technology, none have looked at how perceived usefulness affects other types of decisions, such as the decision to use an aid. The TAM literature would suggest that perceived usefulness might apply to other decision contexts. Namely, if an auditor perceives a decision aid to be useful, they will be more likely to use it. Further, no study has examined the link between perceived usefulness and decision aid reliance. The current study thus extends the literature by testing a proposed relationship between perceived usefulness and reliance mediated by decision aid usage. I posit the following hypothesis:

> H3: Auditors who perceive (do not perceive) a decision aid to be useful
> will be more (less) likely to use the aid.

Client Size

In discussions with practitioners (Zimmerman 2004; Stinnett 2004), it was discovered that various audit tasks are affected, in part, by the size of the client, a client characteristic. For example, when evaluating internal control, client size is a factor in whether or not the auditor uses a decision aid for that part of the engagement (Stinnett 2004). Despite this evidence from practice, there is little research that addresses such a link.

Several studies have examined how client size affects various aspects of the audit, from the total amount of audit hours (e.g., O'Keefe et al. 1994; Stein et al. 1994) to the audit fee (e.g., Davis et al., 1993). For example, Stein et al. (1994) found that the size of the client was a major determinant of the amount of time spent on an engagement. These studies, however, do not address how client size impacts audit strategy.

Gist and Davidson (1999) did find results that suggest a link between client size and audit strategy. In examining the effect of client factors, such as size, on audit time budgets, Gist and Davidson (1999) found evidence to conclude that the allocation of budget hours among auditor positions varied with the size of the client. For example, partner hours would be a greater percentage of the total budget on larger clients. Hackenbrack and Knechel (1997) directly examined the relationship between certain engagement characteristics (e.g., client size) and the allocation of resources (e.g., number of partner hours) on the audit, finding similar results to Gist and Davidson (1999).

More importantly, Hackenbrack and Knechel (1997) found that firms place more emphasis on testing and reviewing critical audit objectives (i.e., those that involve significant risk, considerable judgment, or difficulty in gathering audit evidence) as client size increases. Based on this evidence, it is reasonable to expect that with a larger client the auditor will direct his or her attention to more critical areas, such as assessing management fraud risk. Accordingly, he will spend more time and effort, which may

include utilizing tools available to him, such as a decision aid. Thus, I posit the

following:

> H4: Auditors are more likely to use a decision aid to assess management
> fraud risk on a large client than a small client.

<u>Conformity Pressure</u>

Finally, the pressure one feels as a result of perceived group norms, i.e.,

conformity pressure (DeZoort and Lord 1997) may also influence an auditor's decision

to use a decision aid. Conformity pressure, an audit firm characteristic, is a type of

social influence pressure that is defined as pressure related to the influence that

individuals, within a firm, have on each other. In essence, individuals are affected by

perceived group norms and may react in a manner to be consistent with those norms

(DeZoort and Lord 1997: 41). Thus the influence that an auditor perceives from others

in the firm may affect his or her decision to use a decision aid.

Several studies in the information systems (IS) literature have considered

conformity pressure, also called subjective norms, and its relation to users' acceptance

of technology (e.g., Mathieson 1991; Venkatesh and Davis 2000). Per Venkatesh et al.

(2003), prior IS literature concludes that conformity pressure is not a significant

predictor of system usage in voluntary contexts (i.e., where the subject can voluntarily

use the system), which is the type of context used in the current study. The present

study, however, examines conformity pressure in an auditing environment, which is

different from an IS environment.

One difference is that auditors make numerous judgments and generally face

decisions with greater consequences. For example, auditors evaluate internal control,

deciding whether or not the client's controls are adequate. If the auditor decides

controls are adequate when, in fact, they are not, he or she will not perform necessary

substantive tests, which can result in an ineffective audit. On the other hand, if the

auditor decides controls are inadequate when, in fact, they are, he or she will perform

unnecessary substantive tests leading to an inefficient audit.

Another difference between an auditing and an IS environment is the multiple

layers of review on job assignments. Auditors are held accountable to a wide audience,

including not only the client, but also the client's investors and creditors, regulators, and

the general public. Thus, it is common for auditors to have their work reviewed by at

least two other auditors. For instance, an in-charge will have their decisions reviewed

first by their senior and then again by the audit partner. (In some firms, decisions may

also be reviewed by another partner in the office.) Decisions in an IS environment are

generally not subject to these multiple layers of review. All in all, the audit environment

is unique such that it would extend the literature by looking at how conformity pressure

affects auditor decision-making.

Unfortunately, there are only two accounting studies that address conformity

pressure (i.e., Ponemon 1992; Lord and DeZoort 2001). Moreover, the results from

these two studies are mixed. In examining conformity pressure and time reporting,

Ponemon (1992) found that subjects were more likely to underreport their time when

they faced conformity pressure. In contrast, Lord and DeZoort (2001) found that

conformity pressure did not increase subjects' willingness to sign off on materially

misstated financial statements.

Given the few accounting studies that examine conformity pressure and the fact that they provide mixed evidence suggests that there is still much more to learn in this area. Both Ponemon (1992) and Lord and DeZoort (2001) look at conformity pressure in a situation where the auditor is pressured to commit an unethical or unlawful act. The current study, however, adds to the literature by examining how conformity pressure affects an auditor's strategy in completing an important part of the audit engagement.

Despite these differences, the prior literature does provide some insight into this issue. The results from Ponemon (1992) and Lord and DeZoort (2001) suggest that the effect of conformity pressure is subtle. That is, it would have less effect on a decision with very serious consequences. Knowingly signing off on materially misstated financial statements (Lord and DeZoort 2001) would have more serious consequences (e.g., lawsuits against the firm, loss of license to practice, and damaged credibility) than underreporting time (Ponemon 1992) or choosing to use a decision aid, where the consequences would be much less severe. Thus, I posit the following:

> H5: Auditors who face (do not face) conformity pressure to use a decision aid will be more (less) likely to do so.

In the next section, I outline the study's research methodology. Specifically, I discuss the participants that are used as well as the experimental design and procedures. I also discuss in detail the experimental session, including the task assigned to subjects and the decision aid available to them.

Figure 1

Hypothesized Model
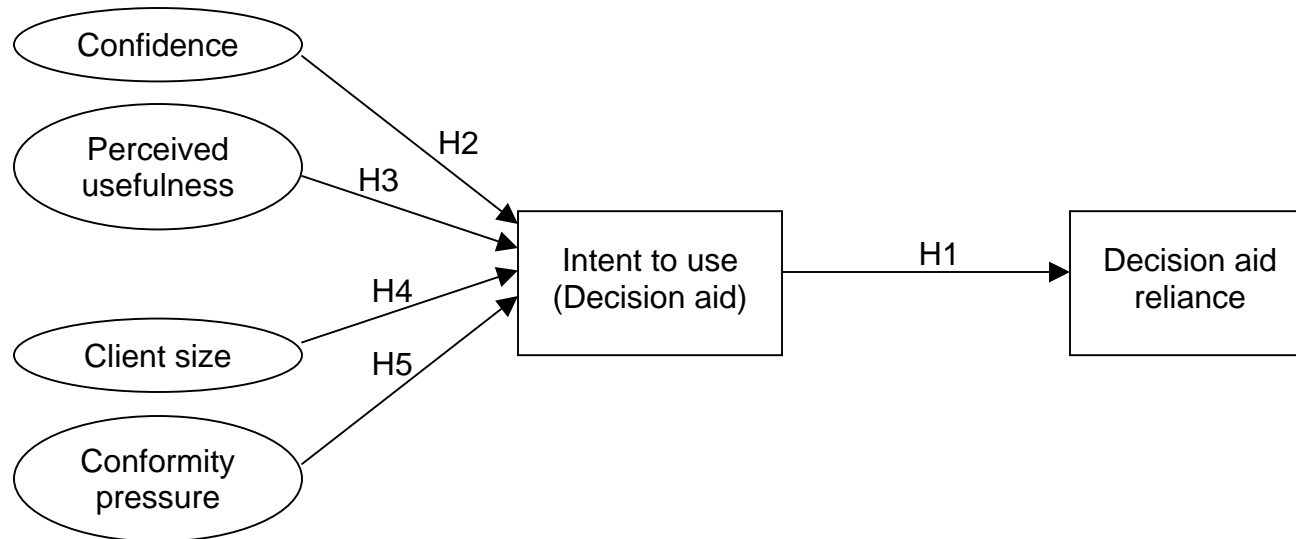
CHAPTER 3

METHODOLOGY

It is posited that several factors (i.e., confidence, perceived usefulness, client size, and conformity pressure) affect decision aid usage. Additionally, it is posited that subjects who choose to use a decision aid will be more likely to rely on the results of that aid than those subjects who do not choose to use an aid. To test these assertions, I conducted the following experiment where auditors are presented with a case in which they assess the risk of management fraud.

Participants

The participants for the study were practicing auditors, specifically, audit seniors. Selecting subjects at the senior level accomplishes two objectives. First, using seniors enhances the reliability of the results since they have experience with the process of assessing management fraud. Second, using seniors increases the external validity of the study since they are also involved in determining management fraud risk (AICPA 2003).

To acquire access to the necessary subjects, several large accounting firms were solicited. A letter, which provided a brief description of the study, the number of subjects needed, the amount of time to complete the task, etc., was sent to the research director or other appropriate contact person with each firm. Permission was granted by one firm to conduct the experiment at a senior-level training session. The session provided access to 156 subjects. (See Table 2, p. 48 for a summary of subject demographic characteristics.) Twenty-four subjects gave responses that were either

37

incomplete or did not meet the parameters required for analysis. Accordingly, they were

dropped from the sample, leaving a final sample of 132 subjects (85% of the original

sample). Of the remaining 132 subjects, about 51% were male and had about two

years of senior-level experience. Additionally, about 67% of the sample never worked

on an audit where fraud was present.

Experimental Session

After permission was granted, the firm provided information regarding the details

of the session, including the location and setup of the training facilities.

At the training facility, subjects were divided into five different rooms, which prompted

the need for five proctors (including the author), one for each room. The author

contacted four colleagues and employed them as proctors for the experiment. At the

training site, the proctors, all who were experienced in conducting experimental

activities, were trained in the experimental protocol.

Proctors were instructed as to their duties and responsibilities for the session.

The training included the following: Each proctor was assigned a room and provided

with a copy of the experimental protocol (Figure 3, p. 51), which included general

instructions for participants. They were also provided with the case materials to be

given to participants. Proctors were told that they were responsible for distributing and

collecting case materials as well as explaining to subjects the instructions for completing

the experiment.

The experimental session proceeded as follows: First, each proctor administered

the case materials, which had been randomly organized to achieve random assignment

of the materials. Next, each proctor read aloud the general instructions and explained the University of North Texas Institutional Review Board (IRB) information letter (attached to the outside of the case materials). Subjects were then instructed to complete the experimental task. (The task is described in more detail in the following section.)   After subjects completed the experiment, the proctor collected the materials.

After the session, all case materials were collected and proctors were debriefed. There was one item to note from the debriefing. One proctor observed two participants being inattentive during the session. (The proctor made a note on those subjects' case packets.)

Overall, the experimental session ran as expected. Except for the two subjects mentioned above, participants seemed attentive and exercised diligence in completing the packets. Further, subjects followed instructions, including the instruction to not go back and look at previous case materials. This was particularly important for maintaining the experiment's integrity.

After the session, each subject's case packet was examined for obvious problems, such as missing or incomplete materials, decision aid errors (e.g., miscalculations in determining the decision aid's final fraud risk assessment), etc. Attempts were made to correct any problems found. For example, one subject miscalculated the decision aid's final fraud risk assessment. In this case, the decision aid's assessment was recalculated based on the number of items the subject checked on the checklist. For those instances where it was not possible to make corrections, the subject was dropped from the sample.

Task

Subjects were randomly assigned to one of four treatment groups. The case

materials provided to subjects were organized as follows: Each packet consisted of two

envelopes, one that included the first company case and the questionnaire; and another

that included the second company case and the exit/demographics survey[6].

Participants were instructed by a proctor to open each envelope in order starting

with the first envelope and read the client case. The case, which describes a producer

of confectionery products, provided instructions to the senior that the manager on the

client engagement has asked that they assess management fraud risk for the company.

The case provided a summary of the company's operations as well as a memo from the

manager to the partner that documented the manager's discussions with the client.

