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Auditors' Performance in Computer-Mediated Fraud Assessment Brainstorming Sessions: An
Investigation of the Effects of Anonymity and Creativity Training

by

Antoinette L. Lynch

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
School of Accountancy
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Keywords: creativity techniques, audit planning,
group simulator; Jabri associative/bisociative scales, teams

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DEDICATIONS

This dissertation is dedicated to my precious daughters, Jaleesa and Shauntia Lynch. Each day, you gave me the motivation to continue to put my best foot forward. Jaleesa, I have seen you eliminate distractions so that you can do your best. I admire you for your dedication to your family and to your education. Shauntia, I admire you for your courage to challenge situations with which you are not comfortable and to seize opportunities. I love you for your independence and your creativity. You both are stars in many ways. I love you dearly and thank you for making this journey one that we have all come to manage and love.

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**AUDITORS' PERFORMANCE IN COMPUTER-MEDIATED FRAUD
ASSESSMENT BRAINSTORMING SESSIONS: AN INVESTIGATION OF THE
EFFECTS OF ANONYMITY AND CREATIVITY TRAINING**

Antoinette L. Lynch

ABSTRACT

In the wake of recent corporate accounting scandals, auditors are encouraged to improve their method of fraud detection. Although Statement on Auditing Standards (SAS) No. 99 does not change the responsibility of the auditor for detecting fraud, it does provide new procedural requirements for assessing fraud risk, such as brainstorming among key team members about the potential for fraud. Using audit interns and internal auditors, this study empirically examines two interventions hypothesized to improve the quality of ideas generated by audit interns and internal auditors. In the first intervention, auditors use a computer-based group support system to brainstorm either non-anonymously or anonymously. For the second intervention, auditors were either trained to use a paradigm-modifying creativity technique or not trained. Additionally, it is hypothesized that the creativity training will have the greatest impact on brainstorming effectiveness when auditors brainstorm anonymously. However, the results suggest that audit interns working non-anonymously generated the greatest number of fraud ideas and also the greatest number of original ideas. Audit interns who received training on a paradigm-modifying creativity training technique generated the greatest number of unique ideas and received, on average, the highest usefulness to the audit process score.

CHAPTER 1: INTRODUCTION

1.1. Issues and the Need for Research

There has been considerable public criticism of the attest function performed by auditors of publicly held corporations (Hilzenrath 2002; Johnson and Masters 2003; Pulliam et al. 2003; Thornburgh 2004; Wyatt; Zeff 2003). When performing external audits, auditors are responsible for providing reasonable assurance that a company's financial statements are free of material fraud and errors. In 1997, in an effort to address concerns of both the profession and the public, the AICPA's Auditing Standards Board (ASB) issued Statement on Auditing Standards (SAS) No. 82: Consideration of Fraud in a Financial Statement Audit, which was designed to assist auditors in fraud detection. Relying on academic research, and recommendations from the Panel on Audit Effectiveness, the ASB's Fraud Task Force, and various stakeholders, the ASB concluded that SAS No. 82 fell short of its intended goal of enhancing auditors' performance in considering material fraud in financial statements. In an effort to address perceived deficiencies of SAS No. 82, the ASB issued SAS No. 99: "Consideration of Fraud in a Financial Statement Audit," in 2002 (AICPA 2002a).

One of the requirements of SAS No. 99 is that the auditor's consideration of fraud must involve the "exchange of ideas or brainstorming among the audit team members, including the auditor with final responsibility for the audit, about how and where they believe the entity's financial statements might be susceptible to material misstatement due to fraud, how management could perpetrate and conceal fraudulent financial reporting, and how assets of the entity could be misappropriated" (AICPA 2002b, paragraph 14). However, SAS No. 99 provides limited guidance on who should attend the brainstorming session, indicating that "key members" of the audit team should participate, making no reference as to whether staff auditors should be included

or excluded. Importantly, SAS No. 99 does not provide any guidance regarding effective brainstorming methods.

Prior to the issuance of SAS No. 99, the assessment of fraud risk was often performed by one of the key audit personnel, utilizing practice aids such as check-off sheets and expert systems (Hirst et al. 1996; Shelton et al. 2001; Solomon 1987). Depending on the size of the engagement, key personnel on the audit team would include, at a minimum, one or more on-site supervisory auditors (senior auditors), a manager, and the partner in charge of the engagement (Rich et al. 1997). Although SAS No. 99 is silent on the possibility of including staff auditors, often it is the staff auditor who first encounters potential audit problems and interacts with employees who may be attempting to conceal fraud (Rabinowitz 1996). Staff auditors are the eyes and ears of the audit team and represent the audit firm's "frontline" personnel. Staff auditors obtain audit evidence, and based on that evidence, reach conclusions that are subsequently evaluated by supervisory team members. According to Ashton and Kennedy (2002, p. 221), "judgments of staff auditors often determine the type and extent of documentation in audit work papers and serve as preliminary inputs for senior auditors' judgments and choices." Thus, it can be argued that participation in the brainstorming session by staff auditors could sensitize them to the possibility of fraud as they gather audit evidence.

The presence of superiors or more experienced auditors could impact a staff auditor's ability to effectively brainstorm about possible fraudulent misstatements that materially affect the entity's financial statements. A drive theory of social facilitation (Zajonc 1965) and prior research in psychology suggests that, under certain conditions, the mere presence of superiors inhibits the productivity of junior members in a brainstorming session (Cottrell et al. 1968; Zajonc 1965). For instance, working with senior team members may convey to the more junior members of the team that they are accountable for their ideas, or that their ideas must meet with the approval of the senior members (Agarwal 2000). This phenomenon, referred to as evaluation apprehension, could

inhibit the ability of staff auditors to provide candid (and possibly valuable) input to the fraud brainstorming session. The purpose of this research is to explore whether two interventions improve the effectiveness of ideas generated by auditors involved in fraud brainstorming sessions mandated by SAS No. 99. Specifically, this dissertation examines the question: How does interaction mode and creativity training impact idea generation of staff auditors in a fraud brainstorming session?

Nagasundaram and Bostrom (1995) suggest that organizations empower employees through nonhierarchical teams in order to tap into the creative ideas of the entire workforce. Although hierarchical audit teams represent a long-established aspect of the auditing environment, which is unlikely to change, group support systems (GSS), deployed by most large auditing firms (e.g., Lotus Notes¹), provide an opportunity to simulate a nonhierarchical setting for the purpose of brainstorming. GSS facilitates the communication between team members who may be located in the same or different locations, and who may interact synchronously or asynchronously (Bamber et al. 1998; Bamber et al. 1996; Pinsonneault et al. 1989). Additionally, GSS has many features such as anonymity, parallel communication, e-mail, and group memory that maximize positive group processes, such as allowing more information to be communicated among group members, and minimizes negative group processes such as information overload (Bamber et al. 1998; Bamber et al. 1996; Pinsonneault et al. 1989). Group support systems permit anonymous interaction brainstorming sessions, by masking the identities of team members for the duration of the session. Since knowledge of the identities of individual audit team members could cause inhibition during the brainstorming session, enabling anonymous contributions to the session should free staff auditors to provide their candid ideas without fear of senior disapproval (Pinsonneault et al. 1998).

¹ Accounting firms are using collaborative software, such as Lotus Notes to facilitate knowledge sharing

The first intervention investigated in this research is the interaction mode in the brainstorming session, specifically whether staff auditors' brainstorming performance is superior when the interaction mode is anonymous rather than non-anonymous. If anonymous interaction in the brainstorming session is shown to result in more effective ideas, the findings would lend support to the use of a GSS that permits anonymous interaction for SAS No. 99 brainstorming sessions. An added benefit of using GSS is that these technologies permit team members to interact regardless of their physical location. In today's global environment, audit teams may be geographically dispersed, especially on audits of large multinational corporations. Thus, there may be occasions when it is not feasible or cost-effective for key engagement personnel to brainstorm at the same time and in the same location.

Auditors must be creative and unpredictable in their fraud detection methodologies. For instance, auditors rarely ask for unlimited access to clients' records, but instead rely on clients to provide requested documents. The assessment of known fraud cases by the "National Commission on Fraudulent Financial Reporting (FCFFR)" (popularly known as the "Treadway Commission") found that creative revenue recognition methods were adopted by high-tech companies. For example, high-tech companies inflated earnings using creative methods known as sham sales and conditional sales (Beasley et al. 2000). These creative methods suggest that fraud perpetrators are familiar with standard audit procedures and go out of their way to avoid detection. Therefore, auditors need to "think outside the box," or to think creatively about how fraud perpetrators can conceal fraud.

There is considerable evidence in the literature that creativity training techniques can enhance the degree of creativity of an individual's output. Thus, the second intervention investigated in the research is whether the use of a creativity training technique results in the generation of more innovative ideas during SAS No. 99 fraud brainstorming sessions. If proven effective, such creativity training techniques represent a relatively low-cost intervention that

auditing firms can employ in order to improve the effectiveness of the fraud brainstorming sessions mandated by SAS No. 99. In other areas, an increasing number of companies are using electronic communication media to solicit innovative ideas from employees. Companies are forming task teams that use brainstorming techniques to generate ideas for new business initiatives. For example, of the five top business initiatives at Royal Dutch/Shell Group, four initiatives came as a result of analyzing ideas generated by employees. Proctor and Gamble has 33 new initiatives that came as a result of a brainstorming task force (Stepanek 1999). Creativity can be used to look for new ways to solve old problems and to solve complex problems (Amabile 1996).

1.2. Purpose and Research Questions

The purpose of this study is to investigate how interaction mode, when using a group support system and training on a paradigm-modifying creativity technique, can impact staff auditors' ability to generate innovative ideas in fraud brainstorming, sessions mandated by SAS No. 99. The research questions are:

(1) Does interaction mode using a GSS affect the quantity, utility, and novelty/rarity of ideas generated by staff auditors?

(2) Does training in a paradigm-modifying creativity technique improve the quantity, utility, and novelty/rarity of ideas generated by staff auditors?

(3) Do interaction mode and creativity training jointly affect the quantity, utility, and novelty/rarity of ideas generated by staff auditors?

1.3. Motivation

Fraud prevention is a high priority in the accounting profession, and to the country in general, as evidenced by President Bush's discussion about fraud in his 2002 State of the Union address, the Sarbanes-Oxley Act of 2002, and the recent release of SAS No. 99 (Bamber 2002; 1998; Whittington 2002). The importance of fraud risk assessment cannot be over emphasized. It

is one of the few tasks that when mishandled can jeopardize an auditor's career, the success of the accounting firm, and the reputation of the audit profession (Palmrose 1987). Fraud-related conclusions reached during the initial planning task will impact decisions about the next stage of the audit, the field work. Examples of decisions affect include the level of expertise needed for the audit, and the timing and extent of audit tests (Anderson 1977). It is important to note that field work is conducted primarily by staff auditors, underscoring the importance of the need for them to be involved in planning stage fraud brainstorming sessions as required by SAS No. 99.

The GSS literature on anonymity reveals a diversity of opinions on whether anonymity is an important feature for electronic brainstorming. The notion that GSS-anonymity is useful is supported by the research of Connolly et al. (1990) and Sosik et al. (1999). Other research have been unsupportive of GSS-anonymity (Jessup et al. 1991; Valacich et al. 1992). Cooper et al. (1998) suggest that one reason for the mixed results is that GSS research on anonymity tends to have low statistical power caused by small sample size, where many studies have only five to 12 groups per treatment. Pinsonneault and Heppel (1998) argue that the mixed results in prior research on the impact of anonymity on idea generation are caused by a weakness in the manipulation of evaluation apprehension. Laboratory environments using student subjects fail to simulate corporate America, where power and job status are salient. The authors provide a compelling need for future anonymity research in a direction that considers situational variables, such as hierarchical structures, computer-based communications, and the use of actual employees (Pinsonneault et al. 1998).

Although several researchers have called attention to the need for an empirical examination of the impact of the hierarchical audit team structure on performance (Bamber 2002; Bamber et al. 1996; Murthy 2002; Solomon 1987), research in this area is limited. Jamal and Tan (2001) created three member teams by pairing an audit manager with a top senior and a mediocre senior. The authors' main goal was to determine if members of the team could predict the

preferences of other team members' evaluation of a high/low ambiguity task. However, the researchers did not explore how having multi-level team participants (more than 2 hierarchical layers) affected judgments. Solomon (1982) compared the specification of prior probability distributions (PPDs) by audit teams to the specification of PPDs by individual auditors. Staff, senior, and management auditors were randomly assigned to an individual, nominal/interacting group, or interacting/nominal group treatment. Participants assigned to the group treatments worked as a three-person team, consisting of a staff auditor, senior auditor, and a manager; two staff auditors and a senior; or two seniors and a manager. Solomon's (1982) focus was primarily on the performance differences between groups and individuals rather than on how alternative team compositions affected the behavior of individual team members. Johnson (1994) also used a three-person team composition in a memory task involving audit work paper reviews. Unlike Solomon (1982), Johnson (1994) did not set out to ensure teams consisted of multiple levels of expertise, but instead randomly assigned staff auditors, seniors, and managers to conditions. Thus, prior research has shed little light on the impact of hierarchical team composition on idea generation during fraud brainstorming sessions.

The complexity of fraud assessment has increased commensurate with the level of creativity and innovation in the commission of fraudulent activities. Fraud perpetrators have employed unique methods that may not be considered during traditional (non-brainstorming) fraud risk assessments. For example, an investment advisor, who failed to register with the SEC, used online chat rooms to increase stock prices. This was stock held in the personal investment portfolio of the advisor. However, instead of leaving a paper trail for auditors or being restricted to the company's internal system for communicating to clients, the advisor relied on chat room sessions to commit fraud (Danner 2000). A former executive of Symbol Technologies was accused of committing securities fraud by persuading distributors to purchase scanners that the distributors did not need. In return, Symbol promised distributors that any unsold scanners would

be re-purchased. This practice is known as “channel stuffing.” The executive’s illegal and clever method allowed Symbol to inflate reported sales (Berenson 2003).

When considering the potential for fraud, in order to be effective, auditors must think just as creatively and unconventionally as fraud perpetrators. Thus, training auditors in a creativity technique—one that allows them to expand their boundaries to look at the situation from a different angle—could improve auditors’ capability to detect fraud and could significantly improve the profession’s fraud detection success rate. Creativity training techniques, specifically “paradigm-modifying²” techniques have been shown to be effective in the information systems literature (Garfield et al. 2001; Hender et al. 2002; Satzinger et al. 1999), and should, therefore, improve auditors’ brainstorming effectiveness.

The remainder of this dissertation is organized as follows: Section II provides a review of prior literature and develops a research framework and the hypotheses. Section III presents the research design and methodology. Section IV presents the results of the study. This dissertation concludes with Section V, a discussion of results, contributions, limitations and potential implications of the findings.

²Paradigm-modifying techniques are those techniques that tend to generate ideas that are revolutionary—ideas that redefine the problem and the belief system of the existing paradigm (Garfield et al. 2001).

CHAPTER 2: LITERATURE REVIEW AND HYPOTHESES

2.1 Introduction

The literature review for this dissertation provides an overview of the factors and events leading to the changes in fraud related procedures dictated by SAS No. 99 and the relevant theoretical constructs (interaction mode, paradigm-modifying creativity training, and brainstorming effectiveness). Additionally, it synthesizes relevant prior research in auditing, management information systems (MIS), and psychology relevant to the research model and hypotheses proposed in this study. Extant audit literature examined in this dissertation focuses on fraud risk assessment in various contexts, and the impact of interaction mode. The MIS literature reviewed in this section includes studies that examine the impact of anonymity, computer-mediated communications and paradigm-modifying techniques on brainstorming effectiveness (the quantity, utility, and novelty of the ideas generated in brainstorming sessions). The relevant psychology literature also includes research on factors that impact brainstorming effectiveness. These factors include social facilitation and evaluation apprehension.

2.2 SAS No. 99 and the Role of Independent Auditors

External auditors are responsible for providing reasonable assurance that financial statements are prepared in accordance with generally accepted accounting principles (GAAP). Along with company management and directors, auditors are responsible for the integrity of the company's financial reporting (AICPA 2002b). The audit process comprises four phases, as shown in Exhibit 1. Although SAS No. 99 states that brainstorming can be conducted throughout the audit process (AICPA 2002b), the standard requires that brainstorming be conducted during Phase I of the audit process. Phase I is the audit planning phase where auditors gather information about the business, such as information regarding the entity's industry and its competitors. During

the final phase, Phase IV, auditors issue an audit report that includes an opinion on the financial statements. Users of financial reports (i.e., stockholders, the government, etc.) rely on the auditor's opinion as to whether the financial statements, prepared by management, are free of material misstatements due to errors (unintentional misstatements) and fraud (intentional misstatements). According to SAS No. 47: Audit Risk and Materiality in Conducting an Audit (AICPA 1983), auditors have the same responsibility for fraud detection as for error detection. In order to provide reasonable assurance that material fraud does not exist when conducting a financial statement audit, the auditor is required to comply with SAS No. 99, which was issued in October 2002 by the Auditing Standards Board (ASB).

SAS No. 99 resulted from a long history of the auditing profession's effort to clarify the auditor's role in fraud detection, and it superseded SAS No. 82 (AICPA 2002a; Nieschwietz et al. 2000). One of the new requirements of SAS No. 99 is for audit team members to exchange ideas about ways an entity's financial statements may be materially misstated due to fraud associated with fraudulent financial reporting, and fraud associated with misappropriation of assets. For the first time, auditors are required to brainstorm; however, SAS No. 99 provides little guidance as to how to conduct the brainstorming session, indicating only that key members of the audit team should participate in the session.

2.3 Fraud Risk Assessment

Extant literature has directed our attention toward auditors' inability to detect fraud or properly analyze fraud-risk factors (Bell et al. 2000; Erickson et al. 2000; Hackenbrack 1992; Nieschwietz et al. 2000; Palmrose 1987; Pincus 1989). For example, Pincus (1989) examined the use of red flag indicators as a method for examining audit fraud risk. Pincus' (1989) research was motivated by the increased use of red flag indicators as a method for assessing fraud risk. Using in-charge auditors from a large CPA firm, Pincus (1989) assigned auditors to either a fraud or no fraud case, and to either the use of a red flag indicator questionnaire or no questionnaire.

Auditors' responses were measured on comprehensiveness, uniformity, and fraud risk assessment. This study found that although questionnaire users considered a more comprehensive set of fraud indicators and exhibited a high degree of uniformity, the participants who did not rely on a questionnaire performed better at assessing fraud risk than those participants who used a questionnaire. The use of only a red flag questionnaire to assess fraud risk may have limited auditors' thinking to a restricted set of risks, discouraging them from thinking beyond the information presented to them.

When exchanging ideas or brainstorming, SAS No. 99 requires the audit team to consider two types of fraud: fraudulent financial reporting and misappropriation of assets (AICPA 2002). In order to comply with SAS No. 99, the team must exchange ideas about "how management could perpetrate and conceal fraudulent financial reporting" (AICPA 2002, paragraph 6). For misappropriation of assets, the audit team must exchange ideas about "how assets of the entity could be misappropriated" (AICPA 2002, paragraph 6). The ideas generated during the brainstorming sessions are used by auditors to assess the risk of material misstatements due to fraud.

2.3.1 Fraudulent Financial Reporting

The National Commission on Fraudulent Financial Reporting defines fraudulent financial reporting as "intentional or reckless conduct, whether by act or omission, that results in materially misleading financial statements" (NCFFR 1987, p. 8). This can be due to a failure to disclose significant information, overstating earnings, inflating assets, or inappropriate accounting procedures (Beasley and Salterio 2001, Dechow et al. 1996). SAS No. 99 states that fraudulent financial reporting may be accomplished by:

- "Manipulation, falsification, or alteration of accounting records or supporting documents from which financial statements are prepared;

- Misrepresentation in or intentional omission from the financial statements of events, transactions, or other significant information;

- Intentional misapplication of accounting principles relating to amounts, classification, manner of presentation, or disclosure” (AICPA 2002, paragraph 6).

2.3.2 *Misappropriation of Assets*

Misappropriation of assets occurs when one or a group of individuals commit fraud for financial gain (Romney and Steinbart 2002). SAS No. 99 states that misappropriation of assets may be accomplished by larceny or skimming of assets (i.e., cash, inventory, receivables) or fraudulent disbursements. Fraudulent disbursements include billing schemes, payroll schemes, expense reimbursement schemes, and check tampering.

2.4 **Interaction Mode**

Interaction mode is how teams interact/communicate. Teams are typically described as consisting of individuals with distributed knowledge with one team leader who is responsible for making final team decisions (Hedlund et al. 1998; Taggar et al. 1999; Phillips 2001; Phillips 2002). Solomon (1987) describes coacting teams as those whose members work concurrently to solve a problem or to perform a task, but implies that coacting teams can consist of members with various job titles or levels of power. The focus of this study is on hierarchical audit teams where power is distributed, with both novices and more expert auditors on the audit team.

Face-to-face, GSS-anonymous, and GSS-non-anonymous are the three ways in which interaction mode can be operationalized (Murthy 2002). “Without anonymity, individuals, particularly low status participants, may withhold ideas due to negative evaluation or may feel pressured to conform to the group majority or senior participants’ views” (Dennis et al. 2001, p. 169). Prior research has defined anonymity as a multidimensional concept, arguing that lack of identification is one of several elements needed to operationalize the degree team members feel

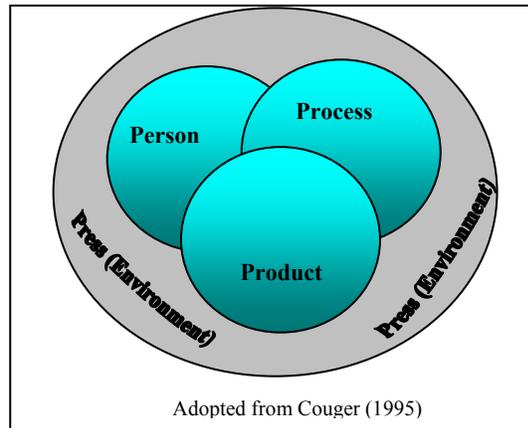
liberated from being evaluated (Nunamaker et al. 1991a; Pinsonneault and Heppel 1998). For example, in addition to lack of identification, individual team members need to feel secure in their proximal distance from other team members (i.e., team members in the next cubical versus team members geographically dispersed). In this study, the levels of interaction mode are defined as GSS-anonymous (team members know the composition of their team, but are unaware of the author of each comment) and GSS-non-anonymous (team members know the composition of their team, and are aware of the author of each comment)³.

2.5 Paradigm-Modifying Creativity Technique

Creativity is a complex, dynamic phenomenon in that it is comprised of four interactive components: the creative product, creative process, creative person, and creative environment (see Figure 1) (Rhodes 1961; Rothenberg and Hausman 1976; Couger 1995). Each component can be described independently, but must interact to operate functionally (Rhodes 1961; Fellers and Bostrom 1993). For example, the creative environment can be one that is constructive or destructive to creativity (Rhodes 1961). The “creative person” component, which encompasses an individual’s innate creativity, is treated as a covariate and discussed under Section 3.5, while the creative process (paradigm-modifying creativity technique training) and environment (interaction mode) are manipulated, as explained below. Finally, the creative product is the outcome variable and is discussed in Section 2.6.

³ The definitions of GSS-anonymous and GSS-non-anonymous are similar to the definitions used by Karan et al. (1996).

FIGURE 1. THE FOUR-PS MODEL OF CREATIVITY



The creative process component is how the creative product (ideas generated) comes into being. It is the thought process of the individual while creating ideas (Amabile 1983). Koester (1964) described the process as “the displacement of attention to something not previously noted, which was irrelevant in the old and is relevant in the new context; the discovery of hidden analogies as a result” (Koestler 1964, p. 119). Over 20 creativity techniques are available that influence an individual’s thought process (VanGundy 1988; Couger 1996). Most techniques fall into two categories, analytical or intuitive (VanGundy 1988). Analytical techniques are paradigm-preserving. “Paradigm-preserving ideas support or extend the existing paradigm; they are evolutionary in that they adapt elements of the existing paradigm” (Garfield 2001, p. 323). An example of an analytical technique that is paradigm-preserving is force field analysis. Individuals using the force field analysis technique generate ideas that are stimulated by what is perceived as being weaknesses and strengths of a problem, thus preserving thought patterns similar to those used in traditional problem-solving methods (Couger 1996). However, prior research suggests that traditional problem-solving methods have not been effective for fraud risk assessment (Palmrose 1987; Pincus 1989; Hackenbrack 1992; Bell and Carcello 2000; Erickson et al. 2000; Nieschwietz et al. 2000).

