CHARACTERISTICS OF CREATIVITY IN RELATION TO AUDITORS' RECOGNITION OF FRAUD CUES AND RESPONSE TO PERCEIVED FRAUD RISK

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CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM

Despite improved audit standards issued by the American Institute of Certified Public Accountants (AICPA) and legislative changes such as the Sarbanes-Oxley Act, audit failures in relation to management fraud have worsened with each passing decade since 1970 (SEC).[1] Because frauds are designed to elude standard audit procedures, auditors have been encouraged to use more unpredictable audit plans (Nieschweitz, Schultz, & Zimbelman, 2000; Wilks & Zimbelman, 2004); however, auditors do not seem to have been so flexible. Also, evolving audit standards may have developed into a two-edged sword. On one hand, the increased reliance on checklists has seemingly improved auditors' potential for detecting certain types of fraud (Hammersley, 2010), while concurrently providing them with a legal defense against malpractice in cases of undiscovered fraud.

On the other hand, evolving audit standards may even have contributed to the increase in audit failures by reinforcing auditors' penchant for using elaborate checklists.

[1]High profile accounting scandals during the 1970s (First Securities Co. of Chicago, National Student Marketing Corporation) included frauds totaling only about $5 million. Similar accounting frauds during the 1980s (ZZZZ Best, MiniScribe) totaled about $82 million; During the 1990s, high profile accounting scandals (Phar-Mor, Informix, Cedant, Waste Management Inc.) totaled $1.6 billion; Finally, during the 2000s, high profile cases (Microstrategy, Unify Corporation, Computer Associates, Xerox, Adelphia, AOL, Fannie Mae, Freddie Mac, Satyam, Merrill Lynch, Qwest Communications, WorldCom, HealthSouth Corp., AIG, Lehman Brothers, many others) totaled in the tens of billions of dollars.

Recent research (Hoffman & Zimbelman, 2009) found that modifying auditor work environments by actively encouraging brainstorming (strategic reasoning) was positively associated with the number and quality of audit plan modifications in relation to known fraud risk. More importantly, research on "brainstorming" or "strategic planning" (Carpenter, 2007; Hoffman & Zimbelman, 2009; Lynch et al., 2009; Trotman et al., 2009) broached a much broader and richer topic: creative thinking as part of the audit task. Arguably, fraudsters avoid detection because they are more creative in hiding their crimes than auditors are in detecting them. Therefore, if fraud is to be deterred, it seems logical that auditors also need to exercise significant creativity in performing audits. This study explores whether creativity, as measured on Rhodes' four dimensions (Rhodes, 1961) is associated with an auditor's ability to better recognize and respond to perceived fraud cues, thus leading to improved fraud detection.

Definitions of creative thinking and creativity abound.[2] Taylor (1988) broadly defined creativity as a mental process involving the generation of new ideas or concepts, or new associations between existing ideas or concepts. To be functional, a creative idea must also be appropriate and useful (Amabile, 1998).

Rhodes (1961), in attempting to consolidate the various definitions of creativity, described four fundamental areas or dimensions usually present in creative activity: the creative person, process, product, and place (i.e., environmental influences). The creative place dimension refers to qualities of the creative environment (i.e., environmental pressures) in relation to the other three areas. Environmental influences (e.g., managers, atmosphere, opportunity, resources, etc.) can either foster or impede creativity (Rhodes,

[2] See for example, Piirto (2004), Pritzker & Runco (1999), Puccio et al. (1999).

1961). The creative person dimension suggests that certain personality traits may drive creativity, while the creative process dimension indicates that an individual's preferences for acquiring, assimilating, and analyzing data may be related to creativity. Finally, the creative product dimension, whether a tangible product or simply an idea, suggests that creativity results in some identifiable output.

The current study benefits the professional and academic audit communities in three important ways. First, it offers a de-facto extension of the research in brainstorming and strategic reasoning by investigating several more aspects of creativity than were originally envisioned—aspects which, like research on brainstorming and strategic reasoning alone, could have significant policy implications for the profession. Second, a positive association between creativity and the ability to recognize fraud cues clearly has significant implications for audit practice. For example, the existence of a positive association would suggest less reliance on structured auditing procedures for fraud detection and a greater emphasis on procedures that encourage creative approaches other than brainstorming or strategic reasoning alone. A positive association within the context of this research may also suggest that the *nature* of the auditing procedure and not just the *extent* is critical for fraud detection vis-à-vis fraud cue subtlety.

Auditor performance was determined, first, by the quality and quantity of fraud cues recognized from reading a descriptive audit scenario – and then listing any fraud cues perceived in the scenario. Performance was then measured according to the quality and quantity of each response variable to perceived fraud risk. The quality of each recognized cue and response variable was judged by a three-member expert panel on a one (low) to three (high) point scale, and an average variable quality was determined.

Finally, the study examined the possibility of classifying auditors into distinct performance groups based on the quality and quantity of recognized cues and responses to perceived fraud risk.

The remainder of this study is organized as follows. Section II provides a review of the literature related to theory and hypotheses development: the physiological and professional basis for historical auditor performance, professional response to the problem of fraud detection, the role of creativity in fraud detection, and a brief explanation of each of the four creativity domains articulated by Rhodes (1961). Section III describes the methodology employed in this study, including a description of the participants, instrumentation, procedures, and data analysis. Section IV details research findings and support for, or refutation of, the hypotheses. Section V contains summarized findings, research contributions, limitations, and future research opportunities.

CHAPTER II

THEORY AND HYPOTHESES DEVELOPMENT

Auditors generally follow standardized audit programs and guidelines from well-known sources. These sources include standards from the AICPA and state licensing boards, proprietary materials, text and professional books, professional organizations, and other training materials. Fraudsters have similar opportunities to learn audit procedures (e.g., from experiences with prior audits; from talking with auditors, business friends, and acquaintances who may have knowledge/access to proprietary information; and from training seminars, consultants, etc.). Educators and practitioners both suggest that auditing is most efficient when auditors incorporate an "element of surprise" into their audit work (e.g., Rittenberg et al., 2010; Panel on Audit Effectiveness, 2000). Presumably, the element of surprise is even more important, though more difficult to accomplish, in assessing fraud risk, providing a compelling reason for creativity in auditing. When fraudsters know which audit procedures are likely to be used, the element of surprise diminishes. Consequently, auditors face the need for continual flexibility and creative auditing procedures to retain their element of surprise.

Physiological Factors and Auditor Creativity

Auditors often respond to increased fraud risk by increasing the extent, rather than changing the nature, of their audit procedures (Carpenter, 2007; Trotman et al., 2009). They tend to change the quantity of their work, rather than the substance, which fails to address the element-of-surprise problem. There is some evidence, moreover, that

auditors' use of standard audit programs actually makes them less likely to even attempt different procedures (Asare & Wright, 2004). Such an inflexible approach to audit work may even have *neurological* antecedents (Cushing & Loebbecke, 1986).

Long-term repetitive use of standard audit checklists or procedures may neurologically impede auditors' ability to change the substance of audit plans under any circumstances. Hebbian Theory (Hebb, 1949) explains that two neurological cells or systems of cells that are repeatedly active at the same time will tend to become "associated," so that activity in one prompts activity in the other (i.e., cells that fire together wire together). This association means that activities can become neurologically connected. Accordingly, learning and/or performing a task, especially through an iterative process, is associated with specific synaptic responses that impede performing routine tasks in a different manner.

Consequently, Hebbian Learning has been linked to heuristic development which, in turn, provides a basis for cognitive biases (Montague et al., 1996; Del Guidice & Mattia, 2001; Van Rooy et al., 2003; Denrell, 2005). Accounting and psychology literature have recognized the influence of cognitive biases (e.g., Shanteau, 1989; Lowe & Reckers, 1994; Ashton & Ashton, 1995), and those biases are germane to the study of fraud detection.

Iterative work procedures may produce a cognitive bias referred to as the Einstellung Effect (Luchins, 1942), when individuals have trouble breaking out of established mindsets and tend to use the same mechanized approach to problem solving—even though better or simpler solutions could be easily found. Hence, auditors trained and reinforced to audit the veracity of some financial statement items, transactions, or internal

control processes by using a limited number of procedures may not recognize viable alternative audit procedures even when they are obvious.

Another potential cognitive bias related to the Einstellung Effect is "functional fixedness" (Baron et al., 2006; Duncker, 1945), which describes a tendency to use physical and/or mental objects/concepts in the way(s) in which they were used in the past (especially if they were successful) without thinking of more creative uses. In other words, individuals' "fixation" on the common use of some item or concept hinders their ability to use the item (e.g., cues, procedures, evidence) in a novel and adaptive way. One can see the performance of standard audit processes as also favoring biases, regardless of whether fraud is suspected.

Two other conceptually related cognitive biases are "confirmation bias" (Wason & Johnson-Laird, 1972) and "congruence bias" (Wason, 1960, 1968). These biases cause people to look for confirmatory evidence of their initial beliefs ("confirmation bias") and to over-rely on direct testing of their initial beliefs ("congruence bias"). Wason (1960) showed participants a sequence of three numbers (e.g., 2, 4, and 6) and asked them to determine the underlying rules for the sequence. Participants most often determined that the rule was some form of "numbers increasing by two." Participants then repeatedly looked for confirmation of that initial assumption even when told that it was not the rule. The "real" rule, which was much simpler (i.e., "three numbers in increasing order of magnitude." p. 130), was overlooked because participants were biased in favor of directly testing their initial hypothesis and failing to consider other indirect tests. Auditors may also fall into such traps by forming initial hypotheses about fraud and then tending to

evaluate audit evidence in support of initial beliefs (McMillan & White, 1993; Kahle et al., 2005).

Additionally, auditor reluctance to use new/different audit procedures or to be more flexible in their methods may also be constrained by the manner in which the process is usually done within their own firm. This lesser-known cognitive bias, called Déformation Professionnelle refers to the dangers of one's employment determining one's "professional perspective" at the expense of a broader view. "When the only tool one has is a hammer, every problem looks like a nail" (Maslow, 1966, p.15). Consequently, auditors could develop a narrow view of their work to the exclusion of a broader view that may include fraud auditing.

Certain environmental pressures (e.g., time constraints, uncertainty, task importance, organizational constraints) and experience exacerbate the influence of cognitive biases on work effort and decision making (Dror et al., 1999; Link, 1992; Nosofsky & Palmeri, 1997; Ratcliff, 1978; Zsambok & Klein, 1997) as people gravitate toward using heuristics in an attempt to be more circumstantially efficient in their decision making. Auditors are often affected by those constraints as well as by budgetary factors, and such constraints may discourage their deviating from prescribed work norms. That is, individual auditor creativity in problem solving may be systematically squelched by the workplace environment.

Research also indicates that overreliance on using checklists has actually impaired auditors' ability to assess fraud risk (Pincus, 1989) or to change audit procedures when confronted with a fraud (Asare & Wright, 2004). Recognizing this problem, the Statement on Auditing Standards (SAS) No. 99 was the first SAS requiring auditors to

engage in group brainstorming to detect fraud in addition to using a checklist (Hoffman & Zimbelman, 2009). Specifically, SAS No. 99 recommends brainstorming as "an exchange of ideas among audit team members about how and where they believe the entity's financial statements might be susceptible to material misstatement due to fraud [and] how management could perpetrate and conceal fraudulent financial reporting" (AICPA 2002, AU Section 316.14). Such brainstorming includes strategic reasoning, which is similarly defined except that it applies to individuals rather than group members. The goal of SAS No. 99 was to encourage auditors to identify ways that management might conceal fraudulent activities or information, and then consider unexpected ways to modify the audit plan to detect elements of the fraud (SAS No. 99).

Overcoming these and other cognitive and workplace biases may be related to several concepts within creativity. Strategic reasoning and brainstorming procedures, for example, have been recommended to offset the congruence bias (Baron, 2008) and confirmation bias (Kahneman and Tversky, 1982). Similarly, the adverse effects of functional fixedness and the Einstellung Effect may be mitigated by widening the scope of experiences (Arnon & Krietler, 1984). Methods of mitigating the negative effects of Déformation Professionnelle may involve expanding auditors' views of their professional role and teaching them to use their skills for accomplishing a broader job task (Rhodes, 1961). Changing environmental conditions to allow for creative expression of ideas (Hoffman & Zimbelman, 2009) also could improve the quality and/or quantity of auditor output in response to known fraud.

Professional Response, Auditor Creativity, and the Fraud Detection Problem

When the Auditing Standards Board (ASB) was formed in 1972, it issued Statement on Auditing Standards (SAS) No. 1 (AICPA 1972), which codified prior Statements on Auditing Procedures (SAPs) that had directed audit work until that time. This standard required auditors to be *aware* that financial statement irregularities were possible, with a caveat that the discovery of fraud was not an objective of the independent auditors' examination (Section 110.05-.08). Still, an economic downturn and escalating fraudulent activities during the 1970s, coupled with political activism to combat fraudulent practices, caused the AICPA to be more sensitive. The profession responded by forming the Public Oversight Board, creating "peer reviews" of audit firms and starting the SEC Practice Section. The ASB also issued SAS No. 16 (AICPA 1977), intending to *expand* auditors' responsibilities to search for material misstatements. The directive was overly vague, however, and losses to fraud continued to rise. Once again the profession responded, this time mirroring recommendations made in the "Report of the Commission on Fraudulent Financial Reporting" (i.e., the Treadway Commission), which were included in SAS No. 53 (AICPA 1988).

SAS No. 53 offered auditors more explicit protection from litigation, but also required them to design audits that proved "*reasonable assurance"* of detecting irregularities (AICPA 1988, paragraph 5, emphasis added). This time the standard differentiated between intentional and unintentional misstatements. The AICPA was beginning to recognize that "audit procedures that are effective for detecting a misstatement that is unintentional may be ineffective for a misstatement that is intentional" (p. 3). The new directive also provided guidance for specifying or

elaborating on factors that may alert auditors to potential fraud. Providing more extensive audit guidance, however, later became problematic because doing so reinforced auditors' penchant for incorporating more elaborate audit checklists into their work programs.

But SAS No. 53 did not materially mitigate fraud (e.g., in the savings and loan industry) during the 1980s. The March 1993 report by the Public Oversight Board stated that the accounting profession had suffered a serious erosion of public confidence which could only be repaired if two conditions were met: 1) the profession improved its standards and practices, particularly its ability to detect management fraud; and 2) users of audited financial statements understand the inherent limitations of those statements through better disclosure (Public Oversight 1993, p.34).

Although auditors had previously been responsible for detecting material misstatements due to fraud, SAS No. 82 (AICPA 1997) elaborated on what was necessary to fulfill those requirements. Notably, this was the first time the AICPA had used the word "fraud" in a SAS, suggesting that it sought to clarify auditors' responsibility in that regard. Additionally, auditors were directed to assess fraud risk separately from other risks, detail how they would address that risk, and satisfy new documentation and communication requirements.

Barnett, et al. (1998) suggests that SAS No. 82 only required formally what "good auditors" had always done instinctively (p. 71). Other research also suggests that audit firms did not change the nature of their audit plans in response to known fraud, even though compliance changes were made in new client checklists, internal control documents, planning meetings with client management, and changes in audit program

summaries where risk assessments and responses were required to be documented (Zimbelman, 1997; Glover et al., 2003). Therefore, increasing the guidelines may have fostered a checklist mentality among practicing auditors who were pressured to uncover fraud and protect themselves from litigation if they did not, all the while constrained by downward pressures on market pricing. Industry gatekeepers began to understand that their focus on audit decision aids alone was not enough and recognized a need to focus on the users of those decision aids.

The need to respond to continual major accounting scandals prompted SAS No. 99 (Consideration of Fraud in a Financial Statement Audit) (AICPA 2002), which became effective for audits of financial statements for periods beginning December 15, 2001. SAS No. 99 was the first audit standard to require auditors to engage in group brainstorming and strategic reasoning. The goal was to encourage auditors to identify ways in which client management might conceal fraudulent activities or information and then to consider unexpected ways to modify the audit plan to detect elements of the fraud. Recent research has found significant improvements in auditors' abilities to modify audit plans when confronted with known frauds (Hoffman & Zimbelman, 2009). In the current audit environment, SAS No. 99 provides at least *minimal* administrative guidance for auditors' efforts to detect and document financial statement fraud. However, since brainstorming and strategic reasoning are actually only techniques of eliciting *creative thinking*, it seems reasonable to investigate other facets of auditor creativity in relation to sensitivity to fraud cues and response to suspected fraud risk.

Fraud and Creativity

There is no "cookbook" approach to detecting fraud (Levy, 1985, p. 87), first because auditors don't usually anticipate client deception, or they would likely turn down the audit engagement (Levy, 1985). Second, detection is difficult because fraud ranges in sophistication from simple to complex (Hammersley, 2010). More than half of the frauds studied by the Treadway Commission were general, involving revenue reporting fraud emanating largely from improper timing or recording fictitious revenues (Beasley et al., 1999; Deloitte, 2007). More sophisticated frauds may result from evading standard procedures and may go undiscovered because of auditor biases or errors. Fraud is frequently embedded within clients' internal controls (Levy, 1985), and often involves collusion (Bedard & Johnstone, 2004; Carcello & Neal, 2000).

Whatever the origin, recognizing fraud cues depends to a large extent on individual auditor knowledge and circumstances that determine the absence or presence of fraud cues. Experience and ability are expected to influence auditors' knowledge (Hammersley et al., 2009). Consequently, the ability to recognize and interpret fraud cues seems even more dependent on the individual auditor, and one important measure of this ability is creativity.

Creativity is defined as a mental process that generates new ideas or concepts, or develops new associations between existing ideas or concepts that are appropriate and useful (Amabile, 1998: Taylor, 1988). A creative idea must "influence the way business gets done – by improving a product or [providing] a new way to approach a process" (Amabile, 1998, p. 78). A *theory* of creativity is a framework for explaining the relationships among factors that pertain to creativity (Piirto, 2004). There are four basic

groupings of creativity theory: philosophic, psychological, psychoanalytic, and domain specific. Given the nature of the research problem (i.e., within the domain of auditing), the domain specific group of theories provides the best guidance for hypothesis development. The skills and knowledge that underlie successful performance in one domain may be unrelated to those that succeed in other domains (Pritzker & Runco, 1999). Likewise the level of creative performance in one domain may be unrelated to creative performance within other domains, or even for performing different tasks within the same domain (Baer, 1993, 1999). That is, a person could be creative in detecting fraud, but not so creative in the domain of horticulture; moreover, the same person could be creative in detecting bank fraud but less creative in detecting transportation fraud.

Distribution of Creativity

Gordon (1961) and Rogers (1954) believed that anyone can be creative (see also Maslow, 1968). While creativity as a personality trait seems to be normally distributed (Shallcross, 1985; Stavridou & Furnham, 1996; Tardiff & Sternberg, 1988), creative achievement shows a skewed (J-shaped) type of distribution (Stavridou & Furnham, 1996), indicating that most creative production in a field is attributable to only a few individuals. Additionally, different organizations and professions seem to attract, select, retain, and promote different kinds of people (Schneider, 1987; Tom, 1971; Vroom, 1966). Consequently, over time, personnel within any organization or profession may tend to exhibit relatively more similar personality traits, including more homogenous types of creativity (Cooper, 2000; Hayward & Everett, 1983; Kirton, 1976).

Without specifically testing for creativity, Al-Beradi and Rickards (2003) found that accountants seemed to display creativity when provided with organization opportunities,

concluding that any lack of creative performance within the audit and tax (versus consulting) functions of a Big 5 accounting firm[3] was not due to individual deficiencies. Using several broad measures to capture measures of creativity, then, should support the following research question:

RQ_1: Can variance in dimensions of creativity among auditors can be identified and empirically measured?

Auditor Creativity and Fraud Cues

Research in multiple disciplines contains numerous examples of the benefits of creativity in settings other than auditing. For example, at Caterpillar, Inc., creative problem solving during business process reengineering resulted in a 50% reduction in process cycle times, a 45% reduction in process steps, a 8% reduction in process resources, and a multi-million dollar bottom line impact (Paper, 1997). Hood and Koberg (1991) found that the creativity of the organizational culture was significantly correlated with accountants' propensity to remain with accounting firms. This finding suggests that the environment can also affect creative problem solving. Creative problem solving, of course, first requires "problem identification" or "problem finding." Wertheimer (1945) explained: "The function of thinking is not just solving an actual problem but discovering, envisaging, going into deeper questions. Often in great discoveries the most important thing is that a certain question is found. Envisaging, putting the productive question is often a more important, often a greater achievement than the solution of a set questions" (p. 123).

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[3]At the time of this research, Arthur Andersen had not ceased operations.

In a longitudinal study of artists, for example, Csikszenthihalyi and Getzels (1970, 1972; Getzels and Csikszenthihalyi 1975, 1976) gathered behavioral measures of problem construction activities (e.g., object handling, object interaction, and the uniqueness of objects handled) prior to the outset of an artistic activity and found that problem-finding was significantly related to creative output. Creative output is not limited to artists; creative auditors can also produce ideas (creative output) that will help them recognize fraud cues and detect fraud.

Similarly, Runco and Okuda (1988) examined the relationship between problem-finding and a creativity measure among adolescents, finding that problem discovery and creativity were positively related. More importantly, their results indicated that the problem-finding component of the creative process is distinct and statistically independent of the problem-solving component (Okuda et al., 1991). Consequently, given the context of auditors' abilities to recognize fraud, a similar relationship between auditor creativity and recognition of fraud cues is expected:

H_1: Auditors' creativity is related to recognition of fraud cues.

Creative Environment

Attention to the environmental effects on creativity has led to an interest in the impact of work environments on employee creativity (e.g., supervisory atmosphere, work team interaction, and organizational climate) (Amabile, 1996, Scott & Bruce, 1994). Mumford and Gustafson (1988) have suggested that whether individuals will be creative depends on individual perceptions of how their creative behavior will be received within the social environment of an organization. Perceptions, however, are related to how much support and encouragement individuals receive in relation to the risks they face when making

errors. Encouragement includes 1) encouragement of risk; 2) fair, supportive evaluation of new ideas; 3) reward and recognition of creativity; and 4) collaborative idea flow (Amabile et al., 1996).

People are more likely to be creative when given authorization to do so (Parnes & Meadow, 1959), and accounting researchers (e.g., Hoffman & Zimbelman, 2009) found that brainstorming and strategic reasoning, both tools to elicit creative behavior, were more fruitful when participants were prompted to engage in the activities. Further, threatening and/or highly critical evaluation tends to undermine creativity (Amabile, 1979; Amabile et al., 1990).

Hoffman and Zimbelman (2009) manipulated the environmental component of creativity, finding positive statistical significance between an improved environment (for creativity) and creative performance. Similarly, Lynch (2004) deliberately manipulated environmental elements via a computer-based support group encouraging creative behavior (i.e., brainstorming) and explicit training in creativity techniques, and found that both encouragement and training were positively associated with the amount and quality of creative output.

Creative Personality

Auditors are usually part of a hierarchical work group with an Auditor-In-Charge. Personality variables undoubtedly contribute to individual or team judgment and decision making, including the influence of motivation. One view of motivation is the need for closure (NFC), which determines the extent to which heuristics and associated biases are used in the judgment and decision-making process (Bailey et al., 2008; Webster & Kruglanski, 1994).

NFC has four facets: preference for order, predictability, intolerance of ambiguity, and close-mindedness (Kossowska, 2007). Auditors' work is often characterized by the first three facets of NFC, which may account for reluctance to make changes in audit procedures, even in response to fraud risk. Moreover, decision-making research has consistently found that decisions to maintain the status quo tend to be regretted less than decisions to change (i.e., the status quo effect) (Mannetti, et al., 2007). So participants with a high (low) NFC score may view the non-status quo choice or alternative as less (more) "normative" which might produce more (less) post-decision second-guessing or regret. Consequently, auditors may have yet another cognitive bias, and concerns about alternatives being somehow less "normal" may interfere with choosing alternative audit planning procedures.

A person's need for closure has been described as "the desire to possess some knowledge on a given topic, any definite knowledge, as opposed to confusion and ambiguity" (Mayseless & Kruglanski, 1987; p. 164). Everyone desires closure but the desire varies individually, being socially, circumstantially, and culturally driven (Van Hiel & Mervielde, 2002). Essentially, someone with a high need for cognitive closure tends to prefer order and predictability to disorder and ambiguity. A personal intolerance for those latter conditions tends to predispose one to being more decisive and closed-minded (Van Hiel & Mervielde, 2002) *at the expense of being creative* (Chirumbolo, et al., 2005, emphasis added). That is, a heightened need for closure seems to vary inversely with the number of creative ideas or potential solutions considered relevant to problem solving or decision making.

Creative Product

In his book "On Becoming a Person," the psychologist Carl Rogers (1961) wrote:

> "In the first place. . .there must be something observable, some product of creation. Though my fantasies may be extremely novel, they cannot usefully be defined as creative unless they eventuate in some observable product – unless they are symbolized in words, or written in a poem, or translated into a work of art, or fashioned into an invention." (p. 349)

MacKinnon (1978) called creative output the bedrock of all creativity research, and many others seem to concur (Guilford, 1957; Jackson & Messick, 1965). Auditors thus must be able to produce an observable product—an outcome—and idea or concept that will help them identify fraud cues and detect fraud. This notion of producing useful and innovative ideas, or fluency (the production of 'ideas'), has been investigated from different perspectives (Eysenck, 1994; Guilford, 1967) and has provided the impetus for ideational behavior.

The creative product approach, in contrast to the creative person or creative process, has the clear virtue of objectivity (Runco et al., 2000-2001). Ideas are produced by everyone, are seen as common products related to creativity across domains, and so are suitable for understanding normally-distributed trait or "everyday" creativity (Runco & Richards, 1998; Runco et al., 2000-2001). Moreover, since both the quality and quantity of creative output can be measured relatively easily (Amabile et al., 1994; Lindauer, 1993; Radio et al., 1989), creative ideation may prove to be the best "general" assessment of creative production.

Creative Process

Cognition refers to the mental processes involved in gaining knowledge and comprehension, including perception, thinking, knowing, remembering, reasoning, judging and problem solving (e.g., Eysenck & Keane, 2005). Cognitive styles have been described as relatively fixed individual preferences for perceiving, assimilating, and processing information.

Research on cognitive styles extends into learning, solving problems, and relating to others (Witkin et al., 1977). Others agree that cognitive styles influence the way we all recognize environmental cues, how we organize and interpret that information, and how we use those interpretations (e.g., Hayes & Allinson, 1998; Hunt et al., 1989; Messick, 1984; Cools & Van den Broeck, 2008).

The concept of cognitive style can be traced to Witkin et al. (1967), who developed the field dependent/independent theory of thinking orientation:

> "We found two decades ago that people differ in the way they orient themselves in space. The way each person orients himself is an expression of his preferred mode of perceiving that is linked to many areas of functioning. Field dependent persons find it difficult to overcome the influence of the surrounding field, or to separate an item from its context." (p. 22)

That is, field dependent persons have a difficult time separating perceptions of self from their external environment, and field independent persons possess a greater ability to do so. Miller (2007) discovered that creativity expressed in undergraduate students' art projects was directly correlated with their scores on a field dependent measure (i.e., how much they relied on information provided in the field of information presented to

them versus how much they considered information outside that field). Other cognitive styles have been recognized, however, including the right-brain (emotional & intuitive)/left brain (logical & analytical) thinking style (Galin & Ornstein, 1972; Ornstein et al. 1979) and Riding's (1991) Cognitive Style Analysis. This latter model refers to a two-dimensional form of thinking divided between how individuals assimilate information (either holistic or analytic) and store it in memory during thinking processes (either verbally or via imagery).

The scant attention paid to creativity in accounting and auditing research requires that we look beyond the field for theoretical and practical guidance. The body of research on police investigations, which bears striking similarities to auditing, is more extensive. Glomseth, et al. (2007) described police investigation as representing a knowledge-intensive and time-critical work environment, similar to auditing. Dean et al. (2006) described police investigations as focusing on procedures and guidelines, gathering data, and building competent *evidence* for a case (italics added). He discusses four thinking styles for police investigators: a) the *procedural* style (embodying the 5-C's of investigation: collecting, checking, considering, connecting, and constructing data into evidence); b) the *challenge* style (where the challenge of the work drives the investigator to do more or better); c) the *skill* style (which is a reflection of technical skills and finesse); and d) the *risk* style (where investigators are proactive in applying creativity in the discovery and development aspects of a case).

Previous empirical research identified these four thinking styles as qualitatively distinct constructs that are arranged in a hierarchical order in terms of their cognitive complexity (Dean, et al., 2006). Additionally, research findings suggest that more

experienced detectives, in a work environment that facilitated creative thought, favored higher-level investigative thinking styles, especially for more serious and complex cognitive tasks (Dean et al., 2006). In separate reports, Dean, et al. (2006, 2007) indicated that imagination and creativity are inevitably essential components of police investigative work—and that more creative detectives apply higher-level investigative, and more successful, thinking styles. The implication is that criminals who are well schooled in standard police procedures adjust their tactics to fly below police or investigative radar. Only imaginative or creative tactics on the part of policemen can circumvent criminals. This implication suggests that auditors' responses to fraud cues are related to their cognitive styles.

In sum, given the extensive research linking workplace environment, personality, ideation, and cognitive styles of thinking to creativity, it seems logical that they may also be related to auditors' responses to perceived fraud cues. Consequently, the third hypothesis is related to all these domains of creativity:

H_2: Auditors' creativity is related to their response to fraud cues.

The Environment as a Moderating Variable

The environment (e.g., work, school, play, home) is the broadest and the most frequently mentioned domain in creativity research (Amabile et al., 1996), stressing its importance relative to the other domains (i.e., creative person, creative process, or creative product) cited by Rhodes (1961). Theoretically, if environments conducive to creativity encourage creativity, environments that are non-conducive to creativity could obstruct creative expression. Consequently, the environment should moderate other creative domains.

Baer and Oldham (2006) found that environmental support for creativity moderated the relationship between time pressure and creativity, for example, and Hunter et al. (2010) even defined creativity as the result of an interaction of the person and situation. Further, a meta-analysis of forty-two prior studies, which examined the relationships between climate dimensions and several measures of creative performance, found that environmental influences were effective predictors of creative performance, especially in turbulent, high pressure, or competitive environments. Hoffman and Zimbelman (2009) also found that manipulating auditor managers' workplace environments moderated creative output in terms of changing the nature of audit programs in cases of a known fraud. Thus, the environment should moderate auditor creativity, depending on whether it is conducive or nonconductive as the following hypothesis states:

H_3: Auditors' work environment will interact with non-environmental domains of creativity in relation to their response to fraud cues.

In summary, then, research has found ample links between inflexible thinking and workplace performance – both in identifying and responding to problems. It seems also well established that auditors tend to retain inflexible thought processes when considering the possibility of fraud (i.e., identifying the problem) and gathering evidence to either prove or disprove the existence of fraud (i.e., their response). A noticeable solution may be the use of creativity. No direct research exists to test the relationship between auditor performance vis-à-vis creativity, beyond noting the differences between more creative roles in an accounting firm segregated by work task (i.e., audit, tax, and consulting). However, police investigation work (which bears some semblance to the more

investigative aspects of auditing), seems to suggest that the relationship exists. A research question and hypotheses were posited to test the relationship in auditing.

