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The Effects of Irrelevant Information and Minor Errors in Client Documents on Assessments of Misstatement Risk and Sample Size

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A dissertation submitted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business at Virginia Commonwealth University.

by

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ABSTRACT

The Effects of Irrelevant Information and Minor Errors in Client Documents on Assessments of Misstatement Risk and Sample Size

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This dissertation consists of three studies. The first study conducts a 2 by 2 experiment to examine how auditors are influenced by the presence of irrelevant information and minor errors (i.e., "dirty documents") when reviewing audit evidence produced by the client. This study tasks 97 public accountants to review audit evidence and finds some evidence that dirty documents influence an auditor's assessment of the likelihood of account misstatement and the appropriate sample size.

In order to demonstrate the usefulness of eye-tracking and to help generate potential research topics, the second study reviews extant literature in other disciplines where eye-tracking technology is applied to various judgment and decision-making contexts. This study suggests how

eye-tracking can enhance extant accounting research. Illustrative examples of promising research opportunities (extending extant research) are provided. In addition, this study identifies how eye-tracking can be applied to more contemporary decision making and educational circumstances.

The third study extends the first experiment through the use of eye-tracking technology. This study utilizes the same 2 by 2 experiment as the first study, but in this case records the eye movements of 43 auditing students while they review the audit evidence. The eye-tracking technology provides additional detail as to the specific evidence participants' focus on during their review. This study finds that participants focus their attention differently depending on whether irrelevant information or minor errors were present.

PART 1: The Effects of Irrelevant Information and Minor Errors in Client Documents on Auditor Decisions

I. INTRODUCTION

Reliable financial reporting is essential to maintaining confidence in our capital markets. Audits are one mechanism that assist in maintaining reliable financial reporting and create value for a number of stakeholders (e.g., investors, analysts, trade exchanges, audit committees, client management, internal auditors, as well as external audit firms). One important feature of every audit is the application of professional skepticism. The auditor's daily exposure to increasingly unique and complex transactions, the expanded use of judgment based estimates and measurements, and the emergence of big data all contribute to an ongoing awareness of the need to properly apply professional skepticism (Glover and Prawitt 2013).

This study examines the influence of client provided "dirty documents" on auditors' skeptical judgments and actions. For purposes of this study, a "dirty document" is defined as a client produced record that contains irrelevant information and/or minor errors. Irrelevant information is extraneous information. Minor errors are errors that are immaterial to the related account balance as well as to the overall financial results and do not appear to be intentional or deceptive. However, although immaterial and unintentional, minor errors may accumulate to a level (or form a pattern) that triggers an adjustment to an auditor's assessment of risk. This study also examines whether dirty documents contribute to over auditing, which is a waste of financial resources and an unnecessarily stressful misuse of audit staff. Onsite auditors interact daily with the client's staff (e.g.,

requesting documents and related clarification). Therefore, an important aspect of the daily auditor-client relationship centers around the quality of the client records provided to the auditor; and the subsequent potential impact that the quality of the record has on the auditor's application of professional skepticism.[1]

This study also examines the role of professional skepticism in the evaluation of dirty documents. The Public Company Accounting Oversight Board (PCAOB) defines professional skepticism as an attitude that includes a questioning mind, being alert to conditions that may indicate possible misstatement due to fraud or error, and a critical assessment of audit evidence (AS 1015). However, in practice the appropriate level of professional skepticism rises and falls along a continuum or range of auditor behavior depending on the circumstances (Glover and Prawitt 2013). In addition, applying the appropriate level of professional skepticism requires achieving a balance between gathering evidence and documentation vs. audit effectiveness and efficiency (including controlling costs).

To examine how auditors are influenced by dirty documents, this study conducts an experiment with 100 participants that have public accounting experience. In a computerized task, participants assume the role of a staff auditor in completing the accounts receivable portion of an audit. Participants review the audit evidence and then assess the likelihood of account misstatement and the appropriate sample size. The presence of irrelevant information and the presence of minor errors is then manipulated between conditions. This paper examines three aspects related to auditor skepticism: trait skepticism, skeptical judgment, and skeptical action. Trait skepticism is a measured

[1] To illustrate, Mr. Paul Meyer, Regional Audit Director at Cherry, Bekaert, LLP, acknowledged dirty documents as "a frequent occurrence that could potentially influence an auditor's assessment of risk."

independent variable captured using the Hurtt scale (2010). Skeptical judgment and skeptical action are dependent variables that are captured from participants' responses after viewing the case materials.

With respect to the underlying behavioral theory, this study posits that the quality of client records influences the application of professional skepticism. Specifically, when auditors encounter client records contaminated with irrelevant information and/or minor errors, how are their judgments and actions impacted? Recent research suggests process accountability theory and epistemic motivation are related to higher quality auditor judgment (e.g., Cohen, Krishnamoorthy, Peytcheva, and Wright 2013). Process accountability is the expectation (regardless of the final outcome) of having to justify your decision to others (Tetlock 1983; Siegel-Jacobs and Yates 1996). Epistemic motivation is the desire to fully understand the problem at hand (Kruglanski 1989; Dreu and Carnevale 2003; Scholten, Van Knippenberg, Nijstad, and Dreu 2007).

Process accountability and epistemic motivation suggest that auditors encountering dirty client records will perform more extensive audit testing than they otherwise would with clean records. The same logic applies to irrelevant information and minor errors operating separately. Auditors encountering irrelevant information and minor errors in client provided records are expected to seek out additional explanations or perform additional procedures and consequently make more skeptical judgments.

This study offers numerous contributions to the literature. First, the results show that as much as 30 percent of an auditor's time on-site can involve cleaning up dirty client documents. This is an important result because this additional work not only impacts audit efficiency and cost, but also contributes to auditor stress and burnout. Second, this study

finds that an auditor's skeptical judgment and action are impacted by both irrelevant information and/or minor errors. This finding suggests that dirty documents contribute to inefficient auditing. The results indicate that the presence of minor errors in audit evidence leads to increases in the estimates of account misstatement likelihood and leads to increases in sample size. When irrelevant information is present, auditors keep the likelihood of misstatement constant, but respond by increasing the sample size. This suggests that the presence of irrelevant information does not immediately cause auditors to conclude that misstatements are more likely to occur, but still results in a more questioning mindset leading to a larger sample size.

Third, this study examines how dirty documents influence auditors with different levels of trait skepticism. Results indicate that trait skepticism does not influence an auditor's skeptical judgments or actions. Specifically, this result suggests that auditors (regardless of their trait skepticism level) make similar skeptical judgments and take similar action with respect to sample size. Perhaps the similar judgments and actions across auditors with different trait skepticism levels indicates that auditor training acts as a modifier for trait skepticism.

Fourth, this study is the first to use evidence that is experienced first-hand by the auditor. Specifically, this study simulates use of records, containing irrelevant information and minor errors, that are produced directly by the client versus the less personal second-hand anecdotal evidence used in previous research (e.g., Hackenbrack 1992). The more applied context adds a personal and possibly a more relevant and/or realistic experience to the research setting. In addition, the significance of a more applied context is that a dirty

record prepared directly by the client may contribute to the auditor's ongoing assessment of client competence.

Fifth, this study provides evidence that a dilution effect does not always occur when auditors are provided with superfluous information. Prior literature using second-hand anecdotal evidence finds that the strength of auditor decisions is reduced when auditors are provided with irrelevant information (e.g., Hoffman and Patton 1997; Shelton 1999). This study's audit setting utilizes records produced directly by the client (and therefore experienced first-hand by the auditor) and finds no dilution effect occurs.

The results of this study should be useful to audit firms, clients and regulators who have an interest in both the application of professional skepticism as well as avoiding the time and expense associated with unnecessary auditing. First, the results should be useful to audit firms, since they are continuously balancing audit risk and available auditor work hours while avoiding the time and expense associated with unnecessary auditing. Second, the results should be important to audit clients, who also are concerned with avoiding the time and expense associated with unnecessary auditing. This study may also start a dialog on the politically incorrect and controversial issue of what is the acceptable likelihood of audit failure? Finally, the results may encourage a discussion to expand the PCAOB definition of professional skepticism to recognize a concomitant obligation to avoiding unnecessary auditing.

This rest of this study is organized into the following sections: Section II reviews the current accounting literature on skepticism; Section III reviews the theories supporting the hypotheses in Experiment 1, and concludes with my hypotheses; Section IV describes the design of Experiment 1 including details about the participants, experimental task, as

well as the independent and dependent variables; Section V describes the results; and Section VI provides conclusions on Experiment 1.

II. LITERATURE REVIEW

Professional Skepticism

The word skepticism comes from the root word "skeptic", which comes from the Greek word "skeptikos", meaning inquiring or reflective (Glover and Prawitt 2013). Therefore, someone labeled as being skeptical could also be described as having a questioning mind, or as being doubtful. In an auditing context, the "presumptive doubt" mindset defines professional skepticism as an attitude that includes a questioning mind and critical assessment of audit evidence (e.g., Nelson 2009; PCAOB 2012; Carpenter and Reimers 2013).[2] Other studies (e.g., Bamber, Ramsay, and Tubbs 1997; Cushing 2003; Hurrt 2007) assert that unless there is evidence to the contrary, the auditor's mindset should be neutral (i.e., no presumption one way or the other as to management carelessness, incompetence or fraud). In AU-C 200, the American Institute of Certified Public Accountants (AICPA) defines professional skepticism as "an attitude that includes a questioning mind, being alert to conditions that may indicate possible misstatement due to error or fraud (2012)." However, it also states that "[an] auditor neither assumes that management is dishonest nor assumes unquestioned honesty (2012)". Glover and Prawitt (2013) conceptualize the application of professional skepticism as falling along a continuum ranging from complete doubt to total trust.[3] In practice an auditor's application

[2] The PCAOB statutory regulations require a neutral mindset (i.e., "The auditor neither assumes that management is dishonest nor assumes unquestioned honesty."). However, the Staff Audit Practice Alert excludes this requirement from its overview of professional skepticism and due professional care. Therefore, this study views the Staff Audit Practice Alert as encouraging a presumption of doubt mindset.
[3] In practice, since an auditor always maintains a questioning mindset, it's arguable that an auditor would never embrace a position of total trust.

of skepticism is likely to fluctuate widely because of the ever changing circumstances, documents and people encountered during an audit.

This study examines three aspects of professional skepticism: trait skepticism, skeptical judgment, and skeptical action. Trait skepticism is comprised of "… individual characteristics that enable auditors to determine when evidence does not "add up," or traits that allow auditors to exercise skeptical judgment (Hurrt, Brown-Liburd, Earley, and Krishnamoorthy 2013 pp. 50). Skeptical judgment occurs when an auditor recognizes that a potential issue may exist and decides that more work is necessary (2013). Lastly, skeptical action is the final step where an auditor modifies their behavior based on their judgment.