Intuitive techniques use either unrelated (i.e., guided fantasy) or related (i.e., brainstorming) stimuli. Intuitive techniques that rely on unrelated stimuli are more likely to produce novel, paradigm-modifying ideas than techniques that rely on related ideas. “Paradigm-modifying ideas are revolutionary in that they redefine the problem or its elements” (Garfield et al. 2001, p. 323). Although there are additional intuitive techniques such as analogies, wishful thinking, and wildest idea, brainstorming is the most common intuitive technique applied in research studies (Satzinger et al. 1999; Garfield et al. 2001; Hender et al. 2002). A thorough literature review revealed only three studies that specifically examined different creativity techniques (Satzinger et al. 1999; Garfield et al. 2001; Hender et al. 2002). These studies indicate that intuitive techniques that use unrelated stimuli lead to more novel ideas.

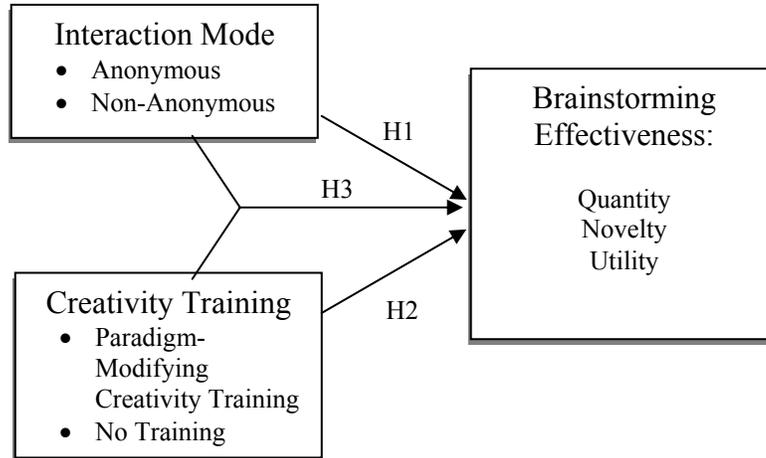
2.6 Brainstorming Effectiveness

As previously stated, Rothenberg and Hausman (1976) and Rhodes (1961) describe several components of creativity, one of which is the creative product (Rhodes 1961; Rothenberg and Hausman 1976; Couger 1995). Effective brainstorming is the generation of ideas that are considered useful, novel, and appropriate (Amabile 1983; Eisenberger et al. 1999; Garfield et al. 2001). In this study, the creative product consists of the ideas generated during brainstorming sessions. One of the purposes of brainstorming is to allow the organization to get input from all members of a team, rather than just from the more vocal members of the team. What is produced or observable from this effort is the product. One measure of brainstorming session effectiveness is the number of ideas generated by each participant. The utility of ideas is a measure of how useful the idea is for the audit planning process. Novelty is a score of rarity or uniqueness; ideas mentioned by fewer participants are more novel than those mentioned by more participants.

The research model is shown in Figure 2, and considers the many dimensions of creativity. Interaction mode represents the environment, creativity training is the process, and brainstorming

effectiveness, which is predicted to be a function of interaction mode, creativity training, and their interaction, is the product.

FIGURE 2: RESEARCH MODEL



2.7 The Effect of Interaction Mode on Brainstorming Effectiveness (link 1)

2.7.1 Evaluation in General:

Prior research findings in psychology on the impact of expected evaluation on creativity are mixed. Several theorists have maintained that external evaluation must be minimized in order to foster creativity (Osborn 1963; White and Owen 1970). Osborn (1963) maintains that when the environment is playful and nonjudgmental, individuals are comfortable suggesting ideas to a team. Similarly, Bartis et al. (1988), using a brainstorming technique, found that creativity was greater for those participants not being evaluated than for those participants who were in the experimenter-evaluation condition. Conversely, Gagne and Zuckerman (1999) found that participants performing a brainstorming task worked harder when co-participants, as well as the experimenter, could evaluate performance. Specifically, as the evaluation potential increased, so did performance.

Shalley (1995) conducted two studies to investigate the effect of coaching group members, expected evaluation, and goal setting on individual creativity and productivity while working on a complex-heuristic task. Results of study 1 revealed that creativity was highest for individuals who worked alone and productivity was highest for individuals who expected no evaluation. However, contrary to what was predicted, Shalley (1995) found insignificant mean differences in productivity between individuals working alone and coaching group members, and insignificant differences in overall creativity between no expected evaluation and expected evaluation. Shalley (1995) conducted her second study to address the impact of creativity goal setting and to address the limitations of study 1. Study 2 revealed that when individuals worked alone and were told to be creative in a no-evaluation environment, they had the highest level of creativity. Productivity was low when individuals worked alone or were assigned a creativity goal.

Evaluations that are more passive and generally less intentional than individuals being explicitly told that their performance would be evaluated are referred to as social facilitation or social inhibition (Amabile 1996). An example of passive valuation would be working in the presence of others. Findings as to whether performance is enhanced when working alone or in another person's presence are mixed (Forsyth 1990). Triplett (1897) is well cited for the first study to indicate that the presence of others motivates individuals. Triplett (1897) observed that the speed for bicyclists, in the company of other competing bicyclists, was significantly faster than those bicyclists who raced alone. Zajonc (1965), using the work of Triplett (1897) and Allport (1924), proposed a drive theory of social facilitation. According to Zajonc (1965), whether performance is enhanced or increased when working on a team or in the mere presence of others depends on whether the task is an easy, well-learned task or a challenging, difficult task.

Cottrell's (1968) conceptualization of social facilitation is that the potential to be evaluated is an antecedent to the increased general arousal produced by the mere presence of

others (Zajonc 1965; Cottrell et al. 1968; Gagne and Zuckerman 1999). Evaluation apprehension posits that arousal is not only caused by the mere presence of others, but by those others who have the potential to evaluate one's performance (Cottrell et al. 1968; Henchy and Glass 1968; Bond and Titus 1983). Cottrell et al. (1968) was the first study to challenge the notion that the mere presence of others is responsible for audience effects on performance (Platania and Moran 2001). Cottrell et al.'s (1968) results were similar to those obtained by Zajonc (1965) in that the presence of interested spectators increased arousal. However, Cottrell et al.'s (1968) results also indicated that when the audience is not observing and not interested, the arousal response is not significantly different relative to those who performed the task alone. Evaluation apprehension suggests that arousal is caused by individuals within the environment that have the potential to evaluate one's performance (Cottrell et al. 1968; Henchy and Glass 1968; Bond and Titus 1983).

2.7.2 GSS and Evaluation Apprehension

The benefits of computer-mediated groups have been extensively investigated. Typically labeled as GSS, these systems have built-in features such as anonymity, parallel communication, and group memory, to minimize communication barriers (Pinsonneault and Kraemer 1989; Bamber et al. 1996; Bamber et al. 1998). Prior GSS research has suggested that anonymity reduces evaluation apprehension because individuals can generate ideas without fear of criticism (Nunamaker et al. 1997). Conversely, in non-anonymous computer-mediated groups, evaluation apprehension has the potential to impair creativity and the production of good ideas. The potential to be evaluated is reduced through anonymous computer-mediated groups, allowing individuals to express unique ideas, free of being criticized by peer or superior team members (Barki and Pinsonneault 2001; Dennis et al. 2001).

Collaros and Anderson (1969) manipulated the level of evaluation apprehension through interaction mode. Teams either included all experts or one expert (unidentified), while the control group did not have any member identified as an expert. The authors found that participants in the

control group, with no mention of expertise, felt the least amount of evaluation apprehension, and, on average, had the highest rating score on practicality and originality of ideas. The “one expert group” mean score on creativity was significantly higher than the “all experts group.”

Diehl and Strobe (1987) manipulated high and low evaluation apprehension through the belief that performance would be evaluated by judges and peers, respectively. The main effect of this manipulation on productivity (the generation of nonredundant ideas) was significant. In other words, high evaluation apprehension led to significantly fewer nonredundant ideas than low evaluation apprehension. Cooper et al. (1998) examined the effect of anonymity on generating controversial ideas when the topic is more controversial or less controversial. Individuals working under GSS-anonymous conditions produced more controversial comments than other treatment groups and GSS-anonymous groups produced more nonredundant ideas than individuals of non-anonymous groups. Examination of the mean scores on perceived evaluation apprehension supported the notion that anonymity reduces evaluation apprehension for both noncontroversial and controversial topics.

Jessup et al. (1990) found that anonymous group members communicated more effectively than non-anonymous group members. Specifically, the authors stated that the “data suggest that anonymous groups are more critical and probing and more likely to embellish an idea” (Jessup et al. 1990, p. 318). In a similar study, Jessup and Tansik (1991) manipulated evaluation apprehension (anonymous vs. non-anonymous). As predicted, the main effects of both anonymity and group proximity were significant on generating comments.

While the GSS literature on anonymity has shown mixed results (Pinsonneault and Heppel 1998; Dennis et al. 2001; Murthy 2002), the advantage of anonymity remains a strong argument in recent literature. Vitharana and Ramamurthy (2003) looked into a software development team’s ability to identify flaws in the software. The authors argue that anonymity may be beneficial for software inspection teams, whose members are typically peers but have

explicit hierarchical differences. Using a complex software inspection task that involved correctly identifying seeded errors, the authors found that anonymity enhanced software inspection. Those in a three-person anonymous group could neither identify other team members nor trace which member identified a software defect. The three-person non-anonymous groups were less effective. The above discussion leads to the first research hypothesis, stated below in alternate form:

H₁: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will be more effective at brainstorming than auditors interacting non-anonymously.

H_{1a}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate a greater quantity of fraud ideas than auditors interacting non-anonymously.

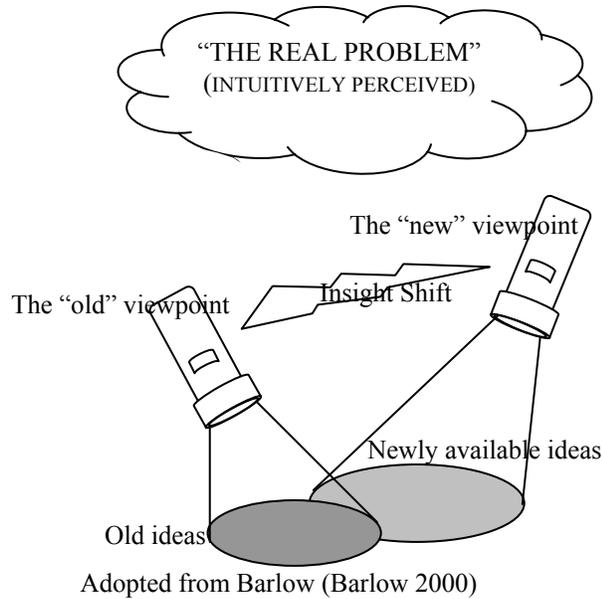
H_{1b}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate more novel fraud ideas than auditors interacting non-anonymously.

H_{1c}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate more useful fraud ideas than auditors interacting non-anonymously.

2.8 The Effect of Paradigm-Modifying Creativity on Brainstorming Effectiveness

A substantial body of literature suggests that individuals think with a narrow set of solutions when trying to solve complex problems rather than thinking creatively (Tversky and Kahneman 1974; Connolly et al. 1993; Hender et al. 2002). The detection of fraud is a complex task, and the objective of creativity techniques is to develop a new way of looking at complex problems and to develop ideas that would not be accomplished through traditional problem-solving approaches (VanGundy 1988; Couger 1996; Lowe et al. 2002). As shown in figure 3, Barlow (2000) graphically depicts the notion of using creativity as an approach for providing insight to the real problem.

FIGURE 3. AN INSIGHT MODEL OF CREATIVITY



“Guided fantasy helps participants step out of their current frame of thought into a fantasy frame where they are asked temporarily to suspend disbelief. They are then asked to generate ideas by relating their fantasies to the problem” (Nagasundaram and Bostrom 1995, p. 95). Guided fantasy is a form of symbolic play where pretending takes place (Piaget 1962; Bateson 1976). Russ et al. (1999) contends that pretend play is the most important type of stimuli for creativity. According to Dansky (1999), an activity is playful to the extent that an individual is intrinsically motivated, self-directed, and free from external rules or constraints, and the link between the means and ends is loose and flexible.

Satzinger et al. (1999) studied whether the type of social interaction would impact the ideas generated by individuals. Social interaction was the information participants were exposed to via group memory. Group memory exposed participants to either a paradigm-preserving technique (force field analysis) or a paradigm-modifying technique (guided fantasy). Those participants exposed to paradigm-modifying ideas tended to generate additional paradigm-

modifying ideas to add to group memory. Likewise, those participants exposed to paradigm-preserving ideas tended to generate additional paradigm-preserving ideas to add to group memory. Even when individuals had creative styles different than their respective treatment, their creative style was influenced by the type of creative technique they used.

In a similar, more recent study, Garfield et al. (2001) evaluated the effect creativity techniques have on an individual's creative output. They were interested in whether ideas generated by participants would be paradigm-preserving or paradigm-modifying ideas based on the creative technique used, the type of ideas generated from "phantom" team members, and participants' measured personality type and creative style. They concluded that while individual characteristics were important, the number of paradigm-modifying ideas were significantly greater for those individuals using an intuitive technique, guided fantasy, than those who used an analytical technique, force field analysis.

Hender et al. (2002) manipulated the type of stimuli received by participants. Undergraduate participants asked to generate ideas to improve a restaurant's ability to maintain customers were randomly assigned to either electronic brainstorming alone (no stimuli), a creative technique known as assumption reversals (related stimuli)⁴, or a creative technique known as analogies (unrelated stimuli)⁵. Similar to the findings of Satzinger et al. (1999) and Garfield et al. (2001), participants exposed to unrelated stimuli produced significantly more creative ideas (measured on originality and paradigm relatedness) than those participants who received no stimuli or a related stimuli. The above discussion leads to the second research hypothesis, stated below in alternate form:

⁴ Assumption reversal idea generation technique is when individuals write down all the assumptions they know about the problem. The listed assumptions are then reversed in any way possible. Participants use the reversed list of assumptions as a stimulus for generating ideas.

⁵ Analogies idea generation technique involves generating a list of analogies or problems that are similar in concept. Subjectively, the individual or group selects one or more of the analogies and provides additional detailed information about the analogy while dismissing thoughts about the initial problem. These details or unrelated stimuli are then forced back to the original problem to assist with the generation of ideas for the original problem.

H₂: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors receiving training in a paradigm-modifying creativity technique will be more effective at brainstorming than auditors receiving no creativity training.

H_{2a}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate a greater quantity of fraud ideas than auditors receiving no creativity training.

H_{2b}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate more novel than auditors receiving no creativity training.

H_{2c}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate more useful than auditors receiving no creativity training.

2.9 The Effect of Interaction Mode and Paradigm-Modifying Creativity Technique on Brainstorming Effectiveness (link 3)

As previously mentioned, the environment can be constructive or destructive to creativity (Rhodes 1961). Power distribution, accountability, and job status are organizational environments that can constrain creativity (Nunamaker et al. 1991a; Amabile 1996; Couger 1996). Research has demonstrated that accountability, which is inherent in a non-anonymous hierarchical audit team, impacts judgment and decision-making (Hoffman and Patton 1997; Rich et al. 1997; Turner 2001; Wilks 2002). The positive aspects of accountability notwithstanding, placing auditors in a frame where they must constantly think about defending their ideas, would have a detrimental effect on their brainstorming effectiveness. Brainstorming requires playfulness, relaxation, and no criticism. Thus, it is unclear whether a profession that is held highly accountable to internal and external stakeholders can create an environment that is conducive to creative thinking.

As noted previously, guided fantasy is an intuitive technique shown to produce or stimulate the production of paradigm-modifying ideas that would otherwise not be generated through the use of analytical techniques or without the assistance of stimuli (Satzinger et al. 1999;

Garfield et al. 2001; Hender et al. 2002). By removing individuals from their existing paradigm, guided fantasy, psychologically, should remove individuals from environmental constraints (Dansky 1980; Amabile 1996). Amabile (1996) suggests that individuals have the ability to reduce the salience of extrinsic goals by the way in which they engage in the task or by removing themselves from those constraints. As previously discussed, the Garfield et al. (2001) and Satzinger et al. (1999) studies demonstrate how ideas are more novel when individuals are provided a stimulus designed to free individuals from their traditional paradigm.

Further, contributing ideas under conditions of anonymity reduces evaluation apprehension and enhances team communication (Jessup et al. 1990; Wilson and Jessup 1995; Vitharana and Ramamurthy 2003). While junior audit team members could provide valuable input and “fresh thinking,” they are likely to be apprehensive about providing their ideas candidly when they are interacting with their superiors on the audit team. Similar to guided fantasy, anonymity is designed to remove individuals from environmental factors that may inhibit performance. Through anonymity, individual team members are free of social inhibition and other external constraints. Thus, anonymity and guided-fantasy have complementary effects on performance. Consequently, the combined effects of anonymous interaction and training in a paradigm-modifying creativity technique should result in the greatest brainstorming effectiveness. This expectation leads to the following interaction hypothesis:

H₃: The effect of creativity training on brainstorming effectiveness in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3a}: The effect of creativity training on the quantity of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3b}: The effect of creativity training on the novelty of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3c}: The effect of creativity training on the usefulness of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

The research hypotheses and the related results are summarized in Exhibit 2.

CHAPTER 3: METHOD

3.1 Introduction

A 2 x 2 factorial design is employed to investigate experimentally whether interaction mode and the use of a creativity training independently and jointly affect brainstorming effectiveness (H1, H2, and H3) (see research model in Figure 2). An important aspect of this study is that it uses a realistic audit task, internal auditors, and interns⁶ training to be practicing auditors for one of the Big-4 accounting firms. The task used in this experiment is designed to simulate the task required by SAS No. 99 during the planning stage of the audit cycle.

3.2 Research Design

The independent variables manipulated in the 2 x 2 between subjects design are (a) interaction mode: GSS-non-anonymous (authors of comments made by other team members identified by name and rank) or GSS-anonymous (authors of comments made by other team members identified by “team member number” only), and (b) paradigm modifying creativity training (guided fantasy training or no creativity training). The experimental design is depicted in Table 1.

⁶ For the remainder of the dissertation, these participants are referred to as “audit interns”

**TABLE 1 - RESEARCH DESIGN LAYOUT
2 x 2 Factorial Research Design**

		Factor 1: Interaction Mode	
		Non-Anonymous	Anonymous
Factor 2: Paradigm-modifying creativity training	No		
	Yes		

Factor 1: Interaction mode

Level 1: GSS-non-anonymous - authors of comments made by other team members identified by name and rank

Level 2: GSS-anonymous - authors of comments made by other team members identified by “team member number” only

Factor 2: Paradigm-modifying creativity training (Creativity Training)

Level 1: Creativity Training – guided fantasy training

Level 2: No Creativity Training

3.3 Task

Participants completed two tasks, a training task and the actual experimental task, a fraud task. The training task involved the generation of ideas on how to use excess tea bags. This task was adapted from Garfield et al. (2001). Participants were given 7 minutes to brainstorm about “how to use excess capacity of tea bags.” They were told that they were employed by a company that was producing an excessive amount of tea bags. Their task was to come up with as many ideas as possible on how to use excess tea bags. The purpose of the training task was to (1) familiarize participants with the GSS interface and (2) to assess whether participants would respond to creativity training using a task and technique that had been successfully employed in prior IS research.

After completing the tea task, participants were then introduced to the misappropriation of assets task. Participants read a misappropriation of assets case adapted from Strand et al. (2002). The case was on a lumber company similar to Home Depot, and included key accounting personnel such as the controller, the chief accountant, accounts payable clerk, and so forth. After

reading the case, participants were provided 15 minutes to brainstorm about “how employees of Lakeview Lumber might commit fraud.”

3.4 Participants

Three groups of participants were recruited for this study: (1) audit interns from a “Big Four” CPA firm, (2) internal auditors who were recruited from the Institute of Internal Auditors, and (3) staff auditors from one of the “Big Four” CPA firms and a smaller regional CPA firm. A total of 191 auditors participated in this study: 77 audit interns, 90 internal auditors, and 24 staff auditors⁷. Box plot tests, used to check for outliers, resulted in dropping the data for four participants from the tea training task and dropping the data for 12 participants from the misappropriation of assets task. All subsequent analysis includes 163 participants for the tea task (74 audit interns and 89 internal auditors) and 155 participants for the fraud task (70 audit interns and 85 internal auditors).⁸ All participants who completed the study were paid \$15 each.

3.4.1 Audit Interns

Junior staff auditors had college degrees and some practical experience on audit engagements. The audit interns participating in this study have many attributes in common with staff auditors. According to senior personnel from the participating CPA firm, the typical audit intern has completed at least 12 units of accounting (the two introductory courses and two intermediate courses or their equivalent). The interview and selection process for interns is the same as the process and selection criteria used for full-time audit hires. Once on the job, and after training, interns are assigned to engagements for the remainder of their internship. At the time of

⁷ For staff auditors, multivariate tests, prior to deleting outliers, revealed insignificant differences on Fraud Quantity, Fraud Novelty, and Fraud Usefulness. When outliers were deleted, the small sample sizes in each cell (e.g., only two participants were in the no anonymity/no training cell) were too small to support statistical testing (see Table 4). Therefore, staff auditors were dropped from further analysis.

⁸ There was no a priori reason for expecting differences among the three groups of participants; thus, separate hypotheses for each group were not proposed. However, once data were collected, the demographics (see Table 3) revealed a clear difference between the audit interns and the internal auditors across all demographic measures.

this study, interns were attending their second day of training, which exposed them to the accounting firm's culture and the knowledge base that is necessary for conducting client service engagements. During and at the end of the internship, the audit intern undergoes formal evaluation and is usually considered for full-time employment. Consequently, audit interns experience the same kinds of pressures to perform well, as do staff auditors.

3.4.2 Internal Auditors

Under Standard for the Professional Practice of Internal Auditing 1210.A2, internal auditors have a professional responsibility relating to fraud while performing "normal" internal audit responsibilities and in fraud investigations. Further, in light of recent fraud cases, the internal auditor is being asked to become more of a partner and consultant to the external auditor. Internal auditors are "in-house experts" within the client's environment and may be called upon to brainstorm with external auditors about the possibility of fraud in their organization. The task and treatments outlined in this study remain the same for internal auditors. Internal auditors were reminded about responsibilities for investigating fraud and working with external auditors.

3.5 Pilot Study

A pilot study was conducted using graduate accounting students enrolled in a contemporary auditing graduate course and undergraduate students enrolled in an internal auditing course. The topic of SAS No. 99 and fraud brainstorming was covered by the instructor in both courses. The purpose of the pilot study was to ensure that the computerized application, created for the purpose of this study, worked as desired and that the experimental manipulations had the intended effect. Although the participant pool in the pilot study was not large enough to enable formal testing of the hypotheses, the pilot data revealed support for the primary hypotheses regarding the effects of anonymity and creativity training on brainstorming effectiveness. However, it should be noted that although student participants in the pilot study

were told to assume they were actual auditors participating in a brainstorming session, it is unlikely that they experienced the pressures that actual audit firm employees would experience. In particular, the pilot study participants were not expecting to be evaluated by senior audit firm personnel as actual audit firm employees would be. Some modifications to the computerized application were made subsequent to the running of the pilot study sessions.

3.6 Covariates

As discussed below, prior research has shown that intrinsic motivation and creative ability can influence brainstorming effectiveness. Therefore, these variables, along with prior brainstorming and fraud detection experiences, are measured and included in the analysis as covariates.

3.6.1 Intrinsic and Extrinsic Motivation

Shalley (1995, p. 484) defines intrinsic motivation as the “inner-directed interest in a task.” In order to be intrinsically motivated, individuals must be both interested in the problem and motivated to find a solution. The notion is that in order for individuals to be creative, they need to be motivated to work hard to break down obstacles to creativity. When individuals are interested in a task and find the task enjoyable, they are intrinsically motivated. When individuals are primarily motivated to complete a task by goals imposed on them, they are extrinsically motivated (Condry and Chambers 1978; McGraw 1978; Amabile 1983). Expected evaluation is a form of extrinsic motivation and can have detrimental effects on creativity (McGraw 1978; Amabile 1983). Extrinsic motivation can stem from trying to get an award, meet a deadline, or obtain the approval of others or a positive evaluation from a supervisor, whereas intrinsic motivation comes from within (Condry and Chambers 1978; McGraw 1978; Amabile 1983). Individuals are intrinsically motivated to the extent that they enjoy accomplishing the task without being told or paid to do so. In order for intrinsic motivation to occur, the individual must

feel free from strong external control, be engaged in a playful activity rather than work, have a sense of competence in completing the task, and be curious or stimulated by the task (Osborn 1957; Amabile 1983; Couger 1995).