CHAPTER III

METHODOLOGY

Measuring Creativity

Four scales were used in this study to assess auditors' creativity across the four dimensions proposed by Rhodes (1961). The creative Person was assessed using Kruglanski's Need-for-Cognitive-Closure scale (NFC) (Kruglanski, Webster, Klem 1993). The creative Process was measured using the Cognitive Style Inventory (CoS1) (Cools & Van den Broeck, 2007), and the creative Product was assessed using the Runco Ideational Behavior Scale (RIBS) (Runco, Plucker, & Lim, 2000-2001). Finally, Place, the environmental pressures found in auditors' workplaces, was measured using the Siegel Scale of Support of Innovation (SSSI)(Siegel & Kaemmerer, 1978).

Need-for-Cognitive-Closure Scale. The NFC scale currently consists of 47 self-report items with a responses ranging from one-to-six on a Likert-type scale. The Cronbach's alpha for the data in the initial (42 item scale) scale development sample was 0.84 for the total item scale, which has been largely supported by additional research (Webster & Kruglanski, 1994).[4] The overall scale included five subscales assessing preferences for 1) order; 2) predictability; 3) decisiveness; 4) discomfort with ambiguity; and 5) closed-mindedness.

Average Cronbach alpha values for each of these subscales across two groups ($n_1 = 281$; $n_2 = 172$) were 0.80, 0.75, 0.74, 0.73, and 0.62 respectively (Webster & Kruglanski, 1994). Refer to Appendix 1 – NFC for the complete instrument.

Cognitive Style Inventory. There are ample instruments to identify and measure cognitive styles, but problems with validity, reliability, interpretation, and administration are even more abundant (Allinson & Hayes, 1996; Streufert & Nogami, 1989). Additionally, matters of convenience, administration, and cost containment even further reduce the number of instruments that may be applied on a large scale within organizations (Allinson & Hayes, 1996). The CoSI contains eighteen items designed to address those issues, which are considered the foremost problems of cognitive style inventories (Cools & Van den Broeck, 2007). The respondent is asked to indicate the extent to which each item describes him or her by placing an "x" along a five-point scale ranging from "not like me at all" (1) to "very much like me" (5).

A meta-analysis of the literature on cognitive styles (Riding & Cheema, 1991) suggests that cognitive styles can be grouped into two basic dimensions: 1) analytic-holistic; and, 2) verbal-imagery. That meta-analytic work was revised by Cools and Van den Broeck (2007) to develop the CoSI. Cools and Van den Broeck's model of cognitive styles is also two dimensional (analytic-holistic and conceptual-experiential), but those two dimensions yield three cognitive styles: 1) the knowing style, 2) the planning style, and 3) the creative style.

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[4]Leone, Wallace, & Modglin (1999) found a Cronbach's alpha of 0.89; Mometa & Yip (2004) reported a Cronbach's alpha score of 0.77 in their Chinese version of the NFC scale; and O'Connor reported a Cronbach's alpha of 0.80.

The instrument is highly reliable, with the authors reporting average Cronbach's alpha coefficients for three validation studies of 0.75, 0.83, and 0.79 for the three styles, respectively. None of the averaged Cronbach alphas were less than 0.73. Additionally, factor analysis clearly supports a three-factor structure, with factor loadings higher than 0.50 (Cools & Van den Broeck, 2007). Refer to Appendix 2 – CoSI for the complete instrument.

Runco Ideation Behavior Scale. The creative product refers to creative works. Runco developed a generic measure of creative output based on the premise that *ideas* can be treated as original products that reflect and quantify creative thinking abilities (Runco et al., 2000-2001). The resultant Runco Ideational Behavior Scale (RIBS) was used to assess creative product. The theoretical basis for the development of the RIBS was Guilford's (1967) Structure of Intellect Model and Mednick's (1962) associative theory (as cited in Runco et al., 2000-2001), which describes how ideas are generated and connected to one another and the factors that influence the process of creative ideation (Mathew, 2010). Instrument items describe behaviors which reflect individuals' penchant for ideation. The RIBS initially consisted of 23 self-report items of ideational frequency, with a response scale ranging on a five-point Likert-type scale from "0" (i.e., never) to a "4" (i.e., daily). The authors reported Cronbach's alpha for the data in the initial sample to be 0.92.

Communication with Dr. Mark Runco, author of the RIBS, resulted in obtaining the long-form RIBS (i.e., RIBS III), which consisted of 74 items. Comparing the short-form and long-form of the RIBS in relation to my professional observation and experience, however, suggested that the former seemed too brief and the latter was too long and

redundant. Dr. Runco approved a "medium-form" instrument by choosing additional items from the long-form to augment the short-form version. Refer to Appendix 3 - RIBS for the complete instrument.

Siegel Scale of Support of Innovation. Relatively few instruments are available to quantitatively assess the work environment for creativity. The most prominent of these is Amabile's KEYS: Assessing the Climate for Creativity (Amabile et al., 1994) and the other is the Siegel Scale of Support of Innovation (SSSI) (Siegel & Kaemmerer, 1978). The KEYS scale has been used extensively in business environments; however the (SSSI) scale was chosen because a) scale items bear a strong resemblance to those in KEYS, b) SSSI Cronbach's alphas were comparable for sub-scales, and, c) the SSSI is within the public domain.

The SSSI is a sixty-one item scale developed to measure members' perception of their organization. The items are grouped into five sub-scale dimensions (Leadership, Ownership, Norms for Diversity, Continuous Development, and Consistency) across three factors (Support for Creativity, Tolerance of Differences, and Employee Commitment). Cronbach's alphas for those three factors were initially found to be 0.94, 0.94, and 0.86, respectively. The scale was developed to be used with educational institutions, however, so may not be completely valid in a private sector business application. Significant findings associating either the entire scale or any of the three subscales under that condition, however, should suggest even greater significance of the predictor variable in practice. Refer to Appendix 4 – SSSI for the complete instrument.

Measurement of Fraud Detection and Response

Experimental Instrument. Two versions of a single descriptive instrument were provided to practicing auditors to assess their 1) Auditors' sensitivity to fraud cues and, 2) Auditors' response to perceived fraud risk. Eighty percent of participants were randomly assigned a version of the instrument replete with financial and non-financial fraud cues varying by degree of subtlety. This version of the experimental instrument is referred to as the High Fraud Risk (HFR), due to the number of embedded fraud-risk cues. Another version contains the same financial information but without most of the non-financial fraud-risk factors described in the instrument narrative. This latter version is referred to as the Low Fraud Risk (LFR), due to the reduced number of embedded fraud-risk cues. In order to control for general skepticism among auditors, that is, to determine whether auditors would tend to find most (even LFR narratives) suspicious, especially if they guessed the nature of the present research, twenty percent of participants from the overall sample were randomly selected to receive the LFR version.

The narrative portion of the experimental instrument was adapted with permission from Hoffman and Zimbelman (2009), but expanded significantly (slightly) in the HFR (LFR) version of the instrument. All financial data were adapted with permission from Brazel et al. (2009) for both versions and the adapted story narrative (Hoffman & Zimbelman, 2009) was re-fitted with financial information from that original instrument. A version of the instrument (HFR) is attached as Appendix 5 – Experimental Instrument. The sections deleted for the LFR version are underlined.

Participants were first asked to read a descriptive audit scenario, including financial data, and then to list any cues that might suggest fraud risk. The embedded cues ranged

in degree from subtle to more obvious. Participants then were asked to weight their selected cues by importance (for indicating potential fraud), and assign an overall fraud risk to the hypothetical scenario. Next, they reviewed prior year audit procedures and, based on their perceived fraud risk, modified those procedures accordingly. Performance was determined first by the quantity and quality of fraud cues recognized and then by the quantity and quality of procedural changes vis-à-vis their perceived fraud risk.

The quality of each recognized cue and response was judged by an expert panel on a scale of 1 (low) to 3 (high) by consensual assessment. Amabile (1982) suggested a consensual assessment technique (CAT), where appropriately qualified observers (expert domain judges) independently judged the creativity of products. The summed product of quality and quantity results in a weighted response variable for each participant. The CAT has repeatedly been shown to be a reliable, valid technique (Hennessey & Amabile, 1999). My expert panel included three university professors with substantial experience teaching/researching auditing and/or fraud examination and two private practice auditors, all with more than 10 years of work experience germane to their field of expertise.

After completing the developmental phase of the research, participants' usual workplace environment was evaluated by self-report (using the SSSI) as either conducive or non-conducive for creative output, and auditor creativity was measured through self-assessments of personality (NFC), cognitive style for processing information (CoSI), and ideation (RIBS). Scores for each dimension of creativity, as well as for sub-constructs when available, were calculated for each participant, along with an overall creativity score, calculated as the sum of individual dimension scores.

Data Analysis. The dependent variables, for either recognition of fraud cues or response to suspected fraud risk were the weighted response variables for each participant. After each participant's creativity was assessed, each overall measure for the four creativity scales (as well as each subscale-measure, when available) was considered as an independent predictor variable of the quality and/or quantity of responses to the experimental conditions. Based on the research, I also controlled for other variables that might have influenced participants' abilities to either assess the potential for fraud or, to the extent fraud risk was perceived to exist, respond appropriately. Control variables included gender, total audit-related work experience, experience in detecting accounts receivable (AR) errors or fraud, exposure to others with experience in detecting AR errors or fraud, auditors' assessments of audit and fraud risk, whether participants were exposed to either the high-fraud risk or low-fraud risk version of the narrative instrument, and both professional and university training in fraud detection.

The models and methods reported in Appendix 6 were used to analyze experimental results. Refer to Appendix 6 – Data Analysis for a complete listing of each hypothesis paired with its model/method of analysis. Refer to Appendix 7 – Variable List for a complete description of regression variables used for analysis.

CHAPTER IV

FINDINGS

Sample

Respondents were solicited by contacting audit partners from two large regional accounting firms in the north-central United States, plus general partners from two small (defined as those with fewer than 100 employees) firms from the same area and by directly soliciting corporate auditors who attended two "Meet the Firms" recruiting events at two mid-sized universities from the same geographical region. After a thorough review of research materials and confidentiality controls, audit and general partners from the public accounting firms agreed to ask for volunteers from their firms' audit staffs. A URL link was emailed to the accounting firms, which the partners made available to auditors based on their personal preference.

Similarly, auditors who were solicited directly during the recruiting events first wanted to obtain permission from their employers before participating and to ensure that sufficient confidentiality controls were in place. The URL link for taking the survey was emailed to each of the solicited auditors. Regardless of who was solicited, responses were centrally processed by an Assistant to the Executive Director of University Technology at Western Illinois University in Macomb, Illinois. All participants remained anonymous to the researcher.

Ninety-four auditors initially agreed to participate in this research project and started to complete the research instrument. Very early in the process, however, six participants

opted not to complete the instrument. An additional fifteen subjects who did respond, moreover, had to be eliminated based on insufficient responses to various parts of the survey, which reduced the overall usable responses to seventy-three or 77.7% of those who initially agreed to participate.

Table 4.1 summarizes the sample.

TABLE 4.1
Research Sample Size

Sample	
Total Initial Responses	94
Number Who Opted-Out	-6
Number Who Provided Insufficient Data	-15
Total Usable Responses	73

Originally, about twenty percent (19) of those agreeing to take the survey were randomly assigned a "Low Fraud Risk" (LFR) version of the instrument, which consisted of the same financial and survey data, but with an abbreviated version of the background vignette within the audit narrative. Of these 19, 15 completed the survey. The purpose of assigning the LFR was to determine whether additional background data, which may suggest more fraud cues depending on auditors' perceptions of the content, would make a difference in auditors' responses. If the LFR version of the instrument was not a significant variable in explaining auditors' responses, it would suggest that other non-informational factors (e.g., creativity) were more important in explaining auditors' responses.

All subjects were practicing auditors, which enhances the external validity of the research findings. Most of the subjects completing the survey (62 or about 85%) were employed by public accounting firms, while others (11 or about 15%) were employed in

industry: two worked in internal audit for a university, two worked in internal audit for a securities firm, and the remaining seven worked elsewhere in the public sector. No one was paid for participating, although all participants were informed that they (or their employers) could have access to any summarized findings garnered from the research.

Covariate Data

Overall, of the 73 completed participant responses, 39 (53.4%) were female and 34 (46.6%) were male. All respondents held at least a bachelor's degree, but for 34 (47.9%) a master's degree (either MBA or master's degree in accounting) was the highest educational level attained. Another subject (1.4%) held both an MBA and master's degree in accounting, and still another (1.4%) held a Ph.D. (in finance) as the highest educational level attained.

Eighteen subjects (24.7%) did not hold professional certification of any sort, while seven (9.5%) held two different professional certifications (CPA, CIA, CFE, CA). The remaining 48 participants (65.8%) were Certified Public Accountants. Twenty-eight subjects (38.4%) reported taking at least one university course related to fraud examination, and five of the 28 reported taking more than one course. Additionally, 56 subjects (76.7%) reported attending fraud training sessions, with an average duration of 4.5 days (median = 2.0).

Insufficient data was gathered on subjects' age, so age was not used as a covariate. Sufficient data was gathered on total months of subjects' auditing experience, however, as well as auditors' work-related experience in detecting accounts receivable errors or fraud. Additionally, subjects' exposure to accounts receivable errors and/or fraud-related

work experience was sought; i.e., they were asked if they had worked on an audit where AR errors or fraud was discovered by someone else on the same audit assignment.

Overall auditing experience ranged from a low of 10 months to a high of 30 years, with an average experience level of 55.3 months, but with a median experience level of only 26 months. More descriptively, 49 subjects (67.1%) had three years or less experience, and about 75.3% of all subjects (55) had fewer than five years of experience. Further, another 9.6% of the subjects (seven) had between five and ten years of experience, so in total 62subjects (84.9%) had less than ten years of experience. Nine additional subjects (12.3%) had between 10 and 20 years of experience and two subjects had more than 20 years of experience in auditing.

All but seven subjects had experience auditing A/R, with the average number of times auditing A/R equaling 60.4 (median = 15 times) for the remaining 66 subjects. Of those 66 subjects, moreover, A/R errors or fraud was detected 34.1 times on average (median = 5 times). More descriptively, A/R errors or fraud was detected 15 times or less by 71.9% of those with experience auditing A/R. Notably, however, all but one of the subjects (72 subjects, or 98.6%) had had exposure to A/R errors or fraud on at least one audit. The average number of times subjects were exposed to A/R errors or fraud during an audit equaled 85.4 (median = 21 times). Covariate data have been summarized in Table 4.2.

TABLE 4.2
Covariate Data Summary

Gender:		Number of Subjects
	Male	34
	Female	39
		73
Education:		
	Bachelor's Only	38
	Master's Only	34
	Doctoral	1
		73
Experience:		
	≤ 3 years	49
	≤ 5 years	55
	≤ 10 years	62
	≤ 20 years	72
		73
Certification:		
	1	48
	≥ 2	7
	None	18
	Total	73
Exposure:		
	0	1
	1 – 25	42
	26 – 100	16
	> 100	14
		73

The data were analyzed sequentially to examine/test the research question and hypotheses developed in Chapter II. The remainder of this chapter is organized as follows. The first phase of the analysis, examining research question 1 and testing hypothesis 1, inspects auditors' characteristics related to creativity and ability to *recognize* potential fraud cues, respectively. Phase 2 of the analysis, testing hypotheses 2 and 3, refers to auditors' *response* to perceived fraud cues. The test of Hypothesis 3 is also a supplemental analysis of auditors' ability to recognize fraud cues.

Test of RQ1: Can Dimensions of Auditor Creativity Be Identified and Empirically Measured?

While it is true that humanity (at least abstractly) is philosophically not measurable, individuals possess many characteristics (e.g., creativity) that are measurable (Wright, 1976). Creativity, for example, is expressed in our behavior; behavior can be observed; and what can be observed can also be measured (Wright 1976, p. 36). In principle, any observable human characteristic can be measured, provided that some suitable measuring scale is handy (Ibidem).

Overall dimensions of creativity (i.e., Creative Place, Creative Person, Creative Product, and Creative Process) among auditors were measured using one of the four standard public-domain scales (Siegel Scale of Support of Innovation, Need for Closure, Runco's Ideational Behavior Scale, and Cognitive Style Index, respectively). Auditors' scores on those scales, along with subscale' scores measuring separate components of the constructs, were tested for both internal and response validity, as well as the normality of scale-score dispersion.

Data Consistency Analysis

Reliability of data for all scales (variables) was assessed by two standard internal consistency checks, Cronbach's Alpha and item-total analysis. Cronbach's Alpha considers a number of items that make up a scale designed to measure a single construct (e.g., one of the domains of creativity), and determines the degree to which all the items are measuring the same construct (Cronk, 2004, p. 102). As already noted in Chapter II, Cronbach's Alphas for subjects' scale measures were all fairly consistent (i.e., > 0.70) during scale development. Moreover, Cronbach's Alpha scores were recalculated using

auditors' responses to scales measuring the various domains of creativity, and the scores were likewise largely supportive (> 0.70) of the scales' internal consistency. Those results are stated in Table 4.3.

Table 4.3
Reliability Statistics

		Cronbach's Alpha	
		Unadjusted	**Adjusted**
Creative Place		0.957	0.958
	Support of Creativity	0.919	0.922
	Tolerance of Differences	0.921	0.921
	Personal Commitment	0.835	0.752
Creative Person		0.795	0.828
	Preference for Order	0.732	0.776
	Preference for Predictability	0.791	0.791
	Decisiveness	0.797	0.797
	Tolerance of Ambiguity	0.752	0.768
	Closed-mindedness	0.701	0.769
Creative Product (Ideation)		0.905	0.918
Creative Process		0.811	0.829
	Knowing Style	0.722	0.722
	Planning Style	0.834	0.834
	Creative Style	0.812	0.842

Similarly, item-total analysis examines the degree of inter-item reliability (Cronk, 2004), but determines if all items within different factors or subscales measure aspects of the same construct (e.g., one of the factors, or subscales, of the different domains of creativity). The correlation between the respondents' answers on each item and their total score on all of the other items was calculated for each item. A low item-total

correlation indicated that an item was not measuring what the rest of the items were measuring (Leary, 2004).

If the correlation between items and item totals fell below a certain level (usually 0.30) or was negative, the worst item was eliminated and the correlation analysis was repeated (Cronk, 2004). When all remaining correlations were greater than 0.3 and positive, the remaining items in the scale were considered to be internally consistent (Leary, 2004). Table 4.3 reports the Cronbach Alpha scores for each scale and sub-scale factor adjusted for items that have been eliminated from analysis due to either a negative or low correlation with item totals within the table.

Normality Testing

Gordon (1961) and Rogers (1954) believed that anyone can be creative (see also Maslow 1968); and others (Stavridou and Furnham, 1996; Shallcross, 1985; Tardiff & Sternberg, 1988) found that creativity as a personality trait seems to be normally distributed. Auditors' creativity, then, should also demonstrate similar variance and distribution characteristics. Since normality is assumed for subsequent testing of data for all other hypotheses, it is imperative to test for normality.

The Ryan-Joiner (R-J) test was used to examine whether the data were normally distributed. R-J is a one-sample hypothesis test to determine whether the population from which the sample was drawn is non-normal (Ryan and Joiner, 1976). The test assesses normality by calculating the correlation between test data and the normal scores for that data; if the correlation coefficient is near 1, the population is likely to be normal (Ibid, p. 2). The R-J statistic assesses the strength of that correlation. The null hypothesis posits that the population is normal (H_0: data follow a normal distribution), and the alternative

hypothesis posits that it is not (H_A: data do not follow a normal distribution). Consequently, if $p \leq 0.05$, the null hypothesis is rejected and the conclusion is drawn that the data are not normally distributed; but if $p > 0.05$, the null hypothesis is be rejected, and the distribution is assumed to be normal (Filliben, 1976).

Results from the R-J test for overall domains of creativity are summarized in Table4.3a. Actual graphical analyses for individual tests are presented in Appendix 8.

TABLE 4.3a
Normality Test Summary – Overall Creativity Scales

Creativity Domain	Mean	Std. Dev.	N	R-J	P-Value
Creative Place	197.0	22.61	73	0.986	0.097
Creative Person	88.48	13.24	73	0.996	>0.100
Creative Product (Ideation)	134.3	20.24	73	0.995	>0.100
Creative Process	63.38	8.02	73	0.985	0.088

In each case, the null hypothesis cannot be rejected ($p > 0.05$) – resulting in the conclusion that data from scales measuring each of the four domains of creativity follow a normal distribution. This finding supports RQ1 in part, that auditors' overall creativity is normally distributed. Table 4.3b below reports the R-J test results for the subscales of creativity.

TABLE 4.3b
Normality Test Summary – Overall Creativity Scales and Subscales

Creativity Domain	Mean	Std. Dev.	N	R-J	P-Value
Support of Creativity	87.71	10.81	73	0.982	0.043
Tolerance of Differences	87.26	11.4	73	0.989	>0.100
Personal Commitment	17.38	2.24	73	0.989	>0.100
Preference for Order	32.95	5.78	73	0.993	>0.100
Preference for Predictability	29.14	5.77	73	0.993	>0.100
Tolerance of Ambiguity	23.01	4.24	73	0.975	<0.01
Closed-Mindedness	3.384	1.29	73	0.995	>0.100
Knowing Style	15.71	2.5	73	0.989	>0.100
Planning Style	26.05	4.75	73	0.992	>0.100
Creative Style	23.81	4.28	73	0.986	>0.100

Three sub-scales comprised the Siegel Scale of Support of Innovation (i.e., Creative Place): Support of Creativity, Tolerance of Differences, and Personal Commitment. The Need for Closure Scale (i.e., Creative Person) consisted of four sub-scales: Preference for Order, Preference for Predictability, Tolerance of Ambiguity, and Closed-Mindedness. There were no sub-scales for Runco's Ideational Behavior Scale (i.e., Creative Product), but three sub-scales comprised the Cognitive Style Index (i.e., Creative Process): Knowledge Style, Planning Style, and Creative Style.

R-J test results for most of the subscale measures were the same as those for the overall domains of creativity. None of the R-J statistics except that for Support of Creativity and Tolerance of Ambiguity were significant at a .05 level, indicating that the null hypothesis of normality cannot be rejected. Consequently, except for those

normality tests, the findings support RQ1, that auditors' creativity, like that of the general population, is normally distributed.

Additional testing using the Kolmogorov-Smirnov normality test, indicated in Table 4.3c, suggests that Tolerance of Ambiguity may still be sufficiently normally distributed. However, additional testing only confirmed that it is unlikely that the Support of Creativity sample represents a normally distributed population. Furthermore, Support of Creativity is highly correlated with Tolerance of Differences (0.848), suggesting a high degree of multicollinearity may exist if both variables are included in subsequent regressions. Rather than impair regression results, Support of Creativity was eliminated from all subsequent regression analysis. Notably, Tolerance of Differences could have been eliminated instead, but additional testing indicated that the regression results would have been identical (since neither Support of Creativity nor Tolerance of Differences were found to be significant predictors of both DVs, and all other independent variables were identically significant at the same alpha levels).

TABLE 4.3c
Additional Tests of Normality

	Kolmogorov-Smirnov		
	Statistic	df	Sig.
Support of Creativity	.107	73	.038
Tolerance of Ambiguity	.091	73	.200

Descriptive Data

Actual creativity data, for either overall scales or subscales, may be analyzed descriptively. Notably, for overall creativity scales, the means and medians for each

domain are relatively close, pointing out the results of normality testing previously described. Consequently, a more granular descriptive analysis compares means only, and views the data in terms of certain demographic and covariate variables. Table 4.3d illustrates some interesting relationships between divisions within those variables.

TABLE 4.3d
Creativity Domains – Descriptive Statistics

	N	Range	Minimum	Maximum	Sum	Median	Mean	Std. Deviation	Variance
Creative Place	73	123	135	258	14382	198	197.01	22.614	511.375
Creative Person	73	69	51	120	6459	87	88.48	13.237	175.225
Creative Product	73	101	93	194	9802	135	134.27	20.238	409.563
Creative Process	73	47	35	82	4627	63	63.38	8.017	64.268
Valid N (list-wise)	73								

First, however, one of the overall scales warrants further discussion. Although the Need for Closure scale (used in measuring Creative Person) was designed to be inversely related to other dimensions of creativity, the sign of the scale, or the direction of its correlation with other variables, cannot be determined a priori. The scale is composed of five subscales, for example, and four of those subscales were designed to be inversely related to creativity (i.e., Preference for Order, Preference for Predictability, Decisiveness, and Closed-Mindedness). The fifth subscale, Tolerance of Ambiguity, was designed to be positively related to creativity. So, although not determinable a priori, the scale likely leans toward an inverse relationship with creativity, and a higher (lower) scale score reflects less (more) creativity.

With that in mind, it is noteworthy that males' scores on all four overall scales indicate higher characteristics of creativity than do female scores, as illustrated in Table 4.3d-1 (Panels A-C). That advantage remained intact when examining subscale creativity scores except in two important areas: (1) Tolerance of Ambiguity and (2) Personal Commitment.

TABLE 4.3d-1
Creativity in Relation to GENDER, AR, and FR

Panel A

		Creative Place											
		Overall			Support			Tolerance			Commitment		
GENDER		n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	Male	34	198.03	24.33	34	88.15	11.47	34	88.18	12.18	34	17.09	2.63
	Female	39	196.13	21.29	39	87.33	10.34	39	86.46	10.78	39	17.64	1.83
AR													
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	High	53	197.91	21.34	53	87.68	10.05	53	87.79	11.06	53	17.74	2.04
	Low	20	194.65	26.14	20	87.8	12.9	20	85.85	12.46	20	16.45	2.52
FR													
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	High	42	202.81	21.35	42	90.02	10.07	42	89.9	11.39	42	18.1	1.65
	Low	31	189.16	22.21	31	84.58	11.14	31	83.68	10.57	31	16.42	2.58

Panel B

	Creative Person																	
	Overall			Order			Predictability			Decisiveness			Ambiguity			Close-Mindedness		
GENDER	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
Male	34	85.71	14.22	34	32.35	6.1	34	28.26	6.43	34	28.74	6.02	34	21.82	4.7	34	3.26	1.31
Female	39	90.9	11.98	39	33.46	5.51	39	29.9	5.08	39	29.51	5.11	39	24.05	3.55	39	3.49	1.27
AR																		
Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
High	53	89.55	12.59	53	33.4	6.26	53	29.51	5.14	53	29.3	4.92	53	23.4	3.69	53	3.25	1.24
Low	20	85.65	14.78	20	31.75	4.14	20	28.15	7.22	20	28.75	7.03	20	22	5.43	20	3.75	1.37
FR																		
Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
High	42	87.93	13.82	42	33.36	6.47	42	28.69	5.79	42	29.21	4.86	42	22.55	4.5	42	3.33	1.32
Low	31	89.23	12.6	31	32.39	4.73	31	29.74	5.77	31	29.06	6.41	31	23.65	3.85	31	3.45	1.26

Panel C

		Creative Product			Creative Process											
		Ideation			Overall			Knowing Style			Planning Style			Creative Style		
GENDER		n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	Male	34	139.21	21.82	34	64.76	8.26	34	16.12	2.14	34	25.94	4.87	34	25	3.81
	Female	39	129.97	17.93	39	62.18	7.7	39	15.36	2.75	39	26.15	4.7	39	22.77	4.45
AR																
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	High	53	132.7	20.11	53	63.58	8.06	53	15.91	2.54	53	26.19	5.08	53	23.66	4.26
	Low	20	138.45	20.5	20	62.85	8.08	20	15.2	2.38	20	25.7	3.83	20	24.2	4.44
FR																
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	High	42	134.19	22.28	42	64.31	8.83	42	16.24	2.69	42	26.26	5.38	42	23.93	4.58
	Low	31	134.39	17.45	31	62.13	6.69	31	15	2.05	31	25.77	3.8	31	23.65	3.91

Similarly, those auditor-subjects estimating higher Audit Risk (AR) and Fraud Risk (FR) after reading the audit narrative tended to have higher scores on the overall creativity scales than those with low-risk estimations—except for the scale measuring Creative Product (i.e., ideation), which showed no real difference between the low- and high-risk assessors. Sub-scale creativity scores were not so uniformly predictive, however. Although higher sub-scale creativity scores for the factors of Creative Place and Creative Process were highly correlated with high AR and FR estimations, for example, that was not the case with the sub-scale measures for Creative Person. Higher AR and FR estimations were associated with similarly higher scores for Tolerance of Ambiguity (a positive correlation) and Closed-Mindedness (an inverse correlation),but

were not so strongly associated with average measures in Preference for Order, Preference for Predictability, and Decisiveness (all inverse correlations).

Table 4.3d-2 (Panels A-C) depict the relationships between experience in terms of total months of experience, in specific experience detecting A/R errors and fraud, and associations with others encountering A/R errors and frauds (TOTEXP, EFEXP, and EFEXPO, respectively) and various creativity measures.

TABLE 4.3d-2
Creativity in Relation to TOTEXP, EFEXP, and EFEXPO

Panel A

		Creative Place											
		Overall			Support			Tolerance			Commitment		
TOTEXP		n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	≥ Median	57	199.81	22.65	57	89.46	10.47	57	88.47	11.43	57	17.28	2.41
	< Median	16	187.06	20.09	16	81.5	9.97	16	82.94	10.55	16	17.75	1.48
EFEXP													
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	≥ Median	35	197.17	24.11	35	87.43	12.24	35	86.71	11.84	35	18.11	1.73
	< Median	38	196.87	21.46	38	87.97	9.47	38	87.76	11.12	38	16.71	2.46
EFEXPO													
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.4	73	17.38	2.24
	≥ Median	35	197.09	23.86	35	87.51	11.74	35	87.11	11.87	35	17.69	2.29
	< Median	38	196.95	21.73	38	87.89	10.03	38	87.39	11.12	38	17.11	2.19

Subjects with relatively more total experience (TOTEXP) or specific experience detecting accounts receivable errors and fraud (EFEXP) were largely more creative (about 1.3 times) than those subjects with less experience. Exposure (EFEXPO) to others with specific detection experience, moreover, was also principally associated with higher creativity scores, perhaps via some informal teaching/learning emanating from that exposure.

Panel B

		Creative Person																	
		Overall			Order			Predictability			Decisiveness			Ambiguity			Close-Mindedness		
TOTEXP		n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
	≥ Median	57	87.95	13.23	57	33.05	5.56	57	28.56	5.87	57	29.21	5.72	57	22.95	4.29	57	3.39	1.25
	< Median	16	90.38	13.52	16	32.56	6.68	16	31.19	5.01	16	28.94	4.96	16	23.25	4.2	16	3.38	1.45
EFEXP																			
	Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
	≥ Median	35	89.8	13.29	35	33.49	5.67	35	30	5.54	35	29.31	5.3	35	22.77	4.94	35	3.54	1.44
	< Median	38	87.26	13.25	38	32.45	5.91	38	28.34	5.92	38	29	5.8	38	23.24	3.54	38	3.24	1.13
EFEXPO																			
	Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
	≥ Median	35	87.6	13.86	35	32.8	6.16	35	28.83	5.7	35	27.97	5.5	35	22.74	4.73	35	3.23	1.42
	< Median	38	89.29	12.77	38	33.08	5.48	38	29.42	5.89	38	30.24	5.4	38	23.26	3.79	38	3.53	1.16

Panel C

		Creative Product			Creative Process										
		Ideation			Overall			Knowing Style			Planning Style			Creative Style		
TOTEXP		n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	≥ Median	57	134.98	18.68	57	63.95	8.62	57	15.72	2.63	57	26.28	4.79	57	24.14	4.26
	< Median	16	131.75	25.59	16	61.38	5.06	16	15.69	2.02	16	25.25	4.67	16	22.63	4.29
EFEXP																
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	≥ Median	35	131.49	22.54	35	64.66	7.34	35	16.34	2.2	35	26.63	4.9	35	23.74	4.56
	< Median	38	136.84	17.78	38	62.21	8.52	38	15.13	2.64	38	25.53	4.61	38	23.87	4.07
EFEXPO																
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	≥ Median	35	133.57	23.42	35	64.54	7.96	35	16	2.46	35	26.17	5.31	35	24.4	4.85
	< Median	38	134.92	17.09	38	62.32	8.03	38	15.45	2.53	38	25.95	4.24	38	23.26	3.67

Finally, descriptive data about preparation to recognize or respond to fraud cues/perceived risks warrants description and examination. Subjects with relatively more training at universities (UCOURSE) or professional training sessions (PROTRAIN) in fraud examination were largely more creative (about 1.8 times) than those subjects with less experience.