Relevant Literature on Professional Skepticism

Nelson (2009) and Hurtt et al. (2013) conduct detailed literature reviews on auditor professional skepticism. The Nelson literature review synthesizes the literature and proposes a model on skepticism. The Nelson model theorizes that auditor judgments and actions are determined by auditor traits, knowledge, incentives and evidential input. Hurtt et al. focus on more recent studies and extend Nelson's model by creating a new category of skepticism called antecedents of skeptical action and judgment. The antecedents of skeptical action and judgment include auditor characteristics, evidential characteristics, client characteristics, and external environment characteristics.

Figure 1 and Figure 2 illustrate the models developed in Nelson (2009) and Hurtt et al. (2013). With respect to this study, each of the three variables of interest, trait skepticism, skeptical judgment and skeptical action, are reflected in both models. Skeptical action and judgment are directly identified as key components in both models. An auditor's

trait skepticism is reflected in the Nelson model under 'traits' and in the Hurtt et al. model under 'auditor characteristics'. The irrelevant information and minor errors utilized in this study are consistent with the 'evidential input' component of the Nelson model and in the 'evidential characteristics' component of the Hurtt et al. model. The following sections discuss key elements of these models as that pertain to this study.

[Insert Figure 1 and 2 here]

Auditor Knowledge

An auditor's inherent knowledge on a topic can play a part in subsequent judgments and actions. Research on auditor knowledge (i.e., what Nelson (2009) breaks down into frequency knowledge, pattern recognition, and specialization) identifies both positive and negative effects of knowledge on professional skepticism. For example, extant research on frequency knowledge (i.e., knowledge of the frequency of types of errors) indicates that experienced auditors are familiar with error causes and effects, and this knowledge increases with experience (Libby 1985; Ashton 1991; Frederick 1990). Similarly, research on pattern recognition reveals that greater knowledge of error frequencies helps auditors better analyze and respond to unexpected audit findings (Libby 1985; Frederick 1990; Trompeter and Wright 2010). Lastly, research on auditor specialization finds that experienced auditors are better able to disregard irrelevant data and are better able to make connections among related pieces of evidence that might suggest an increased risk of error (Brown and Solomon 1990, 1991; Bedard and Bigs 1991; Maletta and Kida 1993; Shelton 1999; Low 2004; Hammersley 2006).

There is also evidence that experience may have a negative effect on professional skepticism. For instance, extant research suggests that more experienced auditors are more

likely to believe that exceptions noted during audits have reasonable non-error explanations than less experienced auditors (Kaplan, Moeckel, and Williams 1992). Such reasoning could negatively impact professional skepticism (Koonce 1992). There is evidence that specialist auditors are more likely to believe that audit findings have non-error causes and assess lower levels of inherent risk compared to non-specialist auditors (Solomon, Shields, and Whittington 1999; Taylor 2000; Payne and Ramsay 2005). In other words, research indicates that more experienced auditors tend to over rely on client explanations and are at risk of assessing an inappropriately low level of risk. Therefore, while auditor knowledge may improve an auditor's ability to handle complexity in an audit, it may lead to auditors becoming biased or less skeptical towards their clients.

Auditor Traits

Research also finds that certain personal traits influence an auditor's judgment and actions. Research on auditor traits includes non-knowledge related items such as problem solving ability, ethical beliefs, and professional skepticism. As expected, extant research on problem solving ability finds that higher ability is generally associated with higher performance on professional skepticism related tasks (Bonner and Lewis 1990; Libby and Tan 1994; Bierstaker and Wright 2001). Literature on ethics or moral reasoning finds similar positive results. These studies, which tend to use assessment instruments like the Rest (1986) defining issues test (DIT), find that auditors scoring higher in moral development tend to be more sensitive to client competence and integrity (Ponemon 1993; Ponemon and Gabhart 1993) and are more likely to identify potentially inappropriate client activity (Bernardi 1994; Jones, Massey, and Thorne 2003). These findings suggest that

auditors who are inherently better at problem solving and more morally developed would make more skeptical judgments than other auditors.

Skepticism Scales

This study adopts the Hurtt (2010) scale to measure trait skepticism in auditors. The Hurtt scale is a relatively recent output from a stream of literature relating to measuring skepticism (e.g., Schaub 1996; Rennie, Kopp, and Lemon 2007; Hurtt 2010). An early study by Schaub (1996) compares peoples' scores on a scale measuring peoples' general propensity to be skeptical and a scale measuring auditor trust in their client. The scale measuring peoples' general propensity to be skeptical includes two earlier scales developed by Wrightsman (1974) that assess the belief that people are trustworthy and independent. Schaub's comparison reveals no relation between scores on the propensity to be skeptical scale and the client-trust scale. Similarly, Rennie et al. (2007) conduct a related analysis and find no association between the client trust measure from Schaub (1996), the auditors' recalled trust in their client scale, and the auditors' general predisposition to trust people scale.

Hurtt (2010) develops and tests a scale that specifically measures auditor professional skepticism (i.e., what this study refers to as trait skepticism). Hurtt's 30-question scale includes measures of six separate characteristics of skeptics supported by philosophy literature that include: suspension of judgment, questioning mind, search for knowledge, interpersonal understanding, self-confidence, and self-determination. Consistent with the definitions of professional skepticism discussed previously, Hurtt's scale suggests that skeptics keep an open mind, question possible conclusions, and consider the possibility that evidence is biased when searching and reviewing evidence.

Subsequent studies validate the Hurtt scale (e.g., Fullerton and Durtschi 2005; Hurtt, Eining, and Plumlee 2008; Rosman 2011; Popova 2012; Faraq and Elias 2012; Quadackers, Groot, and Wright 2009; 2014). For instance, Hurtt et al. (2008) apply the Hurtt skepticism scale to a group of auditors to examine how skepticism influences assessment of audit evidence and generation of alternative explanations for findings. They find that under normal and higher risk audit situations, auditors scoring higher on the skepticism scale engage in more skeptical behaviors than those that score low in skepticism.

Fullerton and Durtschi (2005) apply the Hurtt scale to a study examining internal auditors and their search for evidence. Their results indicate that internal auditors with higher scores on the skepticism scale have a greater desire to search for explanations regarding fraud symptoms. In other words, those determined to be more skeptical also have a more questioning mindset towards potential fraud issues they encounter in the survey. Lastly, in another related study, Quadackers et al. (2009) apply the Hurtt scale to a group of Big-4 auditors in the Netherlands to examine the relationship between their scores on the Hurtt scale and their subsequent judgments on an analytical procedures task. Similar to Fullerton and Durtschi (2005), their results indicate that high scores on the Hurtt scale are positively associated with skeptical auditor behaviors (e.g., the desire to perform further testing and the generation of alternative explanations).

In a more recent study, Quadackers et al. (2014) re-examine the Hurtt scale's predictive ability in a comparison with the Rotter Interpersonal Trust scale (RIT; Rotter 1967).[4] The Hurtt scale is a relatively unbiased instrument when compared to the RIT scale

[4] The RIT scale measures an individual's level of trust, thus to apply it to a skepticism setting they used the inverse value of a participant's score on the RIT scale.

which emphasizes a lack of trust and therefore tends to be negatively biased against the client. Quadackers et al. predict and find, that although high scores on both scales are associated with more skeptical auditor judgment, the RIT scale outperforms the Hurtt scale in high-risk settings. The results make sense, as intuitively, someone scoring low on trust is probably negatively biased against the client and therefore makes relatively more skeptical judgments in all situations; low as well as high risk. For purposes of the study, the Hurtt scale is used because it is less biased overall and it has been extensively validated as a reliable research tool.

Auditor Incentives

Incentives, in addition to knowledge and traits, also influence an auditor's judgment and action. Due to the many powerful yet conflicting incentives auditors face on a regular basis (e.g., the incentive to retain clients and the incentive to avoid litigation), there are abundant studies across the various research methodologies investigating the impact and interaction between various auditor incentives. For instance, analytical research on auditor incentives focuses on the auditor-client interaction and argues that auditors are biased by the types of incentives they encounter in the field (e.g., Nichols and Price 1976; DeAngelo 1981; Antle 1982, 1984; Fellingham and Newman 1985; Magee and Tseng 1990; Antle and Nalebuff 1991; Teoh 1992; Bloomfield 1995; Johnstone, Sutton, and Warfield 2001).

Archival research examining auditor incentives primarily focuses on how non-audit fees influence auditor independence. Although auditor independence is not the same as auditor skeptical judgment and action, the three constructs are closely interrelated. For instance, the suggestion by an auditor to limit discretionary accruals or to issue a going concern statement (two common variables from this subset of audit archival research)

suggests they are exercising skeptical judgment and skeptical action. Some studies in this subset of archival research find evidence of non-audit fees reducing auditor independence (e.g., Frankel, Johnson and Nelson 2002; Larcker and Richardson 2004; Srinidhi and Gul 2006; Blay, and Geiger 2013; Causholli, Chambers, and Payne 2014), while other studies find that non-audit fees have no effect on auditor independence (e.g., DeFond, Raghunandan, and Subramanyam 2002; Ashbaugh, LaFond, and Mayhew 2003; Chung and Kallapur 2003; Ruddock, Taylor, and Taylor 2006). Thus, from an archival standpoint there is mixed evidence that non-audit fee incentives influence auditors' actions.

Experimental research examining auditor incentives finds that auditors' judgments and actions become more skeptical as the risk of litigation or reputation threats increase. Experimental research in this area addresses auditor incentives such as client fee pressure (e.g., Gramling 1999; Houston 1999; Beeler and Hunton 2002; Asare, Cohen, and Trompeter 2005), client retention concerns (e.g., Farmer, Rittenberg, and Trompeter 1987; Trompeter 1984; Chang and Hwang 2003; Blay 2005), audit partner compensation (e.g., Trompeter 1994), and litigation exposure (e.g., Hackenbrack and Nelson 1996; Braun 2001; Houston, Peters, and Pratt 1999; Hwang, and Chang 2010). However, there is some evidence that certain incentives may cause auditors to jeopardize their application of skepticism. For instance, Gramling (1999) finds that when fee pressure is high auditors are more likely to rely on the work of internal auditors as part of their test work. Hackenbrack and Nelson (1996) provide evidence that when engagement risk is moderate, auditors permit their clients to take aggressive reporting stances. Lastly, Blay (2005) suggests that when the risk of losing the client is high, auditors are more likely to recommend issuing a clean audit report.

In a more recent literature review on skepticism, Hurrt et al. (2013) highlight that auditors may lack positive incentives to make skeptical judgments. For instance, Bazerman and Tenbrunsel (2011) raise the issue that a firm's goals and reward incentives for auditors could cause staff to sacrifice their level of skepticism to meet short term firm goals. In other words, an auditor who is rewarded on results over high quality decisions, may choose the more rewarding path of finishing the audit quickly instead of the more appropriate action involving additional documentation and/or audit procedures. To address this issue, Peecher, Solomon, and Trotman (2013) suggest a shift away from penalty based auditor incentives, such as litigation, through the incorporation of more positive incentives.