Research investigating external evaluation on performance has revealed that this form of extrinsic motivation can have a detrimental effect on performance (Cottrell et al. 1968; Shalley and Oldham 1985). In a fraud assessment task, it may be difficult to promote an environment that fosters intrinsic motivation because of several extrinsic constraints. As recent events have demonstrated, claims of failure to detect fraud may result in a collapse of the stock market, an increase in audit oversight, additional accounting rules, and/or the accounting firm going out of business (Plitch 2003). These extrinsic motivating factors should affect how auditors perceive the fraud assessment task. Extrinsic motivation inhibits an individual's ability to take risk and focus on the task (Amabile 1996).

3.6.2 Creative Person

An individual's innate creativity is another dimension of creativity that likely correlates with performance on the experimental task (Rhodes 1961). Some individuals are a constant source of creativity in the workplace (Mumford and Simonton 1997). Guilford defines creativity from the individual perspective as "the abilities that are most characteristic of creative people. Creative abilities determine whether the individual can exhibit creative behavior to a noteworthy degree" (Guilford 1950, p. 444). Research in this area examines individual traits (i.e., personality type, intellect, and habits) associated with the creative product.

Several instruments exist for measuring creativity traits: the Torrance Tests of Creative Thinking (TTCT; (Torrance 1974)), Guilford's Unusual Uses Test (Guilford 1950), Gough's Creative Personality Scale for the Adjective Checklist (Gough 1979), Kirton Adaption-Innovation Inventory (KAI; (Kirton 1976)), and Consensual Assessment Technique (CAT; (Amabile 1982)). Kirton's (1976) idea of a creative person is one who has either an adaptive-creative style or

innovative-creative style. While both styles are characteristic of a creative person, individuals categorized as adaptive are more likely to form paradigm-preserving ideas, while innovative individuals are more likely to form paradigm-modifying ideas (Nagasundaram and Bostrom 1995). Jabri (1991) discusses the limitations of existing measures. For example, Jabri (1991) criticizes KAI's consolidation of scores that factor on three different dimensions (fluency, efficiency, and rule), into one single score. He argues that valuable information is lost by combining the three dimensions, and thus, provides misleading results. Additionally, KAI is costly to access and administer.

Jabri's (1991) theory is that individuals have a preferred style for solving problems. Individuals either generally solve problems intuitively or in a logical, systematic manner (Jabri 1991). The systematic approach occurs when an individual follows step-by-step procedures and prefers to stay within the guidelines of rules and problems. The systematic approach is likely to lead to a traditional approach to solving problems, generating conventional solutions (Scott and Bruce 1994). The intuitive approach occurs for those who tend to retrieve and use information across paradigm boundaries to solve problems, not restricting themselves to established rules and traditional boundaries (Isaksen 1987; Scott and Bruce 1994). Individuals who approach problem-solving intuitively are likely to generate more novel, paradigm-modifying ideas (Isaksen 1987; Scott and Bruce 1994).

Synonymous with systematic and intuitive approaches to problem-solving are associative and bisociative thinking (Scott and Bruce 1994). "Associative thinking is based on habit or set routines that could be expressed in words or by symbols. This is contrasted with bisociative thinking which occurs when two 'matrices' of thought are combined resulting in a nonhabitual thought which is only made known by judgment, decision, or action" (Jabri 1991). With these definitions in mind and addressing the limitations of existing measures of problem-solving, Jabri

(1991) developed and validated an instrument that consists of two independent subscales: associative thinker or bisociative thinker.

Scott and Bruce (1994) used the associative/bisociative scales to measure problem-solving style in a model that predicted intuitive problem-solving style and systematic problem-solving style would have a direct influence on an individual's innovative behavior. While intuitive problem-solving style had insignificant results, systematic problem-solving style had a significant negative influence on innovative behavior. The reported Cronbach's alpha was .90 for the associative scale and .91 for the bisociative scale. Shalley and Perry-Smith (2001) adapted five items of Jabri's (1991) instrument to measure an individual's creativity ability. The Cronbach's alpha was .73 for the five items.

Jabri's (1991) subscales, which were used by Scott and Bruce (1994), are used in this study to control for an individual's problem-solving style. Because individuals' problem-solving style is likely to impact their brainstorming effectiveness, it was necessary to account for the effect of this potential covariate on the dependent variable. Exhibit 3 shows the 19 items used to measure an individual's most dominate problem-solving style.

3.7 Experiment Materials and Procedures

For the audit interns, the experimenter attended a training workshop held by a major CPA firm. Prior to participating in the experiment, audit interns attended a session held by the CPA firm that provided them with a general overview of the audit process and fraud. The experiment for audit interns was administered onsite, in a controlled area designated specifically for the experiment. Approximately three to four computers were set up at each table. The GSS developed for the purpose of the study is Internet-based and was accessed using a Web browser (i.e., Internet Explorer).

Internal auditors used the same GSS system, but were contacted by e-mail and signed up for a time to participate in the study. Experimental procedures for all participants took approximately 1 hour and are outlined in Table 2.

Participants accessed the GSS system developed for the study over the Internet, using a web browser. One way to create a virtual team environment and give individual participants the impression that they are participating in a brainstorming session along with other auditors is by creating a simulator that feeds “phantom” ideas into the system, as if those ideas are coming from other members (when in reality the ideas are being retrieved from a database). A script that retrieves ideas from a database table and inserts them into the participant’s “idea log” window at random intervals was used to create the illusion that additional individuals, other than the actual participants, are a part of the team. Each participant engaged in electronic brainstorming, which is similar to a chat room or virtual meeting place.

The general procedures for all participants were as follows: Using an Internet-enabled computer, participants were instructed to go to the study’s Website address. At this point, participants were prompted to enter a user id and password provided by the experimenter. Once participants gained access to the system, they were presented with a screen containing informed consent information with an option to click on an “agree” button to proceed with the study or a “disagree” button to abort the study. All participants selected the “agree” option, choosing to follow through with the study.

Participants were told that the purpose of the study is to understand the impact that SAS No. 99 has on an auditor’s ability to assess fraud. Next, participants were asked to enter their first and last name and select the auditing firm for which they work from a drop down list. Internal auditors selected “other” from the drop down menu. At this point, the system randomly assigned participants to one of four treatment conditions (guided fantasy training with non-anonymous interaction, guided fantasy training with anonymous interaction, no training with non-anonymous

interaction, or no training with anonymous interaction). Next, participants were instructed to respond to pre-experimental questions that consisted of demographics, the associative/bisociative subscales developed by Jabri (1991) and a measure of evaluation apprehension to capture participants' perception about how they interact when others are present.

TABLE 2 - PROCEDURES FOR PARTICIPANTS⁹

Training/ Non-Anonymous Team	Training/ Anonymous Team	No Training/ Non-Anonymous Team	No Training/ Anonymous Team
Complete pre-study questionnaire	Complete pre-study questionnaire	Complete pre-study questionnaire	Complete pre-study questionnaire
↓	↓	↓	↓
Introduction to Study	Introduction to Study	Introduction to Study	Introduction to Study
↓	↓		
Tea Task Problem	Tea Task Problem	Tea Task Problem	Tea Task Problem
↓	↓		
Guided Fantasy-Brazil	Guided Fantasy-Brazil		
↓	↓	↓	↓
Brainstorm: Tea Task	Brainstorm: Tea Task	Brainstorm: Tea Task	Brainstorm: Tea Task
↓	↓	↓	↓
Employee Fraud Case	Employee Fraud Case	Employee Fraud Case	Employee Fraud Case
↓	↓	↓	↓
Guided Fantasy-Inspector Gadget	Guided Fantasy-Inspector Gadget		
↓	↓	↓	↓
Brainstorm: Fraud Task	Brainstorm: Fraud Task	Brainstorm: Fraud Task	Brainstorm: Fraud Task
↓	↓	↓	↓
Complete post-study questionnaire	Complete post-study questionnaire	Complete post-study questionnaire	Complete post-study questionnaire

⁹ Format of table, adopted from Yip-Ow and Tan (2000).

After the pre-experiment questions, participants saw a screen that states, “*Please wait while the rest of your team logs on ...*” After randomly waiting for approximately 30, 45, or 90 seconds, the screen stated, “*All team members are now logged on. Please proceed.*” The purpose of this screen was to enhance the illusion that participants would be interacting with real independent/external auditors at other locations. Next, participants were told about the task according to their randomly assigned treatment condition. All participants were first trained to use the Internet-based brainstorming system through the use of a tea bag machine under-utilization problem. Participants in the creativity training treatment, in addition, received training on the guided fantasy creativity technique. Participants were told that they were a part of a four-person team. However, unknown to the participants, each electronic brainstorming session only consists of the actual participant in the study, while the other three team members appeared to be a part of the team through a program designed to create the illusion that other team members (hereafter referred to as “phantom” members) existed and were providing input to help the team accomplish its brainstorming assignment.

After training, all participants performed the following steps sequentially: (1) read the misappropriation of assets case, (2) brainstormed about potential fraud committed by employees mentioned in the case, and (3) completed post-experiment questions, such as manipulation checks and intrinsic motivation. Although the risk of communication among participants between experimental sessions was minimized by isolating audit interns who had completed the study from those who had not as yet participated, and by having internal auditors from different companies, it was impossible to prevent such communication. To minimize the potential contamination of the results of the study due to such communication, all participants were

debriefed simultaneously via e-mail once all sessions were completed, rather than after each experimental session.

Participants were instructed not to ask questions of other team members or comment on others' ideas, and to simply offer their own ideas and read ideas put forth by other team members. To eliminate the potential of extraneous variables affecting the outcome, all participants received the same pre-scripted ideas. These pre-scripted ideas for the fraud case were derived from ideas generated by graduate students who participated in the pilot study and senior auditors and managers of two local CPA firms. These pre-scripted ideas from the "phantom auditors" included a mixture of creative and non-creative ideas, and were programmed to appear on the screen at random intervals. In the non-anonymous treatment condition, each comment was tagged with a "phantom" name that is gender neutral and a job title (e.g., "Pat G., Manager"). In Weisband et al. (1995), tagging comments with a name and title made student participants keenly aware of status differences. In the current study, in the anonymous treatment condition, each idea was tagged only with a team member number (e.g., "Team Member 1"), with no indication of the idea author's name or job title.

3.8 Treatments/Independent Variables

3.8.1 Interaction Mode Treatment

Interaction mode was operationalized as non-anonymous and anonymous. The non-anonymous interaction mode and the anonymous interaction mode were expected to induce high and low evaluation apprehension, respectively. Conditions were modeled after Collaros and Anderson (1969), who manipulated inhibition through the manipulation of perceived expertise. In both the non-anonymous and the anonymous treatments, participants were told that they were on an audit engagement team with three superior team members: senior manager, manager, and senior auditor, who are experts in the area of fraud detection. For the non-anonymous treatment, participants saw the name and rank of the team member making each comment. Further,

participants saw their comment tagged with their first and last name initial in bold letters. For the anonymous treatment, participants were told that their identity and the identity of others will be concealed and will remain anonymous. Additionally, they were told that their log-in name cannot be traced back to the ideas they submit. All participants were told that the study is designed strictly to determine the effectiveness of SAS No. 99.

3.8.2 *Paradigm-Modifying Creative Technique Training Treatment*

Participants were randomly assigned to either guided fantasy training, which is an intuitive creativity technique, or to an unstructured brainstorming group, in which participants were not trained on a creativity technique, but simply told to brainstorm. The actual instructions for each treatment are outlined in Appendix A, Section 3. Guided fantasy stimuli is a short paragraph intended to be unrelated to the problem, freeing the individual of external pressure, and expanding the individual's thinking boundaries or imagination.

Task-unrelated stimuli increases brainstorming effectiveness through the use of concepts unrelated to the problem statement. These concepts are thought to promote paradigm-modifying ideas that would otherwise not be considered using task-related stimuli (Satzinger et al. 1999; Garfield et al. 2001; Hender et al. 2002). The no training guided fantasy treatment only receives task-related stimuli (which is the brainstorming of ideas), while the guided fantasy training treatment receives both task-related and task-unrelated stimuli.

Participants in the guided fantasy training treatment were exposed to two different task-unrelated stimuli, a "Brazil" stimulus during the tea task training phase and an "Inspector Gadget" stimulus during the potential fraud brainstorming phase. For the Brazil stimuli (see Appendix A, Section 3), participants were asked to imagine or fantasize about a vacation in Brazil. The Brazil scenario includes embedded concepts such as night life, mosquitoes, and a beach scene. Participants were then instructed to use these concepts to assist in generating ideas. For example, knowing that mosquitoes and other insects are a problem during the Brazil vacation

may generate an idea to use empty tea bags to screen out mosquitoes. Unrelated concepts in the “Inspector Gadget” Scenario (see Appendix A, Section 3) include security guards, backdoor entrance, and mechanical monsters. The one security guard may be viewed as being analogous to the internal auditor, who commits fraud. Auditors are encouraged to set aside prior beliefs during the brainstorming phase of the audit (AICPA 2002), thus considering internal factors should not exclude internal auditors. The backdoor entrance by Dr. Claw and his goons could trigger an idea about programmers who could leave a backdoor into the system to allow him/her unlimited access to the firm’s system, or could include additional scripts in the code that would transfer minute amounts of each transaction into an account to which he/she has access. The statues may symbolize software programs, initially dormant, that have the potential to corrupt data. Finally, the “Inspector Gadget” scenario includes gadgets such as helping hands, telescopic eyes and neck. In maintaining professional skepticism, auditors should look beyond the surface, relying on paper and computer trails. The helping hands should trigger ideas about relying on inside informants, the audit committee, and internal auditors. To eliminate timing differences in treatments, only one of the creativity training treatments was administered during each site visit.

For those in the guided fantasy training treatment, brainstorming took place after providing participants with the stated problem and an “Inspector Gadget” scenario/stimuli. Participants first read the case, and then received the “Inspector Gadget” unrelated stimuli prior to brainstorming about fraud. Participants in the unstructured brainstorming group were not instructed to use a particular brainstorming technique and were expected to use their “natural” (instinctive) brainstorming method. The “no-training” brainstorming group follows the same procedures as the guided fantasy training group, without any training on the unrelated stimuli.

3.9 GSS Technology

Using information technologies already deployed in most large public accounting firms (e.g., Lotus Notes), audit teams can use GSS to transcend time and space boundaries. GSS assists

audit teams in collaborating within or across boundaries to accomplish tasks (Saunders 2000).

One of the primary characteristics of GSSs is parallel communication, which enables team members to brainstorm simultaneously to produce a pool of ideas (Bamber et al. 1996). The pool of ideas is created through simultaneous information exchanged among members and becomes a stimuli for the generation of additional ideas related to the problem statement (Dennis et al. 1998; Hender et al. 2002). Both the training and no training treatment groups receive related stimuli or pool ideas, thought to promote additional ideas. The GSS literature typically refers to this concept as synergy: “Good ideas spur more good ideas, and member utterances may contain task-related stimuli that elicit new ideas from other members” (Barki and Pinsonneault 2001, p. 164).

The specific type of GSS technology used in this study is chat, where team members work at the same time (synchronous), but different locations (dispersed). Additionally, a key feature of GSS technology is used, that is, some groups are anonymous, while others are not. Because “phantom” team members are created, one of the main goals is to have participants believe that they are part of a four-member team, when in actuality, they are the only “real” participant on the team. Social presence theory posits that the use of different communication media, such as GSS, can affect the extent to which factors about the environment and other team members are salient (Short et al. 1976). The effect of others being present can be achieved by creating a credible illusion that others are working on the same team through the use of GSS.

The Internet-based GSS system created for this study was designed to transmit information about the number of individuals on the team, generated ideas, and, for the non-anonymous condition, the implied level of experience of the other team members based on their title. However, lack of verbal (i.e., brief utterances such as ‘yes’, ‘ummm’) and visual cues (i.e., physical appearance) can lower social presence, which in turn can reduce evaluation apprehension (Short et al. 1976; Nunamaker et al. 1991b; Sia et al. 2002). Communication media transmit information, such as facial expressions and hand gestures, in different ways. The extent

to which a non-anonymous interaction mode induces evaluation apprehension depends on the extent to which characteristics about other team members are presented by the medium. The weight given to these transmitted characteristics is determined by the individual, making social presence a subjective measure of the medium used, which in turn influences an individual's behavior (Short et al. 1976). The removal of visual and verbal cues causes the communication media used in this study to have a low degree of social presence. However, the GSS in this study was designed to increase social presence for the non-anonymous team by attaching the job title along with a gender-neutral name to each idea generated by "phantom" team members (i.e., Pat G, senior manager). Also, for the non-anonymous treatment, the participant's first name, initial of last name, and position title was attached to each comment submitted (i.e., Dana S, junior auditor). Position titles in the audit environment symbolize authority and expertise (citation in support of this notion?). Finally, comments from "phantom" team members were submitted in a format similar to that found in chat sessions. For example, instead of submitting comments that were grammatically correct, some comments were submitted with typographical errors.

3.10 Dependent Variable and Data Collection

The dependent variables are Fraud Quantity, Fraud Usefulness, and Fraud Novelty, referred to collectively as brainstorming effectiveness. During the training stage, which involves a tea task, brainstorming effectiveness is measured in terms of the quantity and novelty of ideas relating to the use of tea bags, whereas for the actual fraud case brainstorming effectiveness is measured in terms of the quantity, novelty, and utility of fraud ideas generated by each participant. The software utilized in this experiment captured and stored the ideas entered by participants. In brainstorming, one school of thought is that quantity breeds quality (Osborn 1963; White and Owen 1970). Osborn (1963) argues that it is important to generate as many ideas as possible. The generation of one idea leads to other ideas. It is a way of generating possible hypotheses, where typically the high quality ideas are the last 50 ideas generated during a

brainstorming session (Osborn 1963; White and Owen 1970). Also, generating many ideas provides alternatives and reassurance that every possible idea has been explored, regardless of its utility or usefulness (Osborn 1963; White and Owen 1970). During the brainstorming session, participants are encouraged to build off of others' ideas, create novel ideas, and generate as many ideas as possible. Thus, the quantity component of brainstorming effectiveness is measured by counting the number of non-redundant ideas per task type (tea and fraud). The utility component of brainstorming effectiveness is defined as the extent to which raters believe the idea would be used in the audit planning process. The novelty of ideas was determined based on whether an idea is rarely mentioned by other participants. Ideas produced by Participant A that were rarely mentioned by other participants were deemed novel for Participant A.

First, to determine the quantity of ideas, two coders were used. The qualifications of the coders can be ascertained by reviewing their curriculum vitae, which are included in Appendix C. The coders were first asked to code each idea as an identified control weakness, fraud idea, or a comment. The coders also identified redundant ideas. The coders were blind to the hypotheses of this study and independently coded 1,528 tea ideas and 1,648 fraud ideas. Cohen's Kappa inter-rater reliability analysis was .692 for tea ideas and .707 for fraud ideas. Both values are statistically significant, indicating that the raters coded in a similar manner. After this initial assessment, coders resolved any disagreements, until they reach 100 percent agreement. Non-ideas (comments and identified control weaknesses) per individual were eliminated to determine the quantity of ideas.

Second, once the non-redundant ideas were identified, this list of ideas was submitted to two audit managers from a local CPA firm (see attached resumes) who rated the utility of each idea in the audit planning process. Raters were instructed to rate the extent to which they believed the idea would be used in the audit planning process, using a 3-point Likert-scale, where 1= not useful and 3= very useful. Managers are responsible for reviewing staff auditors work and should

be in the best position to rate overall utility of an idea (See Appendix B for instructions to raters). The raters were blind to the hypotheses of this study and independently coded 98 fraud ideas that were either a unique idea (not similar to other ideas) or a representative of other ideas (similar to other ideas). For those ideas that were representative of other ideas, the same usefulness score rating applied to the representative was also applied to all similar items. Cohen's Kappa inter-rater reliability analysis was less than adequate (.500, p -value $< .01$). The coefficient implies that at least one-half of the variance may be due to random error (Kline 1998). After this initial assessment, raters resolved any disagreements, until they reach 100 percent agreement. An average utility score was calculated for each participant. Raters submitted a brief biography (see Appendix C) to demonstrate their qualifications as a rater and for publication in this study.

Third, using the original quantity list, as determined by the coders, an idea rarity score was generated to gauge the "novelty" of ideas by counting the number of times each participant's idea was listed by other participants, per task. Next, the reciprocal or multiplicative inverse of each idea was computed. For example, if an idea was listed three times, that is by three participants across all treatments, then the reciprocal would be $1/3$ or .333, which is the rarity score for that idea ascribed to all three participants. Those scores approaching 1 are indicative of the least common ideas (high on originality), while those scores closest to zero are indicative of the most common ideas (low on originality). A novelty score for each participant was obtained by summing the rarity scores of each idea submitted by that participant (minus any ideas that was coded as redundant within an individual participant).

The Consensual Assessment Technique (CAT) (Amabile 1996) is employed in the current study to evaluate the utility of products (ideas) generated by each participant. The technique involves using judges to evaluate each idea, and assessing the inter-judge reliability. Amabile (1996) states that three requirements are necessary in order for the task to be appropriate for the consensual assessment technique. First, the task must be one that leads to some product or

response that can be observed by judges. This requirement was met by having participants generate observable ideas about employee fraud. Second, the task must be open-ended to allow flexibility and generation of novel ideas. The misappropriation of assets case was adapted and modified from its original form by providing general background information about the company, being careful not to include obvious red flags that would indicate fraud. Presenting case material to participants without clearly labeling or identifying fraud indicators, allowed participants flexibility in generating ideas versus being confined to red flags already established by the profession. Third, the task should not depend heavily on specific skills (i.e., drawing ability or verbal fluency). However, Amabile (1996) states that if the task is heavily skill-specific, then participant selection must be based on a process that ensures a uniform level of baseline performance to help reduce extreme performance differences between individuals. In this study, although they were not required to be expert fraud examiners, participants needed to be knowledgeable about fraud, such as understanding what fraud is, how it can occur, and what effect fraud has on the financial statements or the audit opinion. In general, junior auditors have general fraud knowledge acquired through college courses and in-house fraud training (Bedard et al. 1993).

CHAPTER 4: RESULTS

4.1 Descriptive Statistics

Demographic data regarding participants are shown in Table 3. On average, across all the groups, participants had less than two years of external audit experience. As would be expected, a significant number of internal auditors and audit interns lacked external auditing experience. Male auditors represented a smaller portion of the sample (42%, n=76) than female auditors (58%, n=103). The majority of the participants were between the ages of 20-24. There were 133 participants between the ages of 20 and 35. Most of the participants had previous brainstorming experience (88% for internal auditors, 96% for audit interns, and 88% for staff auditors). While audit interns lacked fraud experience, a majority of the internal auditors had worked on an engagement where fraud was either suspected, detected, or both. Additionally, descriptive statistics indicate that these three populations (audit interns, internal auditors, and staff auditors) have characteristics that prevent them from being homogeneous, or grouped together as one population. The number of participants in each treatment condition is displayed in Table 4.

TABLE 3 - PARTICIPANT DEMOGRAPHICS
(all participants, n= 179)

Demographic Information Items	Internal Auditors (n=85)	Audit interns (n=70)	Staff Auditors (n=24)
Years of Internal Auditing Experience:			
Mean	5.14		
SD	5.18		
Min	0		
Max	28		
Years of External Auditing Experience:			
Mean	1.51	.01	1.61
SD	2.33	.12	1.20
Min	0	0	0
Max	10	1	4
Gender:			
Female	50	38	15
Male	35	32	9
Age			
20-24	2	65	7
25-29	13	4	13
30-34	24	1	4
35-39	12		
40-44	17		
45-49	10		
50 or more	7		
On approximately how many audit engagements have you worked in your auditing career?:			
Mean	44.51	.04	14.79
SD	32.22	.266	11.25
Min	1	0	0
Max	99	2	40
Have you worked on an audit engagement where fraud was suspected?	Yes: 58 (68%)	Yes: 0	Yes: 4 (16%)
Have you worked on an audit engagement where fraud was detected?	Yes: 43 (51%)	Yes: 0	Yes: 2 (8%)
Have you ever brainstormed (i.e., hastily write down thoughts) with others (in a group setting, in any context)?	Yes: 75 (88%)	Yes: 67 (96%)	Yes: 21 (88%)
Highest Level Education:			
Bachelors degree	57 (67%)	7 (10%)	10 (42%)
Masters degree	27 (39%)	1 (1.4%)	14 (58%)
Ph.D.	1 (1%)		
Who had training related to SAS #99	63 (80%)	13 (19%)	12 (50%)

**TABLE 4 - NUMBER OF PARTICIPANTS IN EACH TREATMENT
CONDITION FOR THE FRAUD TASK**

Panel A: Audit Interns - Participants per Treatment

		Interaction Mode	
		No Anonymity	Anonymity
		Count	Count
Creativity Training	No Training	17	18
	Training	19	16

Panel B: Internal Auditors - Participants per Treatment

		Interaction Mode	
		No Anonymity	Anonymity
		Count	Count
Creativity Training	No Training	26	21
	Training	18	20

Panel C: Staff Auditors - Participants per Treatment

		Interaction Mode	
		No Anonymity	Anonymity
		Count	Count
Creativity Training	No Training	6	7
	Training	6	5

4.2 Correlation Matrices

The Pearson's correlation coefficient (Pearson r) is presented in Tables 5 and 6 for two reasons. First, multivariate analysis of variance (MANOVA) creates a combined variate of all the dependent variables and controls for experiment-wide error rate. Based on theory discussed previously, and the significance of the Pearson r , the use of MANOVA to combine the set of dependent variables and determine their effect, if any, across treatment groups is supported. Second, the Pearson r and its associated significance level are used to determine whether the

continuous covariates and other measures (intrinsic motivation, creative ability, evaluation apprehension, and social presence) are correlated with the dependent variables. In selecting covariates to place in the model, it is important that covariates are highly correlated with the dependent variables without being highly correlated with the independent variables (Hair et al. 1998).