TABLE 4.3d-3
Creativity In Relation to UCOURSE and PROTRAIN

Panel A

		Creative Place											
		Overall			**Support**			**Tolerance**			**Commitment**		
UCOURSE		**n**	**M**	**SD**	**n**	**M**	**SD**	**n**	**M**	**SD**	**n**	**M**	**SD**
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.40	73	17.38	2.24
	Yes	27	203.04	23.16	27	91.00	10.77	27	90.48	11.76	27	17.00	2.47
	No	46	193.48	21.77	46	85.78	10.47	46	85.37	10.88	46	17.61	2.09
PROTRAIN													
	Overall	73	197.01	22.61	73	87.71	10.81	73	87.26	11.40	73	17.38	2.24
	Yes	24	198.25	22.39	24	88.42	10.27	24	87.04	11.45	24	18.00	2.09
	No	49	196.41	22.93	49	87.37	11.16	49	87.37	11.50	49	17.08	2.27

		Panel B																	
		Creative Person																	
		Overall			Order			Predictability			Decisiveness			Ambiguity			Close-Mindedness		
UCOURSE		n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
	Yes	27	82.85	10.18	27	31.37	6.06	27	26.63	4.57	27	29.52	5.26	27	22	3.52	27	2.85	1.03
	No	46	91.78	13.8	46	33.87	5.46	46	30.61	5.93	46	28.93	5.73	46	23.61	4.55	46	3.7	1.33
PROTRAIN																			
	Overall	73	88.48	13.24	73	32.95	5.78	73	29.14	5.76	73	29.15	5.53	73	23.01	4.24	73	3.38	1.29
	Yes	24	88.58	13.06	24	33.83	5.62	24	29.46	5.18	24	28.04	5.19	24	22.08	5.11	24	3.21	1.53
	No	49	88.43	13.46	49	32.51	5.86	49	28.98	6.07	49	29.69	5.66	49	23.47	3.73	49	3.47	1.16

		Panel C														
		Creative Product			**Creative Process**											
		Ideation			**Overall**			**Knowing Style**			**Planning Style**			**Creative Style**		
UCOURSE		n	M	SD	n	M	SD	n	M	SD	n	M	SD	n	M	SD
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	Yes	27	139.07	19.33	27	61.89	9.47	27	15.11	2.53	27	24.52	5.58	27	24.85	3.31
	No	46	131.46	20.43	46	64.26	6.99	46	16.07	2.43	46	26.96	3.98	46	23.2	4.69
PROTRAIN																
	Overall	73	134.27	20.24	73	63.38	8.02	73	15.71	2.5	73	26.05	4.75	73	23.81	4.28
	Yes	24	133.33	19.86	24	64.75	6.94	24	16.54	2.6	24	26.21	4.17	24	24.04	4.41
	No	49	134.73	20.61	49	62.71	8.48	49	15.31	2.36	49	25.98	5.05	49	23.69	4.26

The research question RQ1, "Can Dimensions of Auditor Creativity Can Be Identified and Empirically Measured?" has been examined by (a) describing the scales and subscales utilized to measure creativity; (b) conducting validity and reliability testing for each of those scales, subscales, and scale items; and (c)conducting normality testing for each of the scales and subscales. Finally, descriptive data were briefly noted illustrating variability among creativity scale and sub-scale items, individually and in relation to most covariates used in the research. By all these accounts, ample evidence has been provided to support RQ1. Auditors are, indeed, creative – and that creativity is normally distributed. Moreover, the public domain scales used to measure that creativity were shown to be reliable and valid, and descriptive data suggest that ample variance exists to measure differences between subjects.

Test of H1: Various Dimensions of Creativity among Auditors Will Be Related to Their Recognition of Fraud Cues

The first hypothesis was tested using two regressions. The first regression was used to assess the link between overall dimensions of creativity (i.e., Creative Place, Creative Person, Creative Product, and Creative Process, respectively) among auditors and their ability to recognize fraud cues from an audit narrative. Four standard public-domain scales (Siegel Scale of Support of Innovation, Need for Closure, Runco's Ideational Behavior Scale, and Cognitive Style Index, respectively) were used to measure those four overall dimensions of creativity, respectively.

(1) $$NUMQUALRECOG = \beta_0 + \beta_1 PLACE + \beta_2 PERSON + \beta_3 PRODUCT + \beta_4 PROCESS + \beta_5 GENDER + \beta_6 EFEXPO + \beta_7 TOTEXP + \beta_8 PROTRAIN + \beta_9 UCOURSE + \beta_{10} EFEXP + \beta_{11} VERSION;$$

where the dependent variable, NUMQUALRECOG, was the quantity of fraud cues each subject recognized while reading an audit narrative, weighted by a qualitative assignment for each recognized cue on the basis determined by an expert panel. For example, suppose a subject recognized four cues (up to 10 possible), and the cues were assigned a qualitative rating of 2, 7, 4 and 5, respectively (using a scale of 1 – 7) by the expert panel. The overall "NUMQUALRECOG" was calculated using the following formulae:

$$(a) \quad Average\ Qualitative\ Rating = \sum_{i=1}^{n} (Qualitative\ Rating\ i)/n,$$

where i is any cue recognized (each having a scale of 1 through 7), and n is the # of cues recognized. If no cues are recognized by a subject, his/her average qualitative rating is zero.

$$(2 + 7 + 4 + 5)/4 = 18/4 \qquad = 4.5$$

NUMQUALRECOG = (Average Qualitative Rating x 10) + (# Cues Recognized x 7)

$$73 = (4.5 \times 10) + (4 \times 7)$$

Covariate GENDER was arbitrarily coded as "0" for male and "1" for female. Other covariates (EFEXPO, TOTEXP, PROTRAIN, and EFEXP) were coded as "1" for responses exceeding the median values for those items, and "0" otherwise. The covariate UCOURSE (the number of university courses related to fraud examination) was kept in its original form (which ranged in values from 0 to 3). Finally, covariate VERSION was coded as "1" for those completing the High-Fraud Version (HFV) and "0" for those completing the Low-Fraud Version (LFV).

The second regression was used to delve into the relationship between domains of creativity and auditors' ability to recognize fraud cues by examining auditors' scores on subscales of creativity. The Siegel Scale of Support of Innovation (i.e., Creative Place)

comprises three subscales: Support of Creativity, Tolerance of Differences, and Personal Commitment (although, as previously noted, Support of Creativity was not used as a predictor variable because of its unusually high correlation with Tolerance of Differences). The Need for Closure Scale (i.e., Creative Person) consisted of five sub-scales: Preference for Order, Preference for Predictability, Decisiveness, Tolerance of Ambiguity, and Closed-Mindedness. There were no subscales for Runco's Ideational Behavior Scale (i.e., Creative Product), but three subscales composed the Cognitive Style Index (i.e., Creative Process): Knowledge Style, Planning Style, and Creative Style. Consequently, the second regression used in addressing H1 was:

(2) $NUMQUALRECOG = \beta_0 + \beta_1 DIFFERENCES + \beta_2 COMMITMENT + \beta_3 ORDER + \beta_4 PREDICTABILITY + \beta_5 DECISIVENESS + \beta_6 AMBIGUITY + \beta_7 CLOSEMINDED + \beta_8 IDEATION + \beta_9 KNOWLEDGESTYLE + \beta_{10} PLANNINGSTYLE + \beta_{11} CREATIVESTYLE + \beta_{12} GENDER + \beta_{13} EFEXPO + \beta_{14} TOTEXP + \beta_{15} PROTRAIN + \beta_{16} UCOURSE + \beta_{17} EFEXP + \beta_{18} VERSION;$

where β_1 through β_{11} were the subscales of creativity, and other variables were defined as before.

Collinearity and Multicollinearity

The various scales used to assess different domains of creativity are not orthogonal. Table 4.4a-1 and Table 4.4a-2 provide the Pearson correlation coefficients between the independent variables and covariates in regressions (1) and (2), respectively.

TABLE 4.4a-1
Pearson Bivariate Correlations* - Overall Domains of Creativity

	PERSON	PRODUCT	PLACE	GENDER	UCOURSE	EFEXP	EFEXPO	PROTRAIN	VERSION	TOTEXP
PLACE	**-.342**	**.250**	**.362**	.042	.174	.007	.003	.039	.023	**.235**
PERSON		**-.399**	.014	-.197	**-.319**	.096	-.064	.006	.086	-.076
PRODUCT			**.313**	.229	.225	-.133	-.034	-.033	**-.238**	.067
PROCESS				.162	-.132	.154	.140	.120	**-.231**	.134
GENDER					.060	-.017	-.017	-.010	.067	.030
UCOURSE						-.227	.009	-.149	-.017	.167
EFEXP							**.506**	**.379**	.081	-.221
EFEXPO								**.437**	.013	-.154
PROTRAIN									.067	**-.264**
VERSION										**-.269**

*Correlations ≥ .231 in absolute value are significant at the .05 level.

In general, the correlations between different dimensions of creativity should reflect the theoretical relationships explicated in Chapter II. For example, the Siegel Scale of Support of Innovation, Runco's Ideational Behavior Scale, and the Cognitive Style Index, have all been designed to bear a positive relationship with each other. That design is reflected by the fact that Creative Place, Product, and Process were all significantly and positively correlated with each other ($p \leq 0.05$). Also as expected, Creative Person was inversely related to Creative Place and Creative Product. Notably, however, Creative Person was positively, albeit insignificantly, correlated with Creative Process. Although the Need for Closure (measuring whether a subject is Creative) was designed to be inversely related to other dimensions of creativity, the sign for either Creative Person or Creative Process in Equation (1), or the direction of their correlation with other variables, cannot be determined a priori. The scale measuring Creative Person is composed of five subscales, and four of those subscales were designed to be inversely related to creativity (i.e., Preference for Order, Preference for Predictability, Decisiveness, and Closed-

Mindedness). The fifth subscale, Tolerance of Ambiguity, was designed to be positively related to creativity.

TABLE 4.4a-2

Pearson Bivariate Correlations – Creativity Subscales

	SUPPORT	DIFFERENCES	COMMITMENT	ORDER	PREDICTABILITY	DECISIVENESS	AMBIGUITY	CLOSEMINDED	IDEATION	KNOWLEDGE	PLANNING	CREATIVE	GENDER	UCOURSE	TOTEXP	EFEXP	EFEXPO	PROTRAIN	VERSION
SUPPORT	1	0.848	0.463	0.037	-0.486	0.037	-0.321	-0.207	0.306	0.314	0.176	0.399	0.038	0.194	0.307	-0.025	-0.018	0.046	-0.064
DIFFERENCES		1	0.41	-0.056	-0.516	0.07	-0.382	-0.241	0.203	0.258	0.025	0.354	0.076	0.201	0.202	-0.046	-0.012	-0.014	0.081
COMMITMENT			1	0.263	-0.124	0.07	-0.003	0.025	-0.03	0.179	0.328	0.048	-0.124	-0.161	-0.087	0.315	0.13	0.194	0.118
ORDER				1	0.524	-0.051	0.343	0.188	-0.233	0.2	0.634	-0.362	-0.096	-0.235	0.035	0.09	-0.024	0.108	0.066
PREDICTABILITY					1	0.109	0.477	0.444	-0.462	-0.133	0.292	-0.609	-0.142	-0.315	-0.19	0.145	-0.052	0.039	0.178
DECISIVENESS						1	-0.042	-0.022	0.001	-0.054	0.043	-0.054	-0.071	-0.051	0.021	0.029	-0.206	-0.141	0.181
AMBIGUITY							1	0.411	-0.158	-0.038	0.13	-0.306	-0.264	-0.158	-0.03	-0.055	-0.062	-0.154	-0.071
CLOSEMINDED								1	-0.469	-0.142	0.137	-0.528	-0.087	-0.293	0.004	0.12	-0.116	-0.096	0.02
IDEATION									1	0.327	-0.126	0.582	0.229	0.225	0.067	-0.133	-0.034	-0.033	-0.238
KNOWLEDGE STYLE										1	0.408	0.389	0.153	-0.22	0.005	0.244	0.111	0.234	-0.155
PLANNINGSTYLE											1	-0.039	-0.022	-0.239	0.09	0.117	0.024	0.023	-0.123
CREATIVESTYLE												1	0.262	0.194	0.147	-0.015	0.133	0.038	-0.222
GENDER													1	0.06	0.03	-0.017	-0.017	-0.01	0.067
UCOURSE														1	0.167	-0.227	0.009	-0.149	-0.017
TOTEXP															1	-0.221	-0.154	-0.264	-0.269
EFEXP																1	0.506	0.379	0.081
EFEXPO																	1	0.437	0.013
PROTRAIN																		1	0.067
VERSION																			1

*Correlations ≥ .231 in absolute value are significant at the .05 level.

The correlations between PROTRAIN, EFEXPO, and EFEXP were all significant and positive, which suggests that subjects with higher professional training have more experience with, and exposure to, fraud. The amount of professional training in fraud detection (PROTRAIN) should also increase with auditors' experience (TOTEXP). However, training would normally occur during an auditor's earlier years on the job, and that might explain why training is negatively correlated with TOTEXP. Experience with errors or fraud (EFEXP) would be subsumed by greater exposure to errors or fraud (EFEXPO), which would explain the highly positive correlation between the two. As expected, TOTEXP was also significantly correlated with P1, which measures creative "place" (work environment). The greater the subjects' tenure, for example, the more they viewed their work environments as supportive of their innovative aspirations.

The final highly correlated covariate is VERSION (low- or high-fraud risk) of the audit narrative. VERSION is significantly and negatively correlated with TOTEXP, P3 (Creative Product), and P4 (Creative Process), suggesting that higher characteristics of creativity or greater total experience levels were inversely related to the degree of information provided by the narrative instrument. Notably, GENDER was not significantly correlated with any other independent variable or covariate.

Correlated independent variables make it difficult to make inferences about the individual regression coefficients and their individual effects on the dependent variable. Also, if one tries to determine a subset of variables that best explains the variation in the dependent variable (NUMQUALRECOG), the wrong variables may be eliminated. A pair-wise correlation matrix is insufficient to identify the linear relation that may exist among three or more independent variables simultaneously, however. Multicollinearity

can only be ascertained by examining the latent roots and latent vectors (LRLV) of the independent variables. In general, if all independent variables are perfectly orthogonal, then all the latent roots (Eigen-values) must equal one. Small eigen-values (those ≤ than 0.10) indicate *severe* multicollinearity (Copeland and Espahbodi, 1989). Table 4.4b reports the LRLV's of the eleven independent variables for regression equation (1). Notably, the regression model defined by Equation (1) does not seem to suffer from severe multicollinearity, since there are no small (≤ 0.10) latent roots. Therefore, regression equation (1) was run, and the results are summarized in Tables 4.4c-1 through 3.

TABLE 4.4b

Latent Roots and Vectors of 11 variables

	Latent Vectors Associated with Latent Roots										
Latent Roots	PLACE	PERSON	PRODUCT	PROCESS	GENDER	EFEXP	EFEXPO	PROTRAIN	UCOURSE	VERSION	TOTEXP
2.316	0.300	-0.352	0.392	0.135	0.169	-0.371	-0.266	-0.306	0.331	-0.221	0.354
1.993	-0.327	0.254	-0.295	-0.422	-0.175	-0.390	-0.450	-0.407	-0.005	0.089	0.061
1.337	0.004	0.415	-0.045	0.473	-0.182	0.040	-0.113	-0.090	-0.433	-0.490	0.344
1.072	0.105	-0.114	-0.188	-0.239	-0.686	0.080	0.314	0.077	0.383	-0.276	0.281
0.987	0.642	0.110	-0.328	0.160	-0.116	0.054	-0.138	-0.059	-0.051	0.586	0.239
0.826	0.217	-0.119	0.329	0.078	-0.564	-0.211	-0.306	0.137	-0.226	0.001	-0.546
0.648	0.101	-0.581	-0.226	-0.360	0.091	0.061	-0.130	0.141	-0.589	-0.173	0.213
0.608	-0.005	0.184	-0.099	-0.010	0.122	-0.516	-0.110	0.785	0.111	-0.021	0.182
0.457	0.273	-0.041	-0.574	0.122	0.215	0.047	-0.206	-0.035	0.274	-0.449	-0.459
0.435	0.062	0.210	0.260	-0.285	0.032	0.600	-0.572	0.231	0.197	-0.079	0.127
0.321	0.494	0.428	0.219	-0.514	0.186	-0.148	0.323	-0.112	-0.170	-0.213	-0.112

TABLE 4.4c-1

Regression Equation (1) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.537	.288	.159	18.449664

TABLE 4.4c-2
Regression Equation (1) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	8392.631	11	762.966	2.241	.023
Residual	20763.795	61	340.390		
Total	29156.427	72			

TABLE 4.4c-3
Regression Equation (1) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	One-tailed Significance	Expected Sign
	B	Std. Error	Beta			
(Constant)	12.098	36.021		.336	.369	**n/a**
PLACE	.067	.119	.075	.562	.288	+
PERSON	.348	.202	.229	1.726	.045	**?**
PRODUCT	.293	.132	.295	2.226	.015	+
PROCESS	-.552	.343	-.220	-1.611	.056	**?**
GENDER	-4.402	4.620	-.110	-.953	.172	**n/a**
UCOURSE	6.661	3.015	.271	2.209	.015	+
TOTEXP	-6.628	5.950	-.137	-1.114	.865	+
EFEXP	13.577	5.375	.339	2.526	.007	+
EFEXPO	-3.419	5.437	-.085	-.629	.734	+
PROTRAIN	5.858	5.384	.138	1.088	.140	+
VERSION	3.003	6.015	.061	.499	.310	**n/a**

DV = NUMQUALRECOG

When considering the eleven possible predictors in the regression model defined by Equation (1), neither subjects' work environment, gender, total months of experience, exposure to others' experience detecting A/R errors or fraud, professional training, nor the version (HFR versus LFR) were significantly associated with recognizing fraud cues from the audit narrative. Instead, auditors' direct experience with A/R errors or fraud proved to be the best predictor of recognizing fraud cues. As expected, EFEXP was directly and significantly related to NUMQUALRECOG ($p = 0.007$), which suggests that experience detecting A/R errors and/or fraud cues is significantly related to recognizing fraud cues in the future. Although professional training was not significantly related to the dependent variable, the number of university fraud courses taken by auditors was also positively and significantly associated with NUMQUALRECOG ($p = 0.015$). So, it seems that the more university training one has had in fraud examination, the better one is at recognizing fraud cues. More germane to this research, however, is the fact that the measure for Creative Product (i.e., creative output or ideation) was also directly associated with the dependent variable ($p = 0.015$). This finding alone provides sufficient support for hypothesis H1, which states that more creative auditors are more adept at recognizing fraud cues, ceteris paribus, but additional support was provided by findings for both Person and Process. Both were also significantly predictive of NUMQUALRECOG ($p = 0.045$ and $p = 0.056$, respectively), although PROCESS was inversely related to the dependent variable while PERSON was associated in a positive manner. As mentioned earlier, however, the sign of either PERSON or PROCESS cannot be determined a priori. Consequently, the sign (or direction) of each would depend on the relative strength of scores on the scales' underlying subscales vis-à-vis each other.

Consequently, the regression was repeated using the various subscales within the four creativity domains (regression equation (2)) in order to better understand which components of the overall scales were particularly significant in recognizing fraud cues.

First, a check of the latent roots and vectors of all potential predictor variables (see Table 4.5a) indicates no severe multicollinearity among most variables, although multicollinearity apparently exists between variables Support of Creativity and Tolerance of Differences, as previously noted. The bottom row of Table 4.5a is illustrative. Excluding Support of Creativity from consideration (again, as previously noted), regression Equation (2) was run. Those results are summarized in Tables 4.5b-1 through 3.

TABLE 4.5a

Latent Roots and Vectors of all 18 variables

Latent Roots	Latent Vectors Associated with Latent Roots																	
	SUPPORT	DIFFERENCE	COMMITMEN	ORDER	EDICTABIL	AMBIGUITY	LOSEMINDE	IDEATION	WLEDGEST	ANNINGSTY	EATIVESTY	GENDER	EFEXP	EFEXPO	PROTRAIN	UCOURSE	VERSION	TOTEXP
4.103	0.334	0.333	0.064	-0.218	-0.417	-0.286	-0.311	0.323	0.151	-0.091	0.389	0.137	-0.063	0.027	0.004	0.2	-0.087	0.124
2.738	-0.252	-0.195	-0.414	-0.339	-0.076	-0.007	-0.041	0.042	-0.365	-0.391	-0.037	0.032	-0.344	-0.228	-0.291	0.233	-0.03	0.068
2.055	-0.256	-0.185	-0.073	-0.279	-0.04	-0.19	-0.15	-0.003	-0.048	-0.304	0.062	0.073	0.357	0.423	0.392	-0.029	0.174	-0.401
1.577	-0.253	-0.369	-0.308	0.055	0.076	0.197	-0.101	0.343	0.379	0.194	0.268	0.179	0.003	0.048	0.023	-0.155	-0.465	0.05
1.168	-0.064	0.031	-0.096	0.139	0.14	-0.228	-0.076	0.067	0.16	0.106	-0.006	0.628	-0.153	-0.331	-0.065	-0.154	0.483	-0.245
0.974	-0.038	-0.048	0.11	0.244	0.087	0.261	-0.481	0.288	0.005	0.042	0.024	-0.422	-0.276	-0.086	0.059	0.237	0.198	-0.413
0.941	-0.01	-0.056	-0.242	0.335	0.176	-0.145	-0.225	-0.14	-0.15	0.221	-0.073	0.21	0	0.352	0.139	0.559	0.065	0.351
0.77	-0.033	-0.039	-0.188	0.05	-0.021	-0.559	-0.294	-0.245	-0.012	0.123	-0.115	-0.307	-0.239	-0.213	0.324	-0.352	-0.203	0.07
0.622	-0.205	-0.148	0.195	-0.075	-0.056	-0.239	-0.296	-0.145	-0.162	0.357	0.164	-0.084	0.259	0.118	-0.664	-0.083	0.016	-0.077
0.59	0.027	-0.072	0.303	0.037	-0.065	-0.168	0.164	0.046	-0.295	0.172	-0.162	0.287	-0.081	-0.127	0.115	0.281	-0.539	-0.457
0.521	0.081	0.181	-0.43	-0.131	0.089	-0.19	0.232	-0.127	0.457	0.128	-0.093	-0.259	0.199	-0.109	-0.176	0.383	-0.038	-0.337
0.467	-0.012	0.139	-0.103	-0.122	-0.191	0.205	0.107	-0.417	0.052	0.223	0.233	0.08	-0.571	0.428	-0.008	-0.099	0.023	-0.241
0.386	-0.182	-0.324	0.26	-0.245	-0.123	0.063	0.109	-0.273	0.119	0.223	0.369	-0.064	0.032	-0.399	0.308	0.314	0.203	0.171
0.328	-0.04	0.237	0.015	0.133	0.08	0.289	-0.422	-0.536	0.109	-0.346	0.108	0.206	0.205	-0.23	-0.032	0.032	-0.286	-0.075
0.291	0.294	0.123	-0.189	-0.116	0.563	0.002	0.077	0.044	-0.419	0.104	0.541	-0.058	0.087	-0.081	0.088	-0.096	-0.029	-0.099
0.207	0.017	0.055	0.296	-0.581	0.53	0.005	-0.227	0.026	0.239	0.064	-0.3	0.084	-0.201	0.113	-0.007	0.053	-0.073	0.135
0.159	0.22	0.043	-0.304	-0.307	-0.288	0.373	-0.25	0.025	-0.228	0.437	-0.324	0.102	0.247	-0.141	0.151	-0.102	0.07	-0.025
0.102	-0.685	0.643	0.003	-0.025	0.01	0.023	0.071	0.178	-0.121	0.179	0.033	-0.042	0.047	-0.057	0.128	0.015	-0.032	0.085

TABLE 4.5b-1
Regression Equation (2) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.706	.499	.331	16.454913

TABLE 4.5b-2
Regression Equation (2) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	14535.162	18	807.509	2.982	.001
Residual	14621.264	54	270.764		
Total	29156.427	72			

TABLE 4.5b-3
Regression Equation (2) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	Expected Sign
(Constant)	13.665	40.241		.340	.368	**n/a**
DIFFERENCES	-.277	.256	-.157	-1.082	.858	+
COMMITMENT	3.736	1.243	.416	3.007	.002	+
ORDER	-.472	.581	-.136	-.814	.210	-
PREDICTABILITY	.101	.617	.029	.164	.565	-
DECISIVENESS	.731	.393	.201	1.862	.966	-
AMBIGUITY	1.241	.650	.262	1.908	.031	+
CLOSEMINDED	-4.205	2.141	-.269	-1.964	.027	-
IDEATION	.232	.135	.233	1.712	.046	+
KNOWINGSTYLE	-.150	1.157	-.019	-.129	.551	+
PLANNINGSTYLE	-.287	.665	-.068	-.431	.334	-
CREATIVESTYLE	-1.732	.758	-.369	-2.286	.987	+
GENDER	1.493	4.349	.037	.343	.366	**n/a**
UCOURSE	7.729	2.820	.314	2.741	.004	+
TOTEXP	-2.731	5.425	-.057	-.503	.692	+
EFEXP	10.058	5.414	.251	1.858	.034	+
EFEXPO	-2.537	5.097	-.063	-.498	.690	+
PROTRAIN	6.999	5.176	.165	1.352	.091	+
VERSION	-.127	5.657	-.003	-.023	.491	**n/a**

DV = NUMQUALRECOG

Overall, even with a more in-depth analysis of creativity-related independent variables, UCOURSE and EFEXP remained associated with NUMQUALRECOG in a significantly positive manner ($p = 0.004$ and $p = 0.034$, respectively). Additionally, and importantly, subscales measuring different facets from three of four domains of creativity were significantly related to NUMQUALRECOG.

Expectedly, subjects who had previously taken one or more university courses were better able, perhaps primed, to recognize fraud cues in the audit narrative, and that was certainly the case ($p = 0.004$). Similarly, it was also expected that auditors who had prior experience in detecting A/R errors or fraud would also be more practiced at recognizing fraud cues, and that was also true ($p = 0.034$). Surprisingly, though, total months of experience were not significantly associated with fraud cue recognition, and directionally was the wrong sign. Apparently, then, auditor tenure can actually be detrimental to ability to recognize fraud cues, a recurring observation found in Equation (1), Equation (2), and throughout this research.

Personal commitment was the most predictive creativity subscale of auditors' ability to recognize fraud cues ($p = 0.002$), which suggests that auditors with higher personal commitment to their work were likely to recognize more, and better quality, fraud cues (as measured by NUMQUALRECOG). Perhaps, as noted in Chapter II, subjects with a higher level of personal commitment tend to work harder at task achievement. Similarly, a direct and significant relationship also exists between Tolerance of Ambiguity and NUMQUALRECOG ($p = 0.031$), which implies that auditors' ability to tolerate unclear situations (or thoughts, or hypotheses, or explanations, etc.) were more likely to recognize fraud cues. Theoretically, as explicated in Chapter II, these auditors are more

likely to discard an initial hypothesis, rather than strive to "prove" it, as the confirmation bias suggests. Consequently, they are more open to different explanations of data or behavior. Similarly, a significantly inverse relationship also exists between recognition of fraud cues and auditors being closed-minded ($p = 0.027$). The more closed-minded, the worse subjects were in recognizing fraud cues. Again, as noted previously, closed-minded auditors tend not to consider alternative explanations of data or events. A low score on this sub-scale, however, suggests that auditors remain open to alternative explanations rather than fixating on one. Finally, creative ideation was directly associated with recognition of fraud cues ($p = 0.046$), as in the overall domain regression of Equation (1). Hence, auditors with more creative everyday ideas or thoughts are apparently likely to recognize more (and even more subtle) fraud cues in the audit scenario.

All the above relationships were significant and, importantly, in the expected direction. It seems evident, therefore, that several variables are significantly associated with auditors' fraud cue recognition in the expected direction, which shows substantial support for H1.

The likelihood of collinearity between scales and/or subscales of creativity, especially in models using several subscales which may have overlap with one another, may have had an adverse impact on regression findings. Consequently, a backward elimination regression was run on Equation (2) to derive a "best subsets" set of variables aimed at minimizing standard error and simultaneously maximizing adjusted R^2. The results follow in Tables 4.5c-1 through 3:

TABLE 4.5c-1
Regression Equation (2) –
Best Subset Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.687	.472	.386	15.762446

DV = UMQUALRECOG

TABLE 4.5c-2
Regression Equation (2) –
Best Subset Model ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	13752.235	10	1375.224	5.535	.000
Residual	15404.191	62	248.455		
Total	29156.427	72			

DV = NUMQUALRECOG

TABLE 4.5c-3
Regression Equation (2) –
Best Subset Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	**Expected Sign**
(Constant)	4.214	30.533		.138	.445	**n/a**
COMMITMENT	2.930	.924	.326	3.172	.001	+
ORDER	-.685	.386	-.197	-1.776	.040	-
DECISIVENESS	.728	.347	.200	2.100	.980	-
AMBIGUITY	1.520	.516	.321	2.944	.002	+
CLOSEMINDED	-4.441	1.927	-.284	-2.305	.012	-
IDEATION	.245	.118	.246	2.073	.021	+
CREATIVESTYLE	-2.172	.609	-.462	-3.563	1.000	+
UCOURSE	6.897	2.495	.281	2.764	.004	+
EFEXP	10.276	4.268	.257	2.408	.010	+
PROTRAIN	7.526	4.464	.177	1.686	.048	+

DV = NUMQUALRECOG

As noted, this model was selected as the "best subset" of regressed variables because it resulted in the best adjusted R^2 (0.386), lowest standard error (15.762446), along with the fewest variables. Compared to regression results emanating from Equation (2), only the variable Preference for Order ($p = 0.040$) resulted from the best-subsets in addition to already recognized relationships. The highly significant inverse association suggests that auditors with a high (low) preference for order tend to be less (more) capable at recognizing potential fraud cues.

Additionally, compared to Equation (2) results, the best subsets regression showed improved levels of significance for Personal Commitment (0.001 v. 0.002), Tolerance of Ambiguity ($p = 0.002$ v. 0.031), Closed-Mindedness ($p = 0.012$ v. 0.027), Ideation ($p = 0.021$ v. 0.046), EFEXP ($p = 0.010$ v. 0.034), and PROTRAIN ($p = 0.048$ v. 0.091). Only the significance level for UCOURSE remained constant ($p = 0.004$).

Overall, there seemed to be some collinearity between variables, which was addressed by the backward-elimination-of-variables method of regression. The best-subsets regression variable model seemingly provided better-defined results, results that provided even more support for H1—that more creative auditors are more adept at recognizing fraud cues.