Auditor Judgment

Since judgment is an integral part of every audit, there is an abundance of research in this area (see Allen, Hermanson, Kozloski, and Ramsay 2006; Nelson 2009; and Hurrt et al. 2013 for more detailed literature reviews). Relevant literature in this area includes research on topics such as motivated reasoning (e.g., Wilks 2002; Kadous, Kennedy, and Peeacher 2003; Glover, Prawitt, and Wilks 2005; Guiral, Ruiz, and Rodgers 2011), time pressure (e.g., McDaniel 1990; Kelley and Margheim 1990; and Braun 2000), belief updating (e.g., Ashton and Ashton 1990; McMillan and White 1993; and Bamber, Ramsay, and Tubbs 1997), and irrelevant information (e.g., Hackenbrack 1992; Glover 1997; Hoffman and Patton 1997; Shelton 1999).

Motivated Reasoning

There is an extensive body of research on motivated reasoning and its influence on auditor judgment. In general, the results are consistent with motivated reasoning theory. Motivated reasoning theory (see Pyszczynski and Greenberg 1987; Kunda 1990; Lundgren

and Prislin 1998) suggests that auditors who are motivated to reach a certain outcome process information in a way that ultimately fits that preferred outcome. For instance, Wilks (2002) examines audit manager judgments in an experiment manipulating whether audit managers are aware of their audit partner's beliefs prior to or after making their own decision. Wilks finds that managers who know their audit partner's beliefs ahead of time tend to be biased towards the partner's decisions.

Similarly, Glover et al. (2005) conduct a study examining why auditors sometimes over-rely on evidence obtained from weak substantive analytical procedures. To examine this issue they conduct an experiment where auditors rate the strength of evidence provided by weak analytical procedures performed in relation to whether an account was materially misstated. Results of Glover et al. reveal that auditors view evidence that confirms their prior beliefs to be more persuasive than evidence differing from prior beliefs.

More recently, Guiral et al. (2011) investigate whether auditors' beliefs about evidence are influenced by a self-fulfilling prophecy. They examine this issue in a going concern opinion case setting, where they have auditors review evidence and rate how much it supports their initial beliefs about the client in the case. Results of the experiment show that auditors are more sensitive to evidence that supports their initial belief than disconfirming evidence. Thus, the overall results indicate that an auditor's initial belief influences their judgment.

Time Pressure

Another related stream of literature addresses how time pressure influences auditor judgment. Time pressure is an ongoing issue for audit firms as they strive to manage their staff in the most efficient way possible in order to maximize billable hours (McDaniel

1990). Time pressure is especially important where auditors are required to travel to the client's site or complete the bulk of their work onsite. As expected, extant literature suggests that time pressure can lead to an increase in efficiency at the cost of audit quality (McDaniel 1990; Gramling 1999). Furthermore, time pressure can lead to auditors overlooking critical pieces of evidence that might impact audit risk (Braun 2000). Time pressure also increases the likelihood that auditors engage in inappropriate time-saving behaviors, such as signing-off on procedures before they are fully completed (Kelley and Margheim 1990). However, there is also evidence suggesting that time pressure may help auditors avoid being distracted by irrelevant information (Glover 1997).

Belief Updating

Another stream of research on auditor judgment relates to belief updating. Initial research in belief updating relies on the Bayes' theorem. The Bayes' theorem suggests that auditor beliefs are determined by mathematical probabilities. Unfortunately, there are many situations where the Bayes' theorem failed to predict changes in auditor beliefs. These deviations from the theoretical predictions are attributed to auditors failing to consider all relevant information (Ashton and Ashton 1988). Consequently, more recent research often uses the Hogarth and Einhorn belief revision model (1992), which does not assume that individuals will exhaustively consider all relevant information.

The belief revision model describes how an initial hypothesis (e.g., the accounts receivable account balance is misstated) is updated with the receipt of new evidence (see Hogarth and Einhorn 1992 for further information on their belief revision model). Procedurally, Hogarth and Einhorn's model fits auditing research well, as auditors approach much of their test work with an initial hypothesis, test their hypothesis with

various audit procedures, and then reach their final conclusion. Prior research finds that changes in auditor beliefs when evaluating evidence are influenced by a recency effect where more recent evidence is weighted more strongly than less recent evidence (e.g., Ashton and Ashton 1988; Tubbs, Messier, and Knechel 1990; Asare 1992; Krull, Reckers, and Wong-on-Wing 1993), evidence presentation mode (e.g., Ashton and Ashton 1990; Knechel and Messier 1990), and confirmation bias (e.g., Butt and Campell 1989; McMillan and White 1993; Bamber, Ramsay, and Tubbs 1997).

Ashton and Ashton (1988) investigate various influences on auditor belief updating in an extensive series of five experiments. Specifically, they ask participants to assume an initial probability that an account is misstated. They then present different types of evidence to the participants, and measure the change in the probability of a misstatement from the initial anchor point. Using auditors as participants, they examine the direction of evidence (confirming vs. disconfirming), strength of evidence (strong vs. weak), evidence type (consistently in the same direction vs. additional evidence in mixed directions), evidence order (strong first vs. weak first), and evidence presentation mode (sequential vs. simultaneous). Their experiments provide evidence that weak initial anchor points are more influenced by confirming evidence than relatively stronger initial anchor points. They also find evidence of a recency effect as well as evidence of a dilution effect (i.e., relevant information is under-utilized). These findings suggest that the manner in which evidence is received, and whether it confirms or disconfirms initial beliefs, has a strong influence on auditor judgment.

Tubbs et al. (1990) conduct four experiments relating to the recency effect on auditor belief updating. Their first two experiments manipulate the order of evidence

(weaker first vs. stronger first), while the second two focus on mixed evidence cases (both positive and negative information presented). Results of their study indicate that consistent additional evidence (all positive or all negative) does not lead to a recency effect. However, a recency effect can occur when the evidence is mixed (some positive and some negative).

Asare (1992) examines whether there is a recency effect with respect to going concern decisions. Specifically, Asare examines whether the type and order of evidence interact with auditors' sequential processing of evidence in a going-concern setting. Asare's findings are consistent with Ashton and Ashton (1988), and Butt and Campell (1989). Specifically, Asare finds in both belief revision and audit report decisions, that when auditors assess the going concern of a company, they tend to be biased by a recency effect in evidence evaluation. In other words, auditors who last review evidence suggesting the company would continue to exist, ultimately issue fewer going concern opinions, compared to settings where auditors last review evidence suggesting otherwise.

Krull et al. (1993) examine whether presentation order (mixed positive and negative information) and fraud signals (present or absent) influence decisions. In addition, Krull et al. examine whether experience influences decisions in their study. Instead of using auditors, they investigate manager reactions in a fraud assessment case. They observe a recency effect where the more experienced managers assign a greater weight to the last pieces of evidence received.

Ashton and Ashton (1990) focus on whether evidence presentation mode influences auditor judgment. In other words, they examine whether auditors react differently depending on whether evidence is presented all at once or one piece at a time in a sequence. Building on their initial study above, Ashton and Ashton conduct a study examining how

evidence presentation (sequential vs. simultaneous) and evidence type (positive vs. negative) impacts auditor belief updating. They find that there are greater changes in auditors' beliefs when evidence is negative. They also find evidence presented sequentially leads to greater changes in beliefs than evidence presented simultaneously. They compare their findings to non-auditor participants by running similar experiments with business executives. Contrary to their findings with auditors, business executives are not influenced by positive or negative evidence; nor are they influenced by whether evidence is presented sequentially or all at once. Therefore, this study suggests that auditor training may bias the way evidence is evaluated.

Knechel and Messier (1990) also study whether evidence presentation mode influences auditor judgment. In an experimental setting, they allow auditors to select which additional sources of evidence to review in their analysis and whether to stop at that point or to continue reviewing more evidence. Specifically, Knechel and Messier examine how an auditor's search for additional information influences their evaluation of audit evidence. They find that when given a choice, auditors chose to focus on the more reliable pieces of evidence. Additionally, their results indicate that auditors that stopped earlier in the sequential search for evidence tend to have more extreme assessments. Lastly, consistent with prior studies (e.g., Ashton and Ashton 1988), they find that auditor beliefs were more impacted by negative evidence than positive evidence.

Butt and Campell (1989) look at evidence type (i.e., positive vs. negative) and how auditors approach evidence evaluation. They investigate whether auditors implement an earlier version of the belief revision model called the contrast/surprise model (see Einhorn and Hogarth 1985) or whether they use a hypothesis testing strategy (i.e., they are

confirmation biased) when evaluating a company's internal control system. Butt and Campell find evidence that auditors are not confirmation biased. Their results also indicate that auditors do not seek to confirm their initial assessments and are not more influenced by evidence supporting their initial belief. Finally, they find evidence of a recency effect on auditor decision making which is consistent with earlier studies.

McMillan and White (1993) look at how the framing of a hypothesis test influences auditor skepticism. They are the first to examine how auditors react in error and non-error settings. Non-error settings are situations where it is assumed that the error was not intentional. Additionally, they also look at how experience and the type of evidence (i.e., confirming vs. disconfirming) influence auditors. The results of McMillan and White's study are consistent with prior studies such as Ashton and Ashton where they find that auditors are more sensitive to disconfirming evidence. Their results also indicate that where there is evidence of a possible confirmation bias, auditors tend to ignore disconfirming evidence in the non-error frame. However, their results indicate that auditors are not prone to pre-mature conclusions overall. Therefore, the results of this study are consistent with previous studies' findings that auditors are not confirmation biased in their decisions.

However, subsequent research suggests that auditors may be confirmation biased (e.g., Bamber et al. 1997; Brown, Peecher, and Solomon 1999; Montague 2010). For instance, Bamber et al. (1997) have a group of auditors examine the likelihood of fraud involving inventory and the likelihood of collecting a material accounts receivable balance. Results of their analysis indicate that auditors exhibit a confirmation bias in their assessments. This suggests that auditors may be biased in certain situations towards their initial hypotheses when evaluating audit evidence.

In summary, the findings in belief revision studies suggest that auditor evaluation of evidence may be dependent on which pieces of evidence they encountered last, the presentation of evidence, and their initial biases.

Irrelevant Information

The preceding review of belief updating research is an excellent lead-in to the stream of literature regarding the influence of irrelevant information, as the two areas are closely interrelated. However, please note that this study differs significantly from extant research with respect to the source of the audit evidence. Specifically, this study simulates use of records containing irrelevant information that are produced directly by the client versus the second-hand anecdotal evidence used in previous research. Based on prior research suggesting the source of evidence influences auditors' assessment of risk (Hirst 1994), the results of the research studies discussed below may not hold in this more personal applied context.

Extant research on literature examining irrelevant information generally finds that irrelevant information diminishes the impact of fraud cues on auditor risk assessment (Hackenbrack 1992; Glover 1997; Hoffman and Patton 1997; Shelton 1999). More specifically, extant literature finds that a dilution effect (Nisbett, Zukier, and Lemley 1981) takes place whereby the presence of additional information reduces the impact of the more important information on auditor judgments. Furthermore, even prompting people to be aware of a possible dilution effect seems to have no impact on preventing the effect from occurring (Kemmelmeier 2004).