Table 5 shows the correlation matrix for audit interns. The correlation matrix for the tea task (Panel A) shows a significant correlation between the two dependent variables, Tea Quantity and Tea Novelty (Pearson $r = .783$, $p\text{-value} < .01$). The covariate, mean pre-evaluation apprehension, is negatively correlated with Tea Quantity (Pearson $r = -.296$, $p\text{-value} < .05$) and Tea Novelty (Pearson $r = -.261$, $p\text{-value} < .05$). Finally, mean post-evaluation apprehension is negatively correlated with Tea Quantity only (Pearson $r = -.244$, $p\text{-value} < .05$). The correlation matrix for the fraud task (Panel B) shows that Fraud Quantity has a significant positive correlation with both Fraud Novelty (Pearson $r = .606$, $p\text{-value} < .01$) and Fraud Usefulness (Pearson $r = .411$, $p\text{-value} < .01$). However, Fraud Novelty and Fraud Usefulness are not significantly correlated (Pearson $r = .163$, $p\text{-value} = .177$).

Table 6 presents the correlation matrix for internal auditors. The correlation matrix for the tea task (Panel A) shows a significant correlation between the two dependent variables for the tea task, Tea Quantity and Tea Novelty ($.690$, $p\text{-value} < .05$), and between the covariate mean score of intrinsic motivation and Tea Quantity (Pearson $r = .303$, $p\text{-value} < .01$) and Tea Novelty (Pearson $r = .247$, $p\text{-value} < .05$). The correlation matrix for the misappropriation of assets task (Panel B) shows correlation between the dependent variables, Fraud Quantity, Fraud Novelty, and Fraud Useful, however, covariates are not significantly correlated with either of the dependent variables.

TABLE 5 - CORRELATION MATRIX FOR AUDIT INTERNS
Pearson Correlation Coefficient (Sig. 2-tailed)

Panel A: Audit interns (n=74) – Tea Task

	<u>Tea Quantity</u>	<u>Tea Novelty</u>	<u>Mean Pre EA</u>	<u>Mean Post EA</u>	<u>Mean Social Presence</u>	<u>Mean Intrinsic Motivation</u>	<u>Associative Principal Component</u>	<u>Bisociative Principal Component</u>
Tea Quantity	1	.783(**)	-.296(*)	-.244(*)	.044	.137	-.051	.014
Tea Novelty		1	-.261(*)	-.111	-.111	-.097	-.065	.095
Mean Pre EA ^a			1	.293(*)	-.100	-.168	.000	-.292(*)
Mean Post EA ^b				1	.018	-.274(*)	-.051	-.271(*)
Mean Social Presence					1	.269(*)	-.123	.035
Mean Intrinsic Motivation						1	.284(*)	.213
Associative Principal Component							1	.182
Bisociative Principal Component								1

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

^aThe mean score of evaluation apprehension prior to the experiment; ^bThe mean score of evaluation apprehension after the experiment.

Panel B: Audit interns (n=70) - Fraud Task

	<u>Fraud Quantity</u>	<u>Fraud Novelty</u>	<u>Fraud Usefulness</u>	<u>Mean Pre EA</u>	<u>Mean Post EA</u>	<u>Mean Social Presence</u>	<u>Mean Intrinsic Motivation</u>	<u>Associative Principal Component</u>	<u>Bisociative Principal Component</u>
Fraud Quantity	1	.606(**)	.411(**)	-.201	-.295(*)	-.254(*)	-.095	-.079	-.015
Fraud Novelty		1	.163	-.191	-.183	-.174	-.064	-.243(*)	.190
Fraud Usefulness			1	-.049	-.074	-.307(**)	.009	.113	-.051
Mean Pre EA ^a				1	.300(*)	-.096	-.181	-.004	-.282(*)
Mean Post EA ^b					1	.029	-.287(*)	-.055	-.253(*)
Mean Social Presence						1	.257(*)	-.117	.051
Mean Intrinsic Motivation							1	.292(*)	.194
Associative Principal Component								1	.181
Bisociative Principal Component									1

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

^aThe mean score of evaluation apprehension prior to the experiment; ^bThe mean score of evaluation apprehension after the experiment.

TABLE 6 - CORRELATION MATRIX FOR INTERNAL AUDITORS
Pearson Correlation Coefficient
(Sig. 2-tailed)

Panel A: Internal Auditors (n=89) - Tea Task

	<u>Tea Quantity</u>	<u>Tea Novelty</u>	<u>Mean Pre EA</u>	<u>Mean Post EA</u>	<u>Mean Social Presence</u>	<u>Mean Intrinsic Motivation</u>	<u>Associative Principal Component (</u>	<u>Bisociative Principal Component</u>
Tea Quantity	1	.690(**)	-.124	-.025	.042	.303(**)	-.023	.111
Tea Novelty		1	.010	.152	-.091	.247(*)	.092	.059
Mean Pre EA ^a			1	.238(*)	-.077	-.074	.017	-.292(**)
Mean Post EA ^b				1	-.406(**)	-.286(**)	-.031	-.005
Mean Social Presence					1	.347(**)	.083	.116
Mean Intrinsic Motivation						1	.276(*)	.036
Associative PC							1	.035
Bisociative PC								1

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

^aThe mean score of evaluation apprehension prior to the experiment; ^bThe mean score of evaluation apprehension after the experiment.

Panel B: Internal Auditors (n=85) – Fraud Task

	<u>Fraud Quantity</u>	<u>Fraud Novelty</u>	<u>Fraud Usefulness</u>	<u>Mean Pre EA</u>	<u>Mean Post EA</u>	<u>Mean Social Presence</u>	<u>Mean Intrinsic Motivation</u>	<u>Associative Principal Component</u>	<u>Bisociative Principal Component</u>
Fraud Quantity	1	.665(**)	.336(**)	-.084	.014	-.072	-.059	-.199	.138
Fraud Novelty		1	.185	-.001	.083	-.129	.060	-.164	.139
Fraud Usefulness			1	.192	.192	.049	-.047	-.103	-.011
Mean Pre EA ^a				1	.234(*)	-.076	-.103	.002	-.310(**)
Mean Post EA ^b					1	-.384(**)	-.296(**)	-.037	-.017
Mean Social Presence						1	.337(**)	.081	.109
Mean Intrinsic Motivation							1	.287(**)	.062
Associative PC								1	.062
Bisociative PC									1

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed).

^aThe mean score of evaluation apprehension prior to the experiment. ^bThe mean score of evaluation apprehension after the experiment.

4.3 Effectiveness of Training

The purpose of this section is to assess the effectiveness of the tea bag training task, which was used to train participants according to their treatment before engaging in the actual task, misappropriation of assets task. First, the mean, standard deviation, and cell size is reported for Tea Quantity and Tea Novelty, grouped by treatments. Second, the MANOVA assumptions for audit interns are discussed, followed by the related multivariate test results. Next, the assumptions are reviewed again for internal auditors and the related MANOVA results are reviewed. For all multivariate analysis tests throughout this study, the F-statistic and p-value of the omnibus test (Pillai's Trace, Wilks' Lambda, Hotelling's Trace, and Roy's Largest Root) were identical for each measured variable. Only the Pillai's Trace statistic is reported for each analysis. While, Wilk's lambda is the most widely used, Pillai's is reported since it is the most robust with respect to violations of the normality and homogeneity of variances assumptions (Bray and Maxwell 1985). The assumption of independent observations is satisfied for both the audit interns and the internal auditors. Since the experiment is a between subjects design, participants were not measured on the same variable more than once during the study. The value of dependent variables per participant does not influence the value of dependent variables for other participants. Further, participants were randomly assigned to each treatment group and the data is not of a time-series nature.

MANOVA and parametric tests, in general, center around the assumption of equal variance and covariance and a normal distribution. Thus, in cases where the assumptions were violated, a two-independent-samples nonparametric test using Mann-Whitney, available through SPSS, was conducted. Mann-Whitney does not assume a normal distribution. Similar to ANOVA, the purpose of this test is to determine whether the values of a variable differ across treatment groups. However, the problem with this nonparametric test is that only one independent variable at two levels (i.e. no anonymity and anonymity) can be examined, discounting the contributions of other

independent variables and covariates to the model. SPSS refers to the nonparametric test as a two-independent-samples test. In all cases, the Mann-Whitney test statistic supported the results of the parametric statistics.

4.3.1 Tea Quantity (Number of Ideas Generated)

Tea Quantity was measured during the 7-minute training exercise that involved generating ideas about how to use excess tea bags. During this tea task, the chat application stored all ideas generated by participants. Two coders first identified each “idea” as either an idea or a comment. The coders also identified redundant ideas. Non-ideas were eliminated and only the non-redundant ideas, as determined by the coders, were counted per participant. The descriptive data for both audit interns and internal auditors are shown in Table 7. For the audit interns (Panel A) that did not have anonymity, the highest overall mean occur when they did receive training ($\mu=5.05$). However, for internal auditors (Panel B) that did not have anonymity, the highest overall mean occur when there was no training ($\mu=5.57$).

**TABLE 7 - TEA QUANTITY (NUMBER OF IDEAS GENERATED)
DESCRIPTIVE STATISTICS
(mean, standard deviation, range, n)**

Panel A: Audit interns (n=74)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	3.89 (2.21) 0 - 7 19	5.05 (1.99) 3 - 10 19	4.47 (2.15) 38
	Anonymity	4.16 (1.80) 1 - 7 19	3.76 (2.08) 1 - 6 17	3.97 (1.92) 36
		4.03 (1.99) 38	4.44 (2.10) 36	

Panel B: Internal Auditors (n=89)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	5.57 (2.20) 1 - 9 28	5.20 (2.75) 1 - 12 20	5.42 (2.42) 48
	Anonymity	3.48 (2.16) 21 0 - 9	5.45 (3.07) 1 - 12 20	4.44 (2.79) 41
		4.67 (2.40) 49	5.32 (2.88) 40	

4.3.2 Tea Novelty

The descriptive statistics for Tea Novelty are presented in Table 8, showing the average novelty score for participants in each condition. Tea Novelty was measured by how frequently the same idea was mentioned, thus each idea received a “novelty score” ranging from 0 to 1, with scores close to 0 indicating ideas that were not very novel (i.e., mentioned by most participants) and scores approaching 1 indicating more novel ideas (i.e., mentioned by very few other participants). As with the number of ideas for the tea task, the highest overall mean Novelty score occurred for audit interns who were trained and did not have anonymity ($\mu=1.561$). However, for internal auditors (Panel B), the highest mean occurred when they received training and the interaction was anonymous ($\mu=1.4766$, $s.d.=.972$, $n=20$), which is inconsistent with the internal auditors results for Tea Quantity.

**TABLE 8 - TEA NOVELTY DESCRIPTIVE STATISTICS
(mean, standard deviation, range, n)**

Panel A: Audit interns (n=74)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	1.54 (1.26) 0 – 3.68 19	1.56 (.97) .42 – 3.76 19	1.51 (1.11) 38
	Anonymity	1.30 (.74) .25 – 2.66 19	1.12 (.66) .08 – 2.06 17	1.21 (.70) 36
		1.38 (1.02) 38	1.35 (.86) 36	

Panel B: Internal Auditors (n=89)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	1.45 (1.18) .07 – 4.24 28	1.32 (1.04) .10 – 4.37 20	1.40 (1.11) 48
	Anonymity	.87 (.68) .0 – 2.49 21	1.48 (.97) .04 – 3.35 20	1.17 (.88) 41
		1.20 (1.03) 49	1.40 (1.00) 40	

4.3.3 Audit Interns and Tea Task

4.3.3.1 Multivariate Normal Distribution Assumption

To determine whether the assumption of multivariate normality of the set of dependent variables (Tea Quantity and Tea Novelty) across treatment groups was satisfied, several univariate normality tests were performed using SPSS. The shape of the distributed data was reviewed for proximity to a normal distribution, the degree of skewness and kurtosis was

analyzed using the rule of thumb by Hair et al. (1998), and the box plots and stem and leaf plots were reviewed for extreme outliers. For moderate sample sizes, multivariate analysis is robust to departures from normality when it is due to skewness and/or kurtosis, but not outliers (Hair et al. 1998). Three extreme outliers were examined and deleted after reviewing all treatment cells.

In the no training, no anonymity treatment group, the Kolmogorov-Smirnov (KS-statistic) for Tea Quantity was insignificant, but significant for Tea Novelty (KS-statistic p-value for Tea Quantity=.137 and .016 for Tea Novelty). There were no extreme outliers in this treatment group. Two extreme outliers were identified in the training/anonymity treatment group. After their deletion, KS-statistic became insignificant (KS-statistic p-value for Tea Quantity=.200 and .200 for Tea Novelty). For the no training/anonymity treatment group, the KS-statistic for Tea Quantity was significant, while the KS-statistic for Tea Novelty was insignificant (KS-statistic p-value for Tea Quantity=.033, and for Tea Novelty=.200). Finally, the training/no anonymity treatment group, the KS-statistic improved overall for both dependent variables, but remained significant for Tea Novelty after the deletion of one extreme outlier (KS-statistic p-value for Tea Quantity=.184 and for Tea Novelty=.035).

A multivariate normality test was also performed using principal components analysis. As explained previously, principal component analysis takes the data of the original variable to form one or more principal components that account for a portion of the variance of the original variable (Hair et al. 1998). Assessing the multivariate normality of the principal component is essentially assessing the multivariate normality of the original data (Tea Quantity and Tea Novelty) (Johnson 1998).

4.3.3.2 Equal Variance-Covariance Assumption

The Levene's test of equality of error variances revealed that both Tea Quantity and Tea Novelty violated the assumption of equal variance-covariance across treatment groups ($F=2.417$, $p\text{-value}=.074$ for Tea Quantity and $F=5.795$, $p\text{-value}=.001$ for Tea Novelty). The principal

component compiled for these dependent variables was checked for equality of error variances across treatment groups. The principal component score supported the univariate findings ($F=4.479$, $p\text{-value}=.006$). According to Hair et al. (1998), MANCOVA is robust to violations of this assumption when the cell sizes are approximately equal, that is, the largest cell size (training/no anonymity=19) divided by the smallest cell size (training/anonymity=17) is less than 1.5 ($19/17= 1.12$).

4.3.4 Tea Task Results for Audit interns

The multivariate analysis test statistics showed a significant mean difference across the interaction mode treatment (Pillai's Trace=.097, $F=3.341$, $p\text{-value}=.042$) and its interaction with training (Pillai's Trace=.142, $F=5.147$, $p\text{-value}=.009$), after controlling for mean post-evaluation apprehension (Pillai's Trace=.125, $F=4.14$, $p\text{-value}=.016$). The univariate analysis showed that the main effect of interaction mode and the interaction term were significant for Tea Quantity ($F=6.787$, $p\text{-value} < .05$ and $F=8.444$, $p\text{-value} < .01$, respectively). Because of the significance of the interaction term, the significance of the main effect of interaction mode on Tea Quantity cannot be interpreted without knowing if training was received. For the interaction term, the effect of training is more likely to increase Tea Quantity when no anonymity is provided ($\mu=5.05$). However, when anonymity is available, the effect of training on Tea Quantity can be detrimental ($\mu=3.76$).

4.3.4.1 Multivariate Normal Distribution Assumption

Similar procedures discussed previously for examining the normality assumption for audit interns were applied throughout this study. For internal auditors, only one outlier was deleted, and the assumption of normality was generally satisfied throughout each treatment group. In the no training/no anonymity treatment group, KS-statistic $p\text{-value}=.200$ for Tea Quantity and $.099$ for Tea Novelty. In the training/anonymity treatment group, KS-statistic $p\text{-value}=.082$ for

Tea Quantity and .200 for Tea Novelty. For the no training/anonymity treatment group, KS-statistic p-value=.179 for Tea Quantity and .200 for Tea Novelty. In the training/no anonymity treatment group KS-statistic p-value=.952 for Tea Quantity and .887 for Tea Novelty.

MANCOVA is fairly robust to departures from normality that are not due to outliers (Hair et al. 1998).

4.3.4.2 Equal Variance-Covariance Assumption

For the equal variance-covariance assumption, both the univariate test of this assumption (F=2.070, p-value=.11 for Tea Quantity and F=1.747, p-value=.164 for Tea Novelty) and the multivariate test using a principal component (F=1.515, =.217) indicated that the test of equality of variance-covariance was satisfied.

4.3.4.3 Tea Task Results for Internal Auditors

The multivariate tests of MANOVA showed insignificant mean differences for all variables, except the interaction term. Subsequent ANOVA test statistics revealed that the interaction term was significant on Tea Quantity (F=4.668, p-value < .05). Tea Quantity is likely to be highest under conditions of no training and no anonymity for internal auditors. However, with no training and anonymity, Tea Quantity is likely to be lower than Tea Quantity in any other treatment group.

4.3.5 Summary of Training Effectiveness

The results of this section suggest that creativity training for the study's participants was effective, but only when participants lacked anonymity. The results are thus indicative of an interaction between creativity training and mode of interaction, at least for the tea bag task used for training purposes.

4.4 Fraud Quantity

The descriptive data for Fraud Quantity for both audit interns and internal auditors are shown in Table 9. For audit interns (Panel A), the highest overall mean is again found when there was training, but no anonymity ($\mu=3.89$). For internal auditors, consistent with the Tea Quantity results, the highest overall mean occur in the no training/no anonymity intervention ($\mu=5.27$).

**TABLE 9 - FRAUD QUANTITY DESCRIPTIVE STATISTICS
(mean, standard deviation, range, n)**

Panel A: Audit interns (n=70)

Interaction Mode		Creativity Training		
		No Training	Training	
		No Anonymity	2.88 (1.87) 0 - 7 17	
Anonymity	3.11 (1.91) 0 - 6 18	2.69 (1.352) 0 - 5 16	2.91 (1.66) 34	
		3.00 (1.86) 35	3.34 (1.91) 35	

Panel B: Internal Auditors (n=85)

Interaction Mode		Creativity Training		
		No Training	Training	
		No Anonymity	5.27 (2.88) 1 - 11 26	
Anonymity	3.76 (2.45) 0 - 8 21	4.95 (2.70) 1 - 11 20	4.34 (2.61) 41	
		4.60 (2.77) 47	4.53 (2.53) 38	

4.5 Fraud Novelty

Descriptive statistics for Fraud Novelty are quite different when comparing the audit interns and the internal auditors (Table 10). For audit interns (Panel A), similar to previously discussed dependent variables, the highest overall mean was found in training, but not anonymity ($\mu=.732$). As with the novelty of tea task ideas, the highest overall mean Novelty score for fraud ideas occurred for internal auditors who were trained and who had anonymity ($\mu=.532$).

**TABLE 10 - FRAUD NOVELTY DESCRIPTIVE STATISTICS
(mean, standard deviation, range, n)**

Panel A: Audit interns (n=70)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	.33 (.29) .0 - 1.02 17	.73 (.67) .08 - 2.15 19	.54 (.56) 36
	Anonymity	.32 (.22) .0 - .72 18	.21 (.144) .0 - .58 16	.27 (.19) 34
		.33 (.25) 35	.49 (.56) 35	

Panel B: Internal Auditors (n=85)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	.51 (.44) .02 - 1.63 26	.30 (.24) .0 - 1.02 18	.42 (.39) 44
	Anonymity	.37 (.38) .0 - 1.25 21	.53 (.43) .03 - 1.49 20	.45 (.41) 41
		.45 (.42) 47	.42 (.37) 38	

4.6 Fraud Usefulness

Two audit managers from a local CPA firm rated the usefulness of each idea to the audit planning process on a 3-point scale (1=not useful, 2=useful, and 3=very useful). The descriptive statistics are presented in Table 11 for both audit interns (Panel A) and internal auditors (Panel B). For audit interns, the highest overall mean on Fraud Usefulness was found when training was provided with anonymity ($\mu=2.49$). This was the first dependent variable where the highest overall mean was reported under conditions of anonymity for audit interns. For internal auditors, the highest overall mean occurred for participants who were trained and did not receive anonymity ($\mu=2.61$). The highest mean being reported in the training/no anonymity cell was the first occurrence for internal auditors.

**TABLE 11 - FRAUD USEFULNESS DESCRIPTIVE STATISTICS
(mean, standard deviation, range, n)**

Panel A: Audit interns (n=70)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	1.87 (1.04) 0 - 3 17	2.39 (.33) 2 - 3 19	2.14 (.78) 36
	Anonymity	2.24 (.79) 0 - 3 18	2.49 (.77) 0 - 3 16	2.36 (.78) 34
		2.06 (.92) 35	2.43 (.57) 35	

Panel B: Internal Auditors (n=85)

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	2.54 (.37) 2 - 3 26	2.61 (.41) 2 - 3 18	2.57 (.38) 44
	Anonymity	2.33 (.92) 0 - 3 21	2.51 (.53) 1 - 3 20	2.42 (.75) 41
		2.45 (.67) 47	2.55 (.47) 38	

4.7 Effect of Covariates and Other Measured Variables

In order to assess the reliability of measures, the Cronbach's alpha (α), mean (μ), and standard deviation are reported for the measures of pre- and post-experimental measure of evaluation apprehension and extrinsic and intrinsic motivation. All measures, except a measure of extrinsic motivation, show an acceptable measure of internal consistency ($\alpha > .70$) (Hair al. 1998). A low alpha means that the inter-item consistency or reliability is low and the opposite is true for a high alpha. The reliability estimates were based on the number of participants included

in the fraud task. Table 12 presents the α measures for pre- and post-evaluation apprehension, and intrinsic and extrinsic motivation. Assessing reliability is ascertaining the degree of confidence that can be placed in the scores (Pedhazur and Schmelkin 1991). For extrinsic motivation, the reliability scores were relatively low, but remaining measures were reliable ($\alpha > .70$).

TABLE 12 - CRONBACH'S ALPHA OF MEASURED ITEMS

<i>Scale (Measured Items)</i>	<i>Audit interns (n=70)</i>	<i>Internal Auditors (n=85)</i>
Pre-Evaluation Apprehension	.848 (4)	.897 (4)
Post-Evaluation Apprehension	.931 (4)	.920 (4)
Extrinsic Motivation	.365 (4)	.487 (4)
Intrinsic Motivation	.862 (5) ^a	.860 (5) ^a

^a Although participants answered 6 items for intrinsic motivation, reliability statistics indicated that Cronbach's alpha would increase from .792 to .862 for audit interns if the first intrinsic motivation item was deleted and from .713 to .860 for internal auditors.

*Number in (), represent N of items.

4.7.1 Evaluation Apprehension:

Evaluation apprehension questionnaire items were completed by participants before the experiment (pre-evaluation apprehension) and after the experiment (post-evaluation apprehension). In measuring pre-evaluation apprehension, participants were asked four questions using a 7-point scale: (1) "Usually in a group, I am reluctant to offer an idea for fear of criticism from other members," (2) "Usually in a group, I feel inhibited in offering an idea due to the presence of others who have more experience with brainstorming," (3) "Usually in a group, if I offer an idea that is 'way out,' I get discouraged if I sense a certain disapproval from team members," and (4) "I tend to withhold ideas, for fear of possible disapproval from other members." The pre-evaluation apprehension measurement was reliable for both audit interns and

internal auditors. The post-questionnaire items, asked similar questions but in a past tense: (1) “I was reluctant to offer an idea for fear of criticism from other members,” (2) “I was inhibited in offering an idea due to the presence of others,” (3) “Although no overt criticism was expressed, I was reluctant to offer an idea that was 'way out,' for fear of disapproval from members,” and (4) “I withheld ideas for fear of possible disapproval from other members.” Table 13 and 14 reports the mean scores of pre- and post-evaluation apprehension for the audit interns and internal auditors, respectively.