Test of H2: Various Dimensions of Creativity among Auditors Will Be Related to Their Response to Perceived Fraud Risk;

Like H1, the second hypothesis was tested using two regressions. The first regression was used to assess the link between overall dimensions of creativity (i.e., Creative Place, Creative Person, Creative Product, and Creative Process, respectively) among auditors

and their responses to perceived fraud risks. The same four standard public-domain scales (Siegel Scale of Support of Innovation, Need for Closure, Runco's Ideational Behavior Scale, and Cognitive Style Index, respectively) were used to measure the overall domains of creativity, respectively. However, two control variables were added to the models testing H2, namely measures for perceived audit risk and fraud risk (AR and FR, respectively) developed from reading the audit narrative. Logically, auditors' responses to any audit circumstance should, at least in part, reflect their concerns about those risks. Subjects were asked to estimate values for the audit and fraud risks based on their assessments of the narrative facts, and then assign a rating for each risk on a scale of 1 – 10 (from no risk to absolute risk, respectively). Consequently, the first regression model for H2 was:

(3) $$NUMQUALRESPONSE = \beta_0 + \beta_1 PLACE + \beta_2 PERSON + \beta_3 PRODUCT + \beta_4 PROCESS + \beta_5 GENDER + \beta_6 EFEXPO + \beta_7 TOTEXP + \beta_8 PROTRAIN + \beta_9 UCOURSE + \beta_{10} EFEXP + \beta_{11} VERSION + \beta_{12} AR + \beta_{13} FR;$$

Also, similar to the second regression for testing H1, the second regression for testing H2 was used to delve into the relationship between the domains of creativity and the ability to respond to perceived fraud risks by examining auditors' scores on subscales that composed the overall scales of creativity. Respectively, three subscales composed the Siegel Scale of Support of Innovation (i.e., Creative Place): Support of Creativity, Tolerance of Differences, and Personal Commitment (respectively). As previously noted, however, severe multi-collinearity existed between Support of Creativity and Tolerance of Differences, so the former subscale was dropped from consideration. The Need for Closure Scale (i.e., Creative Person) consisted of five subscales: Preference for Order,

Preference for Predictability, Decisiveness, Tolerance of Ambiguity, and Closed-Mindedness (respectively). There were no sub-scales for Runco's Ideational Behavior Scale (i.e., Creative Product), but three sub-scales composed the Cognitive Style Index (i.e., Creative Process: Knowledge Style, Planning Style, and Creative Style (respectively). Consequently, the second regression used in testing H2 was:

(4) $$NUMQUALRECOG = \beta_0 + \beta_1 SUPPORT + \beta_2 DIFFERENCES + \beta_3 COMMITMENT + \beta_4 ORDER + \beta_5 PREDICTABILITY + \beta_6 DECISIVENESS + \beta_7 AMBIGUITY + \beta_8 CLOSEMINDED + \beta_9 IDEATION + \beta_{10} KNOWLEDGESTYLE + \beta_{11} PLANNINGSTYLE + \beta_{12} CREATIVESTYLE + \beta_{13} GENDER + \beta_{14} EFEXPO + \beta_{15} TOTEXP + \beta_{16} PROTRAIN + \beta_{17} UCOURSE + \beta_{18} EFEXP + \beta_{19} VERSION + \beta_{20} AR + \beta_{21} FR;$$

In both regression models, the dependent variable (***NUMQUALRESPONSE***) was determined by the *quantity* of auditors' solutions to perceived fraud risks, weighted by a *qualitative* assignment for each solution as determined by an expert panel. The entire premise of the scoring was that auditors simply budgeting to do more of, or relying on, the same procedures performed during the prior-year audit were choosing the least creative response to perceived fraud cues. The more they varied their responses in relation to the prior year, the more they exhibited some degree of creativity in their responses to perceived fraud cues.

More specifically, the auditors were first shown a list of twelve standard procedures commonly used to audit A/R, along with the number of hours budgeted for last year's audit. The first ten of those procedures had been used, hypothetically, during the previous year's audit of A/R for the same client. Procedures 11 and 12 (Computer

Assisted Audit Techniques and Interviewing, respectively) had not been used during the previous audit, so although they were on the list of standard procedures from which to choose, they had been assigned "0" hours during the prior audit. Auditors were then presented with an additional (non-standard) A/R audit procedure 13 and asked: "If you were free to do *anything* (in auditing A/R), what else would you do (and how many hours would you budget for the additional procedure)?"

After reading the audit narrative and assigning both AR and FR, auditors were asked to budget hours for each procedure during the current audit, first, for standard procedures 1 through 10, then for (previously unused) standard procedures 11 through 12, and finally for "non-standard procedure 13." The NUMQUALRESPONSE was then calculated for each subject on the basis of his/her reliance (or non-reliance) on each procedure. A penalty/reward system was devised for reliance/non-reliance on the procedures used during the prior audit, using a four step qualitative procedure based on the judgment of an expert panel. The Penalty/Reward factor exists because higher-level or more creative responses (11, 12, and 13) should logically NOT carry the same weight IF the subject also relied on doing more of the same procedures performed during the prior-year audit. That would be tantamount to straddling the creativity fence. Subjects who were sufficiently confident in more creative procedures to rely less on prior-year's procedures should be regarded as more creative overall.

Subjects' responses could be one (or more) of three types: 1) An extension of what was done the previous year (i.e., more hours budgeted for the same procedures was regarded as reliance on the prior year's procedures) which, qualitatively, would be regarded as the lowest level of response to suspected fraud; 2) Budgeting hours to

standard procedures 11 and/or 12, which represented doing something "different" from the prior audit and, qualitatively, a more creative response to suspected fraud; and, 3) Budgeting hours for the non-standard procedure 13, representing something very different from the prior audit and, qualitatively, the most creative response to suspected fraud. For all procedures (1 – 13) where additional hours were budgeted above the prior year's budgeted hours, auditors had to justify what they would do with the additional time. Those justifications, moreover, were reviewed to ensure that what subjects stated they would do with additional budgeted time (especially for procedure 13) did not more appropriately belong to another procedure (e.g., procedures 1 – 12). The following example may help clarify calculation of NUMQUALRESPONSE, assuming the following responses to all 13 procedures:

Procedures	**Budgeted Hours**	
	Overall Increase Scenario	Overall Decrease Scenario
1	+5	-5
2	+3	-3
3	-10	+10
4	-5	+5
5	+6	-6
6	+2	-2
7	+7	-7
8	+4	-4
9	+5	-5
10	+3	-3
11	+5	
12	+10	
13	+10	

For the "Overall Increase Scenario," meaning budgeting more hours for procedures 1 – 10, the NUMQUALRESPONSE were calculated using the following formulae:

(A) Part I Score

(a) Calculate the average increase in budgeted hours for procedures 1 – 10:

(+5) + (+3) + (-10) + (-5) + (+6) + (+2) + (+7) + (+ 4) + (+5) + (+3) = +20/10 = 2

(b) Invert the number in (a) above = (-1) x (+2) = -2

(c) Divide (b) by total prior-year's audit hours = -2/9.6 = -0.21, where 9.6 was last year's average actual hours for procedures 1 through 10

Part I Score = -2

Penalty factor for reliance on prior-year's procedures = -0.21.

(B) Part II Score

(a) Calculate the average budgeted hours for procedures 11 and 12:

(+5) + (+10) = +15/2 = 7.5

(b) Multiply (a) by the penalty factor calculated in (A) = (-0.21) x (7.5) = -1.575

(c) Add (a) and (b) = (7.5) + (-1.575) = 5.925

Part II Score = 5.925

(C) Part III Score

(a) Ascertain budgeted hours for procedure 13 = 10

(b) Multiply the penalty factor in (A) by (a) = (-0.21) x (10) = -2.1

(c) Add (a) and (b) = 10 + (-2.1) = 7.9

Part III Score = 7.9

(D) NUMQUALRESPONSE = Part I Score + Part II Score + Part III Score

(-2) + (+5.925) + (+7.9) = 11.825

Note, however, that if the subject decreased his/her reliance on prior audit procedures, the end-result was different. For the "Overall Decrease Scenario," NUMQUALRESPONSE is 23.175 as shown below:

(A) Part I Score

(a) Calculate the average decrease in budgeted hours for procedures 1 – 10:

(-5) + (-3) + (+10) + (+5) + (-6) + (-2) + (-7) + (- 4) + (-5) + (-3) = -20/10 = -2

(b) Inverse the number in (a) above = (-1) x (-2) = +2

(c) Divide (b) by total prior-year's audit hours = +2/9.6 = +0.21

Part I Score = +2

Reward factor for non-reliance on prior-year's procedures = +0.21.

(B) Part II Score

(a) Calculate the average budgeted hours for procedures 11 and 12:

(+5) + (+10) = +15/2 = 7.5

(b) Multiply (a) by the reward factor calculated in (A) = (+0.21) x (7.5) = +1.575

(c) Add (a) and (b) = (7.5) + (+1.575) = 9.075

Part II Score = 9.075

(C) Part III Score

(a) Ascertain budgeted hours for procedure 13 = 10

(b) Multiply the reward factor in (A) by (a) = (+0.21) x (10) = +2.1

(c) Add (a) and (b) = 10 + (+2.1) = 12.1

Part III Score = 12.1

(D) NUMQUALRESPONSE = Part I Score + Part II Score + Part III Score

(+2) + (+9.075) + (+12.1) = 23.175

If the total budgeted hours do not change for procedures 1 through 10, the penalty/reward factor is zero. Therefore part I score is also zero and parts II and III scores are simplified, but the calculation follows the same procedures.

The calculated NUMQUALRESPONSE scores were then regressed on the independent variables already described. Before performing the regression analysis, however, the latent roots and vectors were checked to determine the existence of severe multicollinearity among potential predictor variables. Table 4.6a reports information for all of the 13 variables considered for the first regression testing H2.

Observing the smallest latent root (0.310) suggests that multicollinearity among possible predictor variables was not severe, so Equation (3) was applied. Results from that running are summarized in Tables 4.6b-1 through 3.

TABLE 4.6a
Latent Roots and Vectors of all 13 Variables

Latent Roots	Latent Vectors Associated with Latent Roots												
	PLACE	PERSON	PRODUCT	PROCESS	GENDER	EFEXP	EFEXPO	PROTRAIN	UCOURSE	VERSION	TOTEXP	AR	FR
2.598	-0.111	0.184	-0.23	0.022	-0.073	0.432	0.364	0.386	-0.255	0.171	-0.305	0.344	0.347
2.113	-0.437	0.397	-0.428	-0.411	-0.238	-0.147	-0.245	-0.193	-0.174	0.159	-0.119	-0.106	-0.207
1.358	-0.021	0.391	-0.004	0.492	-0.172	0.129	0.003	0.01	-0.434	-0.498	0.266	-0.095	-0.205
1.164	-0.221	-0.107	0.177	-0.025	0.164	0.205	0.295	0.273	0.008	0.017	-0.356	-0.545	-0.504
1.082	0	0.147	0.101	0.271	0.643	-0.081	-0.352	-0.107	-0.403	0.341	-0.201	-0.069	0.126
0.971	0.588	0.086	-0.33	0.138	-0.218	0.147	0.02	0.043	-0.003	0.521	0.199	-0.348	-0.121
0.827	-0.229	0.113	-0.333	-0.082	0.551	0.215	0.316	-0.13	0.226	-0.02	0.544	-0.055	0.022
0.651	-0.08	0.58	0.236	0.349	-0.062	-0.058	0.119	-0.154	0.577	0.201	-0.194	0.135	-0.072
0.608	-0.008	0.189	-0.099	-0.005	0.119	-0.517	-0.108	0.784	0.117	-0.023	0.178	-0.013	0.008
0.476	-0.093	0.053	0.51	-0.218	-0.075	0.068	0.085	0.081	-0.264	0.405	0.423	0.348	-0.351
0.437	0.202	0.18	0.048	-0.252	0.138	0.571	-0.579	0.208	0.242	-0.203	-0.031	0.114	-0.151
0.403	0.344	-0.039	-0.322	-0.005	0.242	-0.2	0.188	-0.094	-0.058	-0.134	-0.251	0.489	-0.556
0.31	-0.418	-0.44	-0.266	0.506	-0.127	0.131	-0.303	0.106	0.155	0.212	0.08	0.208	-0.222

TABLE 4.6b-1
Regression Equation (3) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.708	.502	.392	8.95168

TABLE 4.6b-2
Regression Equation (3) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4762.364	13	366.336	4.572	.000
Residual	4727.822	59	80.133		
Total	9490.186	72			

TABLE 4.6b-3
Regression Equation (3) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	Expected Sign
(Constant)	-23.587	17.738		-1.330	.094	**n/a**
PLACE	.073	.058	.145	1.270	.105	**+**
PERSON	.113	.099	.130	1.140	.129	**?**
PRODUCT	.201	.064	.354	3.118	.001	**+**
PROCESS	-.556	.167	-.388	-3.329	.001	**?**
GENDER	3.179	2.255	.139	1.410	.082	**n/a**
UCOURSE	.359	1.464	.026	.245	.404	**+**
TOTEXP	-3.890	2.893	-.141	-1.345	.908	**+**
EFEXP	2.719	2.627	.119	1.035	.152	**+**
EFEXPO	4.841	2.650	.212	1.827	.036	**+**
PROTRAIN	-2.219	2.630	-.091	-.843	.799	**+**
VERSION	-2.186	2.939	-.077	-.744	.230	**n/a**
AR	.581	.692	.094	.839	.202	**+**
FR	2.856	.742	.446	3.849	.000	**+**

DV = NUMQUALRESPONSE

Interestingly, there appear to be some differences among variables important in recognizing fraud cues vis-à-vis responding to fraud cues. Scores on the scale measuring the Creative Person, plus actual experience in detecting A/R errors or fraud, and having previously taken university courses in fraud examination were amongst the significant variables in predicting NUMQUALRECOG but not NUMQUALRESPONSE. Conversely, FR, GENDER, and EFEXPO were among the predictors for

NUMQUALRESPONSE but not for NUMQUALRECOG. Importantly, though, two predictors (scores on the scales measuring Creative Product and Creative Process) were among the predictive independent variables for both dependent variables.

Auditors' assessment of fraud risk (FR) was positively, and most significantly, associated with auditors' ability to respond to perceived fraud risk ($p = 0.000$), which suggests that the more skeptical they were of the situation, the more responsive they were to perceived fraud risk. Additionally, and interestingly, EFEXPO (while not significantly related to recognizing fraud cues) was also a significant predictor of auditors' ability to respond to fraud risk ($p = 0.036$). As their exposure to A/R errors and fraud increases, auditors apparently learn from those encounters how to better respond to their own perceived fraud risk.

Auditors' scores for the scale measuring Creative Product was also a highly significant and direct predictor of being able to respond to perceived fraud risk ($p = 0.001$). That is, more creative auditors (as measured by their scores on the Runco's Ideational Behavior Scale) were better able to respond to perceived fraud risk than less creative auditors. Similarly, auditors' scores on Creative Process were highly significant inverse predictors of being able to respond to perceived fraud risk ($p = 0.001$). That is, the lower their score on the Cognitive Style Index, the better were their responses to perceived fraud risk (note, however, that the sign of PROCESS could not be determined a priori). Notably, GENDER apparently played some small role ($p = 0.082$) in determining auditors' ability to respond to perceived fraud risk. In this case, male auditors more capably responded to perceptions of fraud risk than did female auditors. Overall, then, these significant predictive associations between auditors' creativity and their responses

to perceived fraud risk support H2. That support seems even more evident upon a closer examination of the subscales subsumed by the overall scales for measuring creativity used in Equation (3).

Once again, before developing the second regression model for testing H2, the latent roots and vectors of the 20 variables were checked to determine the existence of severe multicollinearity among the predictor variables. Table 4.7a presents that information for all variables considered for the second regression model testing H2. Multicollinearity is severe in this case too, with the lowest latent root score being < 0.10.

TABLE 4.7a

Latent Roots and Vectors of all 20 variables

Latent Roots	Latent vectors Associated with Latent Roots																			
	SUPPORT	DIFFERENCE	OMMITMEN	ORDER	EDICTABILI	AMBIGUITY	LOSEMINDE	IDEATION	OWLEDGEST	ANNINGSTY	EATIVESTY	GENDER	EFEXP	EFEXPO	PROTRAIN	UCOURSE	VERSION	TOTEXP	AR	FR
4.111	0.334	0.332	0.061	-0.218	-0.417	-0.287	-0.309	0.322	0.149	-0.091	0.388	0.138	-0.066	0.024	0.001	0.201	-0.086	0.125	-0.046	0.016
2.99	0.183	0.156	0.373	0.23	0.05	-0.008	0.01	-0.047	0.333	0.278	0.044	-0.016	0.374	0.281	0.33	-0.208	0.067	-0.129	0.262	0.307
2.205	0.305	0.21	0.179	0.384	0.071	0.145	0.144	0.003	0.149	0.419	-0.038	-0.069	-0.207	-0.302	-0.251	-0.056	-0.156	0.33	-0.221	-0.224
1.586	-0.257	-0.373	-0.295	0.057	0.077	0.177	-0.12	0.344	0.374	0.191	0.272	0.17	0.038	0.088	0.062	-0.16	-0.455	0.02	-0.002	-0.095
1.253	-0.031	-0.02	-0.044	0.161	0.107	-0.381	-0.081	-0.01	0.026	0.121	-0.01	0.343	0.121	0.05	0.201	-0.107	0.316	-0.254	-0.55	-0.372
1.158	-0.06	0.042	-0.099	0.002	0.073	-0.014	0.056	0.066	0.209	0.019	0.008	0.551	-0.223	-0.421	-0.217	-0.159	0.335	-0.102	0.221	0.392
0.998	0.042	0.027	-0.116	-0.257	-0.107	-0.223	0.505	-0.282	-0.001	-0.053	-0.019	0.314	0.281	0.121	-0.043	-0.212	-0.263	0.418	-0.148	0.122
0.925	-0.015	-0.034	-0.239	0.297	0.174	-0.039	-0.181	-0.13	-0.109	0.184	-0.065	0.29	-0.026	0.31	0.062	0.583	0.103	0.389	0.147	0.117
0.75	-0.041	-0.02	-0.237	0.053	-0.005	-0.494	-0.318	-0.282	0.032	0.101	-0.125	-0.26	-0.296	-0.223	0.326	-0.3	-0.16	0.167	0.144	0.109
0.628	0.208	0.121	-0.214	0.077	0.043	0.222	0.346	0.164	0.193	-0.298	-0.157	-0.002	-0.24	-0.104	0.62	0.187	-0.051	-0.044	-0.191	0.117
0.583	0.002	0.074	-0.341	-0.033	0.071	0.164	-0.085	0.005	0.33	-0.166	0.163	-0.345	0.126	0.142	-0.122	-0.221	0.542	0.378	-0.14	0.006
0.555	0.011	-0.028	0.269	0.11	0.013	0.199	-0.143	0.171	-0.323	-0.279	0.014	0.3	-0.087	0.036	0.273	-0.395	0.095	0.392	0.243	-0.303
0.47	0.043	-0.019	-0.027	0.066	0.231	-0.233	-0.068	0.316	0.08	-0.208	-0.276	-0.074	0.593	-0.454	-0.028	0.178	-0.069	0.139	0.159	-0.104
0.413	0.18	0.474	-0.373	0.017	0.166	0.02	-0.013	-0.108	0.112	-0.124	-0.177	0.123	-0.033	0.252	-0.191	-0.137	-0.174	-0.277	0.345	-0.379
0.359	0.045	-0.006	-0.033	0.273	-0.08	-0.147	-0.076	0.439	-0.138	-0.129	-0.44	-0.038	-0.1	0.346	-0.268	-0.236	-0.101	-0.001	-0.237	0.377
0.303	-0.061	0.118	0.041	0.325	-0.079	0.268	-0.386	-0.437	0.058	-0.41	0.102	0.14	0.193	-0.152	-0.073	-0.016	-0.256	-0.069	-0.286	0.192
0.275	-0.296	-0.088	0.156	0.045	-0.578	0.02	0.005	-0.1	0.454	-0.045	-0.456	0.063	-0.058	0.046	-0.014	0.126	0.096	0.082	0.106	-0.254
0.189	0.017	-0.006	-0.387	0.453	-0.536	0.014	0.23	0.06	-0.324	0.109	0.217	-0.074	0.22	-0.141	0.043	-0.072	0.104	-0.125	0.172	-0.023
0.154	0.274	-0.009	-0.221	-0.387	-0.175	0.394	-0.333	-0.011	-0.164	0.387	-0.366	0.12	0.21	-0.108	0.131	-0.097	0.037	-0.009	-0.126	0.066
0.097	-0.664	0.64	0.011	-0.071	0.033	0.071	0.009	0.172	-0.131	0.195	-0.003	-0.033	0.058	-0.057	0.133	0.005	-0.047	0.091	-0.105	0.078

In general, “the linear combination of the standardized original regressor variables weighted by the corresponding elements in the latent vector associated with a very small latent root is the linear combination that defines the multicollinearity” (Mansfield, 1980, p. 472); Copeland and Espahbodi 1989, p. 313). The latent vector associated with the smallest latent root, therefore, needs to be examined in order to identify the variables that are highly involved in the linear relation defined by that latent vector (the last row of Table 4.7a). That examination suggests that Support of Creativity, and Tolerance of Differences, respectively, having the largest values in that row, are highly involved in the linear relation specified above. In other words, the information contained in one of these two variables is also contained in the other variable, so that either or both variables can be dropped from the model without loss of any information [see, e.g., Copeland & Espahbodi or Mansfield, 1989 and 1980, respectively). Since the corresponding number for Support of Creativity (-.664) was higher than that for Tolerance of Differences (.640) in absolute value, the former variable was dropped from consideration and a multicollinearity check was once again performed on the remaining variables. That information is reported in Table 4.7a-2.\

TABLE 4.7 a-2

Latent Roots and Vectors of all 19 Variables

Latent Roots	Latent vectors Associated with Latent Roots																	
	DIFFERENCE	COMMITMEN	ORDER	EDICTABILI	AMBIGUITY	LOSEMINDE	IDEATION	OWLEDGEST	ANNINGSTY	EATIVESTY	GENDER	EFEXP	EFEXPO	PROTRAIN	UCOURSE	VERSION	TOTEXP	AR	FR
3.77	-0.266	0.032	0.297	0.437	0.3	0.34	-0.347	-0.095	0.173	-0.402	-0.16	0.11	-0.008	0.032	-0.238	0.098	-0.114	0.068	0.017
2.894	0.161	0.337	0.124	-0.042	-0.082	-0.086	0.032	0.351	0.199	0.14	0.035	0.389	0.332	0.365	-0.165	0.056	-0.156	0.285	0.337
2.002	0.181	0.172	0.391	0.015	0.122	0.031	0.15	0.339	0.502	0.126	0.018	-0.147	-0.228	-0.185	-0.099	-0.268	0.325	-0.18	-0.188
1.423	-0.512	-0.427	-0.088	0.127	0.233	-0.059	0.282	0.219	-0.013	0.185	0.094	0.087	0.187	0.129	-0.13	-0.463	-0.069	0.06	-0.066
1.251	0.076	0.089	-0.145	-0.122	0.358	0.078	-0.008	-0.028	-0.106	0.001	-0.331	-0.142	-0.088	-0.227	0.114	-0.263	0.263	0.556	0.394
1.15	0.032	0.175	0.019	-0.105	0.002	-0.074	-0.087	-0.221	0.004	-0.012	-0.591	0.199	0.392	0.183	0.186	-0.3	0.133	-0.197	-0.371
0.995	-0.058	0.078	0.246	0.127	0.24	-0.493	0.3	0.011	0.035	0.018	-0.289	-0.283	-0.126	0.054	0.195	0.259	-0.445	0.149	-0.118
0.925	-0.044	-0.25	0.298	0.182	-0.03	-0.183	-0.121	-0.107	0.179	-0.066	0.293	-0.03	0.309	0.068	0.584	0.104	0.376	0.149	0.116
0.748	-0.032	-0.268	0.054	0.013	-0.477	-0.307	-0.268	0.039	0.081	-0.135	-0.253	-0.306	-0.224	0.355	-0.296	-0.164	0.152	0.142	0.112
0.596	0.192	-0.071	0.09	-0.06	0.213	0.389	0.141	0.218	-0.254	-0.13	-0.027	-0.246	-0.119	0.609	0.256	-0.036	0.003	-0.256	0.147
0.583	0.079	-0.341	-0.03	0.069	0.169	-0.075	0.008	0.336	-0.172	0.16	-0.346	0.12	0.139	-0.107	-0.214	0.541	0.379	-0.147	0.01
0.555	-0.018	0.273	0.114	0.005	0.208	-0.127	0.175	-0.313	-0.287	0.012	0.297	-0.097	0.031	0.297	-0.383	0.097	0.397	0.23	-0.296
0.469	0.022	-0.007	-0.072	-0.205	0.227	0.052	-0.322	-0.091	0.211	0.271	0.082	-0.586	0.474	-0.005	-0.199	0.058	-0.165	-0.13	0.084
0.398	-0.573	0.301	-0.045	-0.087	-0.034	-0.033	0.128	-0.214	0.168	0.204	-0.118	0.019	-0.183	0.114	0.054	0.167	0.224	-0.338	0.425
0.359	-0.059	0.039	-0.29	0.102	0.142	0.069	-0.426	0.096	0.155	0.474	0.028	0.103	-0.355	0.27	0.227	0.114	0.007	0.216	-0.338
0.302	-0.093	-0.022	-0.308	0.014	-0.268	0.393	0.431	0.001	0.393	-0.161	-0.133	-0.203	0.162	0.071	0.031	0.259	0.079	0.298	-0.224
0.247	0.362	-0.108	0.004	0.601	-0.107	0.126	0.208	-0.396	0.021	0.436	-0.103	-0.006	0.004	0.033	-0.09	-0.11	-0.046	-0.065	0.201
0.189	-0.011	0.384	-0.46	0.524	-0.005	-0.239	-0.066	0.327	-0.105	-0.229	0.078	-0.216	0.14	-0.043	0.071	-0.101	0.124	-0.172	0.021
0.145	-0.282	0.217	0.378	0.107	-0.383	0.285	-0.078	0.236	-0.434	0.309	-0.088	-0.217	0.121	-0.178	0.095	-0.008	-0.02	0.158	-0.103

Table 4.7a-2 shows that eliminating Support of Creativity removed the severe multicollinearity problem among the remaining independent variables, since the lowest latent root value exceeded 0.10. Consequently, the path was cleared to run Equation (4). Those results are illustrated in Tables 4.7b-1 through 3.

TABLE 4.7b-1
Regression Equation (4) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.764	.584	.424	8.71236

TABLE 4.7b-2
Regression Equation (4) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5543.117	20	277.156	3.651	.000
Residual	3947.069	52	75.905		
Total	9490.186	72			

TABLE 4.7b-3
Regression Equation (4) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			Expected Sign
	B	Std. Error	Beta	t	One-tailed Significance	
(Constant)	-31.169	21.443		-1.454	.076	**n/a**
P1b	.049	.136	.048	.358	.361	**+**
P1c	1.353	.667	.264	2.029	.024	**+**
P2a	-.100	.313	-.051	-.320	.375	**-**
P2b	.731	.328	.367	2.229	.985	**-**
P2c	-.095	.212	-.046	-.451	.327	**-**
P2d	.200	.360	.074	.556	.290	**+**
P2e	-1.959	1.187	-.220	-1.651	.052	**-**
P3	.126	.073	.222	1.737	.044	**+**
P4a	.132	.637	.029	.208	.418	**+**
P4b	-1.097	.353	-.454	-3.109	.002	**-**
P4c	-.214	.405	-.080	-.529	.700	**+**
GENDER	3.636	2.316	.159	1.570	.061	**n/a**
UCOURSE	.660	1.496	.047	.441	.331	**+**
TOTEXP	-1.966	2.873	-.071	-.684	.752	**+**
EFEXP	1.641	2.872	.072	.571	.285	**+**
EFEXPO	4.267	2.712	.187	1.573	.061	**+**
PROTRAIN	-3.348	2.762	-.138	-1.212	.884	**+**
VERSION	-3.593	3.045	-.127	-1.180	.122	**n/a**
AR	.100	.741	.016	.136	.446	**+**
FR	2.934	.760	.458	3.859	.000	**+**

DV = NUMQUALRESPONSE

Again, there appear to be some differences among variables important in recognizing fraud cues vis-à-vis responding to fraud cues. All significant variables are highlighted (in yellow, if significant at $p \leq 0.05$, and blue if $p \leq 0.10$) and emboldened in Table 4.7c:

TABLE 4.7c
Important Variables Comparison – NUMQUALRECOG vs. NUMQUALRESPONSE

	DIFFERENCES	**COMMITMENT**	ORDER	PREDICTABILITY	DECISIVENESS	**AMBIGUITY**	**CLOSEMINDED**	**IDEATION**	KNOWLEDGESTYLE	PLANNINGSTYLE	CREATIVESTYLE	GENDER	**UCOURSE**	TOTEXP	EFFEXP	EFFEXPO	PROTRAIN	VERSION		
NUMQUALRECOG																				
NUMQUALRESPONSE	DIFFERENCES	**COMMITMENT**	ORDER	PREDICTABILITY	DECISIVENESS	**AMBIGUITY**	**CLOSEMINDED**	**IDEATION**	KNOWLEDGESTYLE	**PLANNINGSTYLE**	CREATIVESTYLE	GENDER	UCOURSE	TOTEXP	EFFEXP	**EFFEXPO**	PROTRAIN	VERSION	AR	**FR**

Notably, Personal Commitment and Creative Ideation are the only common variables for both recognizing fraud cues and responding to perceived fraud risk. Aside from those common variables, recognizing fraud cues seemed more related to auditors' keeping an open mind or having been primed for fraud cue recognition by taking one or more university courses. Responding to perceived fraud risk, aside from those common variables, was more related to avoiding strict planning and personal exposure to assignments where someone else had detected A/R errors or fraud. Of course, auditors' assessment of perceived fraud risk was also important.

An explanation of the statistically significant variables in explaining variation in NUMQUALRESPONSE may be more illuminating than the above comparison, however. A direct and highly significant ($p = 0.000$) association was found between auditors' assessments of fraud risk (FR) and their ability to respond to perceived fraud risk. As previously stated, this finding seems to indicate that the more skeptical auditors were of the situation depicted in the audit narrative, the more responsive they were to perceived fraud risk. Additionally, and interestingly, EFEXPO (while not significantly related to recognizing fraud cues) was also a significant predictor of auditors' ability to respond to fraud risk ($p = 0.061$). As their exposure to A/R errors and fraud increased, auditors apparently learned from those encounters how to better respond to their own perceived fraud risk. One can easily imagine an audit team member finding errors or fraud during an audit, for example, and then being peppered with questions about the findings and likely responses from teammates.

As with regression Equation (3) testing H2, moreover, auditors' scores for the scale measuring Creative Product was a highly significant and direct predictor of being able to

respond to perceived fraud risk (p = 0.044). That is, auditors with more creative everyday ideas (i.e., Creative Ideation as measured by their scores on the Runco's Ideational Behavior Scale) were more capable in responding to perceived fraud risk than less creative auditors. Similarly, too, Planning Style of Thinking was a highly significant and inverse predictor of being able to respond to perceived fraud risk (p = 0.002). The scale for measuring that variable indicates a relatively rigid "planning style" of learning, which is the antithesis of creativity. Consequently, a significantly negative relation between PLANNINGSTYLE and NUMQUALRESPONSE suggests that auditors who were less rigid in their thinking style were more adept at responding to perceived fraud risk, which is the same as saying that more creative auditors were better able to respond to perceived fraud risk.