Hackenbrack (1992) examines the impact of diagnostic (i.e., relevant) and non-diagnostic information (i.e., irrelevant information) on auditor decisions in a fraud

judgment scenario. Specifically, auditors read through a case study containing background information on a company and the authors manipulate whether a fraud occurrence is mentioned or not. Then, auditors rate a series of potential fraud indicators on whether they would change their initial fraud risk assessment if they had been included in the case. Hackenbrack's results reveal that auditors given relevant and irrelevant information make assessments that are less extreme than auditors given only relevant information. This finding suggests that irrelevant information has a dilution effect.

Hoffman and Patton (1997), build on the work of Hackenbrack (1992) by examining whether holding auditors accountable for their judgments helps prevent the dilution effect. Their study utilizes a group of auditors making fraud risk assessments in the presence of relevant and irrelevant information. In order to examine how accountability impacts auditor judgments, some participants are required to later justify their answers to a group of their superiors. Surprisingly, Hoffman and Patton find the dilution effect still occurs whether auditors are held accountable for their judgments or not. However, the authors note that auditors in the accountable condition make more conservative judgments than those not held accountable.

Glover (1997) examines whether time pressure and accountability influences the effect of irrelevant information on auditors. The study utilizes auditors making risk assessments with irrelevant information present or not present. Auditor participants make risk assessments regarding the possibility of an account being misstated. Similar to Hoffman and Patton (1997), Glover finds that accountability has no impact on the dilution effect of irrelevant information. Although, as mentioned earlier under the time pressure section, Glover's results reveal that time pressure reduces but does not eliminate the

dilution effect. In other words, when time pressure is present, there is evidence that auditors are less swayed by the presence of irrelevant information.

Lastly, Shelton (1999) builds on the studies mentioned above by examining whether experience plays a role in the appearance of the dilution effect. Shelton uses a going concern scenario and compares the assessments of the likelihood of a company staying in business made by staff auditors to the assessments made by audit managers and partners. Shelton's results indicate that the more experienced auditors were less distracted by irrelevant information.

Overall, prior research suggests that the presence of irrelevant information impacts an auditor's judgment. However, all previous studies examine irrelevant information in audit settings utilizing irrelevant information external to the records being reviewed. This study builds on these prior studies by examining the impact of irrelevant information on skeptical judgements and actions - within the context of a client generated record. The more applied context in this study adds a more personal and possibly a more relevant and/or realistic experience to the research setting. Based on prior research suggesting the source of evidence influences auditors' assessment of risk (Hirst 1994), the results of the research studies discussed above may not hold in this more personal applied context.

Audit Evidence Characteristics

The "evidential inputs" component of Nelson's model (2009) is particularly relevant to this study's research questions. The stream of research on evidential inputs is extended in the Hurtt et al. (2013) model and literature review under the category of audit evidence characteristics. Extant recent research on evidential characteristics and auditor skepticism looks at confirming vs. disconfirming evidence (e.g., Fukukawa and Mock

2011; Trompeter and Wright 2012) and the source of evidence (e.g., Beaulieu 2001; Kizirian, Mayhew, and Sneathen Jr. 2005; Harding and Trotman 2011).

Confirming vs. Disconfirming Evidence

Early studies examining confirming vs. disconfirming evidence are discussed in the belief updating section above (e.g., Ashton and Ashton 1988; 1990). Typically, these studies find that auditors tend to focus more on disconfirming evidence (e.g., Knechel and Messier 1990). Disconfirming evidence typically takes the form of negative evidence or evidence suggesting a misstatement is more likely (disconfirming an initial belief that views the client positively or that there is no misstatement). However, positive evidence would be disconfirming if the auditor's initial belief is a negative assessment of the client.

More recent studies (e.g., Fukukawa and Mock 2011; Trompeter and Wright 2012) focus on how evidence influences fraud related judgments in non-belief updating settings. Fukukawa and Mock (2011) examine how positive or negative assertion framing impacts the assessment of risk in a trade accounts receivable case. They also observe whether an auditor's risk assessment is influenced by a belief based or probability based approach to assertion testing. Results of their study indicate that auditors make similar assessments regardless of approach when evaluating positive assertions. However, when evaluating negative assertions, they find that auditors are less likely to confirm management's assertions.

Similarly, Trompeter and Wright (2012) examine how auditor risk assessments change based on third party information relating to client business performance. Specifically, they examine how auditors react to three critical pieces of evidence in a fraud setting: client provided evidence on the financial statement process, client provided

evidence on meeting their performance objectives, and externally obtained evidence on the client meeting their performance objectives. They find that auditor fraud risk assessments are most influenced by external evidence when the external evidence is inconsistent with client provided evidence.

The above findings suggest that participants may react more strongly in situations where irrelevant information or minor errors are present (since both manipulations could be perceived as negative). In other words, auditors with prior negative experiences dealing with client provided documents containing irrelevant information or minor errors may react in a more skeptical manner than auditors without prior negative experiences with such documents.

Source of Evidence

Auditing standards (e.g., SAS 99; AICPA 2002) require auditors to adjust their level of skepticism based on evidence obtained. Therefore, the source of evidence is a critical consideration in the evaluation of audit evidence. Prior research finds auditors place greater trust in evidence received from external sources (i.e., third parties; Hirst 1994). Harding and Trotman (2011) examine how evidence source influences auditor fraud risk assessments in brainstorming sessions. They manipulate whether risk assessments come from the auditor partner, from client management, or none were included. Their analysis shows that auditors are most skeptical of assessments from the client - and respond by making more skeptical judgments.

Other studies in this stream of research examine how management's integrity influences auditor evaluation of evidence (e.g., Beaulieu 2001; Kizirian et al. 2005). Consistent with prior research, the results show that auditors tend to collect more evidence

from external sources when client management is viewed as being of low integrity. The above findings suggest that auditors may react more skeptically in situations where documents are provided by the client. In other words, when auditors are asked to make assessments about a document provided by a client, they may be predisposed to be more skeptical regardless of the audit evidence provided in the case.

Errors in Audit Evidence

Errors in audit evidence are discussed above in several different research streams. For example, errors in audit evidence are included as part of auditor knowledge of errors (e.g., Libby 1985; Ashton 1991) and belief updating (e.g., Ashton and Ashton 1988; Fukuwa and Mock 2011). Other streams of research examine the characteristics of errors (e.g., Kreutzfeldt and Wallace 1986; Maletta and Wright 1996; Chan, Lin, and Mo 2003) and auditor performance when using sampling to detect errors (e.g., Wurst, Neter, and Godfrey 1991; Allen and Elder 2005; Durney, Elder, and Glover 2014).

Studies examining errors in the context of audit sampling typically focus on finding ways to improve auditor sampling techniques to better detect errors. For example, examining new techniques, such as the use of rectification (Wurst et al. 1991) or modified sieve sampling (Hoogduin, Hall, and Tsay 2010). In addition, other studies find that auditors tend to fail to project errors found in their sampling results to the larger population (e.g., Burgstahler and Jiambalvo 1986; Elder and Allen 1998; Allen and Elder 2005). More recently, Durney et al. (2014) utilize historical audit firm data to identify the distribution, frequencies and magnitudes of errors found in audits. They find a decline in post-SOX error occurrence rates and increased use of larger sample sizes. Their findings suggest that audit firms' actions are more skeptical or focused on providing higher quality audits.

Numerous early studies examine the characteristics and causes of audit errors (e.g., Johnson, Leitch, and Neter 1981; Ham, Losell, and Smieliauskas 1985; Kreutzfeldt and Wallace 1986). Hylas and Ashton (1982) examine 281 financial statement errors requiring audit adjustments on 152 audits and find that most errors are unintentionally caused from inexperienced client employees. They also find that most errors are caught from analytical procedures and discussions with the client. Other studies in this area find that error characteristics differ between cultures (e.g., errors are more prevalent and larger in individualistic cultures; Chan et al. 2003) and more heavily regulated industries have less errors (Maletta and Wright 1996).

More relevant to this study is research identifying the common errors auditors encounter within specific types of accounts. Kreutzfeldt and Wallace (1986) identify the types, frequencies, and size of errors in a dataset of 260 audit engagements across the 13 largest offices of Arthur Anderson & Co. They examine errors in accounts receivable, inventory, fixed assets, accounts payable, and accrued liabilities. They find that errors typically fall into one of the following categories: omission errors, duplication errors, clerical errors, cutoff errors, judgment errors, and incorrect application of GAAP errors.

This study utilizes minor omission errors, duplication errors, clerical errors, and cutoff errors. Moreover, in this study, minor errors are immaterial to the related account balance as well as the overall financial results and do not appear to be intentional or deceptive. However, in practice, minor errors may accumulate to a level (or form a pattern) that triggers an adjustment in an auditor's level of skepticism. Therefore, this study seeks to examine the influence of minor errors on an auditor's application of professional skepticism.

III. HYPOTHESIS DEVELOPMENT

Irrelevant Information

According to the PCAOB, each individual auditor is responsible for appropriately applying professional skepticism throughout the audit, including in the areas of identifying and assessing the risk of account misstatements, and in the evaluation of audit evidence (PCAOB 2012). Furthermore, the PCAOB states the objective of the auditor is to plan and perform the audit to obtain appropriate audit evidence that is sufficient to support the opinion expressed in the audit report (AS 15; 2010). As previously mentioned, this study focuses on audit evidence. Irrelevant evidence is not something that, by itself, should raise any sort of red flag to an auditor. By definition, this is evidence that is not relevant to the decision at hand. Therefore, one might reason that the presence of irrelevant information should have no impact on an auditor's assessment of the sufficiency (i.e., the quantity) and appropriateness (i.e., the quality) of audit evidence obtained or to be obtained.

However, extant research suggests that the presence of irrelevant information does have an effect on auditors. Specifically, extant literature on irrelevant information suggests that it can lead to a dilution effect where the strength of subsequent auditor decisions is reduced as compared to situations where there is no irrelevant information (e.g., Hackenbrack 1992; Hoffman and Patton 1997). This study differs from prior studies, which used second-hand anecdotal information. Instead, this study utilizes records produced directly by the client (and therefore experienced first-hand by the auditor). Therefore, there may be differences in the way irrelevant information affects auditor decisions in this setting.

Process Accountability Theory and Epistemic Motivation

Recent research on process accountability theory and epistemic motivation suggests both are related to higher quality auditor judgments (e.g., Cohen, Krishnamoorthy, Peytcheva, and Wright 2013). Process accountability is the expectation of having to justify your decision to others (Siegel-Jacobs and Yates 1996; Tetlock 1983). Given the potentially harmful professional sanctions, plus the devastating costs associated with audit failure, much auditor attention is directed towards avoiding circumstances involving inadequate audit evidence and documentation. Therefore, the effects of accountability could be especially evident for auditors, as they are subject to the several layers of accountability (i.e., several layers of people reviewing their work) in an audit firm. For instance, each workpaper prepared by a staff auditor is reviewed by more senior staff auditors, senior auditors, supervisors or managers, directors, and sometimes even partners and regulators, such as the PCAOB. Epistemic motivation is the desire to fully understand the problem at hand (Scholten, Van Knippenberg, Nijstad, and Dreu 2007; Dreu and Carnevale 2003; Kruglanski 1989). In an audit context, epistemic motivation could result in doing additional work or consulting with an expert to gain additional comfort around an issue.