Subjects were instructed to read the case and then use the enclosed decision aid to

make an assessment of management fraud risk for the company. This task was

intended to familiarize subjects with the task and the decision aid. After they completed

the task, subjects were instructed to replace the case to the envelope, and complete the

questionnaire. The questionnaire assessed the perceived usefulness of the decision

aid, subjects' confidence in performing the task, their intent to use the decision aid in the

future, and the likelihood they would accept the results of the aid.

After completing the questionnaire, subjects were instructed to return the

materials to the envelope, seal it, open the second envelope, and read the client case,

which describes a producer of paper products. Like the first case, seniors were given

instructions from the manager on the engagement to determine the level of

management fraud risk for the client. The case materials provided a summary of that

_____

[6] All case materials are presented at the end of the chapter (Figures 4-7, p. 52).

client's operations and a memo from the manager to the partner. The materials

differed, however, in that subjects had the option of using the decision aid to complete

the task. Subjects made their assessment of management fraud risk, with or without

the help of the decision aid.

Once they made their assessment, subjects were instructed to return the

materials to the envelope, and complete the exit/demographics survey. The survey

consisted of several questions related to information in the case materials (e.g.,

> Company B (pick one)
>   a. is one of our larger clients.
>   b. is one of our mid-cap clients.
>   c. is one of our smaller clients.

as well as several demographics questions (e.g., My age is _____.). After completing

the exit/demographics survey, subjects returned the survey to the envelope, sealed it,

and returned both envelopes to the proctor.

The Decision Aid

The decision aid used in the experiment is an enhanced checklist, which has two

parts: a checklist of risk factors related to management fraud and a combination rule

that subjects use to calculate the aid's overall assessment of fraud. In addition to being

utilized in the reliance literature (e.g., Eining et al. 1997; Davis 1998), Davis (1998)

notes that checklists are suggested by the literature for a variety of audit tasks.

Checklists are also commonly used in practice (Davis 1998: 37). Moreover, Davis

(1998) argues that an enhanced checklist may appear more credible to subjects

because the combination rule for the enhanced checklist is fairly easy to verify.

The checklist part of the decision aid is adapted from factors that are currently considered in practice (i.e., SAS #99). SAS #99 identifies several risk factors related to management fraud, which can be organized into the following categories: management characteristics and influence over the control environment, industry conditions, and operating characteristics and financial stability (AICPA 2003). The checklist used in the present study organizes risk factors using the above categories. Under each category are several fraud risk factors. For example, under the management characteristics category, risk factors include such items as excessive interest by management to maintain or increase the firm's stock price, high turnover of senior management, and inadequate monitoring of significant controls (AICPA 2003).

Per Eining et al. (1997), the risk factors used in the current study have different weights corresponding to varying levels of management fraud risk, with a "1" indicating a low risk factor, a "2" indicating a medium risk factor, and a "3" indicating a high risk factor (Figure 4, p. 54 and Figure 6, p. 63)[7]. For example, a related party transaction is a red flag indicating a high potential risk of management fraud (Eining et al. 1997; 10). In the present study, the presence of related party transactions is also considered a high risk factor, thus it has been given the highest weight of "3."

In addition to the checklist, the decision aid includes a combination rule that subjects used to calculate management fraud risk. The rule is used in conjunction with the checklist. Once subjects identified risk factors from the case, the combination rule was used to determine the likelihood of management fraud (Figure 4, p. 55 and Figure 6, p. 64). In addition to providing a percentage score for the likelihood of management fraud, the aid also gives an ordinal measure (e.g., the level of management fraud risk is

---

[7] The weights are shown in parentheses beside each risk factor.

"Very High"). The ordinal measure, which is commonly used in practice, is a 5-point

scale from "Very Low" (i.e., small likelihood of management fraud) to "Very High" (i.e.,

high likelihood of management fraud).

Variables

The study employs four independent variables, which are discussed in the first

subsection, and three dependent variables, which are discussed in the second

subsection.

Independent Variables

The experiment uses a 2 x 2 between-subjects design manipulating client size

and conformity pressure. The case materials given to subjects manipulated client size

by describing either a large or small client. In prior studies, client size was generally

operationalized as the company's total assets at the end of the fiscal year (e.g., O'Keefe

et al. 1994; Stein et al. 1994). For example, O'Keefe et al. (1994) examined firms with

total assets ranging from $101,000 to $5,408,000,000.   Consistent with the literature,

client size is operationalized in the present study as the company's total assets at the

end of the year. Client size is described in the case materials as either a large ($3.1

billion in assets, $3.5 billion in assets) or a small ($175 million in assets, $150 million in

assets) client (Figure 2, p. 50).

Additionally, it has been suggested by practitioners that another measure of

client size is the number of audit hours required to audit the client. Per discussions with

one practitioner, subjects are familiar with the idea of required audit hours, thus may

relate to this measure of client size more readily than the value of their clients' assets (Zimmerman 2004). Accordingly, the number of audit hours is also used to operationalize client size. The case materials provide the number of audit hours required to audit the client, either 3500 hours for a large client or 500 hours for a small client (Figure 2).

The conformity pressure variable is manipulated as the presence or absence of conformity pressure. Conformity pressure is defined as the pressure that an individual perceives from others in the organization (DeZoort and Lord 1997). That is, conformity pressure refers to the "power of suggestion" (i.e., perceived group norms) and does not require an explicit request from an individual (DeZoort and Lord 1997: 41). For example, Ponemon (1992) made conformity pressure operational as an unwritten, nonverbal signal. In his study, one group was given a shortened version of the experimental task to create time-to-completion differences between groups, which induced competitive and self-imposed pressure for the group given the full version (Ponemon 1992: 180).

Conformity pressure can also be operationalized more explicitly. For example, in Lord and DeZoort (2001), subjects in the conformity pressure condition were given a suggestion from the senior previously assigned to the audit. In the current study, conformity pressure is made operational in a similar fashion. For subjects in the conformity pressure condition, case materials include a comment that the senior previously assigned to the audit used the decision aid to complete the fraud assessment task (Figure 2). This comment is omitted in the materials given to subjects in the no conformity pressure condition.

In addition to manipulated variables, two variables, confidence and perceived usefulness, are measured. Subjects were asked about their level of confidence in performing the fraud assessment task, using several statements (e.g., I am confident in my ability to assess management fraud.) (Figure 2) derived from prior research. [See Bruner and Hensel (1994) for a further discussion of the confidence measure.] Perceived usefulness of the decision aid is also assessed using several statements (e.g., Using the decision aid would improve my job performance.) (Figure 2) derived from the Technology Acceptance Model (TAM) literature (Venkatesh et al. 2003). For both confidence and perceived usefulness, subjects indicated their level of agreement with the statements using a 7-point Likert scale from "Strongly Disagree" to "Strongly Agree"[8].

Dependent Variables

Three dependent variables are measured in the study, intent to use a decision aid, actual decision aid usage, and decision aid reliance. To measure intent to use a decision aid, subjects are asked the likelihood they would use the provided decision aid to complete the risk assessment task if available in the future[9] (i.e., If available in the future, how likely are you to use this decision aid to assess the risk of management fraud?) (Figure 2). Subjects indicated their response using a 7-point Likert scale from "Very Unlikely" to "Very Likely." Intent to use is also measured by subjects' agreement

---

[8] A 7-point scale was used because it was considered more suitable for multivariate analysis than a smaller scale (e.g., a 5-point scale).

[9] As noted previously, subjects responded to a questionnaire following completion of the fraud risk assessment task for the first client case. In addition to assessing perceived usefulness, user confidence, and decision aid reliance, the questionnaire also assesses subjects' intent to use the decision aid in the future.

with several statements (e.g., I like working with this decision aid.) (Figure 2) that are derived from the TAM literature (Venkatesh et al. 2003). Subjects indicated their level of agreement with the statements using a 7-point Likert scale from "Strongly Disagree" to "Strongly Agree."

Actual decision aid usage is assessed two ways. One is a self-reported measure[10] (i.e., To what extent did you use the decision aid to assess the risk of management fraud?) (Figure 2). Subjects responded using a 7-point Likert scale from "Not at All" to "Extensively." Actual decision aid usage is also measured by reviewing each subject's instrument to determine whether or not they used the decision aid. The researcher and a graduate assistant reviewed each instrument using the following two criteria. First, the decision aid checklist page (Figure 6, p. 63) was reviewed to see if subjects checked any items on the list. Second, the decision rule page (Figure 6, p. 64) was examined to determine if the subject used the rule to calculate fraud risk[11]. Subjects were then coded with a 1 (used the decision aid) or 0 (did not use the decision aid)[12].

Finally, decision aid reliance is also measured two ways. First, reliance is assessed using self-reported measures (e.g., To what extent did you rely on the output of this decision aid in making your final assessment of management fraud risk?) (Figure 2). Subjects responded using a 7-point Likert scale from "Not at All" to "Extensively." Second, decision aid reliance is measured by comparing each subject's final fraud risk

---

[10] As noted previously, after subjects read the second client case, they were asked to provide their assessment of management fraud risk, with or without the help of the decision aid.
[11] Details of this process are discussed in the results section (Chapter 4).
[12] Approximately 90% of the subjects used the decision aid (119 of 132 subjects).

assessment with the assessment provided by the decision aid. Similar to Whitecotton

(1996), a reliance score is computed as follows:

$$\text{Reliance (R)} = 100 - |P - A|,$$

where P is the subject's final fraud risk assessment, and A is the decision aid's fraud

risk assessment[13]. The absolute difference between P and A is subtracted from 100 to

compute the subject's reliance score[14].

Pilot Testing

Prior to the experiment, the case materials were reviewed to help ensure

agreement of which risk factors should be found. Two independent raters read both

cases and checked off the appropriate factors on the decision aid checklist. Afterward,

the raters met to reconcile any differences. Changes were made, as appropriate.

Further, all experimental materials, including the questionnaire and exit/demographics

survey, were pilot tested to determine whether subjects understood the wording used in

the experiment and whether the manipulations worked as intended[15].

In the next chapter, results of the experiment are discussed.

---

[13] The decision aid's fraud risk assessment was determined by the number of items that each subject checked off on his or her checklist (Figure 6, p. 63). For example, one subject checked off five factors, which per the decision rule (Figure 6, p. 64) gave a fraud risk assessment of 55%.
[14] Per the example in Footnote 11, the same subject gave his own fraud risk assessment of 60%. Thus, the subject's reliance score is computed as follows: Reliance(R) = 100 − |60 − 55| = 95.
[15] After the session, subjects completed a debriefing questionnaire (Figure 8, p. 68) to determine whether they were influenced by the manipulations and whether they understood the wording in the case materials.

Table 2

Participant Demographics*

	Average	Std. dev.	Low	High
Age: years	26.5	2.8	23	39
Firm experience: years	2.4	1.5	0.25	12
Public accounting experience: years	3.2	1.9	2	15
Senior-level experience: years	1.8	0.9	0	8
Experience on				
large audits (greater than 2500 audit hours): number	2.7	4.8	0	50
small audits (less than 800 audit hours): number	11.5	9.1	0	50

	Number	Percentage
Gender: Male	67	50.8%
Female	65	49.2%
Fraud experience: Number of auditors who have		
never worked on an audit where fraud was present	88	66.7%
worked on 1 or more audits where fraud was present	44	33.3%

* 156 auditors participated in the experiment. 24 subjects were dropped because their responses were either incomplete or did not meet the parameters required for analysis, leaving a final sample of 132 subjects. All results, including the above demographics are based on the final sample of 132 subjects.