Overall, the significant predictive associations found between auditors' creativity and their responses to perceived fraud risk lend substantial support to H2. Still, the likelihood of collinearity between scales and/or subscales of creativity, especially in models using several subscales which may overlap one another, may have had an adverse impact on regression findings. Consequently, a backward elimination regression was run on Equation (3) to derive a "best subsets" set of variables aimed at minimizing standard error and simultaneously maximizing adjusted R^2. The results follow in Tables 4.7d-1 through 3:

TABLE 4.7d-1
Regression Equation (4)
Best Subset Regression – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
0.755	0.569	0.500	8.118

DV = NUMQUALRESPONSE

TABLE 4.7d-2
Regression Equation (4)
Best Subset Regression – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	5403.821	10	540.382	8.199	.000
Residual	4086.365	62	65.909		
Total	9490.186	72			

DV = NUMQUALRESPONSE

TABLE 4.7d-3
Regression Equation (4)
Best Subset Regression – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	**Expected Sign**
(Constant)	-36.683	15.007		-2.444	.009	**n/a**
P1c	1.513	.509	.295	2.971	.002	+
P2b	.807	.220	.405	3.667	.999	-
P2e	-1.632	.911	-.183	-1.791	.039	-
P3	.131	.060	.230	2.188	.016	+
P4b	-1.203	.240	-.498	-5.022	.000	-
GENDER	3.224	2.030	.141	1.588	.059	**n/a**
EFEXPO	5.265	2.151	.231	2.447	.009	+
PROTRAIN	-3.226	2.336	-.133	-1.381	.914	+
VERSION	-3.421	2.627	-.121	-1.302	.099	**n/a**
FR	3.127	.574	.488	5.451	.000	+

DV = NUMQUALRESPONSE

As noted, this model was selected as the "best subset" of regressed variables because it resulted in the best adjusted R^2 (0.500) and lowest standard error (8.11844). Compared to regression results from Equation (4), only the covariate VERSION (p = 0.099) resulted from the best-subsets in addition to variables already recognized as statistically significant relationships. That slightly significant inverse association suggests that

auditors' ability to respond to perceived fraud risk did not depend on having as much information and, in fact, having less information slightly improved auditors' responses.

Additionally, the best-subsets regression reflects improved levels of significance for Personal Commitment ($p = 0.002$ v. 0.024), Closed-Mindedness ($p = 0.039$ v. 0.052), Personal Ideation ($p = 0.016$ v. 0.044), Planning Style of Thinking ($p = 0.000$ v. 0.002), GENDER ($p = 0.059$ v. 0.061), and EFEXPO ($p = 0.009$ v. 0.061). Only the significance level for FR remained constant ($p = 0.000$).

Overall, there seems to be some overlapping collinearity between variables which was addressed by the backward-elimination-of-variables method of regression. The best-subsets regression variables model provides more clearly-defined outcomes and the results even more strongly support H2, that more creative auditors are more adept at responding to perceived fraud risk.

Test of H3: Auditors' Work Environment Will Interact with Non-Environmental Domains of Creativity in Relation to Both Their Recognition and Response to Fraud Cues.

Two regression models were developed to test Hypothesis (4). The first model examines whether auditors' work environment interacts with other (non-environmental) domains of creativity in relation to fraud cue recognition. The second regression tests the interactive relation between auditors' work environment and other (non-environmental) domains of creativity in relation to responses to fraud cues. The main domains of creativity (PLACE, PERSON, PRODUCT, and PROCESS) were not included in either regression because

including them, as expected (see Cortina, 1993; Hinkle, Wiersma, and Jurs, 1988), induced severe multicollinearity; specifically, there were three very small latent roots (less than .02) in each of the following regressions when they were included in the models. The respective regressions were therefore:

(5) $$NUMQUALRECOG = \beta_0 + \beta_1 PLACExPERSON + \beta_2 PLACExPRODUCT + \beta_3 PLACExPROCESS + \beta 4GENDER + \beta_5 EFEXPO + \beta_6 TOTEXP + \beta_7 PROTRAIN + \beta_8 UCOURSE + \beta_9 EFEXP + \beta_{10} VERSION;$$

(6) $$NUMQUALRESPONSE = \beta_0 + \beta_1 PLACExPERSON + \beta_2 PLACExPRODUCT + \beta_3 PLACE1xPROCESS + \beta 4GENDER + \beta_5 EFEXPO + \beta_6 TOTEXP + \beta_7 PROTRAIN + \beta_8 UCOURSE + \beta_9 EFEXP + \beta_{10} VERSION + \beta_{11} AR + \beta_{12} FR;$$

Before running the regressions, the independent variables in each model were checked again for severe multicollinearity. Tables 4.8a-1 and 4.8a-2 show no small latent roots for the variables in either model. Notably, though, latent vectors for each of the three interactive variables P1*P2, P1*P3, and P1*P4 (in each table) indicate

TABLE 4.8a-1
Latent Roots and Vectors of All 10 Variables

Latent Roots	Latent Vectors of All 10 Variables									
	P1*P2	P1*P3	P1*P4	GENDER	EFEXPO	TOTEXP	PROTRAIN	UCOURSE	EXEXP	VERSION
2.159	0.016	0.297	0.194	0.099	-0.410	0.413	-0.430	0.274	-0.468	-0.217
1.956	-0.263	-0.507	-0.623	-0.122	-0.292	-0.116	-0.280	-0.015	-0.275	0.132
1.344	0.653	-0.211	0.126	-0.481	-0.241	0.129	-0.098	-0.443	0.005	-0.022
1.106	0.231	0.149	0.130	0.418	-0.304	-0.320	-0.062	-0.098	-0.105	0.717
0.929	-0.196	-0.061	0.020	0.534	-0.184	0.047	-0.025	-0.695	0.074	-0.383
0.772	0.190	-0.352	-0.093	0.356	0.265	0.649	-0.207	0.115	0.296	0.264
0.604	-0.135	0.174	0.087	-0.148	0.089	-0.267	-0.777	-0.046	0.487	-0.006
0.515	0.515	-0.250	-0.089	0.363	-0.009	-0.421	-0.076	0.382	0.038	-0.450
0.417	-0.087	0.038	-0.081	-0.048	-0.689	0.121	0.265	0.244	0.601	-0.030
0.197	0.290	0.605	-0.714	0.035	0.096	0.101	0.010	-0.124	0.045	-0.034

TABLE 4.8a-2
Latent Roots and Vectors of All 12 Variables

Latent Roots	Latent Vectors of All 12 Variables											
	P1*P2	P1*P3	P1*P4	GENDER	EFEXPO	TOTEXP	PROTRAIN	UCOURSE	EXEXP	VERSION	AR	FR
2.529	0.066	-0.116	0.004	-0.040	0.402	-0.300	0.418	-0.212	0.450	0.158	0.367	0.383
1.993	-0.248	-0.576	-0.648	-0.158	-0.119	-0.257	-0.103	-0.116	-0.084	0.191	-0.039	-0.113
1.354	0.645	-0.207	0.121	-0.493	-0.237	0.148	-0.106	-0.423	-0.005	-0.055	0.100	-0.048
1.165	0.103	0.042	-0.006	0.269	-0.380	-0.007	-0.265	0.094	-0.286	0.399	0.431	0.515
1.099	0.224	0.122	0.164	0.293	-0.134	-0.368	0.096	-0.244	0.069	0.575	-0.450	-0.247
0.929	-0.201	-0.079	0.009	0.523	-0.188	0.085	-0.044	-0.680	0.065	-0.405	0.021	0.070
0.769	-0.191	0.351	0.084	-0.325	-0.287	-0.638	0.190	-0.107	-0.319	-0.276	0.112	0.020
0.604	0.134	-0.175	-0.085	0.144	-0.082	0.271	0.781	0.042	-0.480	0.014	-0.024	-0.010
0.531	0.495	-0.183	-0.102	0.414	0.037	-0.388	-0.070	0.331	0.021	-0.360	0.244	-0.290
0.433	0.087	-0.180	-0.004	-0.025	-0.438	-0.073	0.130	0.293	0.361	-0.240	-0.483	0.489
0.407	-0.141	0.184	-0.116	-0.020	-0.527	0.186	0.234	0.100	0.485	0.122	0.377	-0.403
0.187	0.299	0.579	-0.708	0.020	0.100	0.091	0.002	-0.117	0.033	-0.059	-0.131	0.145

severe multicollinearity (based on LV size vis-à-vis other LVs). Consequently, to test for an interaction effect between PLACE and non-environmental variables, a variety of forms representing Creative Place was used. The variable itself was used first, for example, followed by several characteristic (dummy) variable versions (e.g., based on deciles, pentiles, quartiles, terciles, and centiles). Since Support of Creativity was the only subscale of PLACE found to be significantly related to either NUMQUALRECOG or NUMQUALRESPONSE, that subscale was also used as a proxy for Creative Place and interacted with scores for PERSON, PRODUCT, and PROCESS. Results from the first set of interactions, using PLACE, are illustrated in Tables 4.8b-1 through 4.8b- 6 – which include both dependent variables, NUMQUALRECOG (Tables 4.8b-1 through 3) and NUMQUALRESPONSE (Tables 4.8b-4 through 6):

TABLE 4.8b-1
Regression Equation (5) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.748	.559	.488	14.400583

DV = NUMQUALRECOG

TABLE 4.8b-2
Regression Equation (5) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	16299.066	10	1629.907	7.860	.000
Residual	12857.360	62	207.377		
Total	29156.427	72			

DV = NUMQUALRECOG

TABLE 4.8b-3
Regression Equation (5) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	Expected Sign
(Constant)	52.495	6.625		7.924	.000	**n/a**
P1xP2	.172	.199	.357	.866	.195	**?**
P1xP3	.257	.117	.835	2.202	.016	**+**
P1xP4	-.384	.327	-.566	-1.172	.123	**?**
GENDER	-2.774	3.476	-.069	-.798	.214	**n/a**
UCOURSE	2.758	2.387	.112	1.156	.126	**+**
TOTEXP	-1.966	4.556	-.041	-.431	.666	**+**
EFEXP	9.158	4.210	.229	2.175	.017	**+**
EFEXPO	-2.384	4.211	-.060	-.566	.713	**+**
PROTRAIN	2.558	4.333	.060	.590	.279	**+**
VERSION	2.623	4.418	.053	.594	.278	**n/a**

DV = NUMQUALRECOG

Only the interacted variable for Creative Product (i.e., Creative Ideation) was found to be significant ($p = 0.016$) compared to the non-interaction regression Equation (2). Previously, with Equation (2), significant variables included Creative Person ($p = 0.045$);

Creative Product (p = 0.015); and Creative Process (p = 0.056). Additionally, UCOURSE (p = 0.015) was a significant determinant for recognizing fraud cues in the audit narrative, along with EFEXP (p = 0.007). Creative Product and EFEXP remain significant determinants for recognizing fraud cues (p = 0.016 and p = 0.017, respectively), but no other variables were found to be predictive.

TABLE 4.8b-4
Regression Equation (6) – Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
.722	.521	.425	8.70502

DV = NUMQUALRESPONSE

TABLE 4.8b-5
Regression Equation (6) – ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	4943.542	12	411.962	5.436	.000
Residual	4546.645	60	75.777		
Total	9490.186	72			

DV = NUMQUALRESPONSE

TABLE 4.8b-6
Regression Equation (6) – Coefficients

	Unstandardized Coefficients		Standardized Coefficients			
	B	Std. Error	Beta	t	One-tailed Significance	Expected Sign
(Constant)	-5.397	5.008		-1.078	.143	**n/a**
P1xP2	-.141	.122	-.514	-1.162	.125	**?**
P1xP3	.316	.072	1.800	4.402	.000	+
P1xP4	-.450	.198	-1.164	-2.271	.013	**?**
GENDER	2.743	2.127	.120	1.290	.101	**n/a**
UCOURSE	-.189	1.462	-.013	-.129	.551	+
TOTEXP	-2.750	2.755	-.100	-.998	.839	+
EFEXP	2.162	2.561	.095	.844	.201	+
EFEXPO	4.543	2.562	.199	1.773	.041	+
PROTRAIN	.055	2.644	.002	.021	.492	+
VERSION	-1.822	2.693	-.065	-.677	.251	**n/a**
AR	.338	.681	.055	.495	.311	+
FR	2.317	.711	.362	3.261	.001	+

DV = NUMQUALRESPONSE

Notably, significant variables from this regression are strikingly similar to those in Equation 4 for testing the relationship between NUMQUALRESPONSE and the overall domains of creativity. The significant variables identified in Table 4.8b-6 are essentially unchanged, except that the interaction effects in the current model (PLACExPERSON, PLACExPRODUCT, and PLACExPROCESS) have replaced the main domain variables (PERSON, PRODUCT, and PROCESS). Although the overall fit of the model has improved slightly (the lowest standard error and highest adjusted R^2 changed from 8.95168 to 8.70502, and from 0.392 to 0.425, respectively), the differences were not statistically significant. Those interaction terms, therefore, do not convey much new information, since it has already been established that PRODUCT, PROCESS,

UCOURSE, EFEXPO and FR were statistically significant predictors of NUMQUALRESPONSE (see Table 4.6b-3).

Consequently, these findings do not support H3, that auditors' work environment will interact with non-environmental domains of creativity in relation to their recognition of fraud cues or in relation to their response to perceived fraud risk.

Since Personal Commitment was the only factor from Creative Place found to be a significant contributing variable in either fraud cue recognition or auditors' response to perceived fraud risk, it may have been a missed measure of what was important in evaluating the effect of workplace creativity on non-environmental domains of creativity. Rerunning both regressions for H3 using Personal Commitment as an interacting variable instead of Creative Place, however, resulted in findings that were essentially unchanged.

Similarly, too, characteristic variables were developed to partition Creative Place for possible interactive effects. Specifically, dummy variables were created based on deciles, pentiles, quartiles, terciles, and centiles for Creative Place – and the same was done for Personal Commitment. None of the characteristic variables had a significant interactive influence on any other domain of creativity. Overall, therefore, the findings suggest that auditors' workplace environment does not interact significantly with other measures of their creativity to either exacerbate or mitigate their ability to recognize fraud cues or respond to perceived fraud risk; therefore no support was found for H3.

CHAPTER V

SUMMARY

Summary of the Study

This study was focused on examining the relationship between creativity and auditors' ability to recognize fraud cues and respond to perceived fraud risk. Practicing auditors were asked to read an audit narrative and identify cues that they perceived may indicate fraud. Those cues were categorized and assigned a qualitative ranking by an expert panel of three individuals with more than ten years of experience in both auditing and teaching at the university level. The quality scores assigned by the three individuals were averaged to determine a consensus quality score for each cue. Then, through an algorithm explicated in Chapter IV, a composite score based on both the number and quality of fraud cues recognized was derived for each auditor.

Subjects were asked to assess the likelihood of both audit risk and fraud risk in the second part of the study, and the third part of the research involved asking auditors how they would respond to perceived fraud risk surrounding the hypothetical audit of accounts receivable, which was part of the audit narrative. Specifically, subjects were given a list of 12 standard audit procedures for accounts receivable, along with the time (in hours) used for these procedures during the previous year. The first 10 procedures had some budgeted hours during the prior year's audit, but standard procedures 11 and 12 (Computer Assisted Audit Techniques and Interviews, respectively) had not been used in the prior year. Auditors were asked how many hours they would budget for each of the

12 standard procedures for auditing accounts receivable in the current year. Additionally, they were offered an open-ended non-standard procedure (number 13), based upon their assessment of fraud risk, and asked: "If you were free to do *anything* (in auditing A/R), what else would you do (and how many hours would you budget for the additional procedure)?" Again, through an algorithm explicated in Chapter IV, both the quantity and quality (determined using the same expert panel as in Part I) of auditors' responses were used to derive a composite score for each subject.

Finally, auditors were asked to complete a series of questions designed to measure characteristics of their creativity under each of the four domains of creativity (Creative Place, Creative Person, Creative Product, and Creative Process). The scales were based on prior research confirming their applicability in measuring each domain.

Summary of Findings

Research Question 1

Research question one (RQ1) asked whether dimensions of auditor creativity can be identified and empirically measured. The question was examined using three methods. First, the public domain scales and sub-scales used to measure creativity were tested for reliability and validity using Cronbach's Alpha and Item-total analysis. One sub-scale, Support of Creativity (a sub-scale of Creative Place) was identified as being highly correlated with another sub-scale of Creative Place (i.e., Tolerance of Differences). Additionally, since research suggests that creativity is normally distributed for the general population, auditors' scores on the creativity scales were tested for normality using the

Ryan-Joiner normality test. That test compares the distribution of scores to a standard normal distribution, and estimates "normality" through a correlation test. The null hypothesis that auditors' creativity along each scale and subscale (except for Support of Creativity in the work environment and Tolerance of Ambiguity) was normally distributed could not be rejected at the 95% level of confidence—which supports RQ1. A second normality test (i.e. the Kolmogorov-Smirnov test), was conducted to either support or refute the results of the R-J normality test for the Support of Creativity in the work environment and Tolerance of Ambiguity variables. Results suggested that the latter variable exhibited sufficient normality, but the former variable still did not. Based on the severe collinearity between the Support of Creativity and Tolerance of Ambiguity variables and failure of the Support of Creativity sub-scale to reflect a normal distribution, a decision was made to eliminate the variable from regression analysis.

The second examination of RQ1 consisted of descriptive data about central tendency and variance within subjects' responses to the creativity scales. That goal was to suggest that sufficient variance exists within the data to measure differences in creativity between subjects. It was concluded that auditors display measurable creativity and their creativity is normally distributed, which provides ample support for RQ1.

Hypothesis 1

H1 postulated that various dimensions of creativity among auditors are related to their recognition of fraud cues. To test this idea, a composite score (NUMQUALRECOG) was developed to measure the number and quality of fraud cues recognized by each auditor. NUMQUALRECOG was then regressed on the auditors' overall dimensions of

creativity plus covariates for gender, overall auditing experience, specific experience with accounting errors or fraud, exposure to accounting errors or fraud, university or professional training in fraud examination, and whether the subject completed a high or low fraud-risk version of the experimental instrument.

Three of the four overall domains of creativity were significantly associated with auditors' ability to recognize fraud cues. Creative Personality ($p = 0.045$) and creative production of ideas ($p = 0.015$) were directly associated with auditors being able to recognize fraud cues, while creative thought processes ($p = 0.056$) was inversely related to their ability to recognize fraud cues. Additionally, auditors having taken one or more university courses in fraud examination ($p = 0.015$) or having had personal experience with accounting errors or fraud in accounts receivable ($p = 0.007$) were better able to recognize fraud cues in the audit narrative. These findings support H1, indicating that auditors' creativity is, indeed, associated with their ability to recognize fraud cues.

The regression was repeated using the various subscales within the four creativity domains in order to better understand which components of the overall scales were particularly significant in recognizing fraud cues. The most significant subscale was Personal Commitment ($p = 0.002$), suggesting that the more committed an auditor was to his/her work or employing organization, the better able he/she was to recognize fraud cues. Subscales of Creative Personality indicated that more capable auditors were also more tolerant of ambiguity ($p = 0.031$), and were less likely to be closed-minded ($p = 0.023$). Auditors who were better able to recognize fraud cues were also much more likely ($p = 0.046$) to have creative thoughts in general. As indicated above, auditors who had previously taken at least one university course on fraud examination or had direct

experience with accounts receivable errors or fraud were significantly more likely to recognize fraud cues in the audit narrative ($p = 0.004$ and $p = 0.034$, respectively). Finally, there was also a small relationship between subjects who had taken professional training seminars in fraud examination and the ability to recognize fraud cues ($p = 0.091$).

Including all possible variables likely also included some embedded collinearity between variables, however, so a backward-elimination regression was run in order to find a model that would minimize standard error and simultaneously maximize adjusted R^2. A direct comparison could be made between the best-subsets model and the subscale model found in Equation (2). Best-subsets results provided additional support for H1. Compared to regression results from Equation (2), only the variable Preference for Order ($p = 0.040$) was found significant in addition to other variables in the best-subsets model. Such a highly significant inverse association suggests that auditors' with a high (low) preference for order tend to be less (more) capable at recognizing potential fraud cues.

Additionally, compared to Equation (2) results, the best-subsets regression resulted in improved levels of significance for Personal Commitment (0.001 v. 0.002), Tolerance of Ambiguity ($p = 0.002$ v. 0.031), Closed-Mindedness ($p = 0.012$ v. 0.027), Personal Ideation ($p = 0.021$ v. 0.046), EFEXP ($p = 0.010$ v. 0.034), and PROTRAIN ($p = 0.048$ v. 0.091). Only the significance level for UCOURSE remained constant ($p = 0.004$).

Overall, there seemed to be overlapping collinearity between variables, which was addressed by the backward-elimination-of-variables method of regression. The best-

subsets regression variable model provided better-defined results and even more support for H1, that more creative auditors are more adept at recognizing fraud cues.

Hypothesis 2

H2 hypothesizes that various dimensions of creativity among auditors are related to their responses to perceived fraud risk. To test this idea, a composite score (NUMQUALRESPONSE) was calculated for response to perceived fraud risk for each auditor. NUMQUALRESPONSE was then regressed on the same predictors used in testing H2, plus the two measures of auditors' perceived audit risk and fraud risk.

Regression results indicated a significant positive association between auditors' level of creative ideation ($p = 0.001$) and their ability to respond to perceived fraud risk, suggesting that more creative auditors are more capable of responding to fraud risk. Similarly, auditors' response to fraud risk increases with their assessment of fraud risk as well as their exposure to accounts receivable errors or fraud ($p = 0.000$ and 0.092, respectively). Conversely, auditors' response to fraud risk decreased with their overall preferred thinking style ($p = 0.001$). These findings largely support H2.

Like the second regression used to test H1, NUMQUALRESPONSE was also regressed on the creativity subscales and the previously mentioned covariates. This more in-depth look at the relation between subscales measuring various dimensions of overall creativity and the same regressor variables provides even more support for H2. Auditors who were either Closed-minded ($p = 0.052$) or preferred a Planning Style for processing information ($p = 0.002$) responded less well to perceived fraud risk than those who did not. Also, auditors who scored high on Personal Commitment ($p = 0.024$), or Creative

Ideation (p = 0.044) were much better at responding to perceived fraud risk – as were those exposed to accounts receivable errors or fraud (p = 0.061). Like the prior regression, a strong positive association was also found between fraud risk assessment (p = 0.000) and responses to perceived fraud risk.

Overall, the significant predictive associations between auditors' creativity and their responses to perceived fraud risk lend substantial support to H2. Still, collinearity between scales and/or subscales of creativity, especially in models using several subscales which may overlap with one another, may have had an adverse impact on regression findings. Consequently, a backward-elimination regression was run on Equation (3) to derive a "best-subsets" set of variables aimed at minimizing standard error and simultaneously maximizing adjusted R^2.

As noted, this model was selected as the "best-subset" of regressed variables because it resulted in the best adjusted R^2 (0.500) and lowest standard error (8.11844). Compared to regression results from Equation (4), the best-subsets regression added only the covariate VERSION (p = 0.099) in addition to already recognized relationships. That slightly significant inverse association suggests that auditors' ability to respond to perceived fraud risk did not depend on having as much.

Additionally, the best-subsets regression reflects improved levels of significance for Personal Commitment (p = 0.002 v. 0.024), Closed-Mindedness (p = 0.039 v. 0.052), Personal Ideation (p = 0.016 v. 0.044), Planning Style of Thinking (p = 0.000 v. 0.002), GENDER (p = 0.059 v. 0.061), and EFEXPO (p = 0.009 v. 0.061). Only the significance level for FR remained constant (p = 0.000).

Overall, there seemed to be some overlapping collinearity between variables, which was addressed by the backward-elimination-of-variables method of regression. The best-subsets regression variables model provided more clearly-defined findings, resulting in more support for H2, (that more creative auditors are more adept at responding to perceived fraud risk).

Hypothesis 3

H3 suggests that auditors' work environments interact with the non-environmental domains of creativity to either exacerbate or mitigate their recognition of fraud cues and/or response to perceived fraud risk. Consequently, the aforementioned regressions were changed to include interaction variables for work environment and personality, work environment and ideation, and work environment and preferred processing style. While several variables were significantly associated with either the recognition of fraud cues or responses to perceived fraud risk, they were mere displacements of the main creativity variables. Significant variables (or their interactive variants) were fewer and less significant than those in regression Equation (1) testing H1 (in part) and essentially unchanged from the significant variables resulting from regression Equation (3) used to test H2 (in part).

Consequently, these findings did not support H3, that auditors' work environment interacts with non-environmental domains of creativity in relation to their recognition of fraud cues or to their response to perceived fraud risk.

Since Personal Commitment was the only factor from Creative Place found to be a significant contributing variable in either fraud cue recognition or auditors' response to perceived fraud risk, it may have been a missed measure of what was important in evaluating the effect of workplace creativity on non-environmental domains of creativity. Rerunning both regressions for H3 using Personal Commitment as an interacting variable instead of Creative Place, however, resulted in findings that were essentially unchanged.

Similarly, too, characteristic variables were developed to partition Creative Place for possible interactive effects. Specifically, dummy variables were created based on deciles, pentiles, quartiles, terciles, and centiles for Creative Place as well as for Personal Commitment. None of the characteristic variables had a materially significant interactive influence on any other domain of creativity. Overall, therefore, the findings suggest that auditors' workplace environment does not interact significantly with other measures of their creativity to either exacerbate or mitigate their ability to recognize fraud cues or respond to perceived fraud risk; therefore, no support was found for H3.

Contributions

This study was motivated by a paper by Hoffman and Zimbelman (2011), who investigated the usefulness of the SAS no. 99 requirement that auditors actively consider the possibility of financial statement fraud through brainstorming and/or strategic reasoning. They found that prompting audit managers to engage in either strategic reasoning or brainstorming improved auditors' responses to known fraud risk. Since both brainstorming and strategic reasoning are tools to elicit creative behavior, research

investigating the relationship between creative behavior and auditors' ability to both recognize fraud cues and respond to perceived fraud risk is a significant extension of the SAS no. 99 research. Therefore, like the research on brainstorming/strategic reasoning in detecting fraud, the present research also has significant policy implications for the profession.

Second, having established that creativity improves auditors' ability to both recognize fraud cues and respond to perceived audit risk, the present research clearly has implications for audit practice. Human resource managers can now pre-screen candidates for auditing and/or forensic accounting assignments; develop training programs to enhance auditors' creative ability; revamp audit procedures and practices to allow for more creativity; and otherwise modify staffing requirements to require and/or employ more elements of creativity on auditing assignments. Important, too, is that enhancing auditor creativity may be done relatively inexpensively in terms of time, money, or other resources. As explained in Chapter II, anyone can become creative and creative people can become more creative. Creativity, moreover, has been associated with increased productivity across myriad industries and professions.

Third, the findings in this research (while only one part of the audit-research wheel) suggest that auditors' creative ability, and not just the nature of audit procedures (as prior research would suggest), is critical for fraud detection. That is, changing the nature of audit procedures is an important step in fraud detection, but a change in audit procedures may be insufficient to detect fraud when the procedures are used by non-creative auditors.

Limitations

This research has a number of limitations. First, is that the sample size was relatively small (73) and the sample was not chosen at random. Hence, it is likely that these shortcomings reduced the overall power of the tests. Additionally, in an effort to help ensure external validity, only practicing auditors were solicited to participate in the research. Given the scant number of participants, however, it was necessary to solicit auditors from several different areas of industry which, given the nature of the audit narrative, may also have impaired the findings to some extent. Overall, the sampling procedure and the self-selection process by auditors in choosing to participate in the study may have biased the results.

Additionally, the time required to participate in the study was apparently too long. Experienced auditors should have been able to complete the assignment in 45-60 minutes, but several people (based on monitoring the time to completion) took significantly longer. Hence, subject fatigue may also have impaired research results. Additionally, the time for completion may have led to a reduction in the number of participants either initially volunteering to complete the survey or in actually completing the instrument after beginning the process.

Finally, even though the survey instrument was field-tested with auditing students, it would have been beneficial to have a small pilot study of practicing auditors complete the survey beforehand; doing so could have led to a more streamlined instrument. That, in turn, could have also mitigated the limitations already noted.

Future Research

Findings from this research project suggest that certain aspects of standard creativity scales may be flawed when used with certain populations. Accountants and auditors may pre-select their profession based on certain characteristics and are trained to develop preferences for order, predictability, and decisiveness. Although, as has been shown, they may remain creative in their thoughts and work, those preferences are regarded as symptomatic of low levels of creativity by the scale used to measure the Creative Person. A brief search of the related literature suggests that that regard is not reserved for Kruglanski's Need for Closure scale, but has become almost definitional. Consequently, development and testing of an accountant-specific (or general quantitative-skills professional) scale to measure the Creative Person would be a likely future research endeavor. Similarly, development and testing of an overall creativity measure for accountants (or other general quantitative-skills professionals) would likely fill a needed void. Runco's Ideational Behavior Skills proved to be highly predictive within the research and should provide a foundational point for that line of research.

The entire research project could benefit from replication with a much larger and more diverse sample, which should ferret out the subtleties of associations. Additionally, samples should probably be capped at the audit manager level in order to include practicing auditors of different levels who have not yet relinquished their technical skills in favor of administrative duties. Whether statistically significant or not, it was notable that an inverse relationship seemed to exist between total work experience and either recognizing fraud cues or responding to perceived fraud risk. It seemed that the more overall experience in auditing, the less capable at either task. That may be the case, given

the probable loss of technical skills; however, it may also suggest that the most conforming, and least creative, gravitate to senior management positions. The research was based on too little data to draw conclusions in any direction, so that may be a worthy piece of future research.

Additionally, the current research revealed that auditors with certain characteristics of creativity were especially good (or not) at either recognizing fraud cues and/or responding to perceived fraud risk. One wonders, then, if those auditors are rewarded in some way for those skills, through promotions, remuneration, assignment choice, etc. Again, a creditable extension of the current research would investigate reward systems for auditors displaying more (versus less) characteristics of creativity.

In addition, a myriad of tangential research projects and questions regarding creativity immediately springs to mind. For example, replication of the current research among specialty groups, or comparative inter-group replication studies would be both useful and interesting. The typical CPA firm generally houses three broad "types" of staff, for example, auditors, tax professionals, and consultants. Logically, the work of those three groups has traditionally required an ascending amount of creativity (respectively), but that notion is currently without research support. Are auditors as creative as tax professionals, for example, and are both those groups less creative than consultants? Without research on the subject, any conclusions are based on mere conjecture.

Similarly, are external auditors more or less creative than regulatory, internal, or governmental auditors? These latter groups should have more domain-specific experience, which may either mitigate or exacerbate their creative abilities. Do various

types of auditors, tax specialists, or consultants within the same company, or across companies, have/require different levels of creativity and does the market recognize and price services by more/less creative auditors (or others within the accounting profession) accordingly or appropriately? Are auditors of any type more/less creative than fraudsters; and are regulatory auditors charged with safeguarding financial markets more/less creative than those who may seek to defraud those markets?

Additionally, it could be illuminating to know whether accounting students are creative, and whether their levels of creativity are associated with performance in various accounting courses. It may also be interesting to know whether accounting courses foster creativity and whether (and if so, how) accounting students learn creativity (i.e., whether creativity is somehow related to critical thinking or analogous reasoning skills).

Finally, one can question whether working in the profession as an auditor (or tax/consulting professional) enhances creativity or reduces it over time, and/or whether auditor (or tax accountant or consultant) tenure is associated with creativity. Last, but not least, one also has to wonder whether any/all findings are equally applicable on an international basis (or across cultures).

Clearly, there are many more research questions than interested researchers. So, in a research world with little low-hanging fruit remaining, future research in/about creativity vis-à-vis the accounting profession may provide an abundant harvest.