Epistemic motivation and process accountability working in tandem or separately could cause an auditor to exert extra audit effort that may potentially rise to the level of unnecessary auditing. Consistent with prior research (e.g., Hoffman and Patton 1997), when taking process accountability and epistemic motivation into account, auditors encountering dirty client records with irrelevant information may perform additional procedures (i.e., approach those documents with a more skeptical mindset) than they otherwise would with clean records with no irrelevant information. Therefore, in my first

set of hypotheses below, I predict that auditors will have a tendency to make more skeptical judgments and take more skeptical action when they encounter documents containing irrelevant information. This discussion leads us to my first set of hypotheses:

H1a: Auditors presented with dirty records containing irrelevant information will assess a greater likelihood of an account misstatement than auditors presented with clean records.

H1b: Auditors presented with dirty records containing irrelevant information will increase their sample size more than auditors presented with clean records.

Minor Errors

As with irrelevant information, at first glance, the presence of minor errors should have no impact on an auditor's assessment of the sufficiency (the quantity) and appropriateness (the quality) of audit evidence. The presence of minor errors should have no impact on the quality of the overall evidence obtained (assuming the errors can be explained or fixed easily) and should not impact the overall quantity. However, auditors are held accountable for their decisions by numerous parties (e.g., more senior auditors, managers, directors, and partners). Therefore, they tend to make more conservative judgments when encountering potential risks (e.g., Hackenbrack and Nelson 1996; Blay 2005; see the incentives discussion above for further detail). Accordingly, the presence of minor errors could potentially motivate auditors to question the overall credibility of the client documents and subsequently lead to over auditing. Thus, I predict in my second set of hypotheses that auditors encountering minor errors in client provided records would seek out explanations behind those errors and consequently make more skeptical judgments and take more skeptical action. This discussion leads to my second set of hypotheses:

H2a: Auditors presented with dirty records containing minor errors will assess a greater likelihood of an account misstatement than auditors presented with clean records.

H2b: Auditors presented with dirty records containing minor errors will increase their sample size more than auditors presented with clean records.

The Interaction between Irrelevant Information and Minor Errors

When taking both irrelevant information and minor errors into account, I predict that the additional effort necessary to interpret the dirty records will make the minor errors less salient and cause auditors to overlook them. This prediction is consistent with extant skepticism research suggesting that in the presence of complex clients there is the potential for auditors to become overwhelmed in information, potentially leading to a break down in skepticism (Hurtt et al. 2013). Furthermore, the literature on irrelevant information and belief updating discussed earlier (e.g., Ashton and Ashton 1988; Hackenbrack 1992) suggests that a dilution effect can occur when information is presented simultaneously (all at once). Such a dilution effect may cause auditors to make less skeptical judgments. Thus, I predict in my third set of hypotheses that skepticism will be lower when irrelevant information and minor errors are present as compared to when just one manipulation is present (see Figure 3 below). This discussion leads us to the following hypotheses:

H3a: Auditors presented with dirty records containing irrelevant information and minor errors will assess a greater likelihood of an account misstatement than auditors presented with clean records, but will assess a lower likelihood than participants presented with just irrelevant information or just minor errors.

H3b: Auditors presented with dirty records containing irrelevant information and minor errors will select larger additional sample sizes than auditors presented with clean records, but lower additional sample sizes than auditors presented with only irrelevant information or minor errors.

[Insert Figure 3 here]

Skepticism Analysis

As noted previously, numerous studies have worked to create scales to measure a person's inherent level of skepticism (e.g., Schwaub 1996; Rennie et al. 2007; Hurtt 2010). Extant literature has also examined whether scores on skepticism scales are related to skeptical judgments (e.g., Fullerton and Durtschi 2005; Hurtt et al. 2008; Rosman 2011; Quadackers et al. 2014). Consistent with prior studies, I intend to measure each participant's level of skepticism to examine whether there is a relation between the participant's inherent level of skepticism (trait skepticism) and their skeptical judgments in this experiment. As noted earlier in the Skepticism Scales section, the Hurtt scale is most closely related to the continuum definition of skepticism and has been validated in several additional studies. Therefore, The Hurtt scale is used to measure participant skepticism in this study. I predict, consistent with prior studies, that auditors who score higher on the skepticism scale will make more skeptical judgments regardless of the circumstances. This leads to the following hypothesis:

H4a: Auditors with higher level of trait skepticism will make larger assessments of the likelihood of account misstatement.

H4b: Auditors with higher level of trait skepticism will select larger sample sizes.

IV. METHOD

Design and Participants

This study employs a 2 x 2 between-subjects design manipulating the presence of irrelevant information in the client documents (i.e., present vs. absent) and whether there are minor errors in the client documents (i.e., no errors vs. errors). This study also measures each participant's trait skepticism and examines whether it influences auditor skeptical judgments or actions. The two primary dependent variables in this study are the increase in the participant's beliefs about account misstatement risk (i.e., a skeptical judgment) and the increase in sample size (i.e., a skeptical action).

Accountants with public accounting experience were recruited through Qualtrics Panel as participants in this study.[5] Qualtrics Panel is part of a larger web-based survey development application called Qualtrics. Qualtrics allows individuals to create surveys and collect participant responses. Qualtrics Panel offers participant recruiting services for researchers. A total of 100 accountants completed the instrument. Participants were randomly assigned to one of four conditions. In addition to the Control Condition (with no irrelevant information or minor errors) the other treatments consisted of: Treatment 1 with no irrelevant information but minor errors are present; Treatment 2 with irrelevant information and no minor errors; and Treatment 3 containing both irrelevant information and minor errors.

Tasks and Procedures

Study participants were sent a link through Qualtrics Panel that provided a link to the survey instrument.[6] As shown in Appendix A, the first screen of the online instrument

[5] This study was approved by the Internal Review Board at Virginia Commonwealth University.
[6] The instrument in this study was pilot tested with 40 auditing students at a large southeastern university.

contained an information sheet describing the experiment and the voluntary nature of participating.[7] The next four screens of the instrument contained four multiple choice screening questions designed to remove potential participants lacking accounting experience and auditing knowledge (see Screens 2-5 in Appendix A). The first two questions verified that participants had public accounting knowledge and experience. The first question asked "How would you describe your primary area of expertise?" If participants did not select "accounting/auditing" then they were removed from the survey. The second question asked "Do you have public accounting experience?" In order to proceed they had to answer "yes."

Questions 3 and 4 verified participants had auditing knowledge. The third question asked "On an audit engagement, if an account is described as high risk then which of the following could take place?" To get this question right they had to select the answer labeled "It's highly likely the account is misstated." The last question asked "On an audit engagement, if an account is described as high risk, typically how will auditors respond when selecting a sample of items to test?" The correct answer for this question was "They will select a large sample of items to test." Participants had to get all four screening questions correct in order to proceed with the study.

Participants who passed the screening questions were then presented with a hypothetical case scenario (see Screen 6 in Appendix A). The case scenario had participants assume the role of a staff auditor performing the accounts receivable portion of an audit of a hypothetical company called Sprandel, Inc., a mid-sized public company

[7] Although participation was voluntary and subjects could quit at any time, Qualtrics would only compensate them for their participation if they completed the full instrument.

specializing in the production of plastic shaped bottles.[8] The case scenario indicated that the audit team assessed the inherent risk for the account as high and the control risk for the account as low. Thus, the overall risk for the account was described as moderate.

Participants were then given the task of assessing the likelihood of account misstatement and determining the appropriate sample size. In order to provide a baseline for assessing the likelihood of account misstatement, participants were informed that their initial estimate of the account being misstated was 20 percent and in prior years the audit team selected 10 items to test. Before proceeding to the review of audit evidence, participants were required to pass a short quiz to verify they were aware of the initial risk assessment and prior sample size (see Screen 7 in Appendix A). The first quiz question asked them "What was your initial estimate of the likelihood of accounts receivable being misstated?" The second question asked them "In prior years, how many items did your firm select to sample?" In order to proceed participants had to select "20 percent" for the first question and "10 items" for the second question. Unlike the earlier screening questions, participants were allowed multiple attempts at selecting the correct answer.

The next screen (see Screen 8 in Appendix A) contained a task reminder to ensure participants knew their task when reviewing the audit evidence. After that the audit evidence screen was presented next (see Screen 9 in Appendix A). Participants were required to view the audit evidence screen for at least 20 seconds, although the average time participants viewed this screen across all four treatments was 60 seconds. Once finished viewing the audit evidence, participants were presented with the two dependent variable questions, followed by a series of debriefing questions.

[8] The hypothetical company Sprandel, Inc., is adapted from a teaching case by Andiola, Lambert, and Lynch (2017).

Independent Variables

The first independent variable was the presence of irrelevant information. As shown in Appendix A (see Screen 9), this variable was manipulated at two levels (irrelevant information present vs. not present). Participants assigned to the irrelevant information absent condition were presented with a client document that had no irrelevant information. This condition only showed the customer name, invoice number, invoice date, and invoice amount. Alternatively, participants assigned to the irrelevant information present condition were presented with a document that contained irrelevant information in the form of unnecessary columns of information. The unnecessary columns contained information on the state the customer is located in, the phone number of the customer, the skew code of the items sold, and the name and number of items sold.[9]

The second independent variable examined the presence of minor errors. As shown in Appendix A (see Screen 9), this variable was also manipulated at two levels (i.e., minor errors present vs. minor errors absent). [10] In the minor errors present condition, participants were presented with client provided audit evidence that contained five minor errors: the total account balance did not tie to the balance sheet, there were minor typographical errors, and there were blank spaces indicating that pieces of the information were potentially missing. Participants assigned to the minor errors absent condition were presented with a client document that was free from errors: the total account balance tied to the balance sheet, there were no minor typographical errors in the information, and the information was complete.

[9] Three auditors with public accounting experience verified that the irrelevant information used in this study accurately depicts examples of irrelevant information that auditors encounter in practice.
[10] In order to determine the appropriate number and type of errors, this instrument was pilot tested with 40 undergraduate auditing students at a large southeastern university.

The final independent variable was a measured variable of each participant's trait skepticism. At the end of the experiment, participants completed the Hurtt (2010) 30 item skepticism scale (see Screens 16-18 of Appendix A). The scale measures skepticism using questions such as "I often accept other people's explanations without further thought" or "I am confident in my abilities." Responses for each item were captured on a seven point Likert scale with 1 representing "strongly disagree" and 7 representing "strongly agree."