Figure 2

Variables

<u>Independent Variables –</u>

Confidence:
I am confident in my ability to assess management fraud. (Curtis and Davis 2003)
I am not at all lacking in self-confidence. (Bruner and Hensel 1994)
I am confident in my understanding of the factors related to management fraud.
(Curtis and Davis 2003)
I sometimes worry about what people think of me. (Bruner and Hensel 1994)
I would be willing to supervise others on a fraud assessment task.
(Curtis and Davis 2003)

Perceived Usefulness:
Using this decision aid would improve my job performance. (Venkatesh et al. 2003)
Using this decision aid would make it easier to do my job. (Venkatesh et al. 2003)
Using this decision aid would make me less efficient at my job. (Venkatesh et al. 2003)
Using this decision aid in my job would increase my productivity.
(Venkatesh et al. 2003)
I would find this decision aid useful in my job. (Venkatesh et al. 2003)
Using this decision aid would enhance my effectiveness on the job.
(Venkatesh et al. 2003)

Covariates:
Age –
My age is _____. (Curtis and Payne 2004)
Gender –
My gender is   Male   Female. (Curtis and Payne 2004)
                         (circle one)
Experience –
I have been with the firm for _____ years. (Curtis and Payne 2004)
I have been in public accounting for _____ years. (Curtis and Payne 2004)
I have been in my current position for _____ years. (Curtis and Payne 2004)
How many audits have you worked on where management fraud was present?
(Curtis and Payne 2004)
How many audits more than 2500 hours have you worked on? (count multiple years
with the same client as multiple clients.) (Curtis and Payne 2004; Zimmerman 2004)
How many audits less than 800 hours have you worked on? (count multiple years with
the same client as multiple clients.) (Curtis and Payne 2004; Zimmerman 2004)

Figure 2 (continued)

Client Size:
Dichotomous (large/small client), manipulated by total assets [$3.1 billion, $3.5 billion for a large client; $175 million, 150 million for a small client] and required number of audit hours (3500 hours for a large client; 500 hours for a small client) (Zimmerman, 2004)

Conformity Pressure:
Dichotomous (presence/absence of conformity pressure), manipulated by presence/absence of a statement saying that the senior previously assigned to the audit used the aid in determining the level of management fraud risk
Statement--
> The senior on last year's audit, who has been promoted to manager, was also in charge of making an assessment of management fraud risk. He used the provided decision aid to make his assessment. (Lord and DeZoort 2001)

<u>Dependent Variables –</u>

Decision Aid Use:
Actual Use –
To what extent did you use the decision aid to assess the risk of management fraud?
Also, determine actual usage by examining the decision aid provided to each subject
Intent to Use –
I like working with this decision aid. (Venkatesh et al. 2003)
Using this decision aid for the given task is a good idea. (Venkatesh et al. 2003)
This decision aid makes work more interesting. (Venkatesh et al. 2003)
I get bored quickly when using this decision aid. (Venkatesh et al. 2003)
I like the idea of using this decision aid. (Venkatesh et al. 2003)
If available in the future, how likely are you to use this decision aid to assess the risk of management fraud?

Decision Aid Reliance:
Reliance score, *Reliance* (R) = $100 - |P - A|$ (Whitecotton 1996)
To what extent did you rely on the output of the decision aid in making your final assessment of management fraud risk?
If available in the future, how likely are you to use the results of this decision aid in making your final assessment of management fraud risk?

Figure 3

Experimental Protocol

Once the case materials have been distributed to participants, the room proctor will read aloud the following:

Good morning, and thank-you for your participation today.

Please note that everyone has two envelopes, labeled A and B with a number preceding the letters (e.g., 1A & 1B). Work through the envelopes in sequence, starting with the A envelope.

In addition to the study materials, the A envelope contains an information letter that explains the purpose and potential benefits and risks of the study, as well as your rights as a participant. Make sure you read the letter before you begin, and keep it for your records. If you have any questions, please let me know.

For each envelope, remove the materials and complete the assigned tasks. After completing a task, replace the materials to its respective envelope, and complete the next task. After completing all the tasks for a particular envelope, seal the envelope, and set aside. **It is important to not look back at completed materials or reopen an envelope once it is sealed.** After you complete the assigned tasks in both envelopes, return them to me.

Figure 4

Trial Run Case Materials

Thank-you for your participation in this study. Your responses will be kept confidential.

Instructions:

Assume you are a senior recently assigned to the audit for Company A. As part of planning the engagement, your manager has asked you to determine the level of management fraud risk for the company. Read the enclosed case information for Company A, including the memo to the engagement partner. After reading the materials, use the decision aid to determine the level of management fraud risk for the company. Then, return the case materials to the envelope, and complete the questionnaire. After completing the questionnaire, return it to the envelope, seal the envelope, and open the second envelope.

Case

Company A is in the candy business. They have been manufacturing and selling their candy products for over twenty-five years. Many of their candy products are sold under familiar brand names, such as **LuckyPops**, *Happy Farmer* lollipops, **YummyMints**, **Sweet Daddy** candy bars, **Maypearls**, **ChocoNuggets**, and **ChocoRolls**.

In addition to their line of candy products, Company A manufactures and sells a wide variety of chocolate and non-chocolate baking products. Some of their more popular brands include **Choco** Cocoa Mix, **Choco** Chocolate Chips, **Pearl** Coconut Flakes, and **Choco** Toffee Chips. They have been making these non-confectionery products for the past seven years.

Figure 4 (continued)

Memorandum

To: Engagement Partner

CC: Audit Senior

From: Audit Manager

Date: 3/8/2006

Re: Company A

Company A, one of our larger (smaller) clients, had total assets of $3.1 billion ($175 million) as of the end of the fiscal year. Based on previous experience, the client will require 3500 hours (500 hours for small client) to audit.

From my recent discussions with management, I have discovered the following additional information about the client.

- Company A's management is eager to increase their market value and have been aggressive in reporting earnings.

- Management has a strong interest in meeting analysts' earnings forecasts.

- Management is not concerned about their SOX sign-off of internal control. They believe their monitoring procedures are particularly strong.

- The audit committee is independent of senior management and is experienced in accounting matters.

- Company A has a strong customer demand for their products.

- A new regulation requirement on import items (e.g., cocoa, coconut) is expected to significantly increase the company's cost of raw materials.

- Company A has experienced growth in earnings over the past three years.

- The company's free cash flow has declined over the past three years.

HAYES & CO., CPA's

Figure 4 (continued)

Decision Aid –

A. Management Fraud Risk Factors Checklist

Instructions: The following is a list of risk factors related to management fraud. After reading the case information for Company A, place a checkmark beside those factors that are found in the case. Then, use the decision rule on the next page to determine the company's level of management fraud risk.

Management characteristics and influence over control environment –

_____ An excessive interest by management to maintain or increase the company's stock price using aggressive accounting practices (3)

_____ A strong tendency for management to commit to analysts, creditors, and other third parties to achieve earnings forecasts (3)

_____ Management of company by a single individual or group or persons without effective oversight from a board of directors or audit committee (3)

_____ Inadequate monitoring of significant controls (3)

_____ High turnover of senior management, counsel, or board members (2)

_____ Senior management is new and therefore inexperienced. (1)

_____ Management has a tendency to take unnecessary risks. (1)

Industry conditions –

_____ Declining industry, evidenced by increasing business failures and decreasing customer demand (2)

_____ New regulatory requirements that may affect the company's financial stability or profitability (2)

_____ High level of competition, accompanied by declining margins (2)

Operating and financial characteristics –

_____ Significant related-party transactions (3)

_____ Unusually rapid growth compared with other firms in the industry (3)

_____ Company has significant difficulty in generating cash flow from operations while reporting increasing earnings. (2)

_____ Company's accounting personnel are inexperienced. (1)

Figure 4 (continued)

B. Decision Rule

Instructions: At the end of each risk factor above, there is a number in parentheses. Sum the numbers in parentheses for each factor checked above. Place the total in the box below. This is the raw score.

$$\boxed{} \quad \textbf{X} \ \ \textbf{5} \ \ \textbf{=} \ \ \boxed{} \ \ \textbf{\%}$$

Multiply the raw score by 5 to get the final fraud risk assessment.

Given the above final percentage, use the scale below to determine the level of management fraud risk.

If the final score is

0 – 10%, the level of management fraud risk is **<u>Very Low</u>**.

11 – 35%, the level of management fraud risk is **<u>Relatively Low</u>**.

36 – 65%, the level of management fraud risk is **<u>Moderate</u>**.

66 – 90%, the level of management fraud risk is **<u>Relatively High</u>**.

Greater than 90%, the level of management fraud risk is **<u>Very High</u>**.

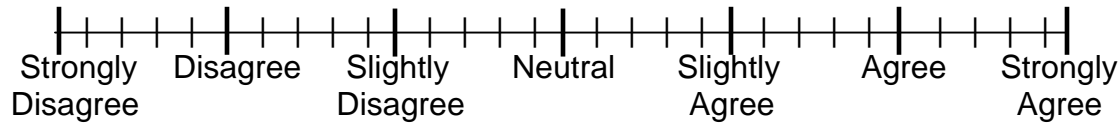Finally, write the result in the box provided (e.g., Relatively High).

$$\boxed{}$$
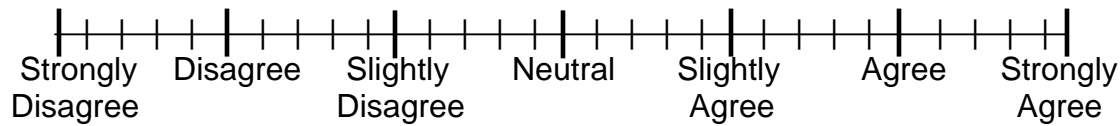
Figure 5

Questionnaire

Instructions: Answer the following. After completing the questionnaire, return it to the envelope, seal the envelope, and open the second envelope. **Please do not refer back to the case materials for Company A.**

A. Give your level of agreement with the following statements. Place an **"X"** on the scale below each statement.
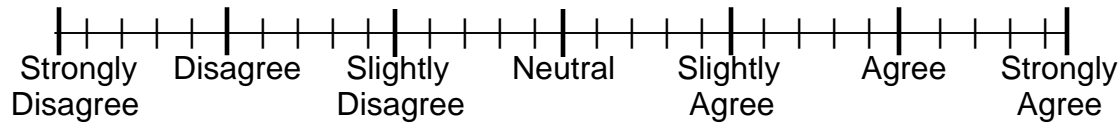
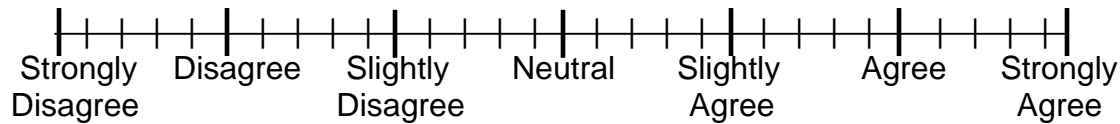1. Using this decision aid would improve my job performance.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

2. I like working with this decision aid.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

3. This decision aid is too complex to be helpful.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

4. Using this decision aid would make it easier to do my job.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

5. I am confident in my ability to assess management fraud.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

6. Using this decision aid for the given task is a good idea.

Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
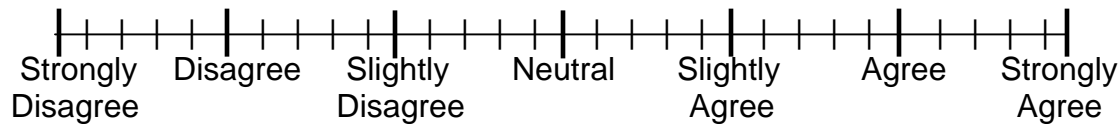Disagree   Disagree   Agree   Agree
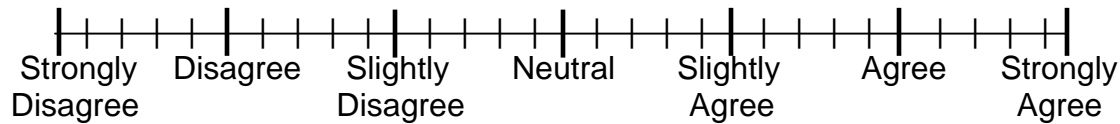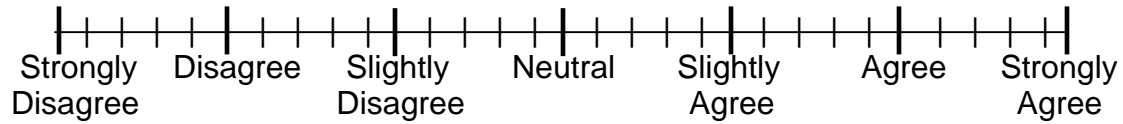
Figure 5 (continued)

7. Using this decision aid would make me less efficient at my job.

|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

8. I found this decision aid easy to use.
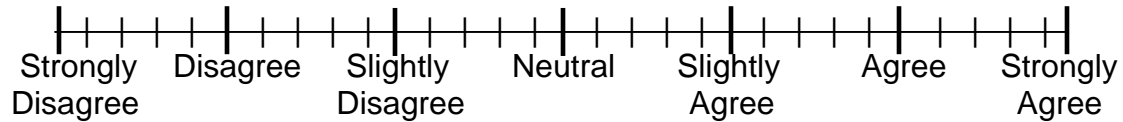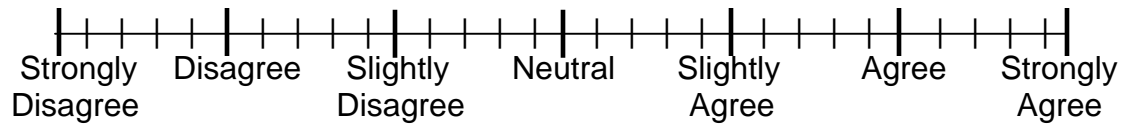
|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