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APPENDIX 1 – NFC

Need for Closure Scale (Creative Personality Inventory)

1 = Disagree Strongly (DS) **2 = Disagree Moderately (DM)** **3 = Disagree A Little (DAL)**	**4 = Agree A Little (AAL)** **5 = Agree Moderately (AM)** **6 = Agree Strongly (AS)**	**DS**	**DM**	**DAL**	**AAL**	**AM**	**AS**
1. I think that having clear rules and order at work is essential for success.		1	2	3	4	5	6
2. Even after I've made up my mind about something, I am always eager to consider a different opinion.		1	2	3	4	5	6
3. I don't like situations that are uncertain.		1	2	3	4	5	6
4. I dislike questions which could be answered in many different ways.		1	2	3	4	5	6
5. I like to have friends who are unpredictable.		1	2	3	4	5	6
6. I find that a well ordered life with regular hours suits my temperament.		1	2	3	4	5	6
7. I enjoy the uncertainty of going into a new situation without knowing what might happen.		1	2	3	4	5	6
8. When dining out, I like to go to places where I have been before so that I know what to expect.		1	2	3	4	5	6
9. I feel uncomfortable when I don't understand the reason why an event occurred in my life.		1	2	3	4	5	6
10. I feel irritated when one person disagrees with what everyone else in a group believes.		1	2	3	4	5	6
11. I hate to change my plans at the last minute.		1	2	3	4	5	6
12. I would describe myself as indecisive.		1	2	3	4	5	6
13. When I go shopping, I have difficulty deciding exactly what it is I want.		1	2	3	4	5	6
14. When faced with a problem, I usually see the one best solution very quickly.		1	2	3	4	5	6

1 = Disagree Strongly (DS) **2 = Disagree Moderately (DM)** **3 = Disagree A Little (DAL)**	**4 = Agree A Little (AAL)** **5 = Agree Moderately (AM)** **6 = Agree Strongly (AS)**	**DS**	**DM**	**DAL**	**AAL**	**AM**	**AS**
15. When I am confused about an important issue, I feel very upset.		1	2	3	4	5	6
16. I tend to put off making important decisions until the last possible moment.		1	2	3	4	5	6
17. I usually make important decisions quickly and confidently.		1	2	3	4	5	6
18. I have never been late for an appointment or work.		1	2	3	4	5	6
19. I think it is fun to change my plans at the last moment.		1	2	3	4	5	6
20. My personal space is usually messy and disorganized.		1	2	3	4	5	6
21. In most social conflicts, I can easily see which side is right and which is wrong.		1	2	3	4	5	6
22. I have never known someone I did not like.		1	2	3	4	5	6
23. I tend to struggle with most decisions.		1	2	3	4	5	6
24. I believe orderliness and organization are among the most important characteristics of a good student.		1	2	3	4	5	6
25. When considering most conflict situations, I can usually see how both sides could be right.		1	2	3	4	5	6
26. I don't like to be with people who are capable of unexpected actions.		1	2	3	4	5	6
27. I prefer to socialize with familiar friends because I know what to expect from them.		1	2	3	4	5	6
28. I think that I would learn best in a class that lacks clearly stated objectives and requirements.		1	2	3	4	5	6
29. When thinking about a problem, I consider as many different opinions on the issue as possible.		1	2	3	4	5	6
30. I don't like to go into a situation without knowing what I can expect from it.		1	2	3	4	5	6

1 = Disagree Strongly (DS) **2 = Disagree Moderately (DM)** **3 = Disagree A Little (DAL)**	**4 = Agree A Little (AAL)** **5 = Agree Moderately (AM)** **6 = Agree Strongly (AS)**	**DS**	**DM**	**DAL**	**AAL**	**AM**	**AS**
31. I like to know what people are thinking all the time.		1	2	3	4	5	6
32. I dislike it when a person's statement could mean many different things.		1	2	3	4	5	6
33. It's annoying to listen to someone who cannot seem to make up his or her mind.		1	2	3	4	5	6
34. I find that establishing a consistent routine enables me to enjoy life more.		1	2	3	4	5	6
35. I enjoy having a clear and structured mode of life.		1	2	3	4	5	6
36. I prefer interacting with people whose opinions are very different from my own.		1	2	3	4	5	6
37. I like to have a plan for everything and a place for everything.		1	2	3	4	5	6
38. I feel uncomfortable when someone's meaning or intention is unclear to me.		1	2	3	4	5	6
39. I believe that one should never engage in leisure activities.		1	2	3	4	5	6
40. When trying to solve a problem, I often see so many possible options that it's confusing.		1	2	3	4	5	6
41. I always see many possible solutions to problems I face.		1	2	3	4	5	6
42. I'd rather know bad news than stay in a state of uncertainty.		1	2	3	4	5	6
43. I feel that there is no such thing as an honest mistake.		1	2	3	4	5	6
44. I do not usually consult many different options before forming my own view.		1	2	3	4	5	6
45. I dislike unpredictable situations.		1	2	3	4	5	6
46. I have never hurt another person's feelings.		1	2	3	4	5	6

1 = Disagree Strongly (DS) 2 = Disagree Moderately (DM) 3 = Disagree A Little (DAL)	4 = Agree A Little (AAL) 5 = Agree Moderately (AM) 6 = Agree Strongly (AS)	DS	DM	DAL	AAL	AM	AS
47. I dislike the routine aspects of my work (studies).		1	2	3	4	5	6
48. I think I am a creative person (either in work or everyday life)*		1	2	3	4	5	6

*****This item added to the NFC scale as an overall self-assessment item, and as a check item for other assessment items included within the scale (Not included in NFC scoring).

Scoring the Need for Closure Scale

1. Reverse items:
   2, 5, 7, 12, 13, 16, 19, 20, 23, 25, 28, 29, 36, 40, 41, 47

2. Sum the following items to form a "lie" score:
   18, 22, 39, 43, 46

3. Remove the subject if the "lie" score is > 15.

4. Sum all the items except for the "lie" items to form the NFC scale.

5. Use the top and bottom 25^{th} percentiles to determine "high" and "low" NFC subjects.

6. For factors (or subscales) use the following scoring system:

   a. Order: 1, 6, 11, 20, 24, 28, 34, 35, 37, 47
   b. Predictability: 5, 7, 8, 19, 26, 27, 30, 45
   c. Decisiveness: 12, 13, 14, 16, 17, 23, 40
   d. Ambiguity: 3, 9, 15, 21, 31, 32, 33, 38, 42
   e. Closed Mindedness: 2, 4, 10, 25, 29, 36, 41, 44

APPENDIX 2 - CoSI

Cognitive Style Inventory (Creative Process Inventory)

Please indicate to what extent the following statements typify you. There are 5 possibilities.

1 = Not like me at all (N/A); **2 = Only a little like me (A/L);** **3 = Neutral (N);**	**4 = Often like me (O/M);** **5 = Totally like me (T);**	**N/A**	**A/L**	**N**	**O/M**	**T**
1. I like much variety in my life.		1	2	3	4	5
2. I study each problem until I have understood the underlying logic.		1	2	3	4	5
3. I prefer well-prepared meetings with a clear agenda & strict time management.		1	2	3	4	5
4. I like to contribute to innovative solutions.		1	2	3	4	5
5. New ideas attract me more than existing solutions.		1	2	3	4	5
6. I make definite engagements which I follow-up meticulously.		1	2	3	4	5
7. I try to avoid routine.		1	2	3	4	5
8. I want to have a full understanding of all problems.		1	2	3	4	5
9. Developing clear planning is very important to me.		1	2	3	4	5
10. A good task is a well-prepared task.		1	2	3	4	5
11. I prefer to look for creative solutions.		1	2	3	4	5
12. I always want to know (specifically) what should be done and when.		1	2	3	4	5
13. I like to analyze problems.		1	2	3	4	5
14. I like to extend the boundaries.		1	2	3	4	5
15. I make detailed analyses.		1	2	3	4	5
16. I prefer clear structures to do my job.		1	2	3	4	5
17. I am motivated by ongoing innovation.		1	2	3	4	5
18. I like detailed action plans.		1	2	3	4	5

Scoring the Cognitive Style Inventory Scale

1. For factors (or subscales) use the following scoring system:

    a. Knowing Style = K = sum items 2 + 8 + 13 + 15

    b. Planning Style = P = sum items 3 + 6 + 9 + 10 + 12 + 16 + 18

    c. Creative Style = C = sum items 1 + 4 + 5 + 7 + 11 + 14 + 17

APPENDIX 3 – RIBS

Please indicate how strongly you agree with the following statements:

1 = Strongly Disagree (S/D); **2 = Disagree (D);** **3 = Neutral (N);**	**4 = Agree (A);** **5 = Strongly Agree (S/A);**	**S/D**	**D**	**N**	**A**	**S/A**
1. I often have ideas for arranging or rearranging the furniture at home.		1	2	3	4	5
2. I often have ideas for making my work easier.		1	2	3	4	5
3. When I cook something, I read the directions and stick to them.		1	2	3	4	5
4. I often spend more time than most people just thinking about things - just having ideas or mulling them over.		1	2	3	4	5
5. I often hear what someone else says but realize there are alternative perspectives. I have my own ideas about the subject or topic (and I wonder if the other person has considered my ideas).		1	2	3	4	5
6. When I put something together, or do something around the house (like cooking), I often ignore or at least modify some of the instructions.		1	2	3	4	5
7. I frequently have ideas that are so odd they surprise even me.		1	2	3	4	5
8. I often come up with ideas other people will probably not think of.		1	2	3	4	5
9. I often play around with alternatives, sometimes asking "what if," just for the fun of it.		1	2	3	4	5
10. I often read something (written by someone else) and realize there are alternative perspectives. I have my own ideas about the subject or topic.		1	2	3	4	5
11. I often have unconventional ideas.		1	2	3	4	5
12. I often have ideas about what I will be doing in the future.		1	2	3	4	5
13. I frequently consider alternative careers (or career changes).		1	2	3	4	5
14. I often find myself childishly involved with simple things, thinking about how they work and how they might be improved.		1	2	3	4	5
15. My ideas are often considered impractical.		1	2	3	4	5
16. I like playing games which require thinking, strategy, and problem solving.		1	2	3	4	5

1 = Strongly Disagree (S/D); **2 = Disagree (D);** **3 = Neutral (N);**	**4 = Agree (A);** **5 = Strongly Agree (S/A);**	**S/D**	**D**	**N**	**A**	**S/A**
17. I am "reflective."		1	2	3	4	5
18. I often have some sort of intuition (a guess or notion) and do not know where it came from.		1	2	3	4	5
19. I avoid an activity which requires on-the-spot problem solving.		1	2	3	4	5
20. I like to try new approaches to a problem.		1	2	3	4	5
21. I often put myself into a situation that will stimulate new ideas.		1	2	3	4	5
22. I like to take a playful approach when faced with a problem.		1	2	3	4	5
23. I often get so interested in a new idea that I neglect what I should be doing.		1	2	3	4	5
24. I often have trouble sleeping at night because I have so many ideas that they keep me awake.		1	2	3	4	5
25. I often find that one of my ideas has led me to other ideas, which then leads me to other ideas, and I end up thinking how ideas are connected.		1	2	3	4	5
26. People sometimes wonder if I'm scatter-brained or absent-minded because I think about different things all at once.		1	2	3	4	5
27. I often explore some hypothetical scenario by thinking of different aspects of it.		1	2	3	4	5
28. I find it easy to think of ideas for presents and gifts.		1	2	3	4	5
29. I am good at combining ideas in ways that others have not tried.		1	2	3	4	5
30. I often have thoughts which can block out all other thoughts – and it's like I'm stuck in a (mental) rut.		1	2	3	4	5
31. When I make plans (e.g., going to a particular restaurant or movie) and something comes up to interfere with my plans, it's easy for me to find something to do instead.		1	2	3	4	5
32. While walking or exercising - out of nowhere an (interesting) idea pops into my head.		1	2	3	4	5
33. Friends ask me to help them think of ideas and solutions.		1	2	3	4	5
34. I'm pretty good at working out new (or at least different) ways to solve a problem.		1	2	3	4	5
35. I often do something that does not really need to be done.		1	2	3	4	5
36. I would have no interest in being an inventor.		1	2	3	4	5

1 = Strongly Disagree (S/D); **2 = Disagree (D);** **3 = Neutral (N);**	**4 = Agree (A);** **5 = Strongly Agree (S/A);**	**S/D**	**D**	**N**	**A**	**S/A**
37. I often see better ways of doing routine things.		1	2	3	4	5
38. I often have questions that I am not certain about how to answer.		1	2	3	4	5
39. I often have ideas about a good plot for a movie or TV show.		1	2	3	4	5
40. I often have ideas about a new invention.		1	2	3	4	5
41. I often have ideas for stories or poems.		1	2	3	4	5
42. I'm often curious about new (or different) routes between home and school (or work).		1	2	3	4	5
43. When making things, I stick to plans - and DO NOT have ideas about changing them.		1	2	3	4	5
44. When something interferes with my plans (e.g., going to a particular restaurant or movie), I'm not sure what to do.		1	2	3	4	5
45. I often have ideas for a new business or product.		1	2	3	4	5
46. I see a cloud, shadow, or similar ambiguous figure and have SEVERAL ideas about what the shape or figure could be.		1	2	3	4	5
47. I have ideas about what I will be doing 10 years from now.		1	2	3	4	5
48. Often, when I'm driving or taking public transportation, an interesting idea pops into my head.		1	2	3	4	5
49. I have trouble staying with one topic when writing letters or emails because I think of so many things to say.		1	2	3	4	5
50. Often, I see people and think about alternative interpretations of their behavior.		1	2	3	4	5
51. When reading books or stories (or watching movies) I have ideas for better endings.		1	2	3	4	5
52. When reading the newspaper or a letter (or something else) that someone else wrote, I often have ideas for better wording.		1	2	3	4	5
53. I often hear songs and think of different or better lyrics.		1	2	3	4	5

Scoring the Runco Ideation Behavior Scale

1. Reverse-score items: 3, 30, 43, 44;
2. Sum all items (after appropriate reverse scoring) to derive an overall score that approximates creative idea generation.

APPENDIX 4 – SSSI

Siegel Scale of Support of Innovation (Creative Place Inventory)

Please indicate the extent you agree with the following statements:

1 = Strongly Disagree (S/D); **2 = Often Disagree (O/D);** **3 = Neutral (N);**	**4 = Often Agree (O/A);** **5 = Strongly Agree (S/A);**	**S/D**	**O/D**	**N**	**O/A**	**S/A**
1. This organization is always moving toward the development of new answers.		1	2	3	4	5
2. This organization can be described as flexible and continually adapting to change.		1	2	3	4	5
3. Our ability to function creatively is respected by the leadership.		1	2	3	4	5
4. Around here people are allowed to try to solve the same problem in different ways.		1	2	3	4	5
5. Creativity is encouraged here.		1	2	3	4	5
6. The role of the leader in this organization can best be described as supportive.		1	2	3	4	5
7. In this organization, we sometimes reexamine our most basic assumptions.		1	2	3	4	5
8. People in this organization are always searching for fresh, new ways of looking at problems.		1	2	3	4	5
9. The way we do things seems to fit with what we're trying to do.		1	2	3	4	5
10. The leadership acts as if we are not very creative		1	2	3	4	5
11. The methods used by our organization seem well suited to its stated goals.		1	2	3	4	5
12. Assistance in developing new ideas is readily available.		1	2	3	4	5

1 = Strongly Disagree (S/D); **2 = Often Disagree (O/D);** **3 = Neutral (N);**	**4 = Often Agree (O/A);** **5 = Strongly Agree (S/A);**	**S/D**	**O/D**	**N**	**O/A**	**S/A**
13. New ideas can come from anywhere in this organization and be equally well received.		1	2	3	4	5
14. We're always trying out new ideas.		1	2	3	4	5
15. People in this organization are encouraged to develop their own interests, even when they deviate from those of the organization.		1	2	3	4	5
16. Members of this organization feel encouraged by their superiors to express their opinions and ideas.		1	2	3	4	5
17. Members of this organization realize that in dealing with new problems and tasks, frustration is inevitable; therefore, it is handled constructively.		1	2	3	4	5
18. In this organization, the way things are taught is as important as what is taught.		1	2	3	4	5
19. The methods used by our organization seem well suited to its stated goals.		1	2	3	4	5
20. Assistance in developing new ideas is readily available.		1	2	3	4	5
21. New ideas can come from anywhere in this organization and be equally well received.		1	2	3	4	5
22. Creative efforts are usually ignored here.		1	2	3	4	5
23. People here try new approaches to tasks, as well as tried and true ones.		1	2	3	4	5
24. I mostly agree with how we do things here.		1	2	3	4	5
25. People talk a lot around here, but they don't practice what they preach.		1	2	3	4	5
26. People around here are expected to deal with problems in the same way.		1	2	3	4	5

1 = Strongly Disagree (S/D); **2 = Often Disagree (O/D);** **3 = Neutral (N);**	**4 = Often Agree (O/A);** **5 = Strongly Agree (S/A);**	**S/D**	**O/D**	**N**	**O/A**	**S/A**
27. The people in charge here usually get the credit for others' ideas.		1	2	3	4	5
28. There is one person or group here who assumes the role of telling others what to do.		1	2	3	4	5
29. The leaders in this organization talk one game but act another.		1	2	3	4	5
30. A person can't do things that are too different around here without provoking anger.		1	2	3	4	5
31. The leadership acts as if we are not very creative.		1	2	3	4	5
32. Most people here find themselves at the bottom of the totem pole.		1	2	3	4	5
33. In this organization we tend to stick to tried and true ways.		1	2	3	4	5
34. I have the opportunity to test out my own ideas here.		1	2	3	4	5
35. A motto of this organization should be "The more we think alike, the better job we will get done."		1	2	3	4	5
36. My ability to come up with original ideas and ways of doing things is respected by those at the top.		1	2	3	4	5
37. This place seems to be more concerned with the status quo than with change.		1	2	3	4	5
38. The best way to get along in this organization is to think the way the rest of the group does.		1	2	3	4	5
39. Nobody asks me for suggestions about how to run this place.		1	2	3	4	5
40. One individual is usually the originator of ideas and policies in this organization.		1	2	3	4	5
41. In this organization, the power of final decision can always be traced to the same few people.		1	2	3	4	5

1 = Strongly Disagree (S/D); **2 = Often Disagree (O/D);** **3 = Neutral (N);**	**4 = Often Agree (O/A);** **5 = Strongly Agree (S/A);**	**S/D**	**O/D**	**N**	**O/A**	**S/A**
42. Once this organization develops a solution to a particular problem, that solution becomes a permanent one.		1	2	3	4	5
43. Around here, a person can get into a lot of trouble by being different.		1	2	3	4	5
44. Others in our organization always seem to make the decisions.		1	2	3	4	5
45. The leader's "pets" are in a better position to get their ideas adopted than most others.		1	2	3	4	5
46. The main function of members in this organization is to follow orders that come down through channels.		1	2	3	4	5
47. There is little room for change here.		1	2	3	4	5
48. These aren't my ideas, I just work here.		1	2	3	4	5
49. I really don't care what happens to this organization.		1	2	3	4	5
50. I am committed to the goals of this organization.		1	2	3	4	5
51. My goals and the goals of this organization are quite similar.		1	2	3	4	5
52. On the whole, I feel a sense of commitment to this organization.		1	2	3	4	5
53. I feel a real sense of responsibility for my work.		1	2	3	4	5

Scoring the Siegel Scale of Support of Innovation

1. For factors (or subscales) use the following scoring system:
    a. Support of Creativity = sum items 1 through 24 (reverse score items 10 and 22)
    b. Tolerance of Differences = sum items 25 through 48 (reverse score all items except 10 and 12)
    c. Personal Commitment = sum items 49 through 53 (reverse score item 49)

2. Sum all items (after appropriate reverse scoring) to derive an overall score that approximates a creative workplace environment.
    a. Use the top and bottom 25^{th} percentiles of the overall score (after reverse scoring) to distinguish between workplace environments that are "conducive" or "non-conducive" to creativity, respectively (for discrete-variable experiments);
    b. Use the total score without consideration of percentiles for continuous-variable experiments;

APPENDIX 5 – EXPERIMENTAL INSTRUMENT

Audit Client Background Story (HFR)

After a full career as an electrical engineer for General Electric Corporation, Henry ("Hank") Green founded American Electronics Corporation in 1964. His idea at the time was to produce high-quality but low-cost electrical appliances for brand name suppliers who wanted to outsource part of their own production. He also envisioned producing and selling the same high-quality goods under his own AmEC label to lower-priced chain stores around the country. Hank Green worked as the Chief Executive Officer from the company's inception throughout the '60s and tumultuous '70s, as increased competition from abroad (most notably Japan) hammered away at the same market niche as AmEC. Still, the company prospered slowly but steadily during that time, primarily by adapting to the changing landscape in the electronic industry. The company's focus moved, first, from electrical appliances to (primarily) radio/t.v./stereo equipment – and then on into electronic security devices.

In 1979 Hank Green retired from the firm and was replaced by the eldest son George, also an electrical engineer, who had worked for the company for about eight years in both research and then sales. On his father's advice, George surrounded himself with like-minded others who had also started in research with him, but seemed capable of progressing in other areas of the company. Hank believed in a close-knit management group where ideas, risks, threats, or just about anything could be freely bandied about among its members without regard for hierarchical structures and all that that usually entails.

George Green inherited a more and increasingly competitive market for both resources and product sales than that of his father, but he seemed inherently more capable of dealing with those pressures. By 1990 he and his team had taken the company public, changing the company name from AmEC to AmTech Corporation in the process. Management (especially George Green) still controlled 60% of the shares, but there was an active over-the-counter market for the stock on NASDAQ. Additionally, the company began to prosper with renewed vigor after the new infusion of IPO capital to support its research and development activities.

Today, AmTech is one of the leading global electronic security companies in the world. AmTech designs, manufactures, markets, sells and services innovative electronic products and systems for security and surveillance, industrial video and professional audio markets worldwide. The technology used in the company's products has been gradually moving from analog to digital processes, but AmTech continues making some analog models in nearly all of its lines. The company has steadily grown, as shown by its increasing sales from $150.8 million in 1989 to $445.5 million in 2010.

AmTech faces competition in each of its markets – which include the United States, Asia and Easter/Western Europe. Despite the company's growth, some of AmTech's current and potential competitors have substantially greater financial, manufacturing, marketing

and other resources than has AmTech – but AmTech is known to be considerably more nimble and able to adapt to market changes. To continue its ability to compete successfully, though, AmTech must continue to make substantial investments in its engineering and development, marketing, sales, and customer service/support.

Historically, sales have been made through two channels with some accounts handled directly by the company and the remaining sales made through licensed distributors. Both the sales handled directly by AmTech and those to licensed distributors are recorded when shipped, which is consistent with the company's policy of shipping FOB shipping point.

Sales terms are 2% discount for payment within 10 days with the net due within 30 days. Receivables are recorded for the gross invoice amount and discounts are recorded when taken. Accounts are written off only after extensive collection efforts are taken. The allowance for doubtful accounts is based on an analysis of accounts outstanding as determined necessary by management. Last year at December 31, 2009, AmTech had about 1,000 active credit customers (both distributors and accounts handled directly by the company). No single customer's annual sales exceeded 5% of total revenues.

Throughout AmTech's history, the cadre of close associates initially identified by George Green have remained with, and advanced in, the company's management structure. The management team currently includes:

President & CEO, George Green	
VP of Sales and Marketing, Tammy White	VP of Operations, Chris Black
Chief Financial Officer, Theo Blue	Controller, Fred Yellow

You have participated in the audit of AmTech for the past three years, and your firm began auditing the company seven years ago – so most of AmTech's executive management, and their long-term tenure, are familiar. CFO Blue, who is relatively new to the company, joined other members of the management team six years ago. He was formerly CFO of a competing firm that AmTech absorbed at that time to increase its market share.

CFO Blue also owns a small fraction of the company, and so has a vested interest in its performance. After five years of employment, all employees become vested in AmTech's retirement program – comprised of company contributi9ons in their profit sharing and 401(k) accounts, as well as a stock purchase plan.

The company contributes 2% of employee pay to each of those components, and employees are not required to contribute any of their own money to the plans in order to get the company contribution. Employee remuneration is topped off with annual bonuses comprised of cash and/or stock options, when the company exceeds profitability targets, which is par for AmTech's industry.

Their more generous than average retirement program emanates from CEO Green's efforts to help ensure employee loyalty and minimize turnover by instituting procedures aimed at profit sharing. AmTech's philosophy of sharing its profits with employees is relatively rare in the industry, but AmTech's late founder (Hank Green) "strongly believed in making all employees partners in the success of our business and that commitment is as strong as ever today," said CFO Theo Blue. The Stewart Benefit Index ®, conducted by global human resources services company Stewart Associates, shows that AmTech scored 217.4 on retirement savings benefits, while the average industry score is 100.

Of course, those benefits are aimed at remunerating a deliberately leaner and more competent than average staff. That is especially important for AmTech – given that the company emplys less than 1,000 people in total. Still, over the years the management team has had times when they were not very cooperative to work with, and have occasionally argued with auditors about accounting treatments. Controller Yellow has generally been at the center of such disputes, arguing that these "kids are greener every year. Don't they teach them anything in business school?" Those disputes generally arise because some accounts at AmTech are based on significant estimates that involve subjective judgments or uncertainties that are difficult to corroborate (e.g., fair value estimates). In any event, VP White or VP Black usually provide alternative sources of information for auditors when controller Yellow is "in one of his moods."

CEO Green is also considered a leader in the industry, aside from a reputation for being extremely aggressive in the way he does business. The engagement partner has considered management's integrity and other factors pertinent to client continuance, however, and believes relatively "deep pockets" and (as in times past) can loan the company up to twice its average cash balance, if necessary, or guarantee additional lines of credit. Additionally, since the executive team has worked together for so long through so many ups-and-downs, and share many of the same goals for the company, they can mitigate CEO Green's aggressive tendencies when necessary.

There is no doubt that Mr. Green is in control of the company, of course, but other executives also figure so prominently that the board of directors isn't worried about succession plans within the near term.

Furthermore, other sources of information indicate that the character of the management team is of high quality. The audit manager, for example, corroborates what the partner has told you and indicates that the integrity of upper management is impeccable.

He also commented that the CEO is one of the most honorable businessmen in the community and that he admires his leadership in local community service organizations such as the United Way.

Preliminary Analytical Procedures

Preliminary analytical procedures for the audit of AmTech were initially performed in early December using data from the November unaudited consolidated financial statements of AmTech and its subsidiaries. These numbers are not presented in the table above but are discussed next.

Preliminary analytical procedures showed that Days Sales in Accounts Receivable increased during the period from 51.3 at December 2009 to 54.4 at November 2010. Management explained that AmTech instituted a new marketing strategy in mid-November that led to the increase. Management made a strategic decision to reallocate marketing responsibilities among its sales channels. Specifically, responsibility for all sales of analog products was turned over to the distributors and AmTech focuses its marketing efforts on the digital products.

To implement that plan, distributors were given access to all of AmTech's analog accounts which was roughly half of the smaller customers previously serviced directly by AmTech, while AmTech continued to service the larger, digital accounts directly. Also, distributors were given significant incentives to buy analog products in mid-November and December. These incentives included profit sharing opportunities, favorable financing terms, and providing warehousing and storage incentives.

Management believes the marketing initiative will be very successful, as many distributors placed orders of analog systems in the second half of November and in December. At year-end 2010, Days Sales in AR increased further to 64.8. Management explained that, by year-end, over 90 percent of the distributors had signed up for the program and placed orders for analog products.

In discussing Days Sales in AR with management, it was noted that this ratio doesn't tell the entire story because much of the increase in AR is due to sales that were outstanding for less than 40 days at year-end because November 15th. was the date the new marketing strategy was implemented. A review of the December 31, 2010 aging of Accounts Receivable showed that the percentage of total AR in the current column (less than 30 days) increased significantly relative to 2009.

Results of Interim Tests

Prior to year-end 2010, the audit team tested internal controls over the Sales and Collections Cycle. At the same time, Sales and Cash Receipts transactions were also tested. Results of these tests indicated that computer and manual controls over Sales and Cash Receipts were in place and working effectively.

The 12/31/10 **inherent risk** assessment and the **control risk** assessment for the sales and collection cycle of AmTech are shown below, along with a subset of the supporting evidence.

	12/31/10
Inherent risk assessment	**LOW**
Control risk assessment	**LOW**

Inherent Risk Factors for Sales and Collection Cycle:

- No material misstatements were identified during the 12/31/09 audit.
- The majority of transactions are routine and 90% of receivables at 12/31/10 are less than 60 days old.
- The majority of AmTech's customers are large retailers with low credit risk.
- There do not appear to be related party transactions in relation to this cycle, consistent with the prior year.

Control Risk Factors for Sales and collection Cycle:

- There have been no significant changes in controls, and current year tests of controls reveal no exceptions.
- Credit transactions are properly authorized and the terms of sales are checked and approved before shipping.
- All necessary documentation is maintained and pre-numbered documents are used.
- Physical access to all documentation is strictly controlled.

AmTech's Financial Statements

AmTech Inc.
Income Statements - Horizontal Analysis

	12/31/2010 (Unaudited)	%*	12/31/2009 (Audited)	%*	12/31/2008 (Audited)	%*
Sales	$445,537,042	$0.03	$428,401,576	($0.01)	$432,728,847	100%
Cost of sales	262,056,050	$0.04	252,316,730	$0.00	251,743,510	100%
Gross profit	183,480,992	$0.01	176,084,846	($0.03)	180,985,337	100%
S/G/A	166,183,850	$0.03	161,007,121	($0.00)	161,078,940	100%
		($0.13)		($0.24)		
Income from operations	17,297,142		15,077,725		19,906,397	100%
Other income (expense):						
Interest expense	-800,850	($0.02)	-782,442	($0.04)	-817,950	100%
Interest income	158,550	$0.22	147,680	$0.14	129,980	100%
Other	651,000	$0.18	609,440	$0.10	551,740	100%
Total Other I/E	8,700	($1.06)	-25,321	($0.81)	-136,230	100%
Income before income taxes	17,305,842	($0.12)	15,052,403	($0.24)	19,770,167	100%
Income tax provision	7,968,600	($0.03)	8,049,065	($0.02)	8,193,240	100%
Net income	$9,337,242	($0.19)	$7,003,338	($0.40)	$11,576,927	100%

* Base year = 2008

AmTech Inc.

Income Statements - Vertical Analysis

	12/31/2010 (Unaudited)	% Sales	12/31/2009 (Audited)	% Sales	12/31/2008 (Audited)	% Sales
Sales	$445,537,042	100.00%	$428,401,576	100.00%	$432,728,847	100.00%
Cost of sales	262,056,050	58.82%	252,316,730	58.90%	251,743,510	58.18%
Gross profit	183,480,992	41.18%	176,084,846	41.10%	180,985,337	41.82%
S/G/A Expenses	166,183,850	37.30%	161,007,121	37.58%	161,078,940	37.22%
Income from operations	17,297,142	3.88%	15,077,725	3.52%	19,906,397	4.60%
Other income (expense):						
Interest expense	-800,850	-0.18%	-782,442	-0.18%	-817,950	-0.19%
Interest income	158,550	0.04%	147,680	0.03%	129,980	0.03%
Other	651,000	0.15%	609,440	0.14%	551,740	0.13%
Total	8,700	0.00%	-25,321	-0.01%	-136,230	-0.03%
Income before income taxes	17,305,842	3.88%	15,052,403	3.51%	19,770,167	4.57%
Income tax provision	7,968,600	1.79%	8,049,065	1.88%	8,193,240	1.89%
Net income	$9,337,242	2.10%	$7,003,338	1.63%	$11,576,927	2.68%

AmTech Inc.