Dependent Variables

There are two primary dependent variables in this study (see Screen 10 in Appendix A). The first dependent variable measured the participant's beliefs about account misstatement risk after encountering a clean versus a dirty client document. Consistent with prior studies mentioned earlier in the belief updating section (e.g., Ashton and Ashton 1988), participants were given an initial estimate in the case description that the likelihood of the account being misstated was 20 percent. Subsequently, after being presented with audit evidence that varied across participants according to treatment, participants rated their beliefs about the likelihood of the account being misstated on a scale ranging from 0 percent to 100 percent.

The second dependent variable was the participant's choice of sample size after encountering a clean vs a dirty client document. The initial sample size recommended to participants was 10 client records based on prior experience with the client. However, after reviewing the dirty document, participants were given the opportunity to choose any sample size between 0 to 30 client records (ranging from 0 percent to 100 percent of the items displayed).

Post-Experimental Questionnaire

After answering the dependent variable questions, participants completed a post-experimental questionnaire. As shown in Appendix A (see Screens 11-19), the post-experimental questionnaire included one manipulation check question, attention check questions, debriefing items, demographic questions, and the scale measuring skepticism. The manipulation check question verified errors were present and asked "Agree or Disagree – The file sent by the client appeared to contain potential errors." Participants responded on a seven point Likert scale with 1 representing "strongly disagree" and 7 representing "strongly agree." Since the presence of irrelevant information is something participants may not be consciously aware of, there were no manipulation check question relating to irrelevant information.

Attention check questions were added to the case to verify participants were still actively reading each question. The first attention check question was presented after the manipulation check questions and asked "complete this sentence: The balance sheet equation is Assets = Liabilities + _____." It was presented as a multiple choice question and the correct answer was "Stockholders' Equity." The second attention check question was included as part of the Hurtt (2010) skepticism scale. Instead of asking participants to rate how closely a statement described themselves, this second attention check question asked participants to "please select strongly disagree for this item." This verified they were actively reading the scale items and not just randomly selecting answers. Participants who answered either of these questions incorrectly were removed from the study by Qualtrics Panel.

The debriefing questions examined participant perceptions, experiences, and beliefs about dirty documents. The first debriefing question used a seven point Likert scale with 1 representing "strongly disagree" and 7 representing "strongly agree" and asked "Agree or Disagree – Your review of the file increased you confidence in the client's competence." The purpose of this question was to assess participant's beliefs about client competence based on how they felt about the audit evidence provided. The second debriefing question used a seven point Likert scale with 1 representing "never" and 7 representing "all the time" and asked "How often do you or your audit team encounter messy or dirty audit files from clients?" The next question built on the second question by providing participants with an open ended question asking "Please briefly describe your most noteworthy experience receiving messy/dirty files from clients."

The next two questions examined how participants felt they are influenced by dirty documents captured at the first and third person level. The first question captured responses at the first person level and asked "Agree or Disagree – Client files that are messy/dirty impact my application of professional skepticism." While the second question addressed the third person level and asked "Agree or Disagree – Messy/dirty documents provided by the client can influence the application of professional skepticism by other members of my audit team." The purpose of the questions relating to the first and third person perspectives was to identify whether a social desirability bias was present.

The demographic and experience questions captured age, years of public accounting and other professional experience, and gender. In addition, participants were asked more specifically "What types of public accounting firms have you worked for?" and "Do you have any professional certifications?" Both questions provided several

potential answers in a multiple choice format and allowed participants to select more than one answer.

V. RESULTS

Demographics and Covariates

Qualtrics rejected prospective participants that failed the screening and attention check questions. A total of 100 accountants subsequently completed the experimental survey questionnaire. Three participants were later removed for giving nonsensical answers to the main dependent variables questions (e.g., they said they thought there was a 100 percent likelihood the account was misstated, but then they selected to sample zero items). Therefore, 97 accountants were ultimately included in the analysis.

Table 1 summarizes the demographic information of the remaining 97 participants. As shown in Table 1, 32 percent of participants fell within the age range of 21 to 30, 26 percent within the age range of 31 to 40, 16 percent fell within the range of 41 to 50, and 27 percent were over 50 years old. The majority of participants spoke English as a first language (93 percent). There was a fairly even number of male and female participants with slightly more male participants (56 percent). The average years of public accounting experience was 9.60 years, and the average years of other professional experience was 8.58 years. The most common professional certification was Certified Public Accountant (71 percent). Lastly, 27 percent had experience working for the Big 4/International (or equivalent at the time) accounting firms, 26 percent had experience working for second tier accounting firms, 28 percent had experience working for regional accounting firms, and 47

percent had experience working for local accounting firms.[11] When these demographic variables were added to the analysis as covariates, there was no evidence that the variables were significant. Therefore, the demographic variables were not included as covariates in subsequent analyses.

To determine whether random assignment to treatments had been achieved, the presence of irrelevant information and the presence of minor errors were included as independent variables in a MANOVA model, with the demographic variables mentioned above included as dependent variables. A lack of significance was found for all demographic variables. This finding provides some evidence that randomization was achieved.

[Insert Table 1 here]

Debriefing Questions

As part of the post-experimental questionnaire participants answered a series of debriefing questions designed to gauge how relevant dirty documents are in auditing. A Likert scale was used to assign a value to the responses. As shown in Table 2, the first question asked whether the participant's review of the file increased their confidence in the client's competence. The mean response for treatments containing errors was 2.52, while the mean responses for treatments not containing errors was 4.04. The difference between these values is significant ($p < 0.001$) suggesting that the presence of minor errors had a significant impact on participant perception of client competence. The mean for treatments containing irrelevant information was 3.40, and the mean for conditions without irrelevant information was 3.14. The differences between these values was insignificant ($p > 0.10$),

[11] Since participants could select more than one answer to the questions relating to work experience and certifications, the responses exceed 100 percent.

thus there were no significant differences between treatments containing irrelevant information or not containing irrelevant information.

The second question asked how often the participant or their audit teams encountered messy or dirty audit files. The mean response was a 4.24 where a 4.0 represented "occasionally" and a 5.0 represented "frequently." The third and fourth questions asked participants to agree or disagree with the statement that messy or dirty audit files influence their application of professional skepticism and the skepticism of other members of their audit team. The mean responses for their professional skepticism was a 5.36, and for the professional skepticism of their teammates the mean was a 5.22. The responses to questions one, three, and four fell on a scale where 4.0 represented a neutral response.

The last question asked how much time on average participants spent on client sites cleaning up dirty or messy documents. This question was answered on a scale that included a sliding bar that allowed participants to select any number between 0 and 100 percent. The mean response was 32 percent, which suggests that cleaning up dirty or messy documents fills a significant amount of audit staff time. In summary, the results of these questions provide support for the motivation of this study.

[Insert Table 2 here]

Lastly, participants were asked in an open ended question to describe their most noteworthy experience with messy or dirty files. Thirty-four participants responded to this question (See Appendix B for a list of all the responses). Five of the responses specifically contained the words irrelevant information and or minor/major errors. All 34 responses described an experience where the files contained an error(s) or contained irrelevant

information. The responses to the open ended question suggest that fixing or addressing minor errors and working with irrelevant information is an on-going issue for auditors and lends further motivation to this study.

Manipulation Check Question

The manipulation check question addressed the presence of errors using seven point Likert response scales with one representing "strongly disagree" and seven representing "strongly agree." The manipulation check question asked participants "Agree or Disagree – The file sent by the client appeared to contain potential errors." The mean response for treatments containing errors was 5.82, and for treatments containing no errors the mean was 3.98. There was a significant difference ($p < 0.001$) between conditions with and without errors consistent with a successful manipulation of the presence of errors. The 3.98 overall mean for conditions with no errors was probably a result of using the "agree or disagree" type Likert scale for responses. Participants who were unsure of whether errors were present or not may have selected a neutral response of 4 representing "neither agree nor disagree" to be safe. Additionally, the mean response for treatments containing irrelevant information was 4.93, and the mean response for treatments without irrelevant information was 4.92. There was no significant difference ($p > 0.10$) between these treatments providing evidence that the presence of irrelevant information did not influence participant's perception of errors being present. Overall, the results of this question indicates that the manipulation of the presence of minor errors was successful.

Test of Hypotheses

The two primary dependent variables are the increase in the likelihood of account misstatement risk and the increase in sample size. The likelihood of account misstatement

was captured on a scale from 0 percent to 100 percent. Then the increase in likelihood of account misstatement was calculated by subtracting the initial likelihood of misstatement (20 percent) from each participant's response. The sample size was captured on a scale ranging from 0 items to 30 items. To calculate the increase in sample size, the initial sample size (10 items) was subtracted from each participant's response. Descriptive statistics are summarized in Table 3.

[Insert Table 3 here]

Tests of Hypothesis 1a and 1b

To investigate how auditors as a whole are influenced by dirty documents, Hypotheses 1, 2, and 3 were tested using a multivariate analysis of variance (general linear model).[12] The results are reported in Table 4 and shown in Figure 4 and 5. H1 examines the main effect of irrelevant information on the increase in likelihood of account misstatement and the increase in sample size. H1a predicts that auditors will assess a greater likelihood of an account misstatement when they encounter irrelevant information. Similarly, H1b predicts that auditors will select a larger sample size when they encounter irrelevant information. As shown in Table 4, the main effect for irrelevant information is insignificant for the increase in account misstatement likelihood ($F(1, 93) = 2.263$, $p > 0.10$) and significant for increase in sample size ($F(1, 93) = 4.969$, $p < 0.05$). These findings fail to provide evidence in support of H1a, but find evidence in support of H1b. The change in sample size suggests that irrelevant information may be perceived suspiciously and while the risk assessment does not immediately increase, auditors cover themselves by increasing the sample size.

[12] Experience was examined as a co-variate in this model, but was not significant.

Tests of Hypothesis 2a and 2b

Hypothesis 2 examines the main effect of minor errors on the increase in likelihood of account misstatement and the increase in sample size. H2a predicts that when minor errors are present, auditors will assess a greater likelihood of an account misstatement. Similarly, H2b predicts that when minor errors are present auditors will increase their sample size. As shown in Table 4, the main effect for minor errors is significant for increase in account misstatement (($F(1, 93) = 5.332$, $p < 0.05$) and increase in sample size ($F(1, 93) = 4.969$, $p < 0.05$). Consistent with H2a and H2b, these findings provide evidence that the presence of minor errors significantly influences auditor judgment regarding the likelihood of account misstatement and the audit sample size.

Tests of Hypothesis 3a and 3b

Hypothesis 3 examines the interaction between the presence of irrelevant information and the presence of minor errors. Specifically, H3a and H3b predict that when both manipulations are present then a dilution effect will occur where auditors react less strongly than they would if only one manipulation was present. As shown in Table 4, the interaction between irrelevant information and minor errors was insignificant for both the increase in account misstatement likelihood ($F(1, 93) = 0.032$, $p > 0.10$) and for increase in sample size ($F(1, 93) = 0.499$, $p > 0.10$). Thus, these results find no evidence of an interaction between the presence of irrelevant information and the presence of minor errors.