9. I am not at all lacking in self-confidence.

|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

10. This decision aid makes work more interesting.

|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

11. Using this decision aid in my job would increase my productivity.

|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

12. I am confident in my understanding of the factors related to management fraud.

|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|

13. I would find this decision aid useful in my job.

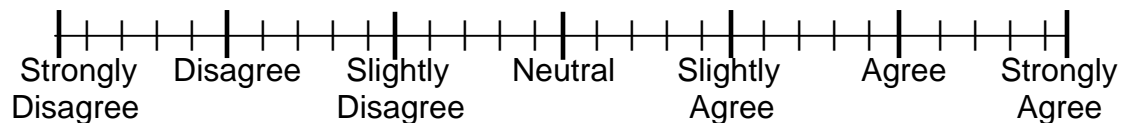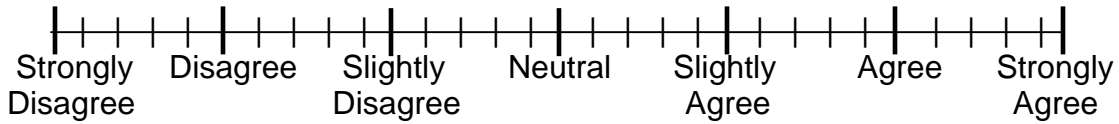|Strongly Disagree|Disagree|Slightly Disagree|Neutral|Slightly Agree|Agree|Strongly Agree|
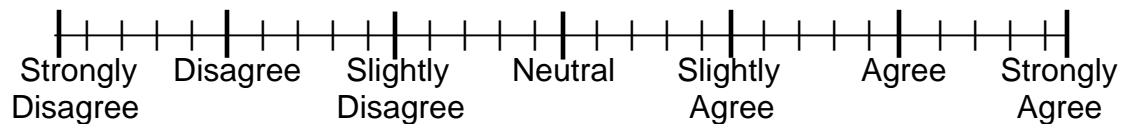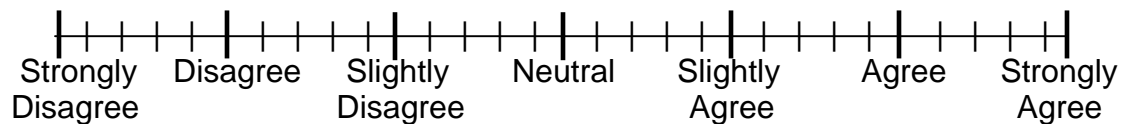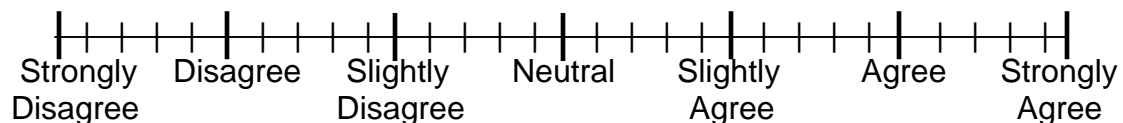
Figure 5 (continued)

14. It would be easy for me to become skillful at using this decision aid.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

15. I sometimes worry about what people think of me.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

16. I get bored quickly when using this decision aid.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree
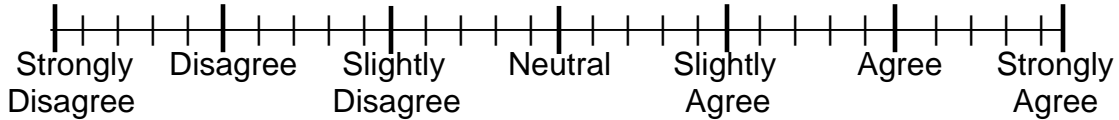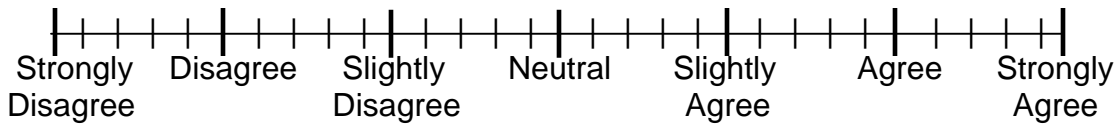
17. Learning to use this decision aid was easy for me.
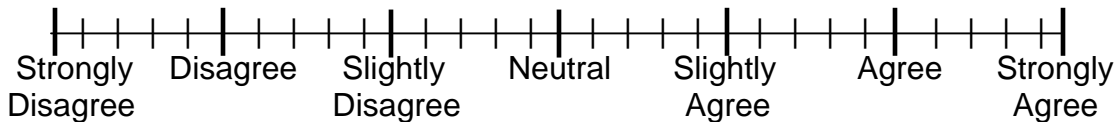
|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

18. I would be willing to supervise others on a fraud assessment task.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree

19. Using this decision aid would enhance my effectiveness on the job.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree
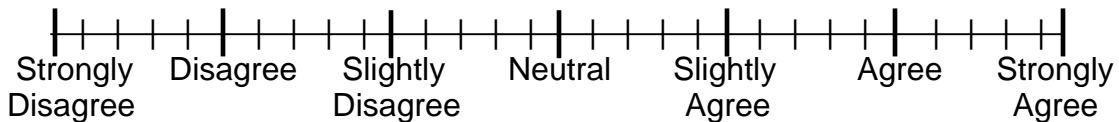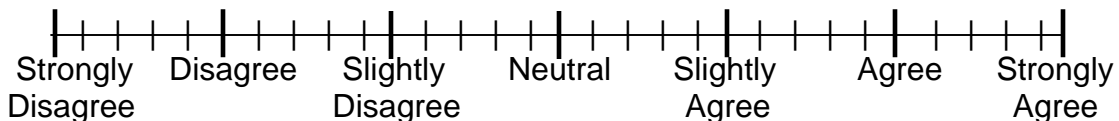
20. The instructions for how to use this decision aid were clear and understandable.

|++++|+++++|+++++|+++++|+++++|+++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree   Disagree   Agree   Agree
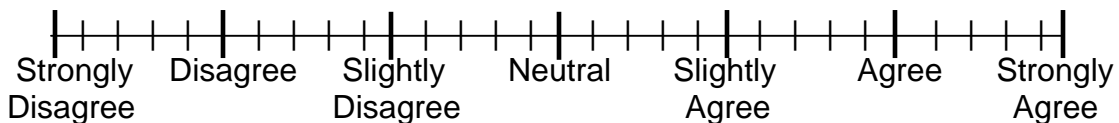
Figure 5 (continued)

21. I like the idea of using this decision aid.
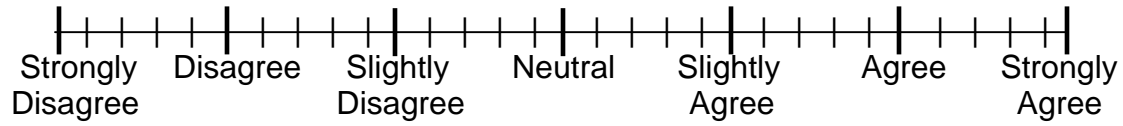
```
|++++|++++|++++|++++|++++|++++|++++|
Strongly   Disagree   Slightly   Neutral   Slightly   Agree   Strongly
Disagree              Disagree             Agree              Agree
```

B. If available in the future, how likely are you to use this decision aid to assess the risk of management fraud? Place an **"X"** on the scale below.

```
|++++|++++|++++|++++|++++|++++|++++|
Very       Unlikely   Slightly   Neutral   Slightly   Likely   Very
Unlikely              Unlikely             Likely              Likely
```

C. If available in the future, how likely are you to use the results of this decision aid in making your final assessment of management fraud risk? Place an **"X"** on the scale below.

```
|++++|++++|++++|++++|++++|++++|++++|
Very       Unlikely   Slightly   Neutral   Slightly   Likely   Very
Unlikely              Unlikely             Likely              Likely
```
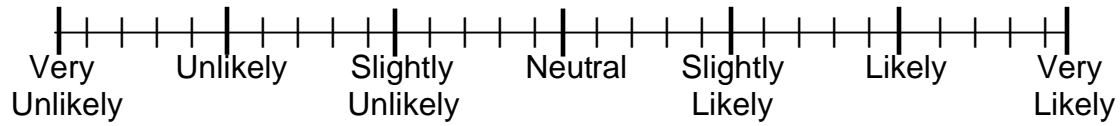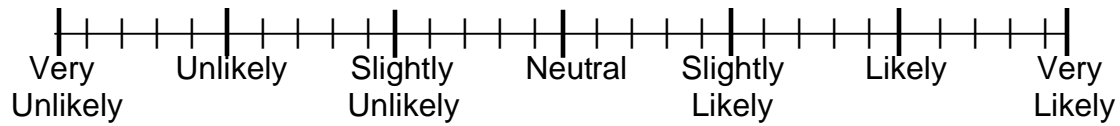
Figure 6

Experimental Case Materials

Instructions:

Assume you are a senior recently assigned to the audit for Company B. As part of planning the engagement, your manager has asked you to determine the level of management fraud risk for the company. Read the enclosed case information for Company B, including the memo to the engagement partner. After reading the materials, determine the level of management fraud risk for the company. You may use the provided decision aid to complete the task if you choose. After making your fraud risk assessment, return the case materials to the envelope, and complete the exit and demographics survey. After completing the survey, return it to the envelope and seal the envelope. **Please do not refer back to any materials in the first envelope.**

Case

Company B makes a variety of paper products. They organize their products under two distinct divisions. The Household Division produces products commonly found in the home. Some of their household products include paper towels, facial tissue, and toilet paper. Their Office Supplies Division makes several products, including computer paper, notepads, etc. They have been manufacturing and selling their products for over twenty years.

Figure 6 (continued)

Memorandum

To:	Engagement Partner
CC:	Audit Senior
From:	Audit Manager
Date:	3/8/2006
Re:	Company B

Company B, one of our larger (smaller) clients, had total assets of $3.5 billion ($150 million) as of the end of the fiscal year. Based on previous experience, the client will require 3500 hours (500 hours for small client) to audit.

The senior on last year's audit, who has been promoted to manager, was also in charge of making an assessment of management fraud risk. He used the provided decision aid to make his assessment (not provided for the absence of conformity pressure condition).

From my recent discussions with management, I have discovered the following additional information about the client.

- Bonuses for Company B's management are not tied to market value or earnings.

- The CEO, also the chairman of the board, has been with the company for the past 15 years.

- The president of one of the company's major customers is also the CEO's brother-in-law.

- The company's accounting department has hired several people this year, most of who are new to the industry.

- Because the industry has a strong customer demand, there have been many new entrants.

- New environmental regulations regarding the chemicals Company B uses in their processes are expected to adversely affect the company's market share in favor of more environmentally friendly alternatives.

- Cash from operations has increased from the prior year.

- Total sales have declined from the prior year.

HAYES & CO., CPA's

Figure 6 (continued)

Management Fraud Risk Assessment

Instructions: Based on the given case information, determine the level of management fraud risk. A copy of the decision aid follows. You are welcome are to use the aid if you choose.

Place an **"X"** on the scale below for the level of management fraud risk for Company B.
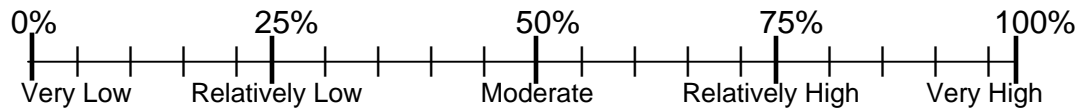
```
0%            25%           50%           75%          100%
├─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┼─┤
Very Low    Relatively Low    Moderate    Relatively High   Very High
```

Figure 6 (continued)

Decision Aid –

A. Management Fraud Risk Factors Checklist

Instructions: The following is a list of risk factors related to management fraud. After reading the case information for Company B, place a checkmark beside those factors that are found in the case. Then, use the decision rule on the next page to determine the company's level of management fraud risk.