Balance Sheets - Horizontal Analysis

	12/31/2010 (Unaudited)	% Change*	12/31/2009 (Audited)	% Change*	12/31/2008 (Audited)	% Change*
Assets						
Current assets:						
Cash and cash equivalents	$2,703,493	9.22%	$2,399,119	-3.08%	$2,475,259	100.00%
Accounts receivable (gross)	14,175,134	18.97%	12,157,193	2.04%	11,914,657	100.00%
Less: Allowance for Doubtful Accounts	-305,465	8.98%	-294,947	5.23%	-280,296	100.00%
A/R (net)	13,869,669	19.21%	11,862,246	1.96%	11,634,361	100.00%
Inventory	73,152,302	22.15%	66,507,808	11.06%	59,885,808	100.00%
Prepaid advertising	3,413,226	-0.22%	3,419,183	-0.05%	3,420,740	100.00%
Other prepaid expenses	1,746,769	5.90%	1,680,868	1.90%	1,649,511	100.00%
Deferred income tax benefits	3,974,479	4.90%	3,825,406	0.96%	3,789,002	100.00%
Total current assets	99,165,403	19.28%	89,989,577	8.25%	83,134,977	100.00%
Property, plant, and equipment, at cost:						
Land and buildings	32,935,183	2.96%	31,027,958	-3.00%	31,987,800	100.00%
Fixtures and equipment	35,761,313	14.78%	32,682,743	4.90%	31,157,190	100.00%
Leasehold improvements	925,109	18.32%	855,430	9.41%	781,869	100.00%
Total property, plant, and equipment	69,621,605	8.91%	64,566,131	1.00%	63,926,859	100.00%
Less - accumulated depreciation	-24,336,208	15.95%	-22,036,582	5.00%	-20,987,770	100.00%
Property, plant, and equipment, net	45,285,397	5.46%	42,529,549	-0.95%	42,939,089	100.00%
Intangibles, net	1,180,452	14.77%	1,113,258	8.23%	1,028,568	100.00%
Total assets	145,631,252	14.58%	133,632,384	5.14%	127,102,634	100.00%
Liabilities and shareholders' equity						
Current liabilities						
Accounts payable	29,158,745	21.74%	26,199,455	9.39%	23,951,337	100.00%
Accrued liabilities	15,467,162	14.29%	13,420,462	-0.83%	13,532,945	100.00%
Short-term note payable	4,239,082	22.75%	3,696,164	7.03%	3,453,472	100.00%
Income taxes payable	5,257,407	30.49%	4,458,369	10.66%	4,029,030	100.00%
Total current liabilities	54,122,396	20.36%	47,774,450	6.24%	44,966,784	100.00%
Deferred income taxes	2,561,254	12.94%	2,541,909	12.09%	2,267,811	100.00%
Long-term liabilities	182,782	8.77%	180,863	7.63%	168,041	100.00%
Shareholders' equity:						
Common Stock, 17,773,000 shares issued	168,763	-8.65%	175,531	-4.98%	184,739	100.00%
Additional paid-in capital	15,146,120	-3.85%	15,449,145	-1.92%	15,752,208	100.00%
Retained earnings	110,916,838	14.89%	103,542,429	7.25%	96,542,091	100.00%
Treasury stock (at cost)	-37,466,901	14.30%	-36,031,943	9.92%	-32,779,040	100.00%
Total shareholders' equity	88,764,820	11.37%	83,135,162	4.31%	79,699,998	100.00%
Total liabilities and shareholders' equity	145,631,252	14.58%	133,632,384	5.14%	127,102,634	100.00%

* Base Year = 2008

AmTech Inc.

Balance Sheets - Vertical Analysis

	12/31/2010 (Unaudited)	% TA	12/31/2009 (Audited)	% TA	12/31/2008 (Audited)	% TA
Assets						
Current assets:						
Cash and cash equivalents	$2,703,493	1.86%	$2,399,119	1.80%	$2,475,259	1.95%
Accounts receivable (gross)	14,175,134	9.73%	12,157,193	9.10%	11,914,657	9.37%
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Inventory	73,152,302	50.23%	66,507,808	49.77%	59,885,808	47.12%
Prepaid advertising	3,413,226	2.34%	3,419,183	2.56%	3,420,740	2.69%
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Property, plant, and equipment, at cost:						
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Fixtures and equipment	35,761,313	24.56%	32,682,743	24.46%	31,157,190	24.51%
Leasehold improvements	925,109	0.64%	855,430	0.64%	781,869	0.62%
Total property, plant, and equipment	69,621,605	47.81%	64,566,131	48.32%	63,926,859	50.30%
Less - accumulated depreciation	-24,336,208	-16.71%	-22,036,582	-16.49%	-20,987,770	-16.51%
Property, plant, and equipment, net	45,285,397	31.10%	42,529,549	31.83%	42,939,089	33.78%
Intangibles, net	1,180,452	0.81%	1,113,258	0.83%	1,028,568	0.81%
Total assets	145,631,252	100.00%	133,632,384	100.00%	127,102,634	100.00%
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Current liabilities						
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Total current liabilities	54,122,396	37.16%	47,774,450	35.75%	44,966,784	35.38%
Deferred income taxes	2,561,254	1.76%	2,541,909	1.90%	2,267,811	1.78%
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Total shareholders' equity	88,764,820	60.95%	83,135,162	62.21%	79,699,998	62.71%
Total liabilities and shareholders' equity	145,631,252	100.00%	133,632,384	100.00%	127,102,634	100.00%

1. **What is the likelihood that these standard procedures for auditing A/R would detect material misstatements in A/R?**

1 2 3	4 5 6 7	8 9 10
Low	Medium	High

2. **Given the information you've just read, what do you think should be the overall audit risk for the AmTech audit?**

1 2 3	**5 6**	**8 9 10**
Low	**Medium**	**High**

3. **Were there any areas you would highlight for scope or planning consideration?**

YES	**NO**

If YES, please list? (Cut and paste or describe, as necessary to explain your perception)

4. **Given the information you've just read, what do you think should be the overall risk of material financial statement fraud for AmTech;**

2 3	5 6 7	8 9 10
Low	Medium	High

5. **Please list the fraud cues you recognized to support your perception: (cut and paste or describe, as necessary)**

6. **Next, please highlight each risk factor that you *listed* in the following manner:**

- Green for each factor you considered a low-level risk factor;
- Yellow for each factor you considered a medium-level risk factor; and,
- Red for each factor you considered a high-level risk factor.

Note: There is no right or wrong designation of risk factors – ONLY your own *perceptions*.

7. **What is the likelihood that these standard procedures for auditing A/R would be *anticipated* by management – which may or may not interfere with detection?**

1 2 3	4 5 6 7	8 9 10
Low	Medium	High

8. ***IF*** **management *is able* to anticipate these standard audit procedures for A/R, what is the likelihood that they would be able to conceal managerial fraud in A/R?**

1 2 3	4 5 6 7	8 9 10
Low	Medium	High

SAS No. 99 requires auditors to discuss ways management *<u>may</u>* *<u>be</u>* committing fraud.

9. Given your understanding of AmTech, list the *most likely* methods that AmTech management *could be* using to commit fraud in *accounts receivable*:

10. Given your list, what is the likelihood that their methods for committing fraud would be detected by one or more of the 12 standard A/R audit procedures previously listed:

1 2 3	4 5 6 7	8 9 10
Low	Medium	High

11. Assume management *is able* to anticipate those twelve audit procedures. If so, *how could they* conceal the potential fraud(s) in A/R you identified as "most likely "above from the list of twelve standard audit procedures for A/R?

The table below shows the hours used to perform each audit procedure last year and allows you to enter your budgeted hours for each procedure completed for the current audit in the far right column. A senior auditor performed the audit procedures of AmTech's accounts receivable last year, but you will perform the procedures this year – based on what you know or suspect about AmTech.

You may use any budget amount you deem necessary while striving to maintain both effectiveness and efficiency.

Standard A/R Audit Procedures	2009 Actual	2010 Budgeted
1. Perform analytical procedures on the allowance, bad debts, and aging of receivables.	10	
2. Review the AR ledger, cash receipts journal, and sales journal for large or unusual items.	4	
3. Select A/R balances to confirm and send positive and negative confirmation requests.	42	
4. Examine evidence of subsequent cash collection from the customer for the following: • any positive confirmations not returned • negative confirmations returned with significant exceptions, and • other account balances deemed appropriate	10	
5. For positive confirmations not returned and for negative confirmations returned with significant exceptions examine supporting documentation such as billing and shipping documents.	6	
6. Review the sales returns after year-end to determine the effect on the AR balance.	6	
7. Test cutoff of sales, sales returns, and cash receipts at year end.	8	
8. Review the reconciliation of the sub-ledger to the GL and investigate unusual items.	4	
9. Test existence of sales by tracing details from the sales journal to supporting documents.	4	
10. Ensure proper treatment of all related party sales and AR.	2	

11. Perform Computer Assisted Audit Techniques (CAATs)	0	
12. Conduct interviews of client personnel.	0	
Total Hours	96	

You will be *automatically* directed to a follow-up question after entering a different value for each individual standard procedure for auditing A/R – and then redirected back to this page to continue your update of "2010 Budgeted" hours.

Follow-up Questions for Changes in Budgeting Time for A/R Procedures

Each procedure has been automatically updated with "2010 Budgeted" hours based on your previous responses. Please explain any changes from "actual hours" used in last year's audit.

1. Perform analytical procedures on the allowance, bad debts, and aging of receivables.	10	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

2. Review the AR ledger, cash receipts journal, and sales journal for large or unusual items.	4	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

3. Select A/R balances to confirm and send positive and negative confirmation requests.	42	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

4. Examine evidence of subsequent cash collection from the customer for the following: • any positive confirmations not returned • negative confirmations returned with significant exceptions, and • other account balances deemed appropriate	10	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

5. For positive confirmations not returned and for negative confirmations returned with significant exceptions examine supporting documentation such as billing and shipping documents.	6	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

6. Review the sales returns after year-end to determine the effect on the AR balance.	6	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

7. Test cutoff of sales, sales returns, and cash receipts at year end.	8	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

8. Review the reconciliation of the sub-ledger to the GL and investigate unusual items.	4	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

9. Test existence of sales by tracing details from the sales journal to supporting documents.	4	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

10. Ensure proper treatment of all related party sales and AR.	2	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

11. Perform Computer Assisted Audit Techniques (CAATs)	0	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

12. Conduct interviews of client personnel.	0	

How would you use additional budgeted time? (If no change in hours, circle N/A ← here, and go to next question):

12. If you were *completely* free to choose, what *other* audit procedures *besides* the twelve standard procedures listed previously would you perform to help you determine whether a fraud in accounts receivable was actually present in AmTech?

13. Please indicate the likelihood that your changes in budgeted hours, or additional procedures, would receive substantial review comments from a reviewer (a manager or partner):

1	2	3	4	5	6	7	8	9	10
Extremely Unlikely									Extremely Likely

14. Please indicate the likelihood that a reviewer would accept your changes in budgeted hours, or additional procedures:

1	2	3	4	5	6	7	8	9	10
Extremely Low									Extremely High

15. Please indicate the extent to which your changes in budgeted hours or additional procedures for auditing A/R may be altered by a superior (circle 5.5 below if there would be NO change):

1	2	3	4	5	5.5	6	7	8	9	10
Substantially Reduced					No Change					Substantially Increased

APPENDIX 6 – Data Analysis

	Hypothesis	**Model/Method of Analysis**
RQ_1	Can dimensions of auditor creativity be identified and empirically measured?	**Use of Ryan-Joiner test of normality, plus validity tests of obtained subject scores on various scales and subscales, plus examination of descriptive statistics;**
H_1	Various dimensions of creativity among auditors will be related to their recognition of fraud cues;	$NUMQUALRECOG = \beta_0 + \beta_1 PLACE + \beta_2 PERSON + \beta_3 PRODUCT + \beta_4 PROCESS + \beta_5 GENDER + \beta_6 EFEXPO + \beta_7 TOTEXP + \beta_8 PROTRAIN + \beta_9 UCOURSE + \beta_{10} EFEXP + \beta_{11} VERSION;$
		$NUMQUALRECOG = \beta_0 + \beta_1 DIFFERENCES + \beta_2 COMMITMENT + \beta_3 ORDER + \beta_4 PREDICTABILITY + \beta_5 DECISIVENESS + \beta_6 AMBIGUITY + \beta_7 CLOSEMINDED + \beta_8 IDEATION + \beta_9 KNOWLEDGESTYLE + \beta_{10} PLANNINGSTYLE + \beta_{11} CREATIVESTYLE + \beta_{12} GENDER + \beta_{13} EFEXPO + \beta_{14} TOTEXP + \beta_{15} PROTRAIN + \beta_{16} UCOURSE + \beta_{17} EFEXP + \beta_{18} VERSION;$
H_2	Various dimensions of creativity among auditors will be related to their response to perceived fraud risk;	$NUMQUALRESPONSE = \beta_0 + \beta_1 PLACE + \beta_2 PERSON + \beta_3 PRODUCT + \beta_4 PROCESS + \beta_5 GENDER + \beta_6 EFEXPO + \beta_7 TOTEXP + \beta_8 PROTRAIN + \beta_9 UCOURSE + \beta_{10} EFEXP + \beta_{11} VERSION + \beta_{12} AR + \beta_{13} FR;$
		$NUMQUALRECOG = \beta_0 + \beta_1 SUPPORT + \beta_2 DIFFERENCES + \beta_3 COMMITMENT + \beta_4 ORDER + \beta_5 PREDICTABILITY + \beta_6 DECISIVENESS + \beta_7 AMBIGUITY + \beta_8 CLOSEMINDED + \beta_9 IDEATION + \beta_{10} KNOWLEDGESTYLE + \beta_{11} PLANNINGSTYLE + \beta_{12} CREATIVESTYLE + \beta_{13} GENDER + \beta_{14} EFEXPO + \beta_{15} TOTEXP +$

		$\beta_{16}PROTRAIN + \beta_{17}UCOURSE + \beta_{18}EFEXP + \beta_{19}VERSION + \beta_{20}AR + \beta_{21}FR;$
H_3	Auditors' work environment will interact with non-environmental domains of creativity in relation to both their recognition and response to fraud cues.	$NUMQUALRECOG = \beta_0 + \beta_1PLACExPERSON + \beta_2PLACExPRODUCT + \beta_3PLACE1xPROCESS + \beta4GENDER + \beta_5EFEXPO + \beta_6TOTEXP + \beta_7PROTRAIN + \beta_8UCOURSE + \beta_9EFEXP + \beta_{10}VERSION;$
		$NUMQUALRESPONSE = \beta_0 + \beta_1PLACExPERSON + \beta_2PLACExPRODUCT + \beta_3PLACE1xPROCESS + \beta4GENDER + \beta_5EFEXPO + \beta_6TOTEXP + \beta_7PROTRAIN + \beta_8UCOURSE + \beta_9EFEXP + \beta_{10}VERSION + \beta_{11}AR + \beta_{12}FR;$

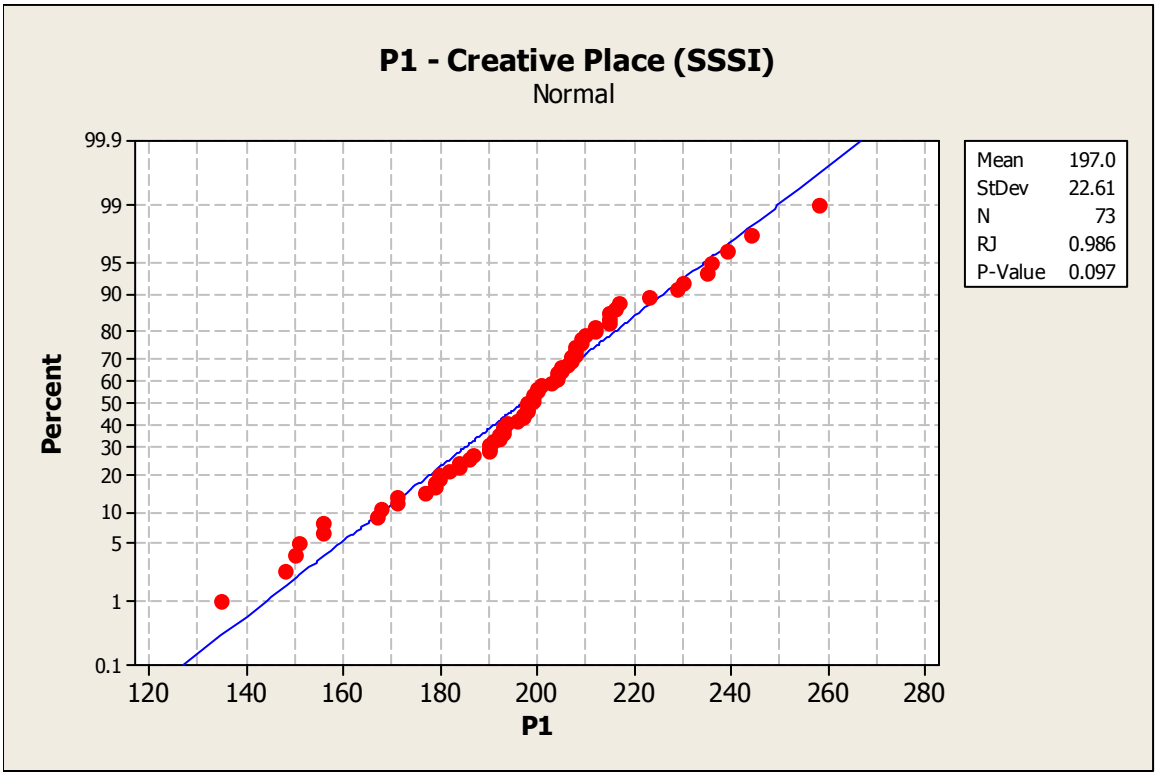
APPENDIX 7 – VARIABLE LIST

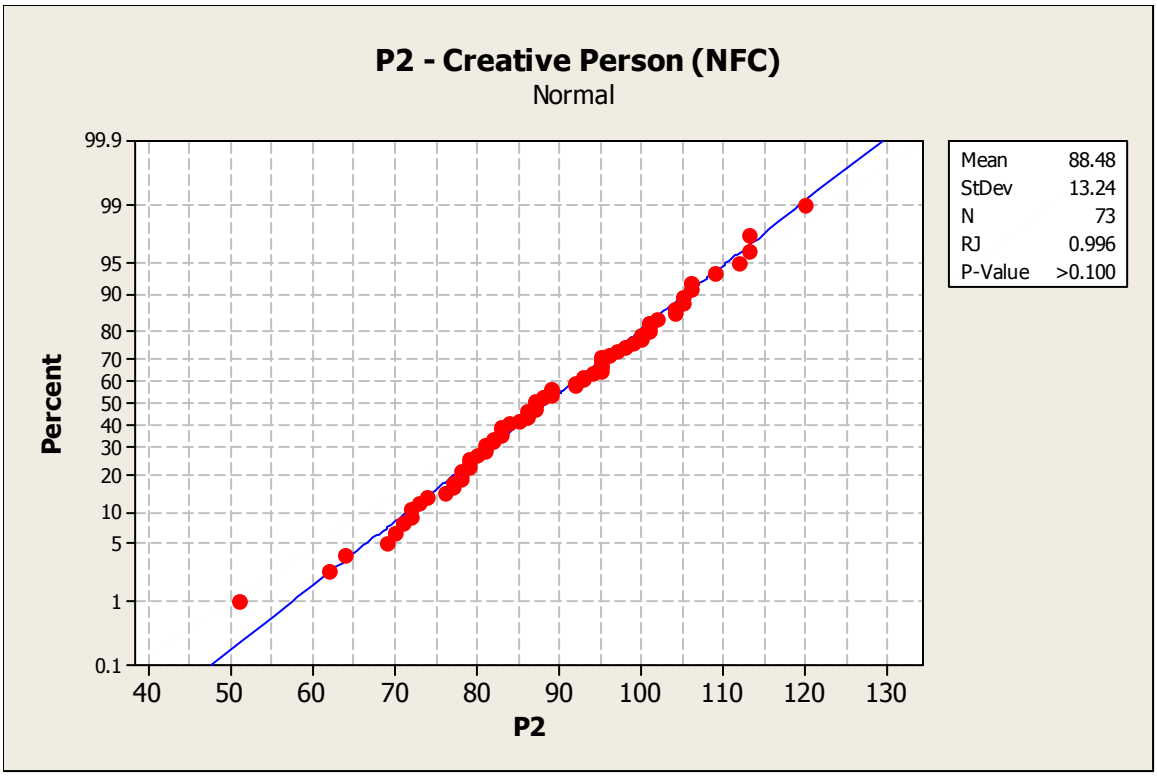
NUMQUALRECOG	The number of fraud cues recognized times the quality of those cues as measured by responses to item #9, #11, #12, and Standard Procedures Follow-Up Questions 1-12 (Experimental Research Instrument);
NUMQUALRESPONSE	The number of auditor responses to suspected fraud times the quality of those responses, as measured by responses to item #9, #11, #12, and Standard Procedures Follow-Up Questions 1-12 (Experimental Research Instrument);
PLACE	Creative Place (Environment) as measured by auditors' scores on the SSSI scale;
SUPPORT	Auditors' scores on the SSSI subscale measuring work environments that are supportive of creativity;
DIFFERENCES	Auditors' scores on the SSSI subscale measuring work environments that tolerate differences of opinion or approach to tasks;
COMMITMENT	Auditors' scores on the SSSI subscale measuring work environments that foster a personal commitment to the organization;
PERSON	Creative Person as measured by auditors' scores on the NFC scale;
ORDER	Auditors' scores on the NFC subscale measuring preference for order;
PREDICTABILITY	Auditors' scores on the NFC subscale measuring preference for predictability;
DECISIVENESS	Auditors' scores on the NFC subscale measuring decisiveness;
AMBIGUITY	Auditors' scores on the NFC subscale measuring tolerance of ambiguity;
CLOSEMINDED	Auditors' scores on the NFC subscale measuring close-mindedness;

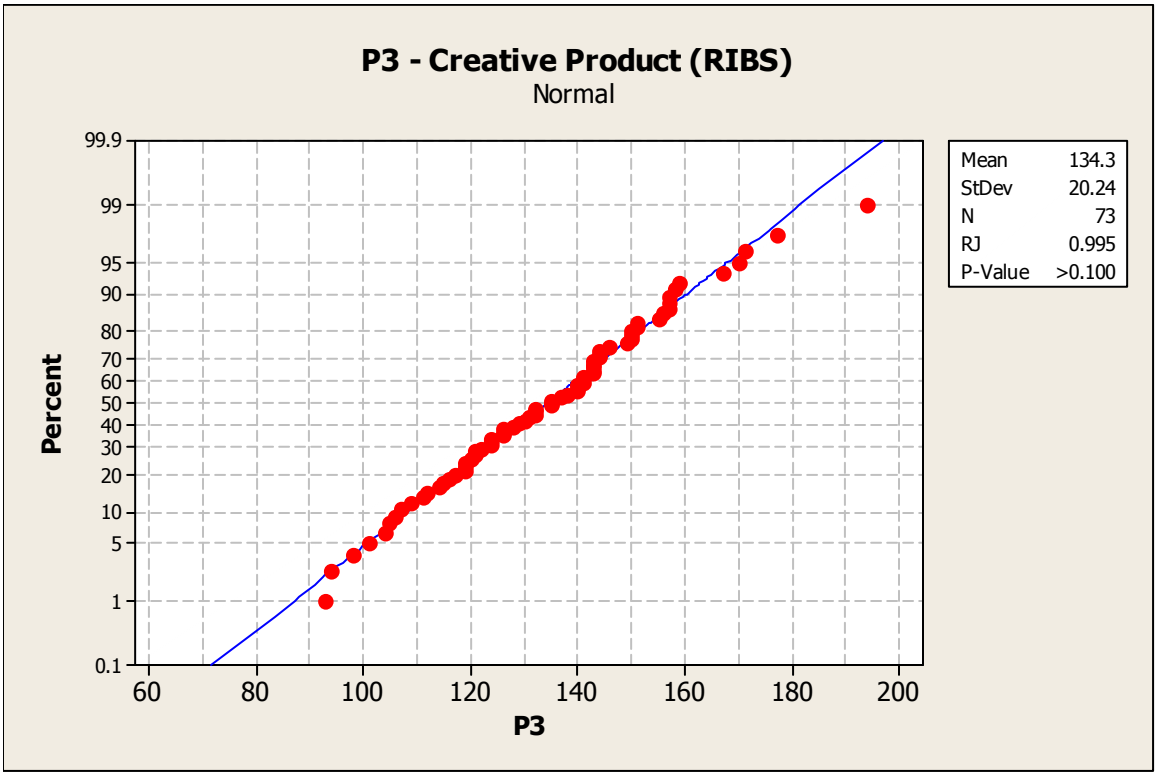
PRODUCT (or IDEATION)	Creative Product as measured by auditors' scores on the RIBS scale;
PROCESS	Creative Process as measured by auditors' scores on the CoSI scale;
KNOWLEDGESTYLE	Auditors' scores on the CoSI subscale measuring a knowing style of thinking;
PLANNINGSTYLE	Auditors' scores on the CoSI subscale measuring a planning style of thinking;
CREATIVESTYLE	Auditors' scores on the CoSI subscale measuring a creative style of thinking;
GENDER	Indicator variable equal to 1 if auditor is male and zero otherwise;
EFEXPO	Number of work assignments where accounting errors or fraud was discovered but the auditor did not discover or work directly with the discovered errors or fraud;
EFEXP	Number of work assignments where accounting errors or fraud was discovered by the auditor;
TOTEXP	Total number of months experience;
PROTRAIN	Indicator variable equal to 1 if auditor had undergone > the median number of professional training days and 0 otherwise;
UCOURSE	Number of university courses taken by the auditor having to do with fraud examination;
VERSION	Indicator variable equal to 1 if auditor completed a high-fraud risk version of the instrument and 0 if he/she completed a low-fraud risk version;
AR	Audit risk assessment by auditor on a scale of 1 – 10;
FR	Fraud risk assessment by auditor on a scale of 1 – 10;

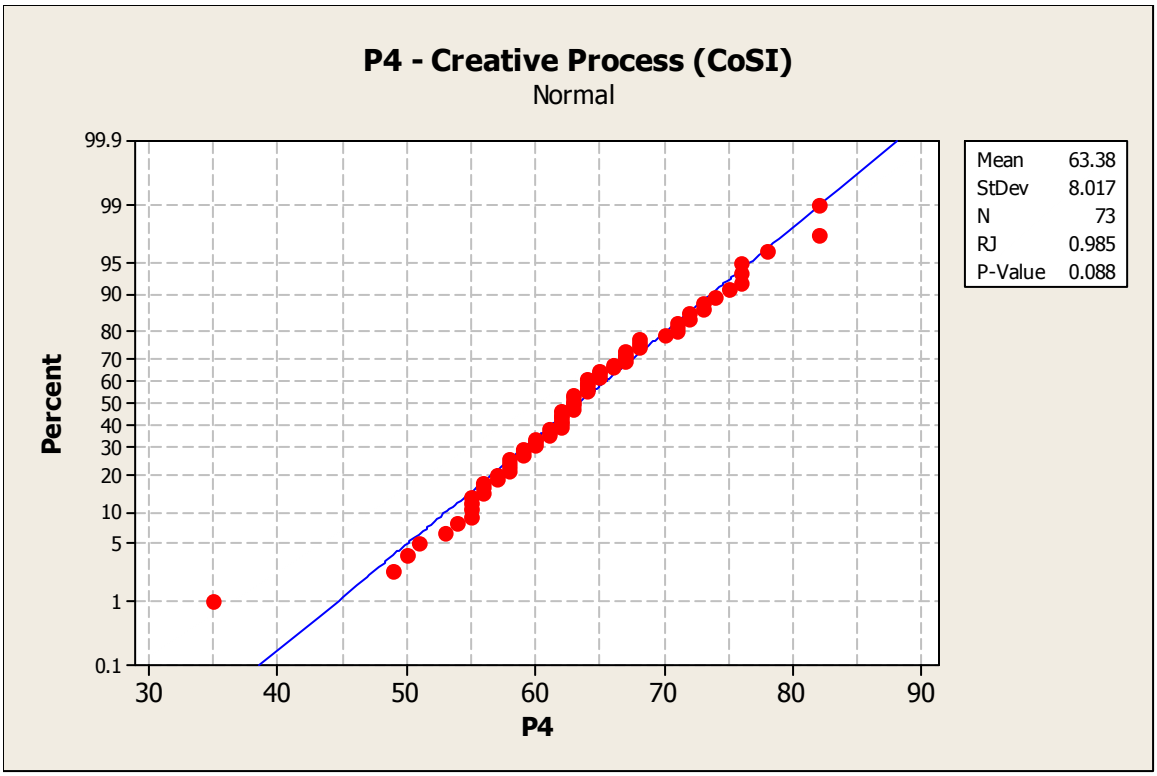
APPENDIX 8

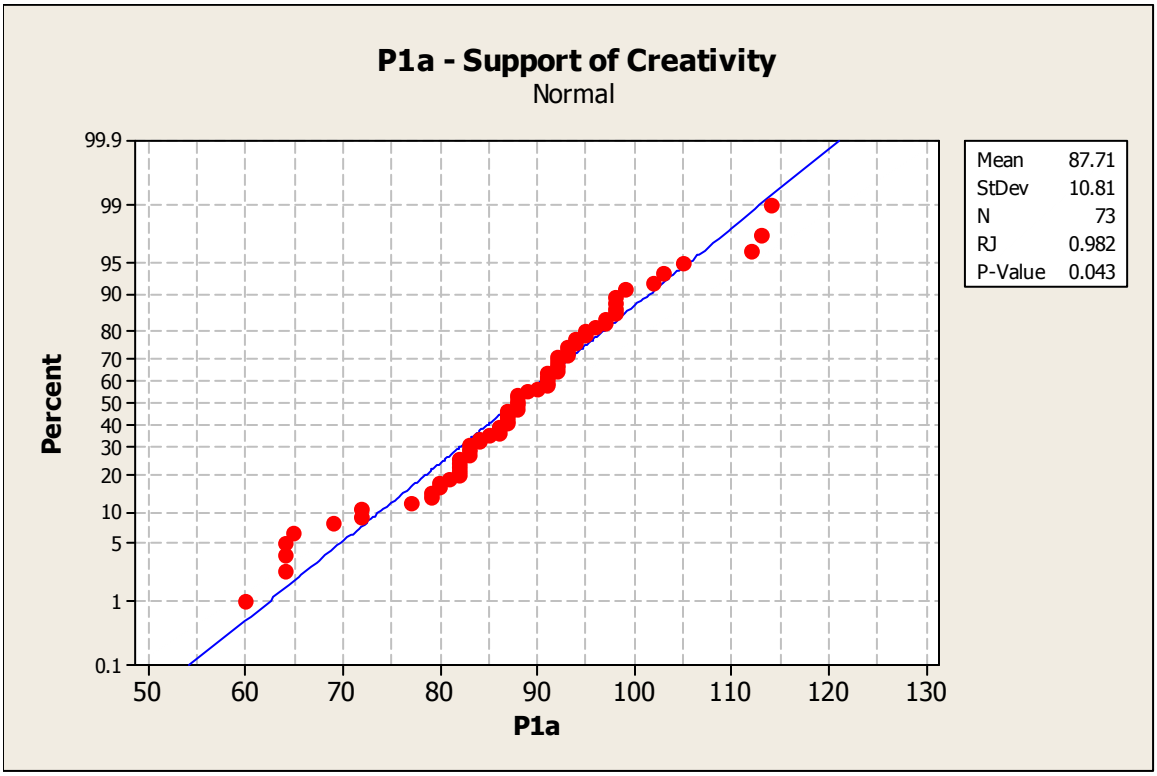
Ryan – Joiner Correlation-Based Normality Test Results