[Insert Table 4 here]

To further analyze the main effects found above, a Games-Howell post hoc test was conducted. A Games-Howell post hoc test was used after a Levene's test for homogeneity was found to be significant. Therefore, the assumption of equal variances could not be

assumed. Results of the Games' Howell post hoc test reveal that the Control condition (where neither irrelevant information nor minor errors were present) and Treatment 3 (where both irrelevant information and minor errors were present) were significant for both change in misstatement amount ($p < 0.10$) and change in number of items ($p < 0.05$). Consistent with the results above, these findings suggest that both irrelevant information and minor errors influence auditor judgments and actions.

Tests of Hypothesis 4a and 4b

Hypothesis 4 examines whether auditors with higher levels of trait skepticism make more skeptical judgments and take more skeptical action. H4a predicts that auditors with higher levels of trait skepticism will make larger assessments of the likelihood of the account being misstated than those with lower levels of skepticism. Similarly, H4b predicts that auditors with higher levels of trait skepticism will select larger sample sizes. Consistent with auditors tested in Hurtt (2010), the overall average skepticism score for participants in Experiment 1 was 75.58 (see Table 5 for details on responses to the Hurtt scale).[13]

[Insert Table 5 here]

In addition, the consistency of trait skepticism scores was tested across the four treatment conditions using a one-way ANOVA and no significant differences were noted ($p > 0.10$). This finding suggests that the average trait skepticism score of participants was constant across the four conditions and that viewing different manipulations did not inadvertently bias skepticism scale scores. To investigate H4a and H4b, a multivariate analysis of variance (general linear model) was used. As shown in Table 6, trait skepticism did not have a significant impact ($p > 0.10$) on the likelihood of misstatement or sample

[13] Auditors surveyed in Hurtt (2010) scored a 75 on one occasion and a 77 on another occasion.

size. There was also no interaction between trait skepticism and the presence of irrelevant information or the presence of minor errors. Thus, H4a and H4b were not supported. Therefore, inconsistent with prior trait skepticism studies (e.g., Hurtt et al. 2008; Rosman 2011; Quadackers et al. 2014) the results do not provide evidence that the auditors' trait skepticism influenced their decisions in the experiment. Perhaps the similar training auditors receive is responsible for the lack of difference between high and low skeptics.

[Insert Table 6 here]

[Insert Figure 4 and 5 here]

Supplemental Analysis

In order to examine whether participant beliefs about client competency influenced their skeptical judgment and skeptical action, a supplemental mediation analysis was conducted using the Hayes (2012) PROCESS tool in SPSS. Table 7 and Figure 6 show the results simple mediation model tests (PROCESS Model 4). As shown in Table 7 four mediation models were tested to see if participant beliefs about client competency mediated the relationship between irrelevant information and minor errors and the dependent variables misstatement likelihood and sample size. As shown in Table 7 Panel B and in Figure 6, client competency was found to fully mediate the association between minor errors and misstatement likelihood ($coeff_{minor\ errors}$ = -1.52, p = 0.000 and $coeff_{client\ competency}$ = -5.72, p = 0.004). This suggests that participant judgments about the likelihood of account misstatements were influenced by their beliefs about client competency. The lack of significance when sample size was the dependent variable in the model suggests that perceived client competency had no influence on the selected sample size. In addition, the lack of results for irrelevant information, suggests that the presence of minor errors had a

greater influence on participant beliefs about client competency than the presence of irrelevant information.

[Insert Table 7 here]

[Insert Figure 6 here]

VI. CONCLUSION

The purpose of this study was to investigate how auditors are influenced by the presence of irrelevant information and minor errors when reviewing audit evidence produced by the client. To address that question this paper conducted an experiment designed to examine how public accountants respond to dirty documents. Participants with public accounting experience assumed the role of a staff auditor completing the accounts receivable portion of an audit. Their task was to review a client provided piece of audit evidence and to determine what the likelihood of misstatement and the appropriate sample size for the resulting audit test.

There are four key findings. First, the results indicate that the presence of irrelevant information and minor errors influenced subsequent auditor skeptical judgments and actions. Specifically, the presence of minor errors in audit evidence led to increases in the estimates of account misstatement likelihood and led to increases in sample size. In instances where irrelevant information was present, auditors kept the likelihood of misstatement constant, but responded by increasing the sample size. The change in sample size suggests that irrelevant information may be perceived suspiciously, and while the risk assessment does not immediately increase, auditors cover themselves by increasing the sample size. Perhaps the similar actions indicate that auditor training acts as a modifier for trait skepticism. Second, this study provides evidence that a dilution effect does not always

occur when auditors are provided with irrelevant information. Prior literature using second-hand anecdotal evidence finds that the strength of auditor decisions is reduced when auditors are provided with irrelevant information. This study's audit setting utilizes records produced directly by the client (and therefore experienced first-hand by the auditor) and finds that no dilution effect occurs.

Third, responses to debriefing questions indicate that as much as 30 percent of an auditor's time on-site can involve cleaning up dirty client documents. This finding serves to support the notion that dirty documents may contribute to over auditing, which is a waste of financial resources and a stressful misuse of audit staff. Lastly, although a number of prior studies find trait skepticism to be influential, our study adds to the growing evidence (e.g., Carpenter and Reimers 2013) that this may not always be the case. In other words, auditors with higher levels of trait skepticism are not more likely to make more skeptical judgments when evaluating audit evidence.

The results of this study are subject to the limitations that apply to any research that employs a judgment and decision making setting. In addition, the lack of being able to identify where auditors focused their attention when making their assessment of the audit evidence is also a limitation. The results show that trait skepticism influences skeptical judgment; however, without being able to identify what participants focused on while reviewing the audit evidence it is difficult to fully understand how the auditor completes their task. This limitation provides motivation to extend this experiment by using eye-tracking technology to identify what specific audit evidence is perceived as most relevant. Therefore, in Part 3, this paper utilizes eye-tracking equipment to record each participant's eye movements while reviewing the audit evidence.

Part 2: If Eyes are the Window to Our Soul, What Role does Eye-Tracking Play in Accounting Research?

I. INTRODUCTION

Eye-tracking technology has the potential to be extremely useful in accounting research. This paper discusses some key features of eye-tracking technology and reviews eye-tracking JDM research. Eye-tracking technology enables us to identify the specific factors focused upon in performing a decision making task. In addition, eye-tracking also enables us to identify the visual search strategies employed in performing a decision making task. Eye-tracking metrics provide evidence as to what data engage a person's attention. In a decision making setting, a person's focus of attention suggests what information is perceived as most relevant to the task (Glöckner and Herbold 2011; Oliveira et al. 2016).

Contemporary state-of-the-art eye-tracking technology provides an unprecedented opportunity for accounting research. Until recently, eye-tracking technology was a relatively unknown and unwieldly tool to use. Early eye-tracking was a slow process that required researchers to analyze eye-tracking data frame by frame. However, companies like Apple, Microsoft, and Google ramped up interest by integrating eye-tracking features into consumer electronic devices (Chen, Jermia, and Panggabean 2016). In addition, companies such as Gazepoint, Eye Tribe, Locarna, and Tobii adapted the technology to more practical desktop and laptop eye-trackers. The improved mobility, precision and integrated analytic software tools raise eye tracking to an entirely new level of functionality. For example, the eye-tracking equipment from Tobii captures images at a

rate of 60 images per second with an accuracy of 0.4 degrees (i.e., roughly the size of a letter in a word file).

Prior to the development and increased availability of eye-tracking technology, accounting researchers used verbal protocol analysis to conduct visual attention research in accounting. Verbal protocol analysis requires participants to verbally think aloud or self-report as they work through a task (Bouwman 1985). However, verbal protocol analysis has several potential limitations. For example, participants may not be able to accurately report their mental processes, the act of reporting may cause participants to think differently, and the researcher could have trouble encoding and/or be biased in their coding of participant responses (Hayes 1982; Hoque 2006).

Eye-tracking technology not only eliminates some of the problems associated with verbal protocol analysis, but also offers certain advantages over verbal protocol analysis. The advantages of eye-tracking technology include: (1) capturing data in real-time while a test subject performs a decision making task; (2) gathering data relating to unconscious cognitive processes that would otherwise be impossible to gather with self-reporting; (3) measuring constructs that people are unable, uncomfortable, or unwilling to truthfully self-report; and (4) a relatively autonomous data collection process which minimizes participant manipulation, subjectivity bias, social desirability bias, and demand effects (Dimoka et al. 2012).

On the other hand, there are some relative disadvantages. The eye-tracking equipment can be costly.[14] Scheduling and calibrating multiple test subjects (one at a time) for the eye-tracking lab may be time consuming and complicated. Also, large amounts of

[14] The equipment manufacturers did not respond to my inquiries regarding cost. However, the VCU eye-tracking equipment (2 computers) was $30,000.

eye scan data may be collected. Depending on the circumstances, it may be difficult to interpret this data (Rayner 1998; Djamasbi 2014).

At first glance it may seem eye-tracking is the preferred method to use over verbal protocol analysis. However, they could actually work to complement each other in practice. For instance, eye-tracking highlights where peoples' attention is focused when performing a task, but does not explain why they focused their attention in that area. Verbal protocol analysis offers the possibility that the participant may reveal why they are focusing their attention on a particular area when performing a task.

Despite a call to use eye-tracking in accounting research by Birnberg and Shields (1984), only four recent studies in accounting utilize eye-tracking technology (Kramer and Maas 2016; Sirois, Bedard, and Bera 2015; Chen et al. 2016; Bellora-Bienengräber, Mertins, and Bassen 2017). Perhaps accounting researchers were discouraged by the unwieldiness and expense of earlier versions of eye-tracking equipment, and/or perhaps the earlier analytical software was perceived as clumsy or imprecise. In any event, although accounting research appears slow to utilize eye-tracking technology, other disciplines such as psychology (e.g., Armstrong and Olatunji 2012), education (e.g., Lai et al. 2013), and marketing (e.g., Wedel and Pieters 2008) extensively use eye-tracking technology.

Therefore, the purpose of this paper is to identify areas where eye-tracking may enhance research in accounting. In addition, this paper reviews extant literature where eye-tracking is applied to various judgment and decision-making contexts. Finally, this paper provides an overview of the common eye-tracking metrics and their application in research. The remainder of this paper will be organized into the following sections: Section II provides background on eye-tracking technology, Section III describes the structure of the

literature review, Section IV reviews and synthesizes the literature, Section V provides suggestions for future research, and Section VI presents the overall conclusions.

II. EYE-TRACKING METRICS AND THEIR USES

Orquin and Loose (2013) define attention as selectivity in perception. Since "[t]he primary objective of accounting is to provide information that helps decision makers make better decisions" (Bouwman 1985 pp1), it is important for researchers to investigate how accountants and other related professionals make decisions. One component of examining the decision-making process is determining on what or where people focus their attention when making decisions. Extant research indicates that eye fixations (i.e., when someone focuses their visual gaze on a single location) are a good indirect measure of visual attention (e.g., Deubel and Schneider 1996; Hoffman and Subramaniam 1995; Glaholt and Reingold 2009). Thus, eye-tracking technology allows researchers to examine where attention is focused when making decisions (See Table 8 for examples of common eye-tracking technologies used in studies reviewed in this paper). Common measures of attention include: fixations, dwell time, areas of interest, saccades, and heat maps or gaze plots.