A difference score was computed (mean post-evaluation apprehension score minus mean pre-evaluation apprehension score) for both audit interns and internal auditors. In most cases, both for audit interns and internal auditors, evaluation apprehension decreased after participating in the study. However, as expected, there was a significantly larger decrease in evaluation apprehension when audit interns brainstormed anonymously ($\mu = -1.324$) than when they brainstormed non-anonymously ($\mu = -.278$) ($F=10.83$, $p\text{-value} < .01$). Likewise for internal auditors, the larger decrease in evaluation apprehension occurred when participants brainstormed anonymously ($\mu = -1.421$) than when they brainstormed non-anonymously ($\mu = -.890$), and this difference was marginally significant ($F=3.829$, $p\text{-value} < .10$). An additional ANOVA test ($F=2.814$, $p\text{-value} < .10$), using the difference score as the dependent variable and the participant group as the independent variable, revealed that, marginally, the largest decrease in evaluation apprehension significantly occurred for internal auditors ($\mu = -1.149$) rather than for audit interns ($\mu = -.786$).

TABLE 13 - EVALUATION APPREHENSION DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
audit interns (n=70)

Panel A: Mean Pre-Evaluation Apprehension

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	3.24 (1.07) 17	2.49 (.75) 19	2.84 (.98) 36
	Anonymity	3.25 (1.33) 18	3.14 (.96) 16	3.20 (1.15) 34
		3.24 (1.19) 35	2.79 (.90) 35	

Panel B: Mean Post-Evaluation Apprehension

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	2.66 (1.26) 17	2.47 (1.55) 19	2.56 (1.40) 36
	Anonymity	1.86 (1.26) 18	1.89 (.96) 16	1.88 (1.11) 34
		2.25 (1.30) 35	2.21 (1.33) 35	

**TABLE 14 - EVALUATION APPREHENSION DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
internal auditors (n=85)**

Panel A: Mean Pre-Evaluation Apprehension

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	2.47 (1.17) 25	2.25 (1.18) 18	2.38 (1.16) 43
	Anonymity	2.62 (1.29) 21	2.76 (1.12) 20	2.69 (1.20) 41
		2.54 (1.21) 46	2.52 (1.16) 38	

Panel B: Mean Post-Evaluation Apprehension

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	1.56 (1.10) 26	1.38 (.83) 18	1.48 (.99) 44
	Anonymity	1.24 (.45) 21	1.30 (.57) 20	1.27 (.51) 41
		1.41 (.88) 47	1.34 (.70) 38	

4.7.2 Social Presence

Social presence was measured to get a sense of experimental realism for participants. Participants brainstormed in a computer mediated environment without the physical appearance of superiors. As previously discussed, the communication media used can impact the extent to which factors about other team members are salient. This is the first known study in auditing that

used “phantom” members to create the illusion of distributed power within an audit team. Thus, it is important to determine to what extent participants believed they were actually communicating with other auditors. After participating in the study, participants answered two questions on a 7 point scale where 1=strongly disagree and 7=strongly agree: (1) “The session was functionally equivalent to a scenario where I was in the same room with my team, each at a different computer terminal,” and (2) “The session worked as well as it would have if the team was in the same room.” The two items were positively correlated for audit interns (Pearson $r = .693$, p -value $< .01$) and for internal auditors (Pearson $r = .432$, p -value $< .01$). Using the mean social presence score as the dependent variable and the participant group as the independent variable, ANOVA results ($F=17.519$, p -value $< .01$) revealed that social presence for internal auditors ($\mu=4.747$) was significantly higher than social presence for audit interns ($\mu=3.650$). However, among audit interns and internal auditors, social presence was not significantly different for those who had anonymity, than for those who did not have anonymity ($F=.434$, $p > .10$; $F=.276$, $p > .10$). Table 15 and Table 16 report the descriptive statistics for audit interns and internal auditors, respectively.

**TABLE 15 - SOCIAL PRESENCE DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
audit interns (n=70)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	3.68 (1.70) 17	3.87 (1.42) 19	3.78 (1.54) 36
	Anonymity	2.92 (1.73) 18	4.19 (1.68) 16	3.51 (1.80) 34
		3.29 (1.73) 35	4.01 (1.53) 35	

**TABLE 16 - SOCIAL PRESENCE DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
internal auditors (n=85)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	4.73 (1.78) 26	4.56 (1.41) 18	4.66 (1.62) 44
	Anonymity	4.86 (1.59) 21	4.83 (1.59) 20	4.84 (1.57) 41
		4.79 (1.68) 47	4.70 (1.50) 38	

4.7.3 Task Complexity

Zajonc (1965) and Amabile (1983) have argued that task complexity is necessary in order to inhibit an individual's performance when others are present. Thus, to determine if participants perceived the fraud task to be complex, participants were asked to indicate their response to a complexity task question on a 7-point scale adapted from Pinsky (2002). Specifically, the question stated, "I thought that the experimental task ... was very easy," where 1=strongly disagree and 7=strongly agree. ANOVA results found a marginally significant mean difference on interaction mode ($F=3.198$, $p\text{-value} < .10$). Those audit interns provided no anonymity ($\mu=3.972$, $n=36$) were somewhat more likely to consider the fraud task complex than those who were anonymous ($\mu=4.529$, $n=34$). Similar results were found on the ANOVA test for internal auditors ($F=3.514$, $p\text{-value} < .10$). Internal auditors in the non-anonymous treatment group ($\mu=5.022$, $n=44$) were also somewhat more likely to rate the task as complex than those internal auditors in the anonymity treatment group ($\mu=5.610$, $n=41$). According to Zajonc (1965) performance is inhibited when individuals are working on a task that they perceive to be difficult, in the presence of others. Under the Yerkes-Dodson theory (1908), a certain amount of pressure,

performance can be enhanced. The findings of this study are consistent with Yerkes-Dodson (1908), but contradict that of Zajonc's (1965). Table 17 and Table 18 report the descriptive statistics for audit interns and internal auditors, respectively.

**TABLE 17 - MEAN TASK COMPLEXITY DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
audit interns (n=70)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	3.94 (1.30) 17	4.00 (1.25) 19	3.97 (1.25) 36
	Anonymity	4.50 (1.65) 18	4.56 (.96) 16	4.53 (1.35) 34
		4.23 (1.50) 35	4.26 (1.15) 35	

**TABLE 18 - MEAN TASK COMPLEXITY DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
internal auditors (n=85)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	5.00 (1.72) 26	5.06 (1.47) 18	5.02 (1.61) 44
	Anonymity	5.48 (1.21) 21	5.75 (1.29) 41	5.61 (1.24) 41
		5.21 (1.52) 47	5.42 (1.41) 85	

4.7.4 *Intrinsic Motivation and Extrinsic Motivation*

After completing the study, participants were asked to rate their level of intrinsic and extrinsic motivation toward the task using items adapted from Amabile (1979) and Conti et al. (2001), and modified for the purpose of this experiment (see Appendix A, Section 4). Internal auditors had a significantly higher level of intrinsic motivation than audit interns ($F=25.062$, p -value $< .01$). Two additional ANOVA tests were conducted using, first, audit interns as the population and then internal auditors as the population. For audit interns who had training, the level of intrinsic motivation was significantly higher than for those with no training ($F=4.157$, p -value $< .05$). The level of intrinsic motivation was greatest for internal auditors who had training and interacted anonymously ($F=6.096$, p -value $< .01$). The measure of extrinsic motivation was not reliable ($\alpha = .365$ for audit interns and $.487$ for internal auditors). Table 19 and Table 20 report the descriptive statistics for audit interns and internal auditors, respectively.

**TABLE 19 - INTRINSIC MOTIVATION DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
audit interns (n=70)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	4.51 (.90) 17	4.92 (.95) 19	4.72 (.93) 36
	Anonymity	4.67 (.86) 18	5.24 (1.29) 16	4.94 (1.11) 34
		4.59 (.87) 35	5.06 (1.11) 35	

**TABLE 20 - INTRINSIC MOTIVATION DESCRIPTIVE STATISTICS
(mean, standard deviation, n)
internal auditors (n=85)**

		Creativity Training		
		No Training	Training	
Interaction Mode	No Anonymity	5.74 (.91) 26	5.33 (.95) 18	5.57 (.94) 44
	Anonymity	5.31 (.97) 21	5.99 (.74) 20	5.64 (.92) 41
		5.55 (.95) 47	5.68 (.90) 38	

4.7.5 *Creative Person*

Each participant completed Jabri's associative/bisociative measurement prior to the experiment. The Cronbach's alpha for the current study is reported in Table 21.

TABLE 21 - CRONBACH'S ALPHA OF MEASURED ITEMS- PROBLEM-SOLVING SCALE

<i>Scale (Measured Items)</i>	<i>Audit interns (n=70)</i>	<i>Internal Auditors (n=85)</i>
Associative Scale	.882 (10)	.825 (10)
Bisociative Scale	.744 (9)	.752 (9)

The objective of using principal component analysis is to reduce the measures of associative and bisociative scales to one principal component for each. Specifically, instead of using ten variables to explain associative thinking and nine variables to explain bisociative thinking, a principal component for each dimension was calculated. Principal component analysis allows the researcher to find linear combinations of X's so that all principal components are uncorrelated and account for maximum variance in the X's. One of the most advantageous aspects of principal component analysis is that it solves the problem of multicollinearity without dropping variables and losing information. The caveat in using principal component analysis is

that, although the principal component defines the true dimensionality of the data, the principal component may not be meaningful (Johnson 1998). The principal component analysis was performed using the correlation matrix which can be applied when the measurement scale is consistent across items. For audit interns, the total variance for the ten associative items was eigenvalue=5.034 (50 percent of the total variance of the original data). The total variance for the nine bisociative items was eigenvalue=3.080 (34% of the total variance of the original data). For internal auditors, the total variance for the ten items accounted for by the principal component was eigenvalue=3.995 (40 percent of the total variance of the original data). The total variance for the nine bisociative items was eigenvalue=3.096 (34% of the total variance of the original data). With the exception of associative principal component being negatively associated with Fraud Novelty (Pearson's $r = -.243$, $p\text{-value} < .05$) for audit interns, both the associative and bisociative principle components were not significantly associated with other dependent variables. Additionally, both principal components were not significantly effective in subsequent model analyses.

4.8 Manipulation Checks

4.8.1 Interaction Mode

One dichotomous measure was used to determine if participants recognized the interaction mode (anonymous or non-anonymous). Participants were asked to respond Yes, Don't Know, or No on a 3-point scale to "Were you told that you were in an anonymous group, where your team members could not determine which ideas you submitted?" Participants' response was satisfactory, where 80 percent of the audit interns responded and 83 percent of the internal auditors responded correctly.

4.8.2 *Paradigm-Modifying Creativity Training*

To assess whether participants understood that they received brainstorming training, participants were asked if they received training on a brainstorming technique that involved fantasizing, using a dichotomous response measure of yes or no. Participants' response was less than satisfactory, where 71 percent of the audit interns responded correctly and 67 percent of the internal auditors responded correctly.

4.9 **Test of Hypotheses H1 through H3**

The research model includes two categorical variables (interaction mode—anonymous or non-anonymous, and creativity training—yes or no) and one continuous dependent variable with three dimensions (quantity, utility, and novelty). To test each hypothesis, the statistical significance of the MANOVA model was evaluated using multivariate statistics (i.e., Wilks' Lambda, Hotelling T^2 , Pillai's statistic). When the overall MANOVA was significant, a series of ANOVAs were performed to draw conclusions about the hypotheses.

In a manner similar to the tea task, this section is divided into several subsections. First, for audit interns, the MANOVA assumptions are discussed, followed by the related MANCOVA results. Next, for internal auditors, the assumptions of MANOVA are discussed followed by related MANOVA results. As discussed in Section 4.10, the participants in this study were randomly assigned to each treatment group and participated in the study independently of others, allowing all observations to be independent of each. Thus, scores by a participant on the dependent measures do not influence the scores of other participants.

4.9.1 *Power Analysis*

Power was analyzed and reported for situations in which the researcher found insignificant mean differences. Analyzing power should provide some indication as to whether the lack of

significance was due to a low sample size or a low effect size. SPSS was used to calculate the partial *eta* square, the noncentrality parameter, and the observed power.

The ANCOVA models, at a significance level of $\alpha = .05$, sample size of 70, and medium effect size, for Fraud Quantity, Fraud Novelty, and Fraud Usefulness were analyzed for power. First starting with audit interns and the fraud task, the overall observed power for Fraud Quantity was .935 (partial *eta* squared = .240, noncentrality parameter = 20.23), which is considered high power. However, the main effect of creativity training on Fraud Quantity was not significant (p-value = .257). The observed power was low at .204 (partial *eta* squared = .020, noncentrality parameter = 1.311). Finally, the interaction term was not supported (p-value = .232), with an observed power of .221 (partial *eta* squared = .022, noncentrality parameter = 1.455). Both observed power levels indicate that there was less than a 22 percent chance that a significant difference would have been found using the treatments.

The overall observed power for Fraud Usefulness was high at .886 (partial *eta* squared = .212, noncentrality parameter = 17.214). The main effect of interaction mode on Fraud Usefulness was insignificant (p-value = .285). The observed power was .186 (partial *eta* squared = .018, noncentrality parameter = 1.16), indicating low power of detecting a significant difference given the sample and the effect size. The interaction term was also insignificant for Fraud Usefulness (p = .816). The power result was low at .056 (partial *eta* squared = .001, noncentrality parameter = .055). Finally, the overall observed power for Fraud Novelty was high at .991 (partial *eta* squared = .316, noncentrality parameter = 29.56)

For internal auditors, the ANOVA models, at a significance level of $\alpha = .05$, sample size of 85, and a medium effect size, for Fraud Quantity, Fraud Novelty, and Fraud Usefulness were analyzed for power. Given that the ANOVA model for each dependent variable was insignificant, power analysis was conducted at the model level. The overall observed power was low for all dependent variables. Specifically, for Fraud Quantity, the power was .418 (partial *eta*

squared = .058, noncentrality parameter = 4.96). For Fraud Novelty, the power was .423 (partial *eta* squared = .58, noncentrality parameter = 5.02), and for Fraud Usefulness, the power was .212 (partial *eta* squared = .028, noncentrality parameter = 2.350).

4.9.2 *Audit interns and Assumptions of MANOVA*

4.9.2.1 *Nature of Distribution*

The assumption under MANOVA is that all variables are multivariate normal. However, there is no direct test of multivariate normality (Hair et al. 1998). Instead, the researcher must rely on univariate normality, where each dependent variable is reviewed individually across treatment groups. To test for univariate normality, the histogram was visually examined, the stem and leaf plots were examined for extreme observations, and box plots were examined for outliers. Additionally, Kolmogorov-Smirnov (KS-statistic) with Lilliefors's correction was the statistical test used to test for normality. Fraud Novelty, Quantity, and Usefulness were reviewed for normality across treatment groups. In the no training/no anonymity group, all but one dependent variable violated the normality assumption (KS-statistic p-value=.082, p-value=.200, and p-value=.074 for Fraud Quantity, Fraud Novelty, and Fraud Usefulness, respectively). The box plot and stem and leaf plots for the three dependent variables revealed two extreme outliers. After deleting these two outliers, the box plot did not identify additional outliers for this treatment group. For the no training/anonymity treatment group, four outliers identified by the stem and leaf and box plots were deleted. The KS-statistic p-value was .166 for Fraud Quantity, .200 for Fraud Novelty, and .031 for Fraud Usefulness. All dependent distributions met the univariate normality statistical test except Fraud Usefulness. One additional outlier was deleted from the training/no anonymity treatment group.

4.9.2.2 *Equality of Variance-Covariance Matrices*

Using only the population of audit interns, the assumption of equality of variance-covariance was violated for the dependent variables Fraud Novelty and Usefulness ($F=.8.400$, $p\text{-value}=.000$ for Fraud Novelty and $F=3.446$, $p\text{-value}=.022$ for Fraud Usefulness). A subsequent multivariate Levene test revealed insignificant results ($F=1.759$, $p\text{-value}=.164$), thus the assumption of equal variance-covariance is satisfied. Additionally, because the cell sizes are approximately equal, MANOVA is robust to departures from this assumption.

4.9.2.3 *Fraud Task Test Results for Audit interns*

H1 predicted that brainstorming effectiveness in a computer-mediated brainstorming session among members of a hierarchical audit team would be higher for members interacting anonymously compared to members interacting non-anonymously. Table 22 presents the results of the subsequent ANCOVA test. A MANCOVA was run controlling for the mean score of post-evaluation apprehension and the mean score of social presence, and with the independent variables and their interaction. The dependent variables were Fraud Quantity, Fraud Novelty, and Fraud Usefulness. After controlling for the mean score of evaluation apprehension and the mean score of social presence, the main effect of interaction mode (Pillai's Trace=.200 $F=5.160$, $p\text{-value} < .01$) was significant. A univariate F-test found a significant effect on both Fraud Quantity ($F=4.492$, $p\text{-value} < .05$) and Fraud Novelty ($F=12.999$, $p\text{-value} < .01$). Although there was a significant mean difference, it was not in the hypothesized direction. Both Fraud Quantity and Fraud Novelty were significantly higher for members interacting non-anonymously compared to members interacting anonymously. Thus, H1 is unsupported.

H2 predicted that brainstorming effectiveness in a computer-mediated brainstorming session among members of a hierarchical audit team would be higher for auditors receiving training in a paradigm-modifying creativity technique compared to staff auditors receiving no training. Table 22 presents the statistical results. After controlling for the mean score of evaluation apprehension

and the mean score of social presence, the main effect of creativity training (Pillai's Trace=.154, F=3.753, p-value < .05) was significant. A univariate F-test found a moderate effect on Fraud Novelty (F=3.556, p-value < .10) and a significant effect on Fraud Usefulness (F=8.177, p-value < .01). As predicted, both Fraud Novelty and Fraud Usefulness were significantly higher for members who were trained to use the creativity technique compared to members who were not trained. Thus, both H2_b and H2_c were supported.

H3 predicted that the effect of creativity training on brainstorming effectiveness will be greater when the interaction mode is anonymous. H3 was unsupported (see Table 22). The multivariate tests resulted in the interaction term not adding to the model (Pillai's Trace=.079, F=1.782, p-value = .160).

TABLE 22 - ANALYSIS OF COVARIANCE FOR FRAUD QUANTITY, FRAUD NOVELTY, AND FRAUD USEFULNESS FOR AUDIT INTERNS

	<u>DF</u>	<u>Fraud Quantity F-Statistic</u>	<u>Fraud Novelty F-Statistic</u>	<u>Fraud Usefulness F-Statistic</u>
Main Effect				
Interaction Mode	1	4.492**	12.999***	1.164
Training	1	1.311	3.556*	8.177***
Interaction				
Training x Interaction Mode	1	1.455	5.516	.055
Covariate				
Mean Evaluation Apprehension ^b	1	9.185***	6.141**	.042
Mean Social Presence ^c	1	5.678	3.524	9.905
Error	64	2.896 ^a	.143 ^a	.521 ^a

***p<.01, **p<.05, *p<.10

^aMean square error

^bMean evaluation apprehension represents the mean score on four post-experimental items.

FIGURE 4 – FRAUD QUANTITY PLOT FOR MAIN EFFECT OF INTERACTION MODE-AUDIT INTERNS

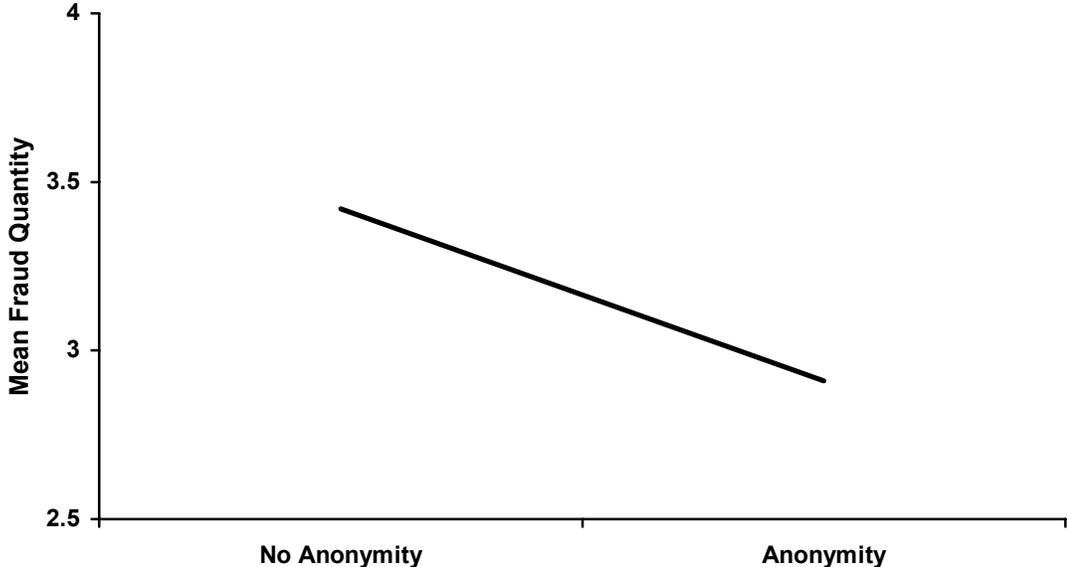


FIGURE 5 – FRAUD NOVELTY PLOT FOR MAIN EFFECT OF INTERACTION MODE –AUDIT INTERNS

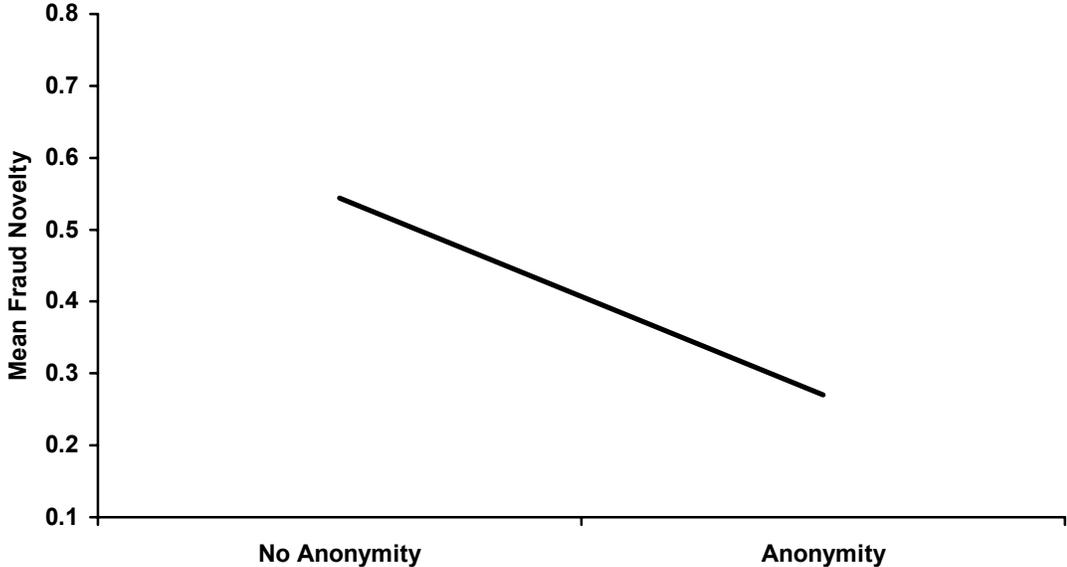


FIGURE 6 – FRAUD NOVELTY PLOT FOR MAIN EFFECT OF CREATIVITY TRAINING - AUDIT INTERNS

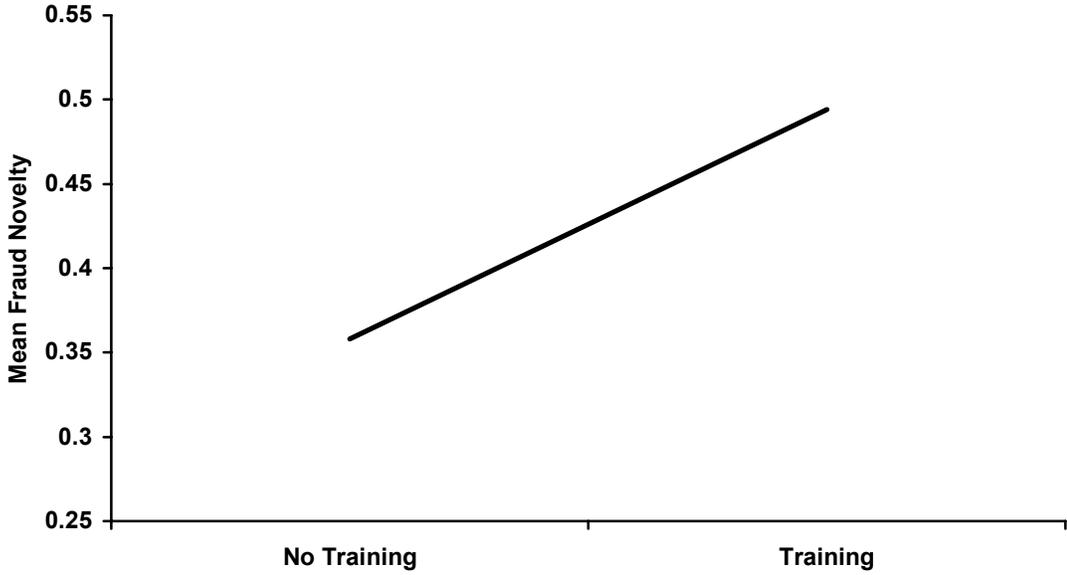
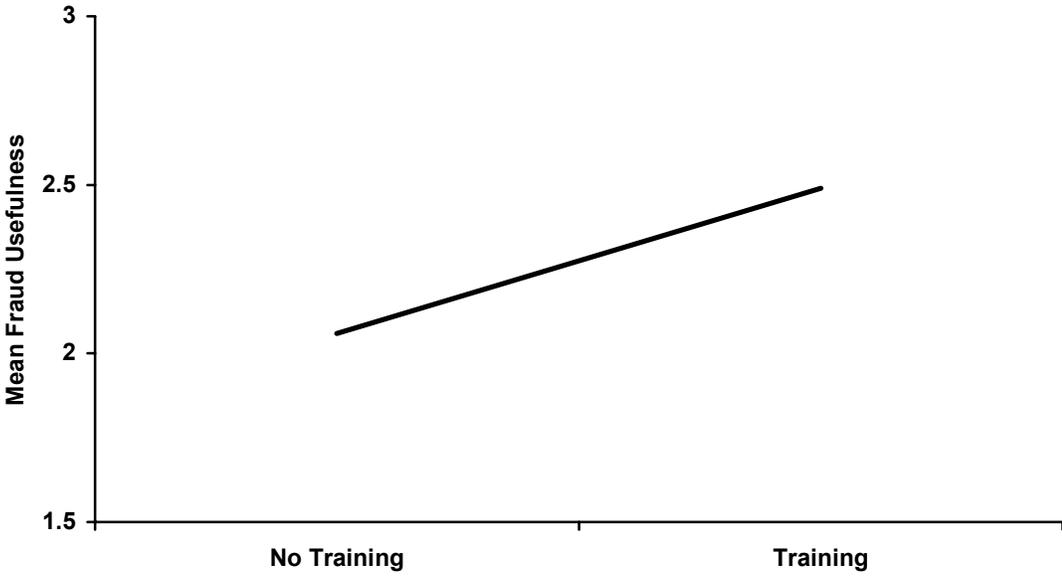