Management characteristics and influence over control environment –

_____ An excessive interest by management to maintain or increase the company's stock price using aggressive accounting practices (3)

_____ A strong tendency for management to commit to analysts, creditors, and other third parties to achieve earnings forecasts (3)

_____ Management of company by a single individual or group or persons without effective oversight from a board of directors or audit committee (3)

_____ Inadequate monitoring of significant controls (3)

_____ High turnover of senior management, counsel, or board members (2)

_____ Senior management is new and therefore inexperienced. (1)

_____ Management has a tendency to take unnecessary risks. (1)

Industry conditions –

_____ Declining industry, evidenced by increasing business failures and decreasing customer demand (2)

_____ New regulatory requirements that may affect the company's financial stability or profitability (2)

_____ High level of competition, accompanied by declining margins (2)

Operating and financial characteristics –

_____ Significant related-party transactions (3)

_____ Unusually rapid growth compared with other firms in the industry (3)

_____ Company has significant difficulty in generating cash flow from operations while reporting increasing earnings. (2)

_____ Company's accounting personnel are inexperienced. (1)

Figure 6 (continued)

B. Decision Rule

Instructions: At the end of each risk factor above, there is a number in parentheses. Sum the numbers in parentheses for each factor checked above. Place the total in the box below. This is the raw score.

☐ **X 5 =** ☐ **%**

Multiply the raw score by 5 to get the final fraud risk assessment.

Given the above final percentage, use the scale below to determine the level of management fraud risk:

If the final score is

0 – 10%, the level of management fraud risk is **Very Low**.

11 – 35%, the level of management fraud risk is **Relatively Low**.

36 – 65%, the level of management fraud risk is **Moderate**.

66 – 90%, the level of management fraud risk is **Relatively High**.

Greater than 90%, the level of management fraud risk is **Very High**.

Finally, write the result in the box provided (e.g., Relatively High).

☐

Figure 7

Exit and Demographics Survey

Instructions: Answer the following. Then, return the survey to the envelope and seal the envelope. **Please do not refer back to any materials in the first or second envelopes.**
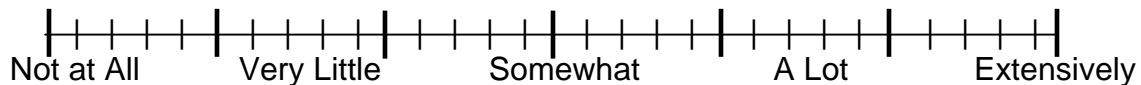
To what extent did you <u>use this decision aid</u> to assess the risk of management fraud? Place an **"X"** on the scale below.
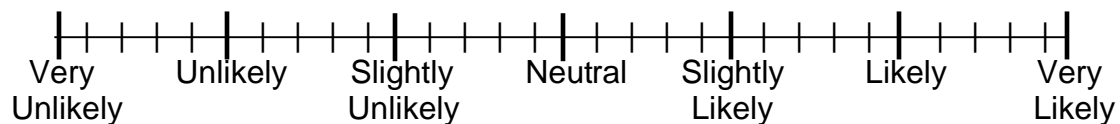
```
├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤
Not at All      Very Little      Somewhat         A Lot      Extensively
```
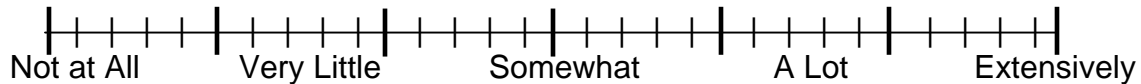
If applicable, to what extent did the senior's use of this decision aid affect your decision to use the aid? Place an **"X"** on the scale below.
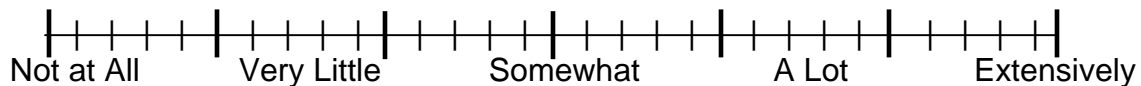
```
├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤
Not at All      Very Little      Somewhat         A Lot      Extensively
```

To what extent did you <u>rely on the output of this decision aid</u> in making your final assessment of management fraud risk? Place an **"X"** on the scale below.

```
├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤
Not at All      Very Little      Somewhat         A Lot      Extensively
```

If available in the future, how likely are you <u>to use this decision aid</u> to assess the risk of management fraud? Place an **"X"** on the scale below.

```
├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤
  Very       Unlikely      Slightly      Neutral      Slightly      Likely        Very
Unlikely                   Unlikely                    Likely                     Likely
```

If available in the future, how likely are you <u>to use the results of this decision aid</u> in making your final assessment of management fraud risk? Place an **"X"** on the scale below.

```
├┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┤
  Very       Unlikely      Slightly      Neutral      Slightly      Likely        Very
Unlikely                   Unlikely                    Likely                     Likely
```
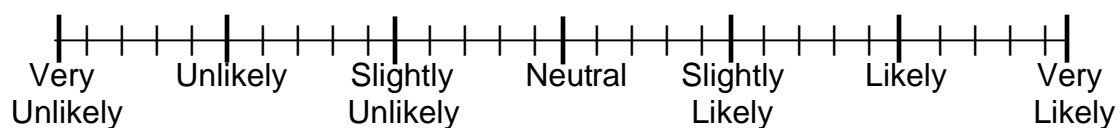
Figure 7 (continued)

My age is _____.

My gender is   Male   Female.
                         (circle one)

I have been with the firm for _____ years.

I have been in public accounting for _____ years.

I have been in my current position for _____ years.

How many audits have you worked on where management fraud was present?
_____

How many audits greater than 2500 hours have you worked on? (count multiple years with the same client as multiple clients.) _____

How many audits less than 800 hours have you worked on? (count multiple years with the same client as multiple clients.) _____

Company A manufactures (pick one)
        a. home & office furniture.
        b. paper products.
        c. confectionary items.

Company B (pick one)
        a. is one of our larger clients.
        b. is one of our mid-cap clients.
        c. is one of our smaller clients.

Company B's industry has (pick one)
        a. had many new entrants.
        b. had no new entrants.
        c. had several companies exit the industry.

Figure 7 (continued)

Company A's (pick one)
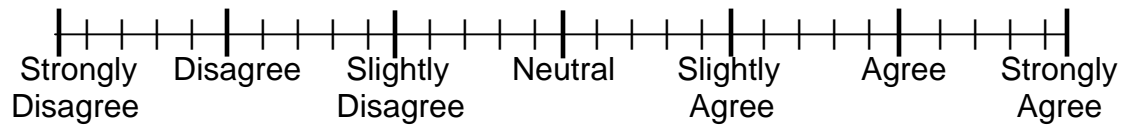   a. monitoring of internal controls is weak.
        b. monitoring of internal controls is average.
        c. monitoring of internal controls is strong.
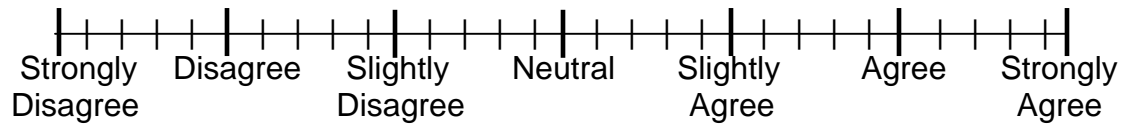

The senior previously assigned to Company B (pick one)
        a. used this decision aid for the given task.
        b. did not use this decision aid for the given task.
        c. did not indicate whether or not they used this decision aid.

Finally, give your level of agreement with the following statements. Place an **"X"** on the scale below each statement.
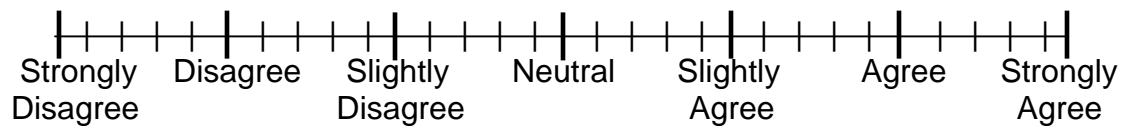
People who influence my behavior think that I should use this decision aid.

Strongly Disagree   Disagree   Slightly Disagree   Neutral   Slightly Agree   Agree   Strongly Agree

People who are important to me think that I should use this decision aid.

Strongly Disagree   Disagree   Slightly Disagree   Neutral   Slightly Agree   Agree   Strongly Agree

In general, my organization supports the use of this decision aid.

Strongly Disagree   Disagree   Slightly Disagree   Neutral   Slightly Agree   Agree   Strongly Agree

Thank-you for your participation!

Figure 8

Debriefing Questionnaire (Pilot Study)

Instructions: Please respond to the following.

1. Was the information about the company's total assets enough to make you think about whether or not to use the decision aid? If not, how could I re-frame it?

2. Was the information about the required number of hours enough to make you think about whether or not to use the decision aid? If not, how could I re-frame it?

3. If applicable, was the previous senior's opinion about the decision aid enough to make you think about whether or not to use the decision aid? If not, how could I re-frame it?

4. Is there anything else that would influence your decision to use the decision aid that I did not ask about in the case study?

5. Please identify anywhere the wording seemed unclear:

6. Please identify anywhere the wording seemed clumsy:

CHAPTER 4

RESULTS & DISCUSSION

Manipulation Checks

As discussed in the previous chapter, several variables (confidence, perceived usefulness, client size, conformity pressure, intent to use, and decision aid reliance) are considered in the study. Two of these variables, namely, client size and conformity pressure, were manipulated in the experiment. In the cases given to participants, client size was manipulated by describing either a large or small client. Conformity pressure was manipulated by the inclusion or exclusion of a statement saying the senior previously assigned to the audit used the decision aid. To check these manipulations, subjects were asked two questions in the exit survey.

For the client size manipulation check, subjects were asked about the size of the client. Specifically, they were asked whether the company in the case was a) one of our larger clients, b) one of our mid-cap clients, or c) one of our smaller clients. For the manipulation to be successful, subjects given a large client should have answered a), while subjects given a small client should have answered c). A X^2 test confirms that significantly more participants (81 subjects, 61% of the sample) answered the question correctly than by chance [$X^2 (1) = 6.82$, $p < 0.01$], which suggests that participants were attentive to the client size manipulation.

For the conformity pressure manipulation check, subjects were asked whether or not the senior previously assigned to the client had used the decision aid. Specifically, they were asked whether the senior a) used this decision for the given task, b) did not use this decision for the given task, or c) did not indicate whether or not they used this

decision aid. For the manipulation to be successful, subjects in the conformity pressure condition should have answered a), and subjects in the no conformity pressure condition should have answered c). Again, a X^2 test confirms that significantly more participants (93 subjects, 70% of the sample) answered the question correctly than by chance [X^2 (1) = 22.09, $p < 0.01$], which suggests that participants in the conformity pressure condition were attentive to the manipulation.

Hypothesis Testing

Before testing the hypotheses, it was first necessary to create summated scales for confidence, perceived usefulness, and intent to use. During the experiment, subjects provided responses to several statements that assessed the aforementioned variables. Those responses were averaged to create a single measure for each variable (Hair et al. 1998). Reliability analysis was performed to ensure that the items in each summated scale were internally consistent. Cronbach's alpha coefficients were calculated for confidence (0.73), perceived usefulness (0.89), and intent to use (0.87). The coefficients for all three variables exceed the generally agreed upon lower limit for Cronbach's alpha, which is 0.70 (Hair et al. 1998).

Additionally, it was important to corroborate the decision to utilize intent to use instead of actual usage in the data analysis[16]. Toward that end, subjects' summated scales (intent to use) were correlated with a score for actual use. As mentioned in the previous chapter, each subject's instrument was reviewed by the researcher to determine whether or not they used the decision aid. First, the decision aid checklist

---

[16] As noted in the previous chapter, the current study uses intent to use as a proxy for actual use, a common practice in the TAM literature where intent is considered an effective proxy (e.g., Mathieson 1991; Taylor and Todd 1995a, 1995b; Venkatesh et al. 2003).

page (Figure 6, p. 63) was reviewed to see if subjects checked any items on the list. Second, the decision rule page (Figure 6, p. 64) was examined to determine if the subject used the rule to calculate fraud risk. Specifically, if they used the rule, one will see the raw score entered on the page as well as the calculation to get the final fraud risk assessment. Further, one will see the ordinal measure for fraud risk (e.g., Very High) entered at the bottom of the page.