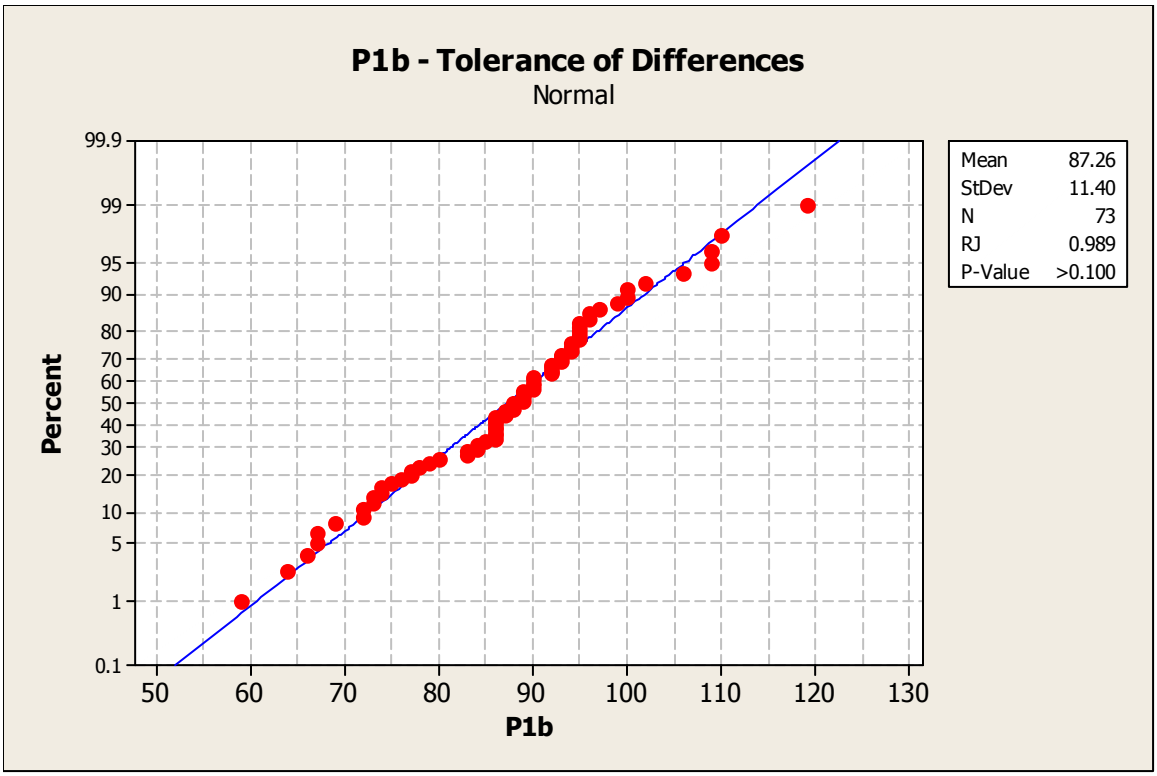


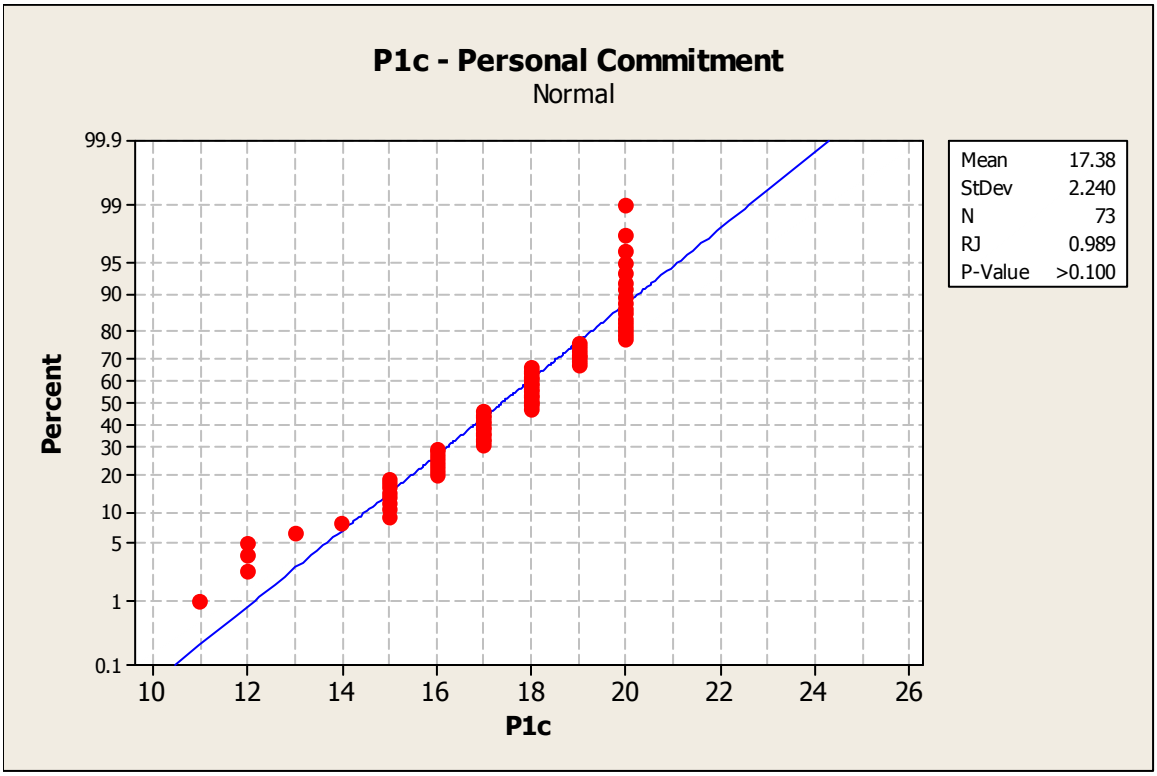

P2 - Creative Person (NFC)
Normal
Percent
P2
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
40
50
60
70
80
90
100
110
120
130
Mean 88.48
StDev 13.24
N 73
RJ 0.996
P-Value >0.100

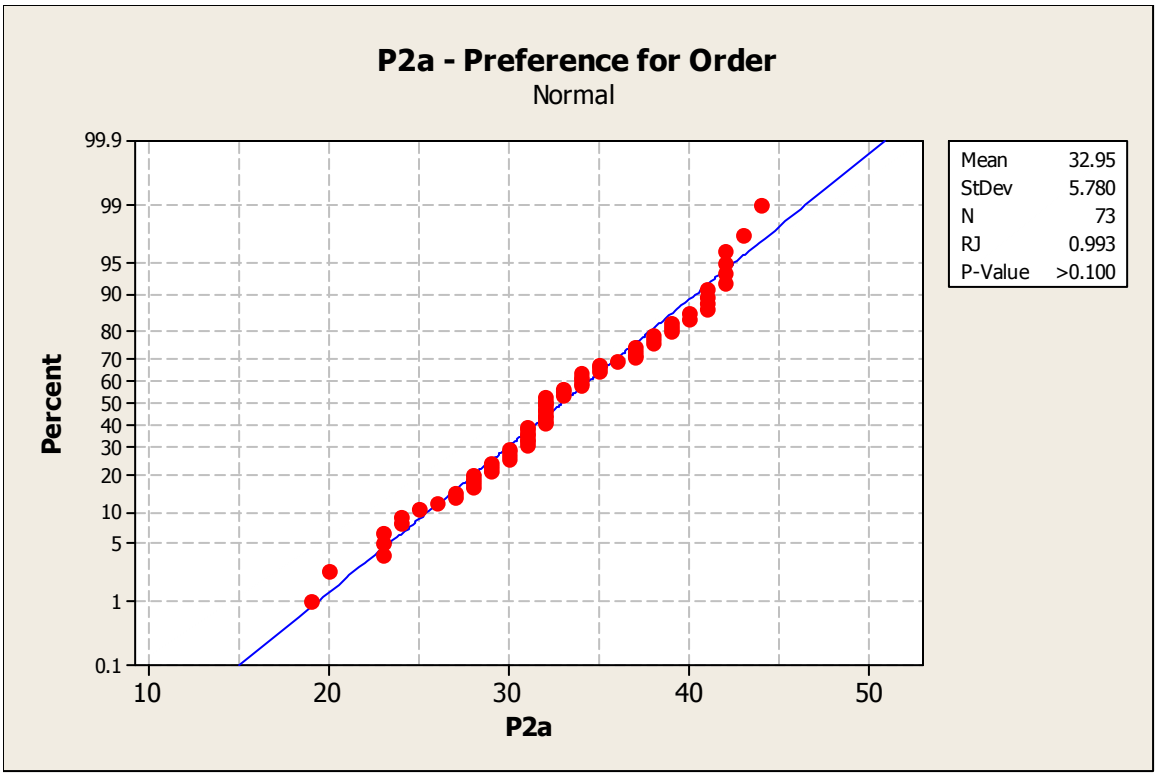

P3 - Creative Product (RIBS)
Normal
Percent
P3
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
60
80
100
120
140
160
180
200
Mean 134.3
StDev 20.24
N 73
RJ 0.995
P-Value >0.100

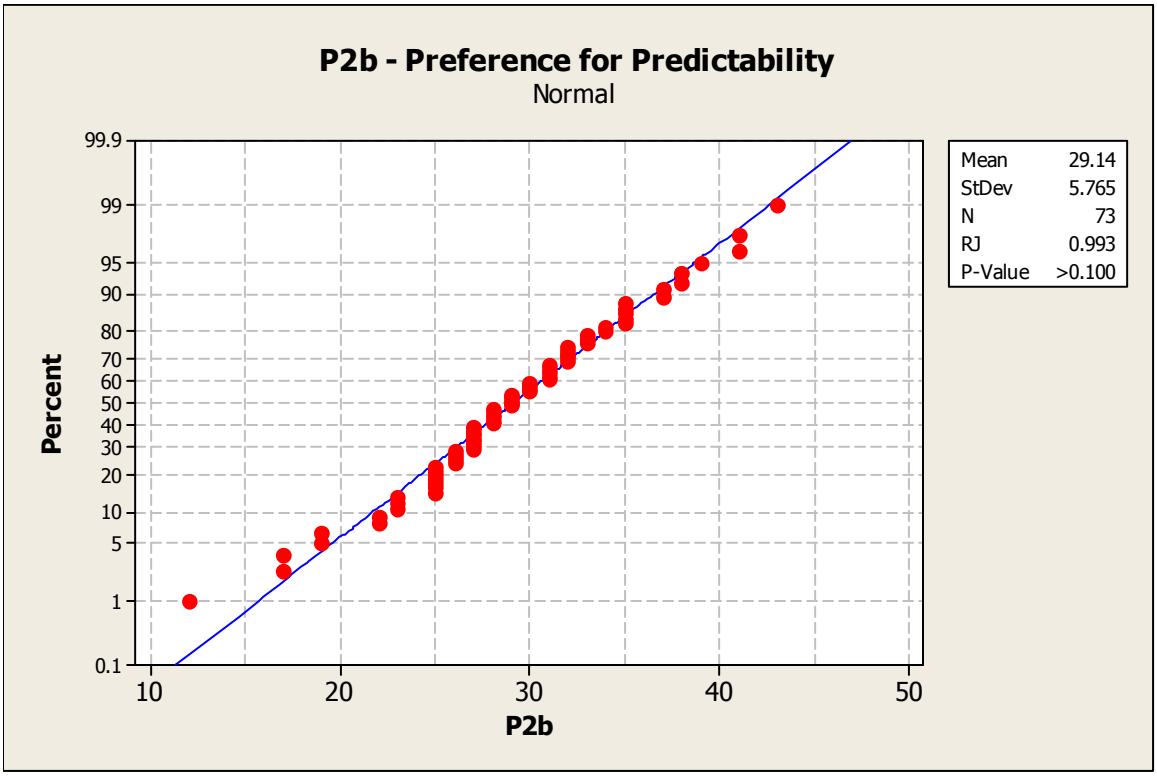

P4 - Creative Process (CoSI)
Normal
Percent
P4
Mean 63.38
StDev 8.017
N 73
RJ 0.985
P-Value 0.088

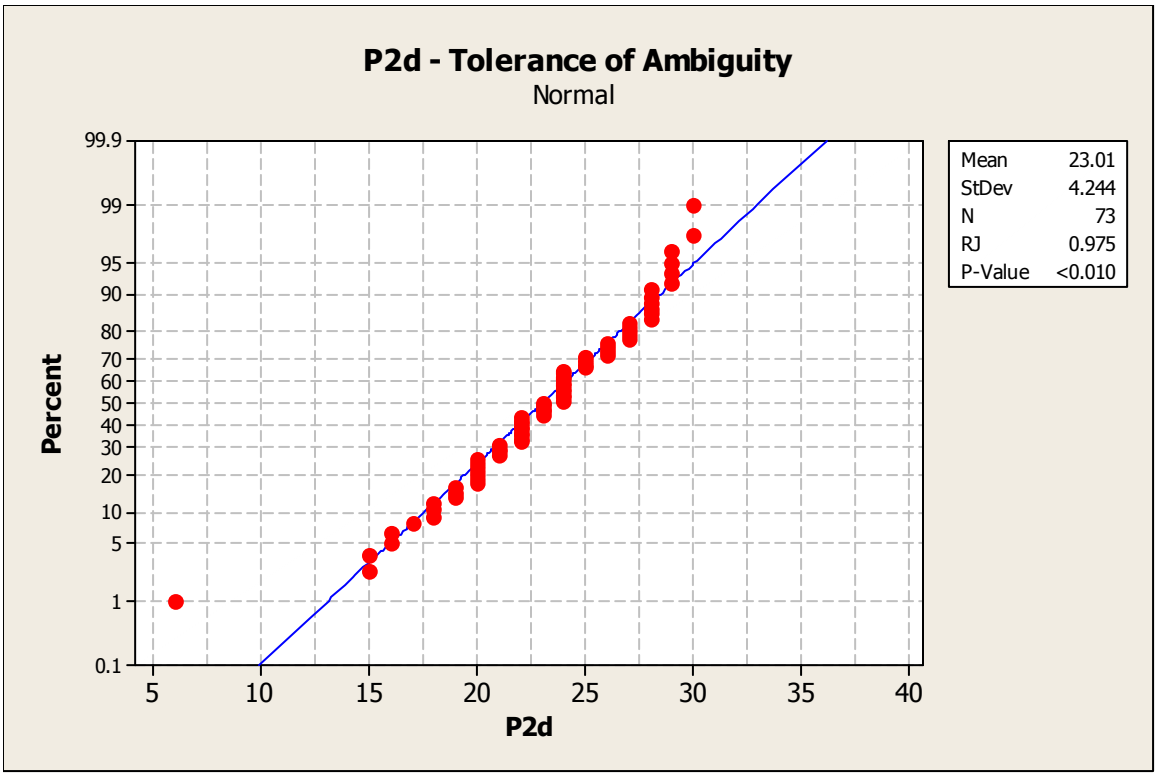

P1a - Support of Creativity
Normal
Percent
P1a
Mean 87.71
StDev 10.81
N 73
RJ 0.982
P-Value 0.043

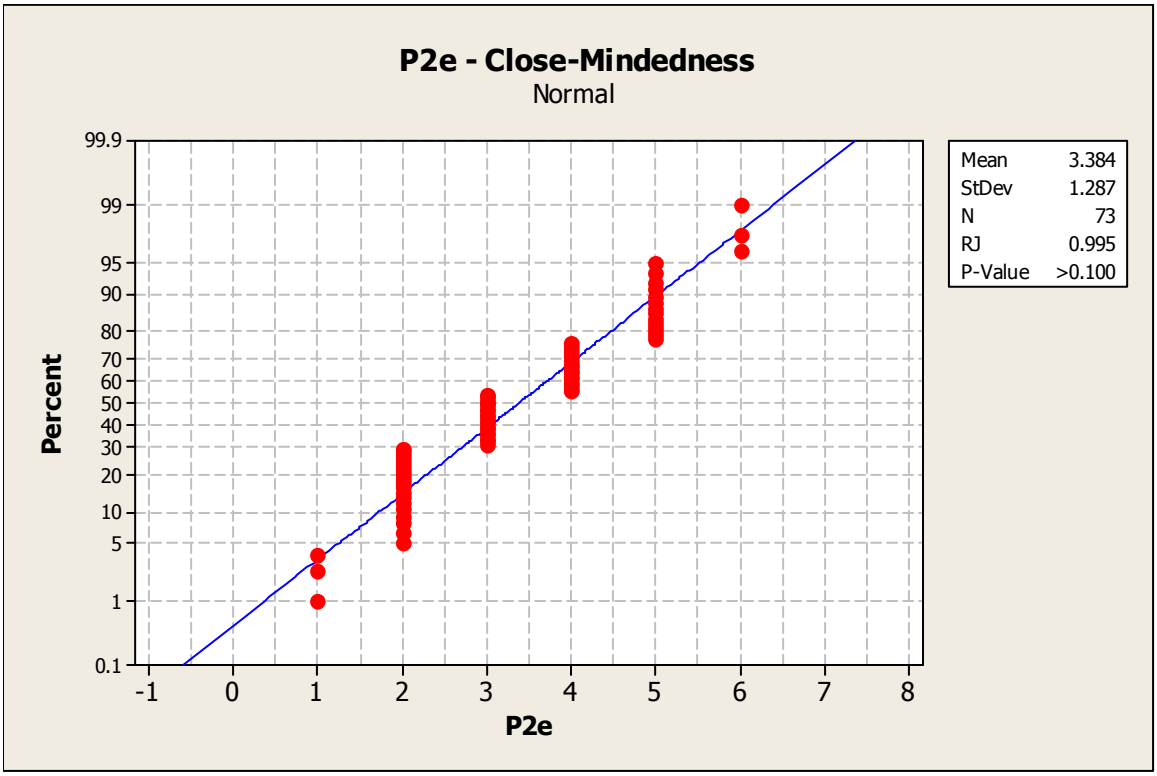

P1b - Tolerance of Differences
Normal
Mean 87.26
StDev 11.40
N 73
RJ 0.989
P-Value >0.100
Percent
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
50
60
70
80
90
100
110
120
130
P1b

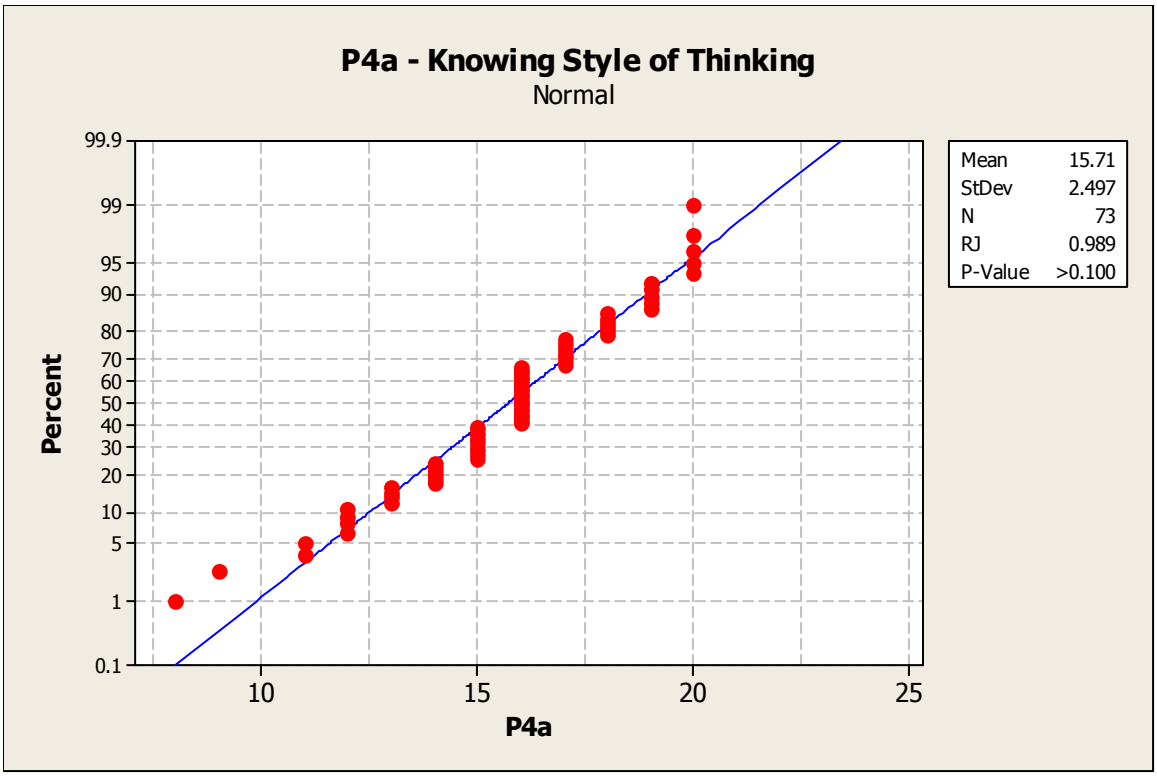

P1c - Personal Commitment
Normal
Mean 17.38
StDev 2.240
N 73
RJ 0.989
P-Value >0.100
Percent
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
10
12
14
16
18
20
22
24
26
P1c

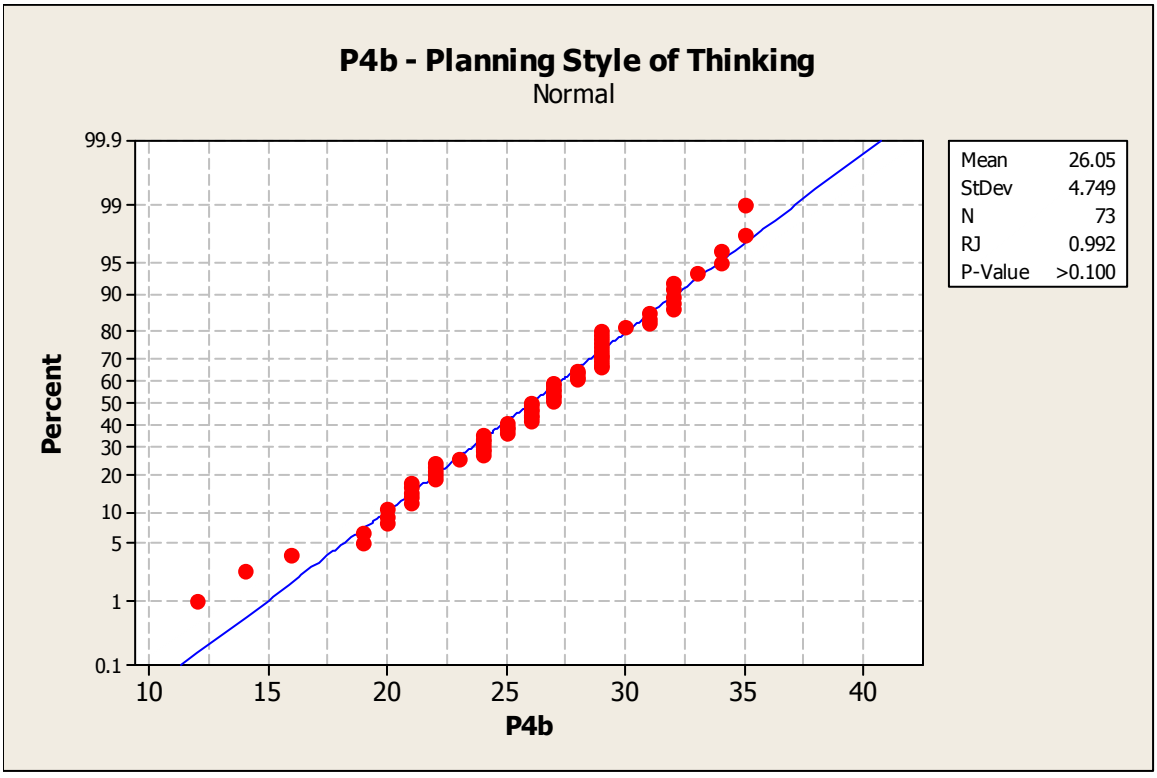

P2a - Preference for Order
Normal
Percent
P2a
Mean 32.95
StDev 5.780
N 73
RJ 0.993
P-Value >0.100

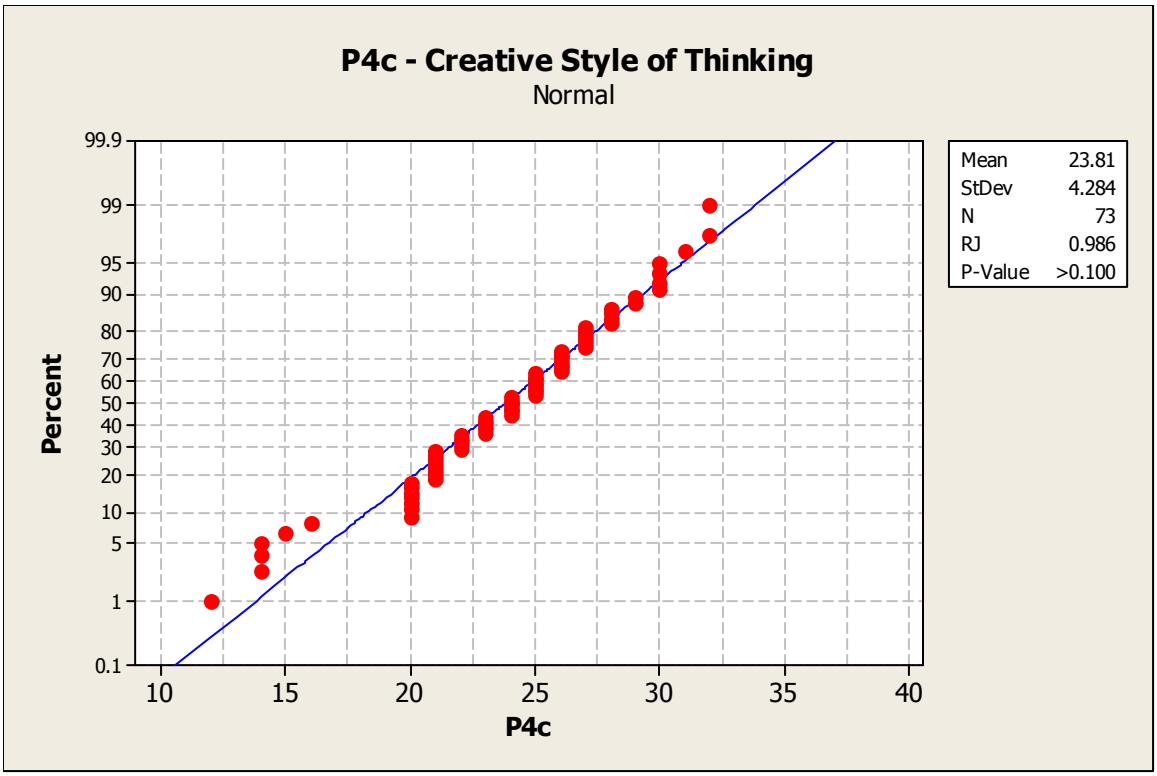

P2b - Preference for Predictability
Normal
Percent
P2b
Mean 29.14
StDev 5.765
N 73
RJ 0.993
P-Value >0.100


P2d - Tolerance of Ambiguity
Normal
Mean 23.01
StDev 4.244
N 73
RJ 0.975
P-Value <0.010
Percent
P2d


P2e - Close-Mindedness
Normal
Mean 3.384
StDev 1.287
N 73
RJ 0.995
P-Value >0.100
Percent
P2e


P4a - Knowing Style of Thinking
Normal
Mean 15.71
StDev 2.497
N 73
RJ 0.989
P-Value >0.100
Percent
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
10
15
20
25
P4a


P4b - Planning Style of Thinking
Normal
Mean 26.05
StDev 4.749
N 73
RJ 0.992
P-Value >0.100
Percent
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
10
15
20
25
30
35
40
P4b


P4c - Creative Style of Thinking
Normal
Percent
99.9
99
95
90
80
70
60
50
40
30
20
10
5
1
0.1
10
15
20
25
30
35
40
P4c
Mean 23.81
StDev 4.284
N 73
RJ 0.986
P-Value >0.100

VITA

Eddward Thomas Herron

Candidate for the Degree of

Doctor of Philosophy

Thesis: CHARACTERISTICS OF CREATIVITY IN RELATION TO AUDITORS' RECOGNITION OF FRAUD CUES AND RESPONSE TO PERCEIVED FRAUD RISK

Major Field: Accounting

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Accounting at Oklahoma State University, Stillwater, Oklahoma in 2012.

Completed the requirements for the Master of Accountancy in Accounting at Southern Illinois University, Carbondale, Illinois in 2004.

Completed the requirements for the Master of Education in Vocational Business Education at Southern Illinois University, Carbondale, Illinois in 1983.

Completed the requirements for the Bachelor of Science/Arts in Business Admin./Economics at Florida Southern College, Lakeland, Florida in 1980.

Experience:

Twenty-two years' experience in bank supervision, auditing, accounting, fraud examination, forensic accounting, and training both domestically (with the Federal Reserve) and abroad (with the International Monetary Fund).

Four years' experience teaching economics, accounting, auditing, banking and financial analysis as an instructor (two years) and assistant professor (two years) for various schools.

Professional Memberships:

AICPA, AAA, ILCPAS.

Name: Eddward T. Herron Date of Degree: July 2012

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: CHARACTERISTICS OF CREATIVITY IN RELATION TO AUDITORS' RECOGNITION OF FRAUD CUES AND RESPONSE TO PERCEIVED FRAUD RISK

Pages in Study: 168 Candidate for the Degree of Doctor of Philosophy

Major Field: Accounting

Abstract:

The research examines whether differences in scores for each of four recognized domains of creativity (assessed with standardized scales measuring workplace support of creativity, personality, degree of creative ideation, and learning style) are associated with auditors' *recognition of fraud cues* embedded in an audit narrative and, then, audit plan changes in *response to auditors' perceived fraud risk* from reading that same audit narrative. Findings suggest a significantly positive relationship between *recognition of fraud cues* and auditors' 1) personal commitment to work/employer, 2) creative ideation, and, 3) tolerance of ambiguity – and a negative relationship with auditors' 1) preference for order, and 2) close-mindedness. Similarly, a significantly positive relationship was found between *responses to perceived fraud risk* and auditors' 1) personal commitment to work/employer, and 2) creative ideation – but a negative relationship with auditors' scores for 1) close-mindedness, and 2) planning style of thinking.

Consequently, auditors who viewed their work as more than merely a job, were generally more creative in simple everyday ways, and were not so rigid in their thinking or the way they processed information were significantly better at both recognizing fraud cues and responding to fraud risks – as creativity theory would suggest.

The research used seventy-three practicing auditors as subjects to mitigate external validity problems. Findings provide an important theoretical extension of prior SAS no. 99 research, which focused only on brainstorming and analytical reasoning (two common tools to elicit *creative behavior*) – as well as significant practical benefits for the auditing profession in terms of auditor selection, assignment, and training.

ADVISER'S APPROVAL: Dr. Robert M. Cornell