FIGURE 7 – FRAUD USEFULNESS PLOT FOR MAIN EFFECT OF CREATIVITY TRAINING - AUDIT INTERNS



4.9.3 *Internal Auditors and Assumptions of MANOVA*

4.9.3.1 *Nature of the Distribution*

To satisfy the assumption of normal distribution of dependent variables across treatments, a total of five extreme outliers were deleted. Three outliers were deleted from the no training/no anonymity treatment group, with resulting KS-statistic=.136, p-value=.200 for Fraud Quantity, KS-statistic=.158, p-value=.092 for Fraud Novelty, and KS-statistic=.152, p-value=.127 for Fraud Usefulness. Thus, all dependent variables were normal except Fraud Novelty. Although a review of the histogram for Fraud Novelty appeared to look positively skewed, the skewness-statistic was 1.124 which is acceptable (Hair et al. 1998). Kurtosis-statistic for Fraud Novelty was .428. No extreme variables were identified in the training/anonymity treatment group, although Fraud Usefulness did not meet the normality assumption according to the KS-statistic (KS-statistic=.244, p-value=.003 for Fraud Usefulness, KS-statistic=.157, p-value=.200 for Fraud Novelty, and KS-statistic=.143, p-value=.200 for Fraud Quantity). For the no training/anonymity treatment, only Fraud Quantity was normally distributed (KS-statistic=.110, p-value=.200), while Fraud Novelty (KS-statistic=.197, p-value=.032) and Fraud Usefulness (KS-statistic=.234, p-value=.004) were not normally distributed according to the tests of normality. After deleting one additional extreme outlier found in the training/no anonymity treatment, the KS-statistic for Fraud Quantity remained significant (KS-statistic=.202, p-value=.051), while the KS-statistic for Fraud Novelty (KS-statistic=.154, p-value=.200) and Fraud Usefulness (KS-statistic=.174, p-value=.156) became insignificant. In most cases, the normal distribution was satisfied. MANOVA is fairly robust to departures of normality when the reasons for violations are not due to outliers (Hair et al. 1998).

4.9.3.2 *Equality of Variance-Covariance Matrices*

To test the assumption of equality of variance-covariance matrices across treatment groups, both a univariate analysis and a multivariate analysis using the principal component were conducted. Although the univariate Levene test resulted in only Fraud Novelty meeting this assumption ($F=.575$, $p\text{-value}=.633$), using the principal component, the dependent variables met the assumption of equal variance-covariance across treatment groups ($F=1.778$, $p\text{-value}=.158$).

4.9.3.3 *Fraud Task Test Results for Internal Auditors*

H1 through H3 were unsupported. The multivariate main effects for training (Pillai's Trace=.013, $F=.352$, $p\text{-value}=.788$), interaction mode (Pillai's Trace=.031, $F=.841$, $p\text{-value}=.475$) and their interaction (Pillai's Trace=.066, $F=1.847$, $p\text{-value}=.146$) were insignificant in the model. When the multivariate tests indicate that the variables do not add to the model, subsequent univariate analysis cannot be interpreted. Hypothesis testing results are summarized in Table 23.

TABLE 23 - SUMMARY OF FINDINGS - REPORTED ALPHA LEVEL
Format of table, adopted from Venkatesh et al. (2003)

Hypothesis Number	Dependent Variable	Independent Variables	Covariates	Supported	Unsupported Directionally ¹	Reference
H _{1a}	Fraud Quantity	IM ²	Post Evaluation Apprehension Social Presence		.05	Table 22 Figure 4
H _{1b}	Fraud Novelty	IM	Post Evaluation Apprehension Social Presence		.01	Table 22 Figure 5
H _{1c}	Fraud Usefulness	IM	Social Presence			
H _{2a}	Fraud Quantity	CT	Post Evaluation Apprehension Social Presence			
H _{2b}	Fraud Novelty	CT	Post Evaluation Apprehension Social Presence	.10		Table 22 Figure 6
H _{2v}	Fraud Usefulness	CT	Social Presence	.01		Table 22 Figure 7
H _{3a}	Fraud Quantity	IM x CT	Post Evaluation Apprehension Social Presence			
H _{3b}	Fraud Novelty	IM x CT	Post Evaluation Apprehension Social Presence			
H _{3v}	Fraud Usefulness	IM x CT	Social Presence			

¹Although a significant difference in the means, it was not in the predicted direction
²IM=Interaction Mode; ³CT=Creativity Training

4.10 Additional Analysis

4.10.1 Manipulation Check Questions Revisited

The interaction mode was intended to affect the degree of evaluation apprehension. Specifically, participants in the anonymity condition should have experienced less evaluation apprehension than those who did not have anonymity. Thus, to establish the effectiveness of the anonymity treatment, multivariate tests were conducted using only those participants who answered the interaction mode manipulation check question correctly. Tables 26 and 27 summarize the analysis for both audit interns and internal auditors.

For audit interns who answered the interaction mode correctly (n=56), the multivariate analysis test showed significance on the mean score of social presence (Pillai's Trace=.158, F=3.070, p-value < .05), the main effect of training (Pillai's Trace= .192, F=3.873, p-value < .05) and interaction mode (Pillai's Trace= .272, F= 6.093, p-value < .01), and the interaction term (Pillai's Trace= .179, F= 3.551, p-value < .05). For audit interns (Panel A), after controlling for the mean score of social presence, the main effect of training was significant on Fraud Novelty, the main effect of interaction mode was significant on Fraud Quantity and Fraud Novelty, and their interaction was significant on Fraud Novelty. The quantity of fraud ideas was significantly greater for audit interns who lacked anonymity than for those who did not. Fraud Novelty was significantly higher for those who received training and had anonymity. Multivariate test were insignificant for internal auditors (n=71).

Table 24 summarizes these findings. Compared to the initial analysis, the findings are slightly different. For audit interns (Table 24, Panel A), the main effect of interaction mode remained significant for Fraud Quantity. For Fraud Novelty, although the main effect of interaction mode remained significant, the interaction term was also significant for Fraud Novelty. Thus, Fraud Novelty was significantly higher for those who received training and had anonymity. Although the main effect of creativity training remained significant for Fraud Novelty, the interaction term (interaction mode x creativity training) was significant for Fraud Novelty. Thus, the main effect of creativity training is not interpreted without knowing the type of interaction mode. Creativity training did not remain significant for Fraud Usefulness, however. Thus, under these conditions of using only participants who accurately responded to the manipulation for interaction mode, H1 through H3 are unsupported for both audit interns and internal auditors.

TABLE 24 - ANCOVA FOR FRAUD QUANTITY, FRAUD NOVELTY, AND FRAUD USEFULNESS
Excluding Participants who Failed Interaction Mode Manipulation Check

Panel A: Audit Interns

	<u>DF</u>	<u>Fraud Quantity</u> <u>F-Statistic</u>	<u>Fraud Novelty</u> <u>F-Statistic</u>	<u>Fraud</u> <u>Usefulness</u> <u>F-Statistic</u>
Main Effect				
Interaction Mode	1	4.182**	17.628***	.438
Training	1	2.019	7.753***	4.411
Interaction				
Training x Interaction Mode	1	1.854	10.754***	.011
Covariate				
Social Presence	1	4.569**	5.381**	5.039
Error	51	3.495 ^a	.115 ^a	.564 ^a

***p<.01, **p<.05
^aMean square error

Panel B: Internal Auditors

	<u>DF</u>	<u>Fraud Quantity</u> <u>F-Statistic</u>	<u>Fraud Novelty</u> <u>F-Statistic</u>	<u>Fraud</u> <u>Usefulness</u> <u>F-Statistic</u>
Main Effect				
Interaction Mode	1	.093	.390	1.649
Training	1	.337	.003	.370
Interaction				
Training x Interaction Mode	1	4.624	4.146	.027
Error	67	7.080 ^a	.161 ^a	.410 ^a

^aMean square error

The results for the creativity manipulation question are in Table 25 and Table 26. For those audit interns who answered the creativity training manipulation check correctly (n=49), multivariate tests revealed that after controlling for the mean score of post evaluation apprehension, both the main effect of interaction mode (Pillai's Trace= .215, F=3.836, p-value < .05) and the interaction term (Pillai's Trace= .142, F= 2.326, p-value < .10) were significant. Fraud Quantity and Fraud Novelty were significantly different on interaction mode (F=4.966, p-value < .05 and F=9.567, p-value < .01, respectively) and on the interaction term (F=3.827, p-value < .10, F=7.023, p-value < .05, respectively). In the original analysis, the interaction term was insignificant for Fraud Quantity and Fraud Novelty. Thus, for the current analysis, excluding those who failed the creativity training manipulation check question, when audit interns received

training and were not anonymous, they were more likely to generate the greatest number of ideas and the most novel ideas. Under these conditions, the main effect of training is insignificant and the main effect of interaction mode cannot be interpreted due to the interaction term. For audit interns, H1 through H3 are unsupported.

For internal auditors (n=56), MANOVA multivariate tests showed a moderately significant mean difference on both interaction mode (Pillai's Trace=.125, F=2.379, p-value < .10) and the interaction term (Pillai's Trace=.128, F=2.449, p-value < .10). Subsequent univariate tests revealed that Fraud Usefulness was significantly different on interaction mode (F=6.265, p-value < .05). Contrary to the predicted relationship, internal auditors who did not receive anonymity ($\mu=2.636$), generated significantly higher useful ideas than those who received anonymity ($\mu=2.186$). Additionally, Fraud Quantity was significantly higher for internal auditors who were not trained and were non-anonymous. In the original analysis, insignificant results were found across all treatments for each dependent variable. Thus, although H1 through H3 remain unsupported for internal auditors; significant mean differences were found in the opposite direction.

TABLE 25 - ANCOVA FOR FRAUD QUANTITY, FRAUD NOVELTY, AND FRAUD USEFULNESS
Excluding Participants who Failed Creativity Training Manipulation Check

Panel A: Audit Interns

	DF	Fraud Quantity F-Statistic	Fraud Novelty F-Statistic	Fraud Usefulness F-Statistic
Main Effect				
Interaction Mode	1	4.996**	9.567***	.949
Training	1	.926	1.796	2.479
Interaction				
Training x Interaction Mode	1	3.827*	7.023**	.450
Covariate				
Post Evaluation Apprehension ^b	1	8.786***	4.210**	.559
Error	44	3.827 ^a	.130 ^a	.636 ^a

***p<.01, **p<.05, *p<.10

^aMean square error

^bMean evaluation apprehension represents the mean score on four post-experimental items.

Panel B: Internal Auditors

	DF	Fraud Quantity F-Statistic	Fraud Novelty F-Statistic	Fraud Usefulness F-Statistic
Main Effect				
Training	1	1.186	.380	4.563
Interaction Mode	1	2.199	.114	6.265**
Interaction				
Training x Interaction Mode	1	5.692**	5.665	2.024
Error	52	6.586 ^a	.152 ^a	.408 ^a

***p<.01, **p<.05, *p<.10

^aMean square error

TABLE 26 - SUMMARY OF FINDINGS - REPORTED ALPHA LEVEL
Format of table, adopted from Venkatesh et al. (2003)

Panel A: Excluding Participants who Failed Interaction Mode Manipulation Check (Audit Interns only)

Hypothesis Number	Dependent Variable	Independent Variables	Covariates	Supported	Unsupported Directionally¹
H _{1a}	Fraud Quantity	IM ²	Social Presence		.05
H _{1b}	Fraud Novelty	IM	Social Presence		
H _{1c}	Fraud Usefulness	IM			
H _{2a}	Fraud Quantity	CT	Social Presence		
H _{2b}	Fraud Novelty	CT	Social Presence		
H _{2v}	Fraud Usefulness	CT			
H _{3a}	Fraud Quantity	IM x CT	Social Presence		
H _{3b}	Fraud Novelty	IM x CT	Social Presence		.01
H _{3v}	Fraud Usefulness	IM x CT			

¹Although a significant difference in the means, it was not in the predicted direction

²IM=Interaction Mode; ³CT=Creativity Training

Panel B: Excluding Participants who Failed Creativity Training Manipulation Check – Audit Interns and Internal Auditors (note: alpha for Internal Auditors is shown in parentheses.)

Hypothesis Number	Dependent Variable	Independent Variables	Covariates	Supported	Unsupported Directionally ¹
H _{1a}	Fraud Quantity	IM ²	Post Evaluation Apprehension		
H _{1b}	Fraud Novelty	IM	Post Evaluation Apprehension		
H _{1c}	Fraud Usefulness	IM			(.05)
H _{2a}	Fraud Quantity	CT	Post Evaluation Apprehension		
H _{2b}	Fraud Novelty	CT	Post Evaluation Apprehension		
H _{2v}	Fraud Usefulness	CT			
H _{3a}	Fraud Quantity	IM x CT	Post Evaluation Apprehension		.10 (.05)
H _{3b}	Fraud Novelty	IM x CT	Post Evaluation Apprehension		.05
H _{3v}	Fraud Usefulness	IM x CT			

¹Although a significant difference in the means, it was not in the predicted direction
²IM=Interaction Mode; ³CT=Creativity Training
Alpha level in parentheses are for internal auditors

4.11 Post Hoc Analysis

The analysis thus far has focused separately on the two distinctly different pools of participants, i.e., audit interns and internal auditors. Post hoc analyses were conducted to address the question of how audit interns and internal auditors compared in terms of brainstorming performance. A 2 x 2 x 2 factorial design was employed using the factors interaction mode (anonymous or non anonymous), creativity training (yes or no), and population (audit interns or internal auditors), with task complexity, the mean score of social presence, and associative problem-solving style included as covariates. The results of all the multivariate tests (Wilks' Lambda, Pillai's Trace, etc.) had the same F-value and were significant for creativity training (Pillai's Trace=.051, F=2.552, p < .10), population (audit interns and internal auditors) (Pillai's Trace=.068, F=3.441, p < .05), a two-way interaction between interaction mode and population (Pillai's Trace=.077, F=3.962, p < .01) and a three-way interaction between interaction mode, creativity training, and population (Pillai's Trace = .071, F=3.596, p < .05),.

Subsequent univariate analyses are shown in Table 27. After controlling for the mean score of social presence, when participants received creativity training, they had a higher fraud usefulness score than those participants who did not receive creativity training ($F=6.064$, p -value $<.05$). Although the main effect of population was significantly different for Fraud Quantity and Fraud Usefulness, so was its two- and three-way interaction with other independent variables. Thus, the effect of population alone cannot be interpreted. Examining the two-way interaction between interaction mode and population, for Fraud Usefulness, the highest overall mean occurred for internal auditors who lacked anonymity ($F=4.793$, p -value $<.05$).

The three-way interaction (interaction mode x creativity training x population) was significant for Fraud Quantity and Fraud Novelty. For Fraud Quantity, the highest overall outcome occurred for internal auditors who lacked training and anonymity. For Fraud Novelty, the highest overall outcome occurred for audit interns who were trained and lacked anonymity. The implications of these findings are summarized in Chapter 5.

**TABLE 27 - ANCOVA RESULTS FOR FRAUD QUANTITY, FRAUD NOVELTY,
AND FRAUD USEFULNESS
Including Only Audit Interns and Internal Auditors**

	<u>DF</u>	<u>Fraud Quantity F-Statistic</u>	<u>Fraud Novelty F-Statistic</u>	<u>Fraud Usefulness F-Statistic</u>
Main Effect				
Interaction Mode	1	3.406	3.772	.012
Training	1	.240	1.409	6.064**
Population	1	6.525**	.054	4.793**
Interaction				
Interaction Mode x Training	1	.906	.048	.040
Interaction Mode x Population	1	.170	7.274***	2.817*
Training x Population	1	.969	3.470	2.241
Interaction Mode x Training x Population	1	5.707**	10.467***	.458
Covariate				
Task Complexity	1	26.257***	7.449***	2.138
Social Presence	1	6.453**	6.871***	4.358**
Associative Problem-Solving Style	1	5.343**	7.186***	.010
Error	144	4.425^a	.141^a	.447^a

***p<.01, **p<.05, *p<.10, ^aMean square error

Table 28 combines all participants that were originally considered for this study, audit interns, internal auditors, and staff auditors. The multivariate tests, after controlling for gender, task complexity, social presence, and associative problem-solving style, revealed the main effect of training (Pillai's Trace = .065, F = 3.251, p-value < .05), the main effect of population (Pillai's Trace = .068, F = 3.415, p-value < .05), the two-way interaction between interaction mode and population (Pillai's Trace = .090, F = 4.637, p-value < .01), and the three-way interaction among interaction mode, training, and population (Pillai's Trace = .074, F = 3.778, p-value < .05) to be significant to the model.

The subsequent univariate analysis revealed that after controlling for gender, task complexity, social presence, and associative problem-solving, the three-way interaction was significant on Fraud Quantity (F = 5.739, p-value < .05) and Fraud Novelty (F = 11.074, p < .01). For Fraud Quantity, the highest overall outcome occurred for internal auditors who lacked training and anonymity. For Fraud Novelty, the highest overall outcome occurred for audit interns

who received training and lacked anonymity. Additionally, after controlling for gender and social presence, the two-way interaction between interaction mode and population was significant on Fraud Usefulness ($F= 3.260$, $p\text{-value} < .10$). For Fraud Usefulness, the highest overall outcome occurred for internal auditors who lacked anonymity. These findings are consistent with the findings in the main analysis and the findings displayed in Table 27.

TABLE 28 - ANCOVA RESULTS FOR FRAUD QUANTITY, FRAUD NOVELTY, AND FRAUD USEFULNESS
Including All Participants (Audit Interns, Internal Auditors, and Staff Auditors, $n=179$)

	DF	Fraud Quantity F-Statistic	Fraud Novelty F-Statistic	Fraud Usefulness F-Statistic
Main Effect				
Interaction Mode	1	3.264	3.443	.000
Training	1	.111	.460	8.923***
Population	1	6.568**	.080	4.757**
Interaction				
Interaction Mode x Training	1	.886	.065	.029
Interaction Mode x Population	1	.191	8.012***	3.260*
Training x Population	1	.897	3.145*	2.718
Interaction Mode x Training x Population	1	5.739**	11.074***	.419
Covariate				
Gender	1	.481	5.808**	6.537**
Task Complexity	1	25.918***	7.282***	2.460
Social Presence	1	6.072**	5.955**	5.503**
Associative Problem-Solving Style	1	4.849**	5.765**	.176
Error	143	4.441^a	.136^a	.431^a

*** $p < .01$, ** $p < .05$, * $p < .10$, ^aMean square error

Another analysis was conducted to determine if significant mean differences exist across treatments for staff auditors only. Multivariate tests results showed insignificant differences prior to and after deleting extreme outliers. Finally, both audit interns and staff auditors are employed as external auditors, thus the possibility of combining the two samples was considered.

Multivariate tests, after controlling for task complexity and associative problem-solving, showed Pillai's Trace=.144, $F=3.25$, $p\text{-value} < .05$. The significant mean difference was found on Fraud Novelty ($F = 4.203$, $p\text{-value} < .05$) and Fraud Quantity ($F = 8.805$, $p\text{-value} < .01$). Similar to the

findings using only audit interns, although the main effect of creative training was insignificant when the brainstorming was not anonymous, both Fraud Quantity and Fraud Novelty were significantly higher compared to participants brainstorming with anonymity. After deleting outliers, treatment cells contained five or fewer staff auditor participants. Further, the results of using staff auditors alone were insignificant. Thus, it appears that the brainstorming performance of the audit interns is driving the results when audit interns are combined with staff auditors.

CHAPTER 5: SUMMARY

5.1 Discussion of the Results

This study sought to examine factors that could impact brainstorming effectiveness among members of a hierarchically structured audit team. Using audit interns and internal auditors, brainstorming effectiveness, defined as Fraud Quantity, Fraud Novelty, and Fraud Usefulness, was predicted to be affected by interaction mode (anonymity or no anonymity), paradigm-modifying creativity technique training (guided fantasy training or no training), and their joint effect.

H1 hypothesized that Fraud Quantity, Fraud Novelty, and Fraud Usefulness would be higher for participants who brainstormed anonymously. This hypothesis was not supported for either audit interns or internal auditors. Contrary to H1, this study found that the quantity and novelty of ideas generated were greatest for audit interns who brainstormed without anonymity, although there was no statistical difference between anonymity or a lack of anonymity for the internal auditors. The results of this study may suggest that under certain corporate environments, anonymity is not best for novices. For instance, in one situation you have audit interns, who are clearly part of a corporate culture, where constant pressure to move up or out is prevalent. In another situation, you have internal auditors who are in an environment where long-term stability in one position is highly likely as long as they are competent in their duties as an auditor. Thus, given the results of this study, heightened evaluation apprehension through lack of anonymity could have induced, for audit interns, a “performance-related pressure” to do well. This suggestion is consistent with prior accounting literature that has shown that auditors’ judgment and decision-making are influenced by the potential to be evaluated (Koonce et al. 1995; Rich et al. 1997). This conclusion is also consistent with the Yerkes-Dodson principle which posits an

“inverted U” relationship between pressure and performance such that pressure initially increases performance but eventually leads to a decline in performance (Yerkes and Dodson 1908).

The second hypothesis, H2, posited that the quantity, novelty, and usefulness of fraud ideas generated would be higher for participants who received creativity training than for those who did not. Creativity training did not significantly increase the total number of ideas generated by audit interns or internal auditors. While there was no difference in the total number of novel ideas or usefulness score for internal auditors, the number of novel ideas and useful ideas was significantly higher for audit interns who received creativity training than for those who did not. The results of this study suggest that this effect was dominated by the non-anonymous treatment group who received creativity training, however, the results did not show significant differences for the interaction term. The lack of results for internal auditors may be simply due to the limited amount of training they received. Perhaps the training time or the training technique was not sufficient to modify the internal auditors’ mental schema. While internal auditors have always been responsible for safeguarding corporate assets, audit interns have yet to develop a mental schema for detecting fraud, and thus, may have been more receptive to the training technique.