For example, during a review of one subject's checklist, it was noted that they checked off five factors; on the decision rule page, it was noted that they had added up the weights for each of the five factors (total = 11), entered that total (raw score), then multiplied by five to get the final fraud risk assessment (i.e., 55). They also entered the ordinal measure at the bottom of the page (i.e., Moderate). Based on this information, it was determined that the subject used the decision aid and was given a score of 1. In contrast, it was noted that for another subject, both the checklist and decision rule pages were left blank. Based on this information, it was determined that the subject did not use the decision aid and was given a score of 0. All subjects' instruments were examined and given either a score of 1 (used the aid) or 0 (did not use the aid). These scores were strongly correlated with each subject's summated scale for intent to use (Pearson: 0.252, p = 0.003).

Hypothesis 1 predicts that auditors who intend to use a decision aid will be more likely to rely on the output given by the aid. To test this hypothesis, subjects' summated scale for intent to use was regressed on their reliance score (i.e., the difference

between the subject's fraud risk assessment and the decision aid's assessment[17]) as shown in the following equation:

$R = \beta_0 + \beta_1 I + \varepsilon$, where R is reliance and I is intent to use.

Results of the regression indicate that intent is a strong predictor of reliance ($\beta = 1.004$, $p = 0.000$), thus supporting Hypothesis 1. Namely, auditors who intend to use a decision aid will be more likely to rely on the output given by the aid.

Hypothesis 2 predicts that auditors with more confidence in their ability to assess management fraud risk will be less likely use a decision aid. Hypothesis 3 predicts that auditors will more likely use a decision aid if they perceive the aid to be a useful tool. Hypothesis 4 predicts that auditors will more likely use a decision aid on a large client than a small client, and Hypothesis 5 predicts that auditors who face conformity pressure will more likely use a decision aid. Multivariate analysis was used to test these four hypotheses.

Since client size and conformity pressure are dichotomous variables, they were coded in the analysis with a "1" or "0." For subjects that were given a large client case, they were coded with a "1" for client size; subjects given a small client case were coded with a "0." Subjects in the conformity pressure condition were coded with a "1" for conformity pressure; subjects not in the conformity pressure condition were coded with a "0."

An examination of simple correlations among the variables (Table 3, p. 76) provides a first glimpse at possible significant relationships. Table 3 shows a strong correlation between perceived usefulness and intent to use, which is consistent with

---

[17] As noted in the previous chapter, the decision aid's assessment is determined on a subject-by-subject basis. Namely, the aid's assessment is based on the items that each subject checks off on their checklist (Figure 6, p. 63).

Hypothesis 3. The table also shows a strong negative correlation between client size and intent, which is inconsistent with Hypothesis 4.

Table 4 (p. 77) presents the results of the multivariate analysis. Perceived usefulness is significant ($p = 0.000$)[18], supporting Hypothesis 3. Namely, the results suggest that auditors are more likely to use a decision aid if they perceive the aid to be a useful tool. Despite the initial evidence provided by the correlation matrix (Table 3), client size is not significantly related to intent to use ($p = 0.491$) in the presence of other variables; thus Hypotheses 4 is not supported. Further, no significant relationship exists between confidence and intent to use and conformity pressure and intent to use; thus Hypotheses 2 and 5 are not supported.

Additional analysis was performed to determine if confidence, client size, and conformity pressure are significantly related to intent to use in the absence of perceived usefulness[19]. Perceived usefulness was removed from the analysis, and multivariate tests were performed on the remaining variables (i.e., confidence, client size, and conformity pressure). The results of the analysis show that client size is significantly related to intent to use ($p = 0.021$), but in the opposite direction of Hypothesis 4[20]. Namely, auditors are more likely to use a decision aid on a small client.

A possible explanation is that a smaller client may be riskier from an audit standpoint because their accounting personnel are generally less experienced than personnel at larger clients (Zimmerman 2005). Accordingly, an auditor may be more

---

[18] No interaction effects were found. Accordingly, the analysis presented in Table 4 excludes consideration of interaction effects.

[19] Table 3 shows a strong negative correlation between client size and perceived usefulness. To address the concern that the effect of perceived usefulness is overshadowing the effects of other variables (e.g., client size), multivariate analysis was performed on the other variables excluding perceived usefulness (Hair et al. 1998).

[20] Consistent with the initial multivariate analysis, confidence and conformity pressure are not significantly related to intent to use.

likely to use the decision aid on a smaller client. The model itself, however, is no longer significant ($p = 0.083$) when perceived usefulness is removed. Thus, the results suggest that the model is incomplete without perceived usefulness included.

As shown in Table 4, client size is not significantly related to intent to use. A possible explanation is that the manipulation did not work as intended. As mentioned previously, subjects were asked a question about the size of the client.   Although the analysis of the manipulation check suggests that the manipulation was successful [X^2 (1) = 6.82, $p < 0.01$], only 61% of the sample answered the client size question correctly. In other words, almost 40% of the sample answered the question incorrectly.

Further, although an audit partner was consulted in the development of the case materials, it is possible that some subjects perceived the size of the client differently than intended. For example, some subjects in the large client condition may have perceived their client to be smaller relative to their own clients. Overall, it is reasonable to conclude that the results for client size are confounded by an apparent problem with the manipulation.

Conformity pressure is also not significantly related to intent to use. Similar to client size, a possible explanation lies in the manipulation. Subjects were asked whether or not the senior previously assigned to the client had used the decision aid. Although the analysis of the manipulation check suggests that the manipulation was successful [X^2 (1) = 22.09, $p < 0.01$], only 70% of the sample answered the conformity pressure question correctly. Despite efforts to make the case materials appear realistic, some of those subjects in the conformity condition may not have felt pressured by their peer's use of the decision aid (i.e., the senior previously assigned to the client). Thus,

similar to client size, the results for conformity pressure are likely confounded by a problem with the manipulation.

Interestingly, in contrast with prior literature that suggests otherwise (Arkes et al. 1986; Whitecotton 1996), confidence does not affect an auditor's intent to use a decision aid[21]. One important difference between those studies and the current one is the type of subjects used. Arkes et al. (1986) used students in their experiment, while Whitecotton (1996) used both students and financial analysts; the current study uses auditors. The audit environment is unique in that auditors make numerous judgments and generally face decisions with greater consequences. Thus, it is possible that in an audit setting, confidence is not a significant factor in deciding whether or not to use a decision aid. Rather, other factors, such as the perceived usefulness of the decision aid, are considered more important.

Additionally, post hoc analysis was conducted to address the concern that the summated scale for confidence is an inappropriate measure[22]. Accordingly, the two items that relate to general confidence were removed, and the multivariate analysis was run again with the new summated scale for confidence. While the Cronbach's alpha coefficient was higher for the new summated scale (0.75), the results of the multivariate analysis were unchanged. Specifically, perceived usefulness is significant ($p = 0.000$), and the other variables, including confidence, are not significant.

---

[21] The implication from both Arkes et al. (1986) and Whitecotton (1996) is that subjects rely less on a decision aid when they have more confidence in their ability to perform a particular task. Although these studies deal with the concept of decision aid reliance, it is reasonable to expect that confidence would have a similar effect on one's decision to use a decision aid.

[22] Of the five statement items that make up the confidence scale (Figure 2, p. 49), three items relate specifically to subjects' confidence on the management fraud task, while the other two items relate to subjects' confidence in general.

Table 3

Correlation Matrix

	Client size	Conformity pressure	Confidence	Perceived usefulness	Intent to use	Decision aid reliance
Client size	1.000					
Conformity pressure	0.017	1.000				
Confidence	0.069	-0.064	1.000			
Perceived usefulness	-0.197*	-0.143	0.009	1.000		
Intent to use	-0.202*	-0.099	0.015	0.891**	1.000	
Decision aid reliance[23]	-0.201*	0.056	0.049	0.318**	0.417**	1.000

* $p < 0.05$
** $p < 0.01$

[23] The correlations with reliance are based on a smaller sample (n = 119) because only those subjects that used the decision aid have a reliance score. All other correlations are based on a sample of 132 subjects.

Table 4

Multivariate Analysis (Hypotheses 2-5)

Source of Variation	Sum of Squares	df	Mean Square	F	p-value
Confidence	0.393	1	0.393	0.079	0.780
Perceived usefulness	2328.516	1	2328.516	465.187	0.000*
Client size	2.385	1	2.385	0.477	0.491
Conformity pressure	2.721	1	2.721	0.544	0.462
Residual error	635.704	127	5.006		

* $p < 0.01$

Mediation Testing

As noted in Chapter 2, the posited link between intent to use the decision aid and subsequent reliance on the aid (Figure 1, p. 36) is critical because it ties the current study into the decision aid reliance literature. Therefore, it is necessary to test whether intent to use mediates the relationship between the several independent variables (e.g., perceived usefulness) and reliance on the aid. Mediation was tested using a stepwise regression technique (Holmbeck 1997; Baron and Kenny 1986).

Per Baron and Kenny (1986), four conditions are considered in establishing mediation:

1) the independent variable (e.g., perceived usefulness) must be significantly related to the dependent variable (i.e., reliance) (Path a; Figure 9, p. 82),

2) the independent variable must be significantly related to the mediator (i.e., intent to use) (Path b; Figure 9),

3) the mediator must be significantly related to the dependent variable (Path c; Figure 9) after controlling for the independent variable, and

4) the effect of the independent variable on the dependent variable (Path a: Figure 9) is less after controlling for the mediator.

The stepwise regression technique was utilized to test whether intent to use mediates the relationship between perceived usefulness and reliance on the decision aid. As noted previously, Hypothesis 3 is supported; that is, perceived usefulness is significantly related to intent to use, supporting the above second condition for establishing mediation. Hypothesis 2, 4, and 5, however, were not supported; namely, confidence, client size, and conformity pressure were not significantly related to intent to

use. Thus, in the mediation analysis that follows, perceived usefulness is the only variable considered.

A series of three regressions were estimated to test whether intent to use mediates the relationship between perceived usefulness and reliance on the decision aid.

Condition 1

Perceived usefulness was regressed on subjects' reliance scores (path a; Figure 9). Table 5, Panel A (p. 83) shows the results of the analysis. Path a (i.e., perceived usefulness regressed on reliance) is significant ($p = 0.000$), thus supporting the first condition for establishing mediation.

Condition 2

Perceived usefulness was also regressed on intent to use (Path b; Figure 9). Table 5, Panel B shows the results of the analysis. Path b (i.e., perceived usefulness regressed on intent to use) is significant ($p = 0.000$), thus supporting the second condition for establishing mediation.

Conditions 3 & 4

Intent to use and perceived usefulness were both regressed on subjects' reliance scores (paths c and a, respectively; Figure 9). The effect of intent to use on decision aid reliance was measured, controlling for perceived usefulness (Condition 3), and the effect of perceived usefulness on decision aid reliance was measured, controlling for

intent to use (Condition 4) (Holmbeck 1997; Baron and Kenny 1986). Table 5, Panel C

shows the results of the analysis. Path c (i.e., intent to use regressed on decision aid

reliance) is significant ($p = 0.001$), controlling for perceived usefulness (Condition 3).

Further, the effect of perceived usefulness on decision aid reliance (Path a) is less after

controlling for intent to use (Condition 4) and is no longer significant ($p = 0.178$).

As an additional test to support Condition 4, the Aroian test, which is a

modification of the Sobel test, was used (Preacher and Leonardelli 2003). The Aroian

test measures whether the mediator (i.e., intent to use) carries the influence of the

independent variable (i.e., perceived usefulness) to the dependent variable (i.e.,

decision aid reliance) (Preacher and Leonardelli 2003). Mathematically, it tests

Condition 4 directly, namely that the product of the regression coefficients for paths b

and c equal zero (i.e., $bc = 0$). Per Baron and Kenny (1986), the Aroian test is

calculated by dividing bc by its standard error (i.e., $bc/\sqrt{c^2 s_b^2 + b^2 s_c^2 + s_b^2 s_c^2}$). The

resulting ratio is treated as a z test. The results of this test are significant ($z = 3.442$,

$p = 0.000$). Overall, the results of the stepwise regression technique suggest that that

intent to use mediates the relationship between perceived usefulness and decision aid

reliance. Further, the results of the above Aroian test suggest that intent to use is a

potent mediator between perceived usefulness and decision aid reliance.

In sum, the above results support the proposed link between decision aid usage

and reliance. As discussed previously, this link is an important facet of the present

study because it provides a clearer picture of an auditor's decision to rely on an aid. In

a practical setting, auditors generally make an initial decision to use a decision aid;

then, they determine whether to accept the results of the aid. The underlying

assumption is that if the auditor first chooses to use the aid, they are more likely to rely on the aid. Thus, an examination of factors that are purported to affect decision aid reliance should actually consider the effect of those factors on decision aid usage. The results appear to support that idea. Namely, the relationship between perceived usefulness and decision aid reliance is mediated by decision aid usage.
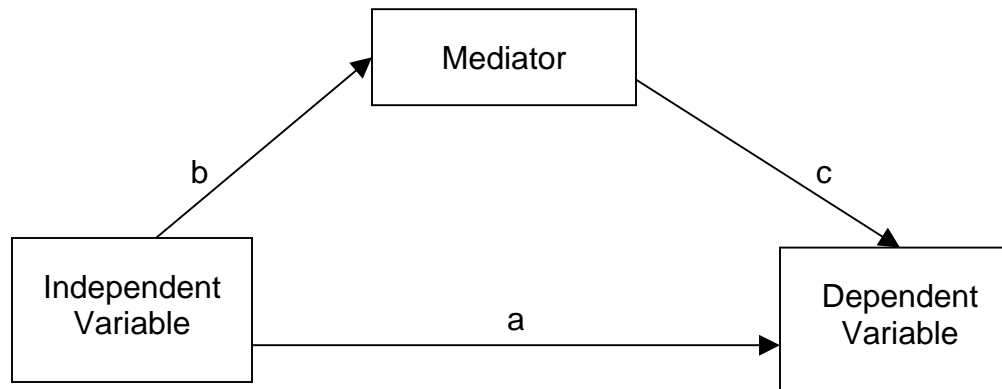
Figure 9

Mediation

Table 5

Mediation Testing

Panel A: Path a from perceived usefulness to decision aid reliance
Equation: $R = \beta_0 + \beta_1 U + \varepsilon$

Variable	Coefficient
Intercept	76.117*
	(0.000)
U	0.796*
	(0.000)
Model F-statistic	13.145*
	(0.000)
Adjusted R^2	9.3%

Panel B: Path b from perceived usefulness to intent to use
Equation: $I = \beta_0 + \beta_1 U + \varepsilon$

Variable	Coefficient
Intercept	1.019
	(0.200)
U	0.935*
	(0.000)
Model F-statistic	503.160*
	(0.000)
Adjusted R^2	79.3%

Panel C: Path c from intent to use to decision aid reliance, controlling for Path a
Equation: $R = \beta_0 + \beta_1 I + \beta_2 U + \varepsilon$

Variable	Coefficient
Intercept	73.917*
	(0.000)
I	1.531*
	(0.001)
U	-0.617
	(0.178)
Model F-statistic	13.288*
	(0.000)
Adjusted R^2	17.2%

P-values are shown in parentheses.
* $p < 0.01$

Variables are defined as follows:
R = Decision aid reliance
U = Perceived usefulness
I = Intent to use

CHAPTER 5

CONCLUSION

Recent accounting scandals have had a profound impact on the profession, underscoring the increasing need for tools that help auditors assess management fraud. Prior research suggests that decision aids are useful tools for a variety of tasks, including fraud assessment (e.g., Eining et al. 1997). At the same time, prior research suggests that auditors are reluctant to rely on decision aids for a variety of reasons, including confidence in their own abilities (e.g., Arkes et al. 1986). Thus, the purpose of this study is to develop a better understanding of the factors that influence decision aid usage and reliance.

Cognitive dissonance theory (Festinger 1957) and escalation of commitment theory (Staw 1981) both suggest that auditors may feel compelled to rely on a decision aid if they initially choose to use the aid. Accordingly, in the current study, decision aid usage is hypothesized as a mediating variable. Further, prior research suggests that several variables, namely, confidence (Arkes et al. 1986; Whitecotton 1996); perceived usefulness (Davis et al. 1989); client size (e.g., Gist and Davidson 1999); and conformity pressure (e.g., Lord and DeZoort 2001) may influence decision aid usage.

Senior-level auditors participated in an experiment that examined the influence of several factors (i.e., confidence, perceived usefulness, client size, and conformity pressure) on their decision to use a decision aid and rely on its output. The results show that auditors are more likely to rely on a decision aid if they first choose to use the aid. In addition, consistent with the Technology Acceptance Model (TAM) literature, auditors are more likely to use a decision aid if they perceive the aid to be useful.

Moreover, the results show that intent to use a decision aid mediates the relationship between perceived usefulness and decision aid reliance. Specifically, auditors that perceive a decision aid to be a useful tool are more likely to rely on a decision aid because they are more likely to use the aid initially.

Additionally, the results of the study show that client size and conformity pressure are not significantly related to decision aid usage. As noted in the previous chapter, an apparent problem with the manipulations for both variables may have contributed to the lack of significance. Future research could reexamine the manner in which client size and conformity pressure are manipulated. In particular, since conformity pressure is relatively unexplored in the accounting literature, it may be a worthwhile avenue for future research.

The present study also produced evidence that is inconsistent with prior research (Arkes et al. 1986; Whitecotton 1996). The conclusion from these two studies is that confidence is inversely related to decision aid reliance. Taken a step further, it is also expected that confidence has an inverse relationship with decision aid usage. The results, however, show that confidence is not significantly related to decision aid usage. As noted previously, an explanation may be that the current study uses auditors while prior studies used students and/or financial analysts (Arkes et al. 1986; Whitecotton 1996). A possible avenue for future research would be to compare the level of confidence in auditors and non-auditors (e.g. financial analysts) as it relates to decision aid reliance.

While care was taken to address all methodological issues, a few caveats should be noted when considering the evidence presented in this study. First, the

generalizability of the results is limited to the extent that the experiment abstracts from

mundane realism (Swieringa and Weick 1982). Like most experiments, the current

study simplifies the research setting to include only those variables that the author

considers pertinent. In this case, confidence, perceived usefulness, client size, and

conformity pressure were considered important factors to look at with respect to

reliance; thus, the experiment was designed to focus only on those variables.

Second, although the results found intent to use a decision aid to be significantly

related to decision aid reliance (Hypothesis 1), the adjusted R^2 of the overall model

(17%) suggests that intent to use accounts for only a part of the change in subjects'

reliance scores[24]. A possible explanation for this result is that the study uses intent to

use in lieu of actual use. Although intent to use is significantly correlated with actual

use (Pearson: 0.252, $p = 0.003$), the weak correlation suggests that intent does not fully

explain the decision to use an aid. It is possible that actual use may account for more of

the change in subjects' reliance scores.

Another possible explanation for the small R^2 is that there are additional factors

that may affect decision aid reliance. Indeed, the current study did not examine the

complete set of factors that affect decision aid reliance. Future research should focus

on uncovering these additional factors, both factors that directly affect decision aid

reliance, and those that indirectly affect reliance via intent to use the decision aid.

Finally, there is potential for measurement error given that several variables examined

in the study (i.e., confidence, perceived usefulness, intent to use) were measured using

responses that were based on subject perceptions. The use of multi-item scales

---

[24] The results from the mediation testing also show that intent to use a decision aid is significantly related to decision aid reliance when controlling for perceived usefulness (Table 5, Panel C). The adjusted R^2 for the overall model is also 17%.

mitigates these concerns to an extent, but it still may be possible that measurement error could occur.

Despite these limitations, the current study extends the decision aid reliance literature in two important ways. First, the study shows that perceived usefulness, a significant construct from the TAM literature, is also a significant factor in determining decision aid usage and reliance. Second, the study further delineates the relationship between factors, such as perceived usefulness, and decision aid reliance. Namely, the results show that decision aid usage mediates that relationship.

REFERENCES

Abdolmohammadi, M. 1987. Decision support and expert systems in auditing: A review and research direction. *Accounting and Business Research* 17 (Spring): 173-185.

Abdolmohammadi, M. and C. Usoff. 2001. A longitudinal study of applicable decision aids for detailed tasks in a financial audit. *International Journal of Intelligent Systems in Accounting, Finance and Management* 10 (September): 139-154.

Albrecht, W.S., D.J. Cherrington, I.R. Payne, A.V. Roe, and M.B. Romney. 1980. Auditor involvement in the detection of fraud. In: *Management Fraud: Detection and Deterrence*, edited by R.K. Elliott and J.J. Willingham. Princeton, NJ: Petrocelli Books.

Albrecht, W.S. and M.B. Romney. 1986. Red-flagging management fraud: A validation. *Advances in Accounting* 3: 323-334.

American Institute of Certified Public Accountants (AICPA). 1997. *Consideration of Fraud in a Financial Statement Audit*. Statement on Auditing Standards No. 82. New York, NY: AICPA.

American Institute of Certified Public Accountants (AICPA). 2003. *Consideration of Fraud in a Financial Statement Audit*. Statement on Auditing Standards No. 99. New York, NY: AICPA.

Arkes, H.R. and C. Blumer. 1985. The psychology of sunk cost. *Organizational Behavior and Human Decision Processes* 35: 124-140.

Arkes, H.R., R.M. Dawes, and C. Christensen. 1986. Factors influencing the use of a decision rule in a probabilistic task. *Organizational Behavior and Human Decision Processes* 37: 93-110.

Arnold, V. and S.G. Sutton. 1998. The theory of technology dominance: Understanding the impact of intelligent decision aids on decision makers' judgments. *Advances in Accounting Behavioral Research* 1: 175-194.

Aronson, E. 1968. Dissonance theory: Progress and problems. In: *Theories of Cognitive Consistency*, edited by R. Abelson, E. Aronson, W. McGuire, T. Newcomb, M. Rosenberg, and P. Tannenbaum. Chicago: Rand McNally.

Ashton, R.H. 1990. Pressure and performance in accounting decision settings: Paradoxical effects of incentives, feedback, and justification. *Journal of Accounting Research* 28 (Supplement): 148-180.

Ashton, R.H. 1992. Effects of justification and a mechanical aid on judgment performance. *Organizational Behavior and Human Decision Processes* 52: 292-306.

Baron, R.M. and D.A. Kenny. 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology* 51: 1173-1182.

Bayer, J.A. 2002. Fall from grace: Joe Berardino presided over the biggest accounting scandals ever and the demise of a legendary firm. Here's what happened. *Business Week* 3795 (August 12): 50.

Bell, T.B., W.R. Landsman, and D.A. Shackelford. 2001. Auditors' perceived business risk and audit fees: Analysis and evidence. *Journal of Accounting Research* 39 (June): 35-43.

Boatsman, J.R., C. Moeckel, and B.K. Pei. 1997. The effects of decision consequences on auditors' reliance on decision aids in audit planning. *Organizational Behavior and Human Decision Processes* 71: 211-247.

Brown, D. and D.R. Jones. 1998. Factors that influence reliance on decision aids: A model and an experiment. *Journal of Information Systems* 12 (Fall): 75-94.

Bruner, G.C. and P.J. Hensel. 1994. *Marketing Scales Handbook: A Compilation of Multi-item Measures*. Chicago, IL: American Marketing Association.

Butler, S.A. 1985. Application of a decision aid in the judgmental evaluation of substantive tests of detail samples. *Journal of Accounting Research* 23 (Autumn): 513-526.

Cote, M. 2002. The collapse of Arthur Andersen. *CA Magazine* 135 (August): 60.

Curtis, M.B. and M.A. Davis. 2003. Assessing knowledge structure in accounting education: An application of Pathfinder associative networks. *Journal of Accounting Education* 21: 185-195.

Curtis, M.B. and E. Payne. 2004. Long-term investment in audit technology. Working paper, University of North Texas.

Davis, E. 1998. Decision aids for going-concern evaluation: Expectations of partial reliance. *Advances in Accounting Behavioral Research* 1: 33-59.

Davis, F.D. 1989. Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly* 13 (September): 319-340.

Davis, F.D., R.P. Bagozzi, and P.R. Warshaw. 1989. User acceptance of computer technology: A comparison of two theoretical models. *Management Science* 35 (August): 982-1003.

Davis, F.D. and J.E. Kottemann. 1994. User perceptions of decision support effectiveness: Two production planning experiments. *Decision Sciences* 25 (January/February): 57-78.

Davis, F.D. and J.E. Kottemann. 1995. Determinants of decision rule use in a production planning task. *Organizational Behavior and Human Decision Processes* 63: 145-157.

Davis, L., D. Ricchiute, and G. Trompeter. 1993. Audit effort, audit fees, and the provision of non-audit services to audit clients. *The Accounting Review* 68 (January): 135-150.

Dawes, R.M. 1976. Shallow psychology. In: *Cognition and Social behavior*, edited by J.S. Carroll & J.W. Payne. Hillsdale, NJ: Erlbaum.