H3 stated that the effect of training on fraud quantity, novelty, and usefulness would be higher for individuals working anonymously than non-anonymously. This hypothesis was unsupported for both audit interns and internal auditors. Although, Table 10, Panel A, show that the highest mean occurred for audit interns in the non-anonymous treatment group who received creativity training, statistically significant findings showed that training alone was sufficient to impact performance for audit interns irrespective of the interaction mode (anonymity or non-anonymity). However, this was not the case for internal auditors since neither training nor interaction mode impacted the outcomes. Internal auditors are more experienced and have a pre-established taxonomy for considering fraud, and it may be that the limited amount of training in this study was insufficient to modify their paradigm. This conjecture is supported by research on

expertise, which says that experts typically have an established taxonomy and employ heuristic reasoning, which means that experts, through experience, develop an intuitive method for solving problems. However, for the audit interns who do not have a pre-established taxonomy, the training helped them think creatively about fraud, which improved their fraud brainstorming performance.

Although the creativity literature suggests that brainstorming sessions should be free of environmental pressures (Osborn 1957), the results of this study suggest that, under certain conditions, environmental pressures may enhance performance. Also, given that fraud perpetrators have been known to employ creative techniques, auditors' way of thinking about fraud must be unpredictable to avoid familiarization and predictability of audit procedures. The initial brainstorming session sets the tone of the audit and affects the audit plan and the level of fraud skepticism. Auditors must not be content with the way they currently approach the audit process.

5.2 Contributions

SAS No. 99 mandates brainstorming as part of overall fraud risk assessment. This study provides initial evidence regarding factors that may impact the effectiveness of brainstorming sessions designed to more accurately assess the risk of fraud related to the audit engagement. One contribution is that for junior members of a hierarchical team and/or organization, where the norm is to either be promoted or to leave the organization, no anonymity serves to increase evaluation awareness, as opposed to evaluation apprehension, and improves performance. However, this is not necessarily true when an individual's reputation has already been established or when an individual's job status is not affected by an "up or out" promotion policy, as in the case of internal auditors. Whether the lack of results for internal auditors is due to level of expertise, team/firm structure, or some other unidentified artifact is unknown and is an area for future research.

A second contribution is that this study provides support for the use of creativity training to improve the brainstorming effectiveness for novice staff auditors. Whether the technique can be used effectively for internal auditors or more senior external auditors remains an open question. Creativity training for junior auditors or novices is necessary given that they are the eyes and ears of the audit team. Thus, their observations and feedback to senior audit team members is vital to the audit process. Lack of an effect of creativity training for the internal auditors may be due to their level of expertise and reliance on heuristics, or may be due to the amount of time allocated for training. For internal auditors, the limited amount of training may have been insufficient to modify a pre-established paradigm or way of thinking. Whether creativity training can be useful for experts, and/or the conditions under which it is found to be useful for expert auditors, is a question for future research.

5.3 Limitations

This study is subject to a number of limitations. First, multiple sessions were conducted. Thus, there was the slight potential that earlier participants communicated with later participants about the true nature of the study. To minimize this internal validity threat, individuals were debriefed only after all subjects participated in the study. Additionally, during the beginning of each session, participants had the opportunity to state whether they have discussed particulars of the study with previous participants.

The inter-rater reliability for the Fraud Usefulness indicated that the audit managers were inconsistent in their rating (Cohen's Kappa=.500). The Fraud Usefulness instrument was developed specifically for this study, and thus, lacked prior empirical support. Although Fraud Usefulness was defined for the audit managers, the extent to which the audit managers relied on the specified definition or some other form of usefulness was not determined. Future research should determine what is meant by the term "usefulness." How this term is defined is important because the definition will impact which ideas are considered in the audit process. Also, because

the scale lacked empirical support, the researcher was faced with the decision of what type of scale would be best to rate “Fraud Usefulness.” Future research applying a measure of usefulness should look cautiously at the appropriate way to measure the concept, that is, once the term “usefulness” has been clearly defined.

Given the low power of the statistical test, there is a chance that due to the effect size (the relationship between the variables), the sample size, or both, that this study failed to find a significant mean difference on a variable, when one exists. This is known as a Type II error. The lower the power, the higher the likelihood of a Type II error (Keppel and Wickens 2004). Type II error for this study could have been controlled without increasing the risk of a Type I error by increasing the number of participants in each cell and by increasing the effect size through alternate methods of making the creativity training and anonymous interaction treatments more salient. Future research should consider both of these options for increasing power.

Auditors rarely encounter fraud (Palmrose 1987; Pincus 1989; Hackenbrack 1992; Bell and Carcello 2000; Erickson et al. 2000; Nieschwietz et al. 2000). Thus, results are limited to the performance of audit interns and cannot be generalized to those individuals who have had actual fraud experience. The use of audit interns as surrogates for staff auditors warrants discussion, particularly for external validity purposes. Internal validity speaks to the experimental realism of the study, while external validity refers to generalization of findings to a targeted population and setting. Internal validity is a necessary condition for external validity (Pedhazur and Schmelkin 1991). External validity, at the expense of internal validity, may have been jeopardized with the use of audit interns instead of staff auditors.

Evaluation apprehension of junior auditors would be difficult to study in a controlled environment. As experienced by Schultz and Hooks (1998), including staff auditors in the current study was both difficult and costly. Staff auditors were rarely available in large numbers at one location, since they were dispersed to various field locations. The use of audit interns allowed

evaluation apprehension to be salient with the use of phantom team members who were superior to the audit interns. Given that evaluation apprehension was a necessary component of this study, audit interns enhance the realism, which is an important aspect of internal validity. For example, names of phantom team members were likely to be more believable to audit interns than by staff auditors. According to Gibbins (1984), staff auditors or auditors in general are likely to be aware of the fact that they are participating in an experiment, and thus unlikely to be affected by deception techniques in experiments. The experimental outcome relied heavily on the deception by having participants believe they were part of an actual brainstorming session with superiors.

Also, given that the topic of brainstorming among audit team members is a new research area in the accounting profession, the use of audit interns provides insight into the performance of junior auditors when evaluation apprehension is likely to be present. Thus, although external validity may be limited, the use of audit interns as surrogates for staff auditors was necessary in order to achieve experimental realism, thus enhancing internal validity. Schultz and Hooks (1998) make a compelling argument that can be applied to this study. First, few, if any, studies have reviewed the audit team in a hierarchical structure where it is important to simulate a hierarchical audit team structure and explore the performance of the junior member. Additionally, although audit interns had never encountered fraud, they were likely to be familiar with ways employees could misappropriate company assets. It was obvious that audit interns had acquired the conceptual meaning of fraud. Audit interns generated ideas similar to those of internal auditors. Thus, it is hoped that the findings for audit interns, who were carefully recruited by one of the “Big Four” international CPA firms, can help us gain insight on the brainstorming performance of newly hired staff auditors, who are often exposed to their first audit immediately after being hired. These findings associated with audit interns cannot be generalized to staff auditors who have a college degree, on-the-job training, certifications, and auditing experience.

5.4 Future Research

Overall, although creativity training can be beneficial, a lack of anonymity may be beneficial to the brainstorming process when team members are constantly “auditioning” for the next level. It is possible that “evaluation awareness” occurs on the upside, and “evaluation apprehension” occurs on the downside. Unlike participants used in psychology literature, auditing is a unique profession in that there are consequences for not doing a job well the first time. Thus, future research can determine if the findings on anonymity hold true for all levels of external audit positions. Anonymity may be unnecessary for all external auditors, where failure to do well and receive recognition for accomplishments come at a high price.

Phantom members were used in the current study, and thus, participants did not receive feedback on their ideas. Results may have been different, especially given that audit interns experienced a higher degree of evaluation apprehension than internal auditors, if negative versus positive feedback was provided from superior team members. While it would be difficult to create a believable simulation using phantom members to provide negative/positive feedback, future research could employ confederates playing the role of senior auditors providing either positive or negative feedback during the brainstorming session.

Internal auditors have typically been assigned the task of safeguarding company assets. Thus, it is natural to expect internal auditors to have more experience at generating ideas about employee fraud than audit interns. Given this level of expertise for internal auditors, it is possible that the creativity training, in general, will not affect brainstorming performance, or perhaps the particular creativity training used in this study cannot effectively be applied to experts who have a well-trained methodology for analyzing fraud. Future research should determine whether or not a creative tool that is effective for training novices is also an effective tool for training experts. In other words, some creativity training techniques may be more effective at modifying a pre-existing taxonomy or paradigm than other creativity training techniques.

Future research could also determine the most appropriate amount of time to allocate to the brainstorming session. Each idea in the current study was time-stamped, and thus it may be informative to further analyze the data to determine when the best brainstorming performance generally occurred for each individual. Another approach would be to manipulate the time allocated for each brainstorming session and determine if the amount of time is important to quantity, quality, and usefulness of fraud ideas.

Additionally, this study used a misappropriation of assets case. Future research can examine the same factors using a fraudulent financial reporting case. Because this type of fraud is likely to involve revenue recognition matters and internal control overrides, the results may be different for junior auditors, who typically do not deal directly with management and for internal auditors, who may have limited exposure to fraudulent financial reporting.

The Yerkes-Dodson theory posits that various levels of pressure have a positive effect on performance. However, over time, increased levels of pressure will become overwhelming and cause performance to suffer. The team structure in this study was held constant. However, future research should consider studying performance under increased levels of pressure. For example, during the brainstorming session, it would be interesting to examine the effect of bringing in another senior auditor all of a sudden—would such an intervention improve or inhibit brainstorming effectiveness? Would such increased pressure cause brainstorming performance to decline, per the Yerkes-Dodson principle.

These and other research questions are worthy of investigation in this line of research that seeks to shed light on the most effective and efficient methods of improving auditors' ability to detect fraud.

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EXHIBITS

EXHIBIT 1: FOUR PHASES OF AN INDEPENDENT AUDIT

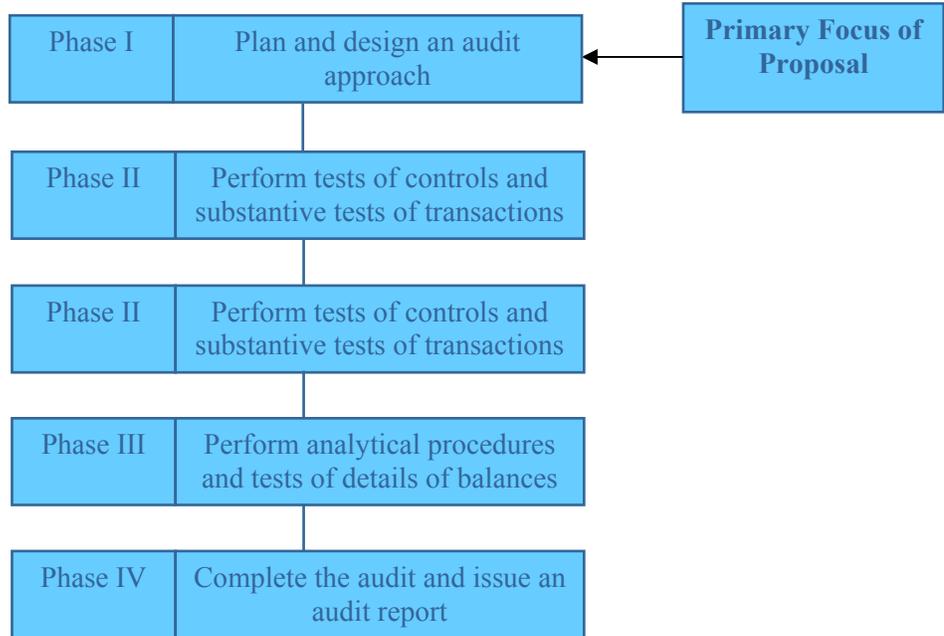


EXHIBIT 2: SUMMARY OF HYPOTHESES AND RESEARCH QUESTIONS

<i>Research Questions:</i>
Research Question 1: Does interaction mode using a GSS affect the quantity, utility, and novelty of ideas generated by staff auditors?
Research Question 2: Does training in a paradigm-modifying creativity technique improve the quantity, utility, and novelty of ideas generated by staff auditors?
Research Question 3: Do interaction mode and creativity training jointly affect the quantity, utility, and novelty of ideas generated by staff auditors?
<i>Hypotheses:</i>
<p>H₁: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will be <u>more effective</u> at brainstorming than auditors interacting non-anonymously.</p> <p>H_{1a}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate more <u>fraud ideas</u> than auditors interacting non-anonymously.</p> <p>H_{1b}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate more <u>novel</u> fraud ideas than auditors interacting non-anonymously.</p> <p>H_{1c}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors interacting anonymously will generate more <u>useful</u> fraud ideas than auditors interacting non-anonymously.</p>
<p>H₂: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors receiving training in a paradigm-modifying creativity technique will be <u>more effective</u> at brainstorming than auditors receiving no creativity training.</p> <p>H_{2a}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate more <u>fraud ideas</u> than auditors receiving no creativity training.</p> <p>H_{2b}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate more <u>novel</u> than auditors receiving no creativity training.</p>

H_{2c}: In a computer-mediated brainstorming session among members of a hierarchical audit team, auditors in a paradigm-modifying creativity technique will generate more useful than auditors receiving no creativity training.

H₃: The effect of creativity training on brainstorming effectiveness in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3a}: The effect of creativity training on the number of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3b}: The effect of creativity training on the novelty of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

H_{3c}: The effect of creativity training on the usefulness of fraud ideas generated in a computer-mediated brainstorming session will be greater when the interaction mode is anonymous than when it is non-anonymous.

**EXHIBIT 3: CHARACTERISTICS OF ADAPTORS AND INNOVATORS
TAKEN FROM (JABRI 1991)**

ITEMS FOR INDEPENDENT SUBSCALES: ASSOCIATIVE AND BISOCIATIVE	
Associative	Bisociative
Adhering to the commonly established rules of my area of work.	Being confronted with a maze of ideas which may, or may not, lead me somewhere.
Following well-trodden ways and generally accepted methods for solving problems.	Pursuing a problem, particularly if it takes me into areas I don't know much about.
Being methodical and consistent in the way I tackle problems.	Linking ideas which stem from more than one area of investigation.
Paying strict regard to the sequence of steps needed for the completion of a job.	Being fully occupied with what appear to be novel methods of solution.
Adhering to the well-known techniques, methods and procedures of my area of work.	Making unusual connections about ideas even if they are trivial.
Being strict on the production of results, as and when required.	Searching for novel approaches not required at the time.
Accepting readily the usual and generally proven methods of solution.	Struggling to make connections between apparently unrelated ideas.
Being precise and exact about production of results and reports.	Spending time tracing relationships between disparate areas of work.
Adhering carefully to the standards of my area of work.	Being 'caught up' by more than one concept, method or solution.
Being fully aware beforehand of the sequence of steps required in solving problems.	

APPENDIX A: RESEARCH MATERIALS

SECTION 1 – CONSENT FORM AND LOG ON SCREEN

General Introduction and Consent Form

Let me start by thanking you. We need your help, and we appreciate you taking the time to participate in this study. Your efforts will guide us as we consider the effectiveness of SAS No. 99: *Consideration of Fraud in a Financial Statement Audit*. Specifically, the purpose of this study is to determine how well individuals brainstorm and assess fraud risk in accordance with SAS No. 99. Please take a moment to read and sign the participant consent form below.

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research study. Please read this carefully. If you do not understand anything, ask the person in charge of the study.

Title of Study: A Study Examining the Effectiveness of SAS No. 99: Consideration of Fraud in a Financial Statement Audit

Principal Investigator: Antoinette Lynch, University of South Florida (alynch@coba.usf.edu; 813-974-6863)

Study Location(s):

This is an Internet (Web-based) study. You are being asked to participate because you are an auditor.

The purposes of this research study are (1) to obtain future auditors' ideas for potential material misstatements due to fraud in a financial statement audit and (2) to determine the performance of individuals in a virtual environment.

You will be asked to brainstorm and respond to a series of questions on different screens in this Web-based study. The entire study will take approximately 60 minutes to complete. You will receive \$15 for your participation. By taking part in this research study, you will help increase the overall knowledge of the relative effectiveness of the brainstorming requirement for SAS No. 99. This study will help the auditing profession understand the importance of using brainstorming techniques to consider solutions for complex problems. There are no known risks involved in taking part in this research study.

By taking part in this research study, you will help increase the overall knowledge of the relative effectiveness of the brainstorming requirement for SAS No. 99. This study will help students to understand the importance of using brainstorming techniques to consider solutions for complex problems. There are no known risks involved in taking part in this research study.

Your responses will be kept confidential to the extent of the law. It is possible because you are responding online that unauthorized individuals could gain access to your responses. Authorized research personnel, employees of the Department of Health and Human Services, and the Institutional Review Boards at the University of South Florida may inspect the records from this research project.

The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you or your firm in any way. Your responses will be coded with a unique identifier and will be stored in a database on a secure server located in the College of Business Administration at the University of South Florida. Only the Principal Investigator and a doctoral student will have access to the database on the secure server.

Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. You are free to refuse to answer any questions that make you feel uncomfortable.

I understand that this research study has been reviewed and approved by the University of South Florida's Institutional Review Board. For research-related problems or questions regarding subjects' rights, I can contact the Division of Research Compliance of the University of South Florida at 813-974-5638.

Questions and Contacts

- If you have any questions about this research study, contact Ms. Antoinette Lynch at 813-974-6863 or Dr. Uday Murthy at 813-974-6523.
- If you have questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Compliance of the University of South Florida at 813-974-5638.

Consent to Take Part in This Research Study

By answering the questions, you agree that:

- I have fully read or have had read and explained to me this informed consent form describing this research project.
- I have had the opportunity to question one of the persons in charge of this research and have received satisfactory answers.
- I understand that I am being asked to participate in research. I understand the risks and benefits, and I freely give my consent to participate in the research project outlined in this form, under the conditions indicated in it.

Investigator Statement:

I certify that participants have been shown an online information sheet via the Internet that has been approved by the University of South Florida's Institutional Review Board and that explains the nature, demands, risks, and benefits involved in participating in this study. I further certify that a phone number has been provided in the event of additional questions.

Signature of Investigator

Printed Name of Investigator **Date**

Log On Screen

Firm:

First name: **Last name:**

SECTION 2 – DEMOGRAPHICS, EVALUATION APPREHENSION,
AND JABRI

Demographics for External Auditors (adapted from Kozloski (2002))

First, we will need you to provide some basic demographic data.

1. How many years of external auditing experience do you have?
2. Which of the following classifications best represents your current position?
*Intern Junior Auditor Senior Auditor Manager Senior Manager
Partner*
3. What is your gender? *male female*
4. What is your e-mail address?
5. What is your age?
20-24 25-29 30-34 35-39 40-44 45-49 50 or more
6. Are you a Certified Public Accountant, Certified Management Accountant, or Certified Fraud Examiner? (Please check all that apply.):

¹⁰CPA CMA CFE CISA CIA None of the above
7. What is the highest level of education that you have earned?
Bachelors degree Masters degree Ph.D. or DBA
8. What year did you obtain the degree listed above?
9. Have you ever brainstormed (i.e., hastily write down thoughts) with others (in a group setting, in any context)?

Yes No
10. Have you ever been trained to use a brainstorming technique?

Yes No
11. Within the last 12 months, how often have you brainstormed in a group setting to consider fraud in a client's financial statements?
12. On approximately how many audit engagements have you worked in your auditing career?

¹⁰ CPA: Certified Public Accountant; CMA: Certified Management Accountant; CFE: Certified Fraud Examiner; CISA: Certified Information Systems Auditor; CIA: Certified Internal Auditor

13. On approximately how many audit engagements have you worked where you were responsible for performing or supervising planning procedures?
14. On approximately how many audit engagements have you worked where you were responsible for performing or supervising procedures relating to SAS No. 99, *The Consideration of Fraud in a Financial Statement Audit*?
15. Have you worked on an audit engagement where fraud was suspected? *Yes* *No*
16. Have you worked on an audit engagement where fraud was detected? *Yes* *No*
17. Please briefly describe any training you have had related to the consideration of fraud or the detection of fraud. Please break this training down into the following categories listed below. Please also indicate the length of said training (e.g., 4 CPE hours or ½ day, as the case may be).
- 17a. Training relating to SAS No. 99 (or SAS No. 82), *The Consideration of Fraud in a Financial Statement Audit*
- 17b. Other fraud related training (please select all that apply):
- | | |
|-----------------------------------|---|
| <i>1 CPE course in fraud</i> | <i>Multiple CPE courses in fraud</i> |
| <i>1 fraud workshop (non CPE)</i> | <i>multiple fraud workshops (non CPE)</i> |
| <i>in-house fraud training</i> | <i>college-level course(s) in fraud</i> |

Pre-Measure of Evaluation Apprehension

18. Please respond to the following questions using the 7-point scale provided. Answer questions from a work-related context. Click under the number that indicates the best representation of your judgment:

18a. Usually in a group, I am reluctant to offer an idea for fear of criticism from other members

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

18b. Usually in a group, I feel inhibited in offering an idea due to the presence of others who have more experience with brainstorming.

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

18c. Usually in a group, if I offer an idea that is ‘way out,’ I get discouraged if I sense a certain disapproval from team members.

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

18d. I tend to withhold ideas, for fear of possible disapproval from other members.

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

Demographics for Internal Auditors

First, we will need you to provide some basic demographic data.

1. How many years of internal auditing experience do you have?
2. How many years of external auditing experience do you have?
3. Years with your current company
 - Less than 3 years
 - 3 to 5 years
 - 6 to 10 years
 - 11 to 15 years
 - 16 to 25 years
 - 25 or more years
4. What is your gender? *male female*
5. What is your e-mail address?
6. What is your age?
20-24 25-29 30-34 35-39 40-44 45-49 50 or more
7. Are you a Certified Public Accountant, Certified Management Accountant, or Certified Fraud Examiner? (Please check all that apply.):

¹¹CPA CMA CFE CISA CIA None of the above
8. What is the highest level of education that you have earned?
Bachelors degree Masters degree Ph.D. or DBA
9. What year did you obtain the degree listed above?
10. Please select the industry of your company (select one)¹²:

Agriculture	Health Care/Medical	Real Estate
Banking/Securities	Insurance	Retail/Wholesale/Trade
Business Services	Legal	Telecommunications
Computer/Software Services	Manufacturing	Transportation
Construction	Professional Services	Utilities
Education	Public Accounting	Food Services
Public Adm/Government	Other	
11. Please check your company/organization's size (employees):

¹¹ CPA: Certified Public Accountant; CMA: Certified Management Accountant; CFE: Certified Fraud Examiner; CISA: Certified Information Systems Auditor; CIA: Certified Internal Auditor

¹² Questions 9 through 11 adapted from <http://www.businessfinancemag.com/survey/2003.cfm>

- 0 to 200
- 201 to 500
- 501 to 1,000
- 1,001 to 5,000
- 5,000 to 10,000
- higher than 10,000

12. Have you ever brainstormed (i.e., hastily write down thoughts) with others (in a group setting, in any context)?

Yes *No*

13. Have you ever been trained to use a brainstorming technique?

Yes *No*

14. Within the last 12 months, how often have you brainstormed in a group setting to consider fraud in a client's financial statements?

15. On approximately how many audit engagements have you worked in your auditing career?

16. Have you worked on an audit engagement where fraud was suspected? *Yes* *No*

17. Have you worked on an audit engagement where fraud was detected? *Yes* *No*

18. Please briefly describe any training you have had related to the consideration of fraud or the detection of fraud. Please break this training down into the following categories listed below. Please also indicate the length of said training (e.g., 4 CPE hours or ½ day, as the case may be).

18a. Training relating to SAS No. 99 (or SAS No. 82), *The Consideration of fraud in a Financial Statement Audit*

18b. Other fraud related training (please select all that apply):

1 CPE course in fraud
1 fraud workshop (non CPE)
in-house fraud training

Multiple CPE courses in fraud
multiple fraud workshops (non CPE)
college-level course(s) in fraud

Pre-Measure of Evaluation Apprehension

19. Please respond to the following questions using the 7-point scale provided. Answer questions from a work-related context. Click under the number that indicates the best representation of your judgment:

19a. Usually in a group, I am reluctant to offer an idea for fear of criticism from other members

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

19b. Usually in a group, I feel inhibited in offering an idea due to the presence of others who have more experience with brainstorming.

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

19c. Usually in a group, if I offer an idea that is ‘way out,’ I get discouraged if I sense a certain disapproval from team members.

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

19d. I tend to withhold ideas, for fear of possible disapproval from other members.

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

Jabri's Measure of Problem-Solving Style

These questions explore problem-solving style. Remember, there are no “correct” or “incorrect” answers.

Please answer the following questions on the 7-point scale that ranges from “unlikely to enjoy” to “likely to enjoy.” Click under the number that indicates the best representation of your judgment.

1. Adhering to the commonly established rules of my area of work.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

2. Being confronted with a maze of ideas which may, or may not, lead me somewhere.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

3. Following well-trodden ways and generally accepted methods for solving problems.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

4. Pursuing a problem, particularly if it takes me into areas I don't know much about.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

5. Being methodical and consistent in the way I tackle problems.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

6. Linking ideas which stem from more than one area of investigation.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

7. Paying strict regard to the sequence of steps needed for the completion of a job.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

8. Being fully occupied with what appear to be novel methods of solution.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

9. Adhering to the well-known techniques, methods and procedures of my area of work.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

10. Making unusual connections about ideas even if they are trivial.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

11. Being strict on the production of results, as and when required.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

12. Searching for novel approaches not required at the time.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

13. Accepting readily the usual and generally proven methods of solution.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

14. Struggling to make connections between apparently unrelated ideas.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

15. Being precise and exact about production of results and reports.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

16. Spending time tracing relationships between disparate areas of work.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

17. Adhering carefully to the standards of my area of work.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

18. Being 'caught up' by more than one concept, method or solution.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

19. Being fully aware beforehand of the sequence of steps required in solving problems.

1-----2-----3-----4-----5-----6-----7
Unlikely Neutral Likely
to Enjoy to Enjoy

SECTION 3 – MANIPULATION OF TREATMENTS

Task Introduction for Undergraduate and Graduate Students Only (Pilot Test)

You have been selected to participate in a brainstorming exercise. You will be acting the role of a newly hired auditor, who is working for a Big 4 accounting firm. The purpose of this study is to test the effectiveness of SAS No. 99, which requires auditors to brainstorm about the possibility of fraud. Thus, today, you will work together with a team of external auditors and exchange ideas about fraud in a financial statement audit. We think you will find this fun and a good way to get experience working in a virtual environment. Today, you will work with experts of a nationally known Big 4 accounting firm: a senior auditor, manager, and senior manager. Thus, your team will consist of you and these three team members.

Task Introduction for Internal Auditors Only

You have been selected to participate in a brainstorming exercise. As an internal auditor, you will be asked to brainstorm with a group of external auditors about a financial division of a hypothetical company.

Under Standard for the Professional Practice of Internal Auditing 1210.A2, internal auditors have a professional responsibility relating to fraud while performing “normal” internal audit responsibilities and in fraud investigations. Further, in light of recent fraud cases, the internal auditor is being asked to become more of a partner and consultant to the external auditor.

The purpose of this study is to test the effectiveness of SAS No. 99, which requires auditors to brainstorm about the possibility of fraud. Thus, today, you will work together with a team of external auditors and exchange ideas about fraud in a financial statement audit. We think you will find this fun and a good way to get experience working in a virtual environment. Today, you will work with experts of a nationally known Big 4 accounting firm: a senior auditor, manager, and senior manager. Thus, your team will consist of you and these three team members.

Task Introduction for GSS-Non-Anonymous Interaction Mode Only

You have been selected to participate in a brainstorming exercise. The purpose of this study is to test the effectiveness of SAS No. 99, which requires auditors to brainstorm about the possibility of fraud. Thus, today, you will work together as a team of four auditors and exchange ideas about fraud in a financial statement audit. We think you will find this fun and a good way to get experience working in a virtual environment. Today, you will work with experts that were “hand-picked” by a national representative of your firm: a senior auditor, manager, and senior manager. Thus, your team will consist of you and these three team members.

You will begin by practicing with a task to get you acquainted with the software. The goal is to come up with as many ideas as possible to solve the problem. No idea is too wild. Research shows that the more solutions you generate, the more likely you are to generate good solutions. Brainstorming is a way to generate a lot of solutions in a very short time.

Here are general brainstorming rules that apply since you are brainstorming with other team members who are considered experts in your field.

- (1) Generate ideas that would be used in the audit planning process.
- (2) It is possible that someone will come up with an idea similar to yours.
- (3) Criticism is ruled out. Adverse judgment of ideas must be withheld until later.
- (4) “Free-wheeling” is welcomed. The wilder the idea, the better; it is easier to tame down than to think up.
- (5) Quantity is wanted. The greater the number of ideas, the more the likelihood of useful ideas.
- (6) Combination and improvement are sought. In addition to contributing ideas of your own, you should suggest how ideas of others can be turned into better ideas; or how more ideas can be joined into still another idea.

Task Introduction for GSS-Anonymous Interaction Mode Only

You have been selected to participate in a brainstorming exercise. The purpose of this study is to test the effectiveness of SAS No. 99, which requires auditors to brainstorm about the possibility of fraud. Thus, today, you will work together as a team of four auditors and exchange ideas about fraud in a financial statement audit. We think you will find this fun and a good way to get experience working in a virtual environment. Today, you will work with experts that were “hand-picked” from a national representative of your firm: a senior auditor, manager, and senior manager. Thus, your team will consist of you and these three team members.

The ideas of all team members will be anonymous. This means that your team members will not be able to trace ideas to you. Your log-on name and identification information is in no way tied to your comments. Likewise, you will not be able to determine if the idea was generated by the senior auditor, manager, or senior manager.

You will begin by practicing with a task to get you acquainted with the software. The goal is to come up with as many ideas as possible to solve the problem. No idea is too wild. Research shows that the more solutions you generate, the more likely you are to generate good solutions. Brainstorming is a way to generate a lot of solutions in a very short time.

Here are general brainstorming rules that apply since you are brainstorming with other team members.

- (1) Criticism is ruled out. Adverse judgment of ideas must be withheld until later.
- (2) “Free-wheeling” is welcomed. The wilder the idea, the better; it is easier to tame down than to think up.
- (3) Quantity is wanted. The greater the number of ideas, the more the likelihood of useful ideas.

(4) Combination and improvement are sought. In addition to contributing ideas of your own, you should suggest how ideas of others can be turned into better ideas; or how more ideas can be joined into still another idea.

Training Task for Unstructured Brainstorming Group

Tea bag machine task

For this task you are asked to brainstorm about: How to use excess capacity of tea bags.

You work for a company that makes tea bags. The tea bag machines are currently producing tea bags over the expected capacity. The company would like for you to come up with ways to use the excess tea bags. Remember, the goal is to come up with as many ideas as possible to solve the problem. No idea is too wild, criticism is ruled out, and quantity is wanted.

Training Task for Guided Fantasy Training Group

Tea bag machine task

For this task you are asked to brainstorm about: How to use excess capacity of tea bags.

You work for a company that makes tea bags. The tea bag machines are currently producing tea bags over the expected capacity. The company would like for you to come up with ways to use the excess tea bags. Remember, the goal is to come up with as many ideas as possible to solve the problem. No idea is too wild, criticism is ruled out, and quantity is wanted.

Guided Fantasy is a popular brainstorming technique that is used to help individuals ‘think outside the box. This activity will help you generate different ideas about using tea bags. You will want to read the following scenario at a slow pace.



(Participants first name, captured by log on screen), please read the following scenario at a slow pace, and then use the scenario to fantasize.

Now, we will guide you into a fantasy. Sit comfortably, close your eyes and take a few moments to relax. Become aware of your breathing and how it flows in and out. Once you are completely relaxed, read the following.

Destination: Brazil

You have just won a dream vacation to Brazil. Your vacation will take you from the night life of Rio de Janeiro, to the beautiful white beaches of Brazil. You and 3 of your friends will have passes to a fashionable and trendy nightclub. In this nightclub, you will see the latest fashion wear and the movers and shakers of the Latin world, no outfit is too unique. Your hotel is on the beach, where you can have your breakfast served on your porch and head to the beach for a day of fun in the sun (don't forget your sunscreen). After 4 days in the city and on the beaches you will be taken to the tropical rain forests. Here you will see hundreds of species of animals and flora. The mosquitoes and other bugs will be biting so remember to protect yourself. While there, you will have a chance to scale the great forest canopy and experience the life of the rain forest. Enjoy your trip, bon voyage!

Now, you are ready to begin the actual brainstorming session. Remember, you are in Brazil and your goal is to brainstorm about how to use excess capacity of the tea bags!!!

Example of Brainstorming Simulator – Non-Anonymous Team Interaction Treatment

Chat log window

TEAM MEMBER	TEXT OF IDEA
Participant's First Name and Last Name Initial. –Junior Auditor	To keep mosquitoes away
Pat S. - Senior Auditor	strain vegetables
Chris T. - Senior Manager	To wash jewelry
Dana P. - Manager	stuff pillow
Chris T. - Senior Manager	could be used ofr instant coffee
Participant's First Name and Last Name Initial. –Junior Auditor	To wash delicate items

Example of Brainstorming Simulator – Anonymous Team Interaction Treatment

Chat log window

TEAM MEMBER	TEXT OF IDEA
Team Member 1	stuff pillow
Team Member 4	To wash delicate items
Team Member 3	could be used ofr instant coffee

Missappropriation of Assets Case – Consistent Across All Treatments

Chat system training completed...

The actual task works exactly the same way. You are required to read the following case about an audit client and then make an assessment about the likelihood of fraud.

Lakeview Lumber, Inc.

Case Information: *(In order to protect the company's privacy, names have been changed)*

Here is the actual case....

For this task you are asked to brainstorm about: How employees of Lakeview might commit fraud.

Lakeview Lumber, Inc. is located in the city of Lakeview. Lakeview Lumber sells between 30,000 and 35,000 different kinds of building materials, lawn and garden products, and home improvement supplies to retail customers, as well as to contractors and other building professionals. Retail customers are required to pay in cash or by a major credit card at the time of their purchase. However, the vast majority of contractors and building professionals have established credit accounts and are billed on a monthly basis. Lakeview Lumber's main competitors are The Home Depot, Inc. and Eagle Hardware & Garden.

THE KEY ACCOUNTING PLAYERS

- *Joe Metros, Controller* of Lakeview Lumber, Inc., is responsible for the firm's accounting activities. Joe was recently hired and had been the Deputy Director of a finance department in a nearby town for the past five years. A reporter from the Daily Observer interviewed Joe for a feature article in the business section. Joe talked about his family and the many civic activities that he supported, both financially and by volunteering his time. He also discussed his vision for the future of the Accounting Department and identified a number of short-term and long-term goals. Initially, Joe wants to implement a number of changes designed to improve the efficiency and effectiveness of departmental operations. He plans to eliminate a number of accounts that are rarely used. He also hopes that financial information can be provided more quickly when requested by auditors and department heads. Joe is especially concerned about the extent of employee turnover. Five of the seven department employees have held their current positions less than one year, and training costs can be rather significant. Joe has been told that the previous Controller, Crystal Smith, was very controlling and task-oriented, and that this may have caused employees to seek employment elsewhere. In addition to Joe, the Accounting Department includes the following personnel:

- *Libby Jones, Chief Accountant.* She manages and maintains the General Ledger. Libby is also responsible for general office management and day-to-day operations in the department. She earned a degree in accounting from the local university and has worked for the department for 15 years. Libby is 37; her husband owns a local hardware store.

- *Marsee Weston, Senior Accountant.* She is responsible for monitoring property, plant, and equipment. She also maintains all records of fixed/real assets. Marsee has been employed by the department for eight months. She is 39; her husband teaches mathematics at the local high school.

- *Scott Smyth, Senior Accountant.* He is the Cash Manager; maintains bank relations; manages all investments; performs all wire transfers; and reconciles all bank accounts. Scott is 32 and has been employed by the department for seven months. Scott's wife is a sales associate at one of the local automobile dealers.
- *Cathy Elgin, Staff Accountant.* She maintains all records pertaining to credit accounts; invoices those contractors and building professionals who owe money on their credit accounts; maintains control of all Petty Cash Funds; accounts for all daily deposits from departments within the company; and is also the secondary payroll clerk. Cathy is 27 and has been employed by the department for almost nine months. Her husband is employed by the U.S. Postal Service.
- *Bob Thomas, Accounts Payable Clerk.* He processes all payments to suppliers with names beginning with A through L. Bob is 36 and has worked in the department for almost two years. He is single and has lived in town his entire life except for the five years he served in the U.S. Navy.
- *Nora Stewart, Accounts Payable Clerk.* She processes all payments to suppliers with names beginning with M through Z. Nora is 20, and has been employed by the department for six months. She is single and lives in an apartment complex near the university campus.
- *Chuck Sanchez, Payroll Clerk.* He processes all bi-weekly and monthly payrolls and maintains all payroll records. Chuck is 31, recently divorced, and has been working in the department for ten months. Chuck lives in an older neighborhood with his 7-year-old son.

Guided Fantasy Treatment Group

“Inspector Gadget” Fantasy



Now, you will be guided into an Inspector Gadget fantasy. As previously stated, this “Guided Fantasy” technique is designed to help you think “outside the box,” just like the Brazil scenario. Remember to read the scenario at a slow pace. Come up with as many creative ideas as possible. Sit comfortably, close your eyes and take a few moments to relax. Become aware of your breathing and how it flows in and out. Once you are completely relaxed, read the following...

[Participants first name, captured by log on screen], you are “Inspector Gadget” on a special assignment at the “Museum of Modern Art in Manhattan.” Your assignment is to prevent the theft of the museum’s inventory. At closing time, you send the museum’s security guards on their way, except for one who is to watch the doors for you. You “intend to spend the night in the museum to protect the artwork.” Dr. Claw and two of his goons, “meanwhile, have backed a tractor trailer up to the rear of the museum,” and are getting “ready to do some dirty work.” Dr. Claw activates two of his mechanical monsters who are inside the museum posing as enormous “statues.” As these monsters distract you, “Inspector Gadget,” the “trusted” security guard opens the rear door of the museum to allow Dr. Claw and his goons to enter. Go Gadget! Go! You are going to need every techno-trick up your cyber-sleeve to defeat the ruthless Claw.¹⁴

You have your *helihat* that allows you to fly from room to room; your *helping hands*, just in case you need an extra pair; your *telescopic legs* to raise you up so that you can see beyond normal distances. The same can be done with your *telescopic neck*.

Okay, “Inspector Gadget,” use your techno-tricks, special gadgets, squirt guns, roller skates, and magna glass to solve this mystery.

Now, you are ready to begin the actual brainstorming session. Remember, the goal is to think about the Lakeview Lumber case, brainstorm about how employees of Lakeview Lumber, Inc. might commit fraud, and remain in your “Inspector Gadget” mode. Go Gadget! Go!!!

¹³ <http://www.geocities.com/Hollywood/Screen/7219/>

¹⁴ The concept of this story is adapted from
http://www.angelfire.com/80s/inspectorgadget/first_season/art_heist.html

On the following screen, you are to brainstorm about the possible ways in which fraud might be committed by Lakeview Lumber's employees. Remember, no idea is too wild, no idea will be criticized by anyone, and more ideas are better. Again, time is important. You will have 15 minutes to complete this task. It is important that the 15 minutes be used as efficiently as possible.

Brainstorming Session for fraud

SECTION 4 – POST-EXPERIMENTAL QUESTIONNAIRE – CONSISTENT ACROSS TREATMENTS

Post-Study Questionnaire

Please respond to the following questions using the 7-point scale provided. Please click under the number that indicates the best representation of your judgment:

Intrinsic Motivation

For me, the brainstorming activity was motivated more by intrinsic factors (my own interest) than by extrinsic factors (e.g., others working in the group, the instructions that were provided to me).

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

I got a lot of pleasure out of brainstorming about employee fraud.

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

I enjoyed the opportunity to participate in this study.

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

I achieved new insights through brainstorming about employee fraud.

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

I derived satisfaction from brainstorming about employee fraud.

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

I enjoyed being involved with other team members during the brainstorming activity.

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

Extrinsic Motivation

How much did you think about impressing other team members while generating ideas?

1-----2-----3-----4-----5-----6-----7
Very Little Neutral A Whole Lot

How much did you want to generate ideas that were comparative or better than other team members' ideas?

1-----2-----3-----4-----5-----6-----7
Very Little Neutral A Whole Lot

I completed this study because it was something I felt I had to do.

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

I did not take the task seriously because there was no monetary or other tangible benefit for performing well.

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

Interaction Mode – Manipulation Check

Please select the statement below that best describes the team you brainstormed with:

- Members of my group included a senior auditor, manager, senior manager.
- I cannot recall the ranking status of my group members.

Please select the statement below that best describes the team you brainstormed with:

- Each team member’s idea was tagged with his/her first name, last name initial, and job title.
- Each team member’s idea was anonymous and tagged as Team Member 1, 2, 3, or 4.

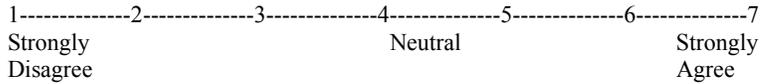
Anonymity:

- Were you told that you were in an anonymous group, where your team members could not determine which ideas you submitted? 1= yes, 2= don’t know; 3=no

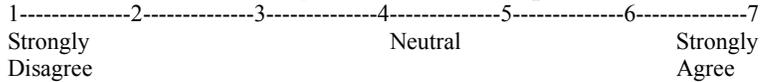
Evaluation Apprehension - Manipulation Check

Please respond to the following questions using the 7-point scale provided. Please click under the number that indicates the best representation of your judgment:

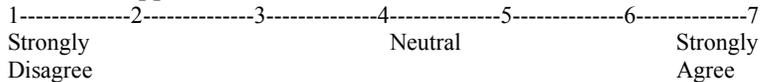
I was reluctant to offer an idea for fear of criticism from other members.



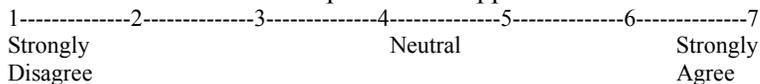
I was inhibited in offering an idea due to the presence of others.



Although no overt criticism was expressed, I was reluctant to offer an idea that was ‘way out,’ for fear of disapproval from members.



I withheld ideas for fear of possible disapproval from other members.



I was aware of the position of each person.
1-----2-----3-----4-----5-----6-----7
Strongly Disagree Neutral Strongly Agree

I was mindful of the job titles/rank of my team members.
1-----2-----3-----4-----5-----6-----7
Strongly Disagree Neutral Strongly Agree

Guided Fantasy – Manipulation Check

Did you receive training on a brainstorming technique that involved fantasizing?

Yes No

Task Complexity

Overall, how would you rate the difficulty of the brainstorming task for the employee fraud case you had to do in this study?

Compared to the tasks I usually work on, I thought that the experimental task (brainstorming about ways employees could commit fraud) was very easy

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

Social Presence

The session was functionally equivalent to a scenario where I was in the same room with my team, each at a different computer terminal.

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

The session worked as well as it would have if the team was in the same room.

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

Debriefing

Thank you for your participation!!!

To preserve the *integrity* of this research, please do not discuss this study with your colleagues.

When the study is complete, we will send you an e-mail providing additional information regarding the purpose of this study. If you have any questions, please feel free to contact Ms. Antoinette Lynch at alynch@coba.usf.edu or Dr. Murthy at umurthy@coba.usf.edu.

APPENDIX B - INSTRUCTIONS TO RATERS

Rating Instructions (adapted from Santanen (2002))

Please read these instructions:

Thank you for agreeing to assist with this research project. You have been asked to participate due to your experience in the area of fraud. Your participation will consist of scoring solutions that were generated in response to a fraud case involving misappropriation of assets. It is estimated that scoring the solutions in this file will take you approximately 2 hours.

This file contains three worksheets (each is a different tab across the bottom of the spreadsheet).

1. The first sheet contains these INSTRUCTIONS.
2. The second sheet contains the background information provided for the CASE and the instructions provided to participants.
3. The third sheet contains the pool of SOLUTIONS to the fraud task generated by audit interns and internal auditors during a 15-minute period. Additionally, this sheet contains one measure:

Review each idea and rate the extent to which you believe you would use or consider the idea in the audit planning process of Lakeview Lumber (see case on 2nd sheet). Do not worry about related cost. Rate each idea on a scale of 1 to 3, where 1= not useful; 2=moderately useful; and 3=very useful.

Additional procedures for scoring the solutions contained in the third worksheet are as follows:

1. Please take a moment to read through the case and instructions contained on the CASE worksheet.
2. Before you score any of the IDEAS, please take a moment to familiarize yourself with the ideas by reading a random sampling of them (perhaps 10 to 20 ideas). For example, read several ideas from the top of the list, read some from the middle of the list, and then read some closer to the end of the list. There are approximately 98 ideas in total.
3. These ideas have been generated by auditors who may not have much experience in the area of fraud. Please rate these ideas RELATIVE TO ONE ANOTHER rather than rating them against some absolute standard that may exist for fraud in general. The rating scale for usefulness is to flow along a range of 1 to 3 such that a value of 1 means not useful and 3 represents very useful. The general aim is to rate the ideas relative to each other using your experience and judgment as a guide. The ideas have been numbered for your convenience.
4. In order to score the solutions relative to one another, please score AT LEAST ONE solution as 1 (not useful) and score at least one solution as 3 (very useful). It is entirely possible, though not required, that multiple solutions may receive a score of 1 and multiple solutions may receive a score of 3. Please use your own subjective judgment in making these assessments. Remember, junior auditors generated these solutions.
5. If you have any questions about this procedure, please contact Antoinette at the following e-mail address: alynch@coba.usf.edu or 813-974-6863.
6. It is clear that some of the subjects gave this task a more serious effort than others. For the sake of making comparative judgments, it was necessary for all the solutions to be included in this data set for scoring. As this data set contains data from different experimental treatments, some of these differences may be a result of the particular technique that was used with each

treatment. This is why we need your assistance.

7. Thank you for your help!!! Your time is greatly appreciated!

Thank you for your participation in this research project.

APPENDIX C - INFORMATION ON CODERS AND RATERS

VERONDA WILLIS, CPA (CODER)

University of Colorado

Campus Box 419

Boulder, CO 80309-0419

E-mail: Veronda.Willis@Colorado.EDU

Ms. Veronda Willis, CPA, is an accounting Ph.D. candidate (minor in econometrics) at the University of Colorado. She received both her Bachelor of Science Degree and a Masters Degree in Professional Accounting from the University of Texas at Austin. She was held many positions from 1995 to 2000, including accounting manager at Enron Capital & Trade Resources. She also worked for PricewaterhouseCoopers from 1990 to 1994. Ms. Willis has many accolades and her vita is available from the author, upon request.

MARGARITA MARIA LENK (CODER)

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(970) 491-4983 FAX (970) 491-5205

E-mail: Margarita.Lenk@colostate.edu

Dr. Margarita Lenk, CMA, is an associate professor at Colorado State University. She received her Ph.D. in 1991 from the University of South Carolina, her MACC degree from the University of North Carolina at Chapel Hill, and her BSBA degree from the University of Central Florida. Dr. Lenk has an overwhelming number of referred publications, presentations, and books that she has authored. Her vita is available from the author, upon request.

DANIEL J. JOHNSON (RATER)

Senior Audit Manager, Kirkland, Russ, Murphy, & Tapp
www.KRMTCPA.com

Mr. Johnson received his Bachelor of Science Degree in Accounting and Finance from Augustana College, Rock Island, Illinois. He spent 10 years with Arthur Andersen, LLP in Tampa and Chicago. He has extensive experience in all aspects of audit, review, transaction due diligence, and benefit plan services. He served several publicly traded companies and is well versed in SEC reporting issues. Mr. Johnson's relevant industry experience includes work with real estate, hospitality, construction, timeshare, manufacturing, retail, distribution, and financial service clients.

BOB BATZ (RATER)

Audit Manager, Kirkland, Russ, Murphy, & Tapp
www.KRMTCPA.com

Mr. Batz received his Bachelor of Science Degree in Accounting from the University of South Florida. He has extensive experience with all aspects of audit, review and compilation services. Mr. Batz plays a significant role in firm-wide training and recruiting efforts. His relevant industry experience includes automotive, restaurants, construction, credit counseling, manufacturing, and distribution. He also has substantial knowledge of the reporting requirements of employee benefit plans.

ABOUT THE AUTHOR

Dr. Antoinette LaBarbara Lynch was born and raised in Hampton, Virginia. She has two lovely daughters, Jaleesa and Shauntia Lynch. In 2000, she relocated to Tampa, Florida, to pursue a Doctorate of Philosophy in Accounting Information Systems.

Prior to pursuing her Ph.D., Dr. Lynch graduated from Christopher Newport University with a BSBA in Accounting. She also completed 2 years of master-level coursework at The College of William and Mary. She has worked for the University of South Florida, NASA Langley Research Center, Eason, Lawson, and Westphal, P.C., and the Air Force Audit Agency. She is a member of several accounting organizations and recipient of several scholarships and awards. Her research interests include behavioral research in areas of improving auditors' ability to detect fraud and understanding the impact of information technology on the audit process and individual behavior.

Dr. Lynch believes that we all face challenges in our life, and how you handle those challenges will affect the road you travel. She believes that goals are not possible if you do not rely on the wisdom of others, and if you are not grateful for that wisdom. Seeking knowledge and sharing knowledge is the key to personal development. Everyone should take time to self analyze themselves, and not spend energy on criticizing choices of others. The world is a very dynamic universe, and how we view the world and our position in the world, will impact all that we know and do.