DeZoort, F.T. and A.T. Lord. 1997. A review and synthesis of pressure effects research in accounting. *Journal of Accounting Literature* 16: 28-85.

Eining, M.M. and P.B. Dorr. 1991. The impact of expert system usage on experimental learning in an auditing setting. *Journal of Information Systems* 5 (Spring): 1-16.

Eining, M.M., D.R. Jones, and J.K. Loebbecke. 1997. Reliance on decision aids: An examination of auditors' assessment of management fraud. *Auditing: A Journal of Practice and Theory* 16 (Fall): 1-19.

Elliott, R.K. and J.J. Willingham. 1980. *Management Fraud: Detection and Deterrence*. New York: Petrocelli Books.

Farrell, J.J. and H.B. Shadab. 2005. The focus of future PCAOB auditor inspections. *The CPA Journal* 75 (June): 9.

Festinger, L. 1957. *A theory of cognitive dissonance*. Stanford: Stanford University Press.

Fishbein, M. and I. Ajzen. 1975. *Belief, Attitude, Intention, and Behavior*. Reading, MA: Addison-Wesley Publishing.

Garland, H. 1990. Throwing good money after bad: The effect of sunk costs on the decision to escalate commitment to an ongoing project. *Journal of Applied Psychology* 75: 728-731.

Gibbins, M. and K. Jamal. 1993. Problem-centered research and knowledge-based theory in the professional accounting setting. *Accounting, Organizations, and Society* 18: 451-466.

Gist, W.E. and R.A. Davidson. 1999. An exploratory study of the influence of client factors on audit time budget variances. *Auditing: A Journal of Practice and Theory* 18 (Spring): 101-116.

Glover, S.M., D.R. Prawitt, and B.C. Spilker. 1997. The influence of decision aids on user behavior: Implications for knowledge acquisition and inappropriate reliance. *Organizational Behavior and Human Decision Processes* 72: 232-255.

Goldberg, L.R. 1968. Simple models or simple processes? Some research on clinical judgment. *American Psychologist* 23: 483-496.

Gorry, G.A. and M.S. Scott-Morton. 1971. A framework for management information systems. *Sloan Management Review* (Fall): 55-70.

Hackenbrack, K. 1992. Implications of seemingly irrelevant evidence in audit judgment. *Journal of Accounting Research* 30 (Spring): 126-136.

Hackenbrack, K. and W.R. Knechel. 1997. Resource allocation decisions in audit engagements. *Contemporary Accounting Research* 14 (Fall): 481-499.

Hair, J.F., R.E. Anderson, R.L. Tatham, and W.C. Black. 1998. *Multivariate Data Analysis*. 5th edition. Upper Saddle River: Prentice Hall.

Hansen, J.V., J.B. McDonald, W.F. Messier, and T.B. Bell. 1996. A generalized qualitative-response model and the analysis of management fraud. *Management Science* 42 (July):1022-1032.

Holmbeck, G.N. 1997. Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology* 65: 599-610.

Ives, B., S. Hamilton, and G.B. Davis. 1980. A framework for research in computer-based management information systems. *Management Science* 26 (September): 910-934.

Jermias, J. 2001. Cognitive dissonance and resistance to change: The influence of commitment confirmation and feedback on judgment usefulness of accounting systems. *Accounting, Organizations, and Society* 26: 141-160.

Johnson, V.E. and S.E. Kaplan. 1996. Auditor's decision-aided probability assessments: An analysis of the effects of list length and response format. *Journal of Information Systems* 10 (Fall): 87-101.

Kachelmeier, S. and W.F. Messier. 1990. An investigation of the influence of a non-statistical decision aid on auditor sample size decisions. *The Accounting Review* 65 (January): 209-226.

Kaplan, S.E., J.H. Reneau, and S. Whitecotton. 2001. The effects of predictive ability information, locus of control, and decision maker involvement on decision aid reliance. *Journal of Behavioral Decision Making* 14 (January): 35-50.

Kleinmuntz, B. 1990. Why we still use our heads instead of formulas: Toward an integrative approach. *Psychological Bulletin* 107: 296-310.

Knapp, C.A. and M.C. Knapp. 2001. The effects of experience and explicit fraud risk assessment in detecting fraud with analytical procedures. *Accounting, Organizations, and Society* 26 (January): 25-37.

Kohlberg, L. 1969. Stages and sequences: The cognitive developmental approach to socialization. In: *Handbook of Socialization Theory and Research*, edited by D. Goslin. Chicago: Rand McNally.

Kottemann, J.E., F.D. Davis, and W.E. Remus. 1994. Computer-assisted decision making: Performance, beliefs, and the illusion of control. *Organizational Behavior and Human Decision Processes* 57: 26-37.

Libby, R. and J. Luft. 1993. Determinants of judgment performance in accounting settings: Ability, knowledge, motivation, and environment. *Accounting, Organizations, and Society* 18: 425-450.

Loebbecke, J.K., M.M. Eining, and J.J. Willingham. 1989. Auditors' experience with material irregularities: Frequency, nature, and detectability. *Auditing: A Journal of Practice and Theory* 8 (Fall): 1-28.

Lord, A.T. and F.T. DeZoort. 2001. The impact of commitment and moral reasoning on auditors' responses to social influence pressure. *Accounting, Organizations and Society* 26: 215-235.

Lowe, D.J., P.M.J. Reckers, and S.M. Whitecotton. 2002. The effects of decision-aid use and reliability on jurors' evaluations of auditor liability. *The Accounting Review* 77 (January): 185-202.

Lys, T. and R.L. Watts. 1994. Lawsuits against auditors. *Journal of Accounting Research* 32 (Supplement): 65-93.

MacKinnon, D.P. 1994. Analysis of mediating variables in prevention and intervention research. In: *Scientific Methods in Prevention Research*, edited by A. Cazares and L.A. Beatty. NIDA Research Monograph 139. DHHS Pub. No. 94-3631. Washington, D.C.: U.S. Government Print Office.

Mathieson, K. 1991. Predicting user intentions: Comparing the technology acceptance model with the theory of planned behavior. *Information Systems Research* 2 (September): 173-191.

Messier, W.F. and J.V. Hansen. 1987. Expert systems in auditing: The state of the art. *Auditing: A Journal of Practice and Theory* 7 (Fall): 94-105.

Mladenovic, R. and R. Simnett. 1994. Examination of contextual effects and changes in task predictability on auditor calibration. *Behavioral Research in Accounting* 6: 178-203.

Moffitt, K. 1994. An analysis of the pedagogical effects of expert system use in the classroom. *Decision Sciences* 25: 445-457.

Mulligan, T.S. 2002. Accounting watchdog reiterates it will disband. *Los Angeles Times* (February 1): C4.

Nieschwietz, R.J., J.J. Schultz, and M.F. Zimbelman. 2000. Empirical research on external auditors' detection of financial statement fraud. *Journal of Accounting Literature* 19: 190-246.

O'Keefe, T.B., D.A. Simunic, and M.T. Stein. 1994. The production of audit services: Evidence from a major public accounting firm. *Journal of Accounting Research* 32 (Autumn): 241-261.

Peterson, D.K. and G.F. Pitz. 1986. Effect of input from a mechanical model on clinical judgment. *Journal of Applied Psychology* 71: 163-167.

Piaget, J. (1932) 1936. *The Moral Judgment of the Child*. New York: Free Press.

Pincus, K.Y. 1989. The efficacy of a red flags questionnaire for assessing the possibility of fraud. *Accounting, Organizations, and Society* 14: 153-163.

Ponemon, L.A. 1992. Auditor underreporting of time and moral reasoning: An experimental lab study. *Contemporary Accounting Research* 9 (Fall): 171-189.

Ponemon, L.A. 1993. The influence of ethical reasoning on auditors' perceptions of management's competence and integrity. *Advances in Accounting* 11: 1-29.

Preacher, K.J. and G.J. Leonardelli. 2001. Calculation for the Sobel test: An interactive calculation tool for mediation tests. Available at: http://www.unc.edu/~preacher/sobel/sobel.htm.

Ramos, M. 2003. Auditors' responsibility for fraud detection. *Journal of Accountancy* 195 (January): 28-36.

Rohrmann, B. 1986. Evaluating the usefulness of decision aids: A methodological perspective. In: *New Directions in Research and Decision Making*, edited by B. Brehmer, H. Jungermann, P. Lourens, and G. Sevon. New York, NY: Elsevier Science Publication Co.

Rose, J.M. 2002. Behavioral decision aid research: Decision aid use and effects. In: *Perspectives on AIS Research*, edited by S. Sutton and V. Arnold. Sarasota, FL: American Accounting Association.

Saksena, P. 2001. The relationship between environmental factors and management fraud: An empirical analysis. *International Journal of Commerce and Management* 11: 120-143.

Sorenson, J.E. and T.L. Sorenson. 1980. Detecting management fraud: Some organizational strategies for the independent auditor. In: *Management Fraud: Detection and Deterrence*, edited by R.K. Elliott and J.J. Willingham. Princeton, NJ: Petrocelli Books.

Staw, B.M. 1981. The escalation of commitment to a course of action. *Academy of Management Review* 6 (October): 577-587.

Stein, M.T., D.A. Simunic, and T.B. O'Keefe. 1994. Industry differences in the production of audit services. *Auditing: A Journal of Practice and Theory* 13 (Supplement): 128-142.

Stinnett, M. January 28, 2004. Interview by author, Denton, TX.

Swieringa, R.J. and K.E. Weick. 1982. An assessment of laboratory experiments in accounting. *Journal of Accounting Research* 20 (Supplement): 56-101.

Swinney, L. 1999. Consideration of the social context of auditors' reliance on expert system output during evaluation of loan loss reserves. *International Journal of Intelligent Systems in Accounting, Finance, and Management* 8 (September): 199-213.

Szajna, B. 1996. Empirical evaluation of the revised technology acceptance model. *Management Science* 42 (January): 85-92.

Taylor, S. and P.A. Todd. 1995a. Assessing IT usage: The role of prior experience. *MIS Quarterly* 19 (December): 561-570.

Taylor, S. and P.A. Todd. 1995b. Understanding information technology usage: A test of competing models. *Information Systems Research* 6 (June): 144-176.

Todd, P. and I. Benbasat. 1991. An experimental investigation of the impact of computer based decision aids on decision making strategies. *Information Systems Research* 2 (June): 87-115.

Todd, P. and I. Benbasat. 1992. The use of information in decision making: An experimental investigation of the impact of computer-based decision aids. *MIS Quarterly* 16 (September): 373-393.

Todd, P. and I. Benbasat. 1994. The influence of decision aids on choice strategies: An experimental analysis of the role of cognitive effort. *Organizational Behavior and Human Decision Processes* 60: 36-74.

Venkatesh, V. and F.D. Davis. 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science* 46 (February): 186-204.

Venkatesh, V., M.G. Morris, G.B. Davis, and F.D. Davis. 2003. User acceptance of information technology: Toward a unified view. *MIS Quarterly* 27 (September): 425-478.

Warshaw, P.R. 1980. A new model for predicting behavioral intentions: An alternative to Fishbein. *Journal of Marketing Research* 17 (May): 153-172.

Whitecotton, S.M. 1996. The effects of experience and confidence on decision aid reliance: A causal model. *Behavioral Research in Accounting* 8: 194-216.

Whitecotton, S.M. and S.A. Butler. 1998. Influencing decision aid reliance through involvement in information choice. *Behavioral Research in Accounting* 10 (Supplement): 182-200.

Whitecotton, S.M., D.E. Sanders and K.B. Norris. 1998. Improving predictive accuracy with a combination of human intuition and mechanical decision aids. *Organizational Behavior and Human Decision Processes* 76: 325-348.

Will, R.P. 1992. Individual difference in the performance and use of an expert system. *International Journal of Man-Machine Studies* 37: 173-190.

Wolfe, C., T. Loraas, and M. Chandler. 2002. Choice behavior, goal orientation, and the technology acceptance model. Working paper, Texas A&M University.

Ye, L.R. and P.E. Johnson. 1995. The impact of explanation facilities on user acceptance of expert systems advice. *MIS Quarterly* 19 (June): 157-172.

Zimbelman, M.F. 1997. The effects of SAS No. 82 on auditors' attention to fraud risk factors and audit planning decisions. *Journal of Accounting Research* 35 (Supplement): 75-97.

Zimmerman, H. February 11, 2004. Interview by author, Denton, TX.

Zimmerman, H. August 3, 2005. Interview by author, Denton, TX.