[Insert Table 8 here]

Fixation is a term used to describe when someone looks at a particular data element or location for an extended period of time (Duchowski 2002). The more times or the longer someone fixates on a particular spot in an eye-tracking study, the greater the number of fixations or fixation time. Extant research on fixations suggests that fixations reflect and influence preferences (Armel et al. 2008; Krajbich et al. 2010, 2012) and that people have a higher fixation likelihood on attributes relevant to reaching a decision (Glöckner and

Herbold 2011; Oliveira et al. 2016). Research in neuroscience also finds evidence that fixations are associated with portions in the brain associated with decision making (Lim, O'Doherty, and Rangel 2011).

Dwell time is a term used to describe the sum of fixations in one area before a participant fixates on another area (Bialkova and van Trijp 2011). Longer dwell times, fixation durations, gaze times indicate higher levels of processing (Velichokovsky 1999; Velichokovsky, Rothert, Kopf, Dornhofer, and Joos 2002; Glöckner and Herbold 2011). Longer fixations or dwell times spent on specific points could also suggest participants have trouble interpreting evidence (Goldberg and Kotval 1999).

Areas of interest (AOI) or regions of interest are areas of visual interest defined by the researcher during the experiment (Kim, Seligman, and Kable 2012; Su, Rao, Li, Wang, and Li 2012; Ashby and Rakow 2015). Researchers use AOI's to compare and contrast the amount of time participants spend viewing particular areas of a visual stimulus. For example, Chen and Pu (2010) examine how online shoppers react to two different recommendation interfaces for products. They define areas of interest as groupings of products in the two interfaces and investigate the frequency and dwell time participants fixate on those areas.

Saccades are quick eye movements between locations or fixations (Sperling and Weichselgartner 1995; Pieters and Warlop 1999; Su et al. 2012). Researchers use saccades to track eye-movement, as well as to examine the number of times participants shift between areas of interest or within areas of interest. For instance, Pieters and Warlop (1999) find that the number of inter-brand saccades increase and the number of intra-brand saccades decrease when consumers are making product decisions under time pressure.

Researchers develop heat maps or gaze plots to visually represent where participants look in eye-tracking studies (See Figure 7 below for an example). Gaze plots show a participant's sequence of fixations including fixation points and saccades (Djamasbi 2014). Heat maps show where participants gaze and use colors to show where fixations are the highest. The brighter the color, the more attention was given to that part of the visual stimulus. Heat maps primarily provide information about the trends in viewing intensity. For instance, Djamasbi, Siegel, and Tullis (2011), find that participants are drawn to human faces, and the presence of human faces can divert attention from the task. Although heat maps are typically not included in the primary analyses of eye-tracking studies, Djamasbi (2014) recommends calculating the distribution of fixations on heat maps and comparing them across viewers. For example, Djamasbi, Siegel, Skorinko, and Tullis (2011), use a heat map analysis to examine the website viewing behavior of different generations, and find that baby boomers are much more thorough when viewing websites than younger generations. See Table 9 for a summary of the key terms mentioned above.

[Insert Figure 7 here]

[Insert Table 9 here]

III. LITERATURE REVIEW STRUCTURE

In order to augment the assimilation of prior research across multiple disciplines, this paper borrows from the organizational framework developed by Orquin and Loose (2013). Orquin and Loose (2013) conduct a detailed review of studies that use eye-tracking technology to examine attention and decision making. Their review synthesizes research across marketing, psychology, public policy and health, and neuroscience.

Orquin and Loose (2013) organize their findings from studies examining attention and decision making into four categories: stimulus driven attention, goal-driven attention, attention and working memory, and down-stream effects. For this review, this paper uses three of the four categories from Orquin and Loose (See Figure 8 for further detail). The fourth category was dropped because it is already covered as a subset of the other three. In addition, this paper also includes more recent studies, including four in accounting. Lastly, for each category this paper identifies potential areas of future research or application in accounting.

[Insert Figure 8 here]

IV. LITERATURE REVIEW

Goal-Driven Attention

Goal-driven attention (also known as top-down processing or endogenous attention) occurs when a person's focus of attention pertains to the demands of the task (Theeuwes 2010; Orquin and Loose 2013; Meißner, Musalem, and Huber 2016). One could argue that eye-tracking research relating to goal-driven attention is particularly applicative to accounting/auditing tasks. An auditor, for example, assigned the task of assessing the likelihood of an account misstatement, must focus attention on data elements/information that are relevant to the task. Consistent with Orquin and Loose (2013), this paper organizes research in this area into the following five subcategories: task instructions, utility effect, heuristics, attention phases, and learning effects.

Task Instructions

Goal-driven attention may be influenced by the nature of the task instructions or goals. Research in this area finds that different task-specific instructions or different goals

can lead to different scan paths through the same stimuli (e.g., Yarbus 1967; Glöckner, Fiedler, Hochman, Ayal, and Hilbig 2012; Kim et al. 2012; Toubia, de Jong, Stieger, and Füller 2012). Other research focuses on how changes in task specific demands influence attention (e.g., Pieters and Warlop 1999; Selart, Kuvaas, Boe, and Takemura 2006). For instance, Pieters and Warlop (1999) examine how consumer brand choice varies depending on the presence of time pressure and the presence of high motivation to perform well. They find that people work faster under time pressure and slower when there is high motivation to perform well. Specifically, in terms of eye-tracking, they find the presence of time pressure leads to lower fixation durations among alternatives and increased inter-brand saccades. While the presence of high motivation to perform well leads to higher fixation durations and lower inter-brand saccades. Similarly, other studies investigate how changes in task specific motivation (e.g., the motivation to select the healthy option) influence attention and find results consistent with task specific demands (e.g., Visschers, Hess, and Siegrist 2010; Bialkova and Trijp 2011; Van Herpen and Van Trijp 2011).

Utility Effect

Goal-driven attention may be influenced by a utility effect. The utility effect basically says that people focus relatively more on information that is perceived to have greater importance or value for the task (Glöckner et al., 2012). The utility effect is the most robust finding from eye-tracking studies in decision making and has been demonstrated across a variety of tasks (Orquin and Loose 2013). Important findings in this area include that participants tend to have more fixations on attributes of greater importance to their decision (Glöckner and Herbold, 2011; Glöckner et al., 2012; Meißner et al. 2016), longer first fixation durations (Glaholt & Reingold, 2012), and longer first dwell durations

on the items of final selection (Glaholt and Reingold 2009, 2011; Schotter, Berry, McKenzie, and Rayner 2010). In other words, people spend more time initially and more time in general focusing on the items or the attributes of those items they believe are most relevant to their decision.

Eye-tracking research also finds that people are likely to have their first and last fixations on the item they ultimately select (Glaholt and Reingold 2011; Schotter et al. 2010; Krajbich and Rangel, 2011). Furthermore, numerous studies find that the likelihood of fixating on the option they will ultimately select increases until the decision is made (e.g., Atalay, Bodur, and Rasolofoarison 2012; Fiedler and Glöckner 2012). This emphasis on the option of choice in decision making tasks is called the gaze cascade effect (Shimojo, Simion, Shimojo, and Scheier 2003). This gaze cascade effect is supported by numerous studies (e.g., Meißner et al. 2012; Shi et al. 2013). Conversely, recent studies such as Nittono and Wada (2009) and Bird, Lauwereyns, and Crawford (2012) provide evidence that gaze allocation (i.e., where people allocate their visual attention) has no impact on final decisions and therefore reject the gaze cascade effect. As an alternative to the gaze cascade effect, Glaholt and Reingold (2009a; 2009b; 2011) develop an analysis based on dwell sequences that illustrates that dwell frequencies and dwell times increase towards the chosen option in decision making.

Heuristics

Heuristics are methods or shortcuts people use to help solve problems and make decisions more quickly in information rich environments (e.g., Gigerenzer et al. 1999). Heuristics may also influence goal driven attention. Bounded rationality models (see Simon 1957) suggest that people use heuristics to make decisions when they face situations

that exceed their processing capacity. Consistent with bounded rationality models, eye-tracking research finds that heuristics influence attention (e.g., Day, Lin, Huang, and Chuang 2009; Day 2010; Renkewitz and Jahn 2012). For instance, Day et al. (2009) manipulate the type of decision making strategy employed by subjects (weighted additive rule (WADD) vs. elimination by aspects method (EBA)). They find that participants using the WADD search strategy view more information and spend more time re-visiting pieces of information than participants using the EBA strategy. These findings suggest that the type of heuristic used could influence where people focus their attention.

Despite the eye-tracking research findings suggesting heuristics influence attention, efforts in eye-tracking to predict behavior using only one heuristic has often been unsuccessful (e.g., Knoepfle, Tao-yi Wang, and Camerer 2009; Glöckner and Herbold, 2011; Shi et al. 2013). For example, Shi et al. (2013) investigate how consumers make decisions on comparison websites that use matrices to evaluate different attributes between products. Results of their eye-tracking analysis indicate that decision makers frequently shift their attention between alternative and attribute-wise transition patterns within a single decision task. In other words, they find that decision makers tend to shift between focusing on different alternatives, and focusing on specific attributes of alternatives, suggesting that consumers do not use one single heuristic when making decisions.

Attention Phases

Goal-driven attention may also be influenced by the phase of the task. Eye-tracking research finds that attention during decision making tasks can be broken down into the following three general phases: overview (beginning of the task), comparison (middle of the task), and checking (end of the task) phases (Russo and Leclerc 1994; Clement 2007;

Glaholt and Reingold 2011). For example, Krajbich and Rangel (2011) and Krajbich et al. (2012), provide evidence that fixations during the overview phase and checking phase are much shorter than the fixations during the comparison phase. Similarly, Glöckner and Herbold (2011) find evidence that the first 10-20 initial fixations in choice tasks are much shorter than later fixations. These findings suggest that people focus their attention on information more during the comparison phase.

Learning Effects

Goal-driven attention may also be impacted by a learning effect associated with repeated exposure to the task. Eye-tracking research on learning effects looks at how repeated trials influence the attention of participants when completing decision tasks. Results of these studies indicate that as participant learning increases, the number of fixations decreases (Bialkova and van Trijp 2011; Knoepfle et al. 2009; Fiedler and Glöckner 2012; Ashby and Rakow 2016). In addition, there is evidence that the utility effect (i.e., people tend to focus on the pieces of information they believe to be the most relevant) increases with learning and participants fixate more on important attributes in their decisions (Meißner and Decker 2010; Meißner et al., 2012; Meißner et al. 2016). These results suggest that the more experience people have with tasks, the less time they need to view details before reaching a decision.

In accounting, Kramer and Maas (2016) investigate whether learning effects lead to an evaluation bias in a performance review setting. Kramer and Maas manipulate whether subjects previously recommend for or against promoting a subordinate, and then have subjects rate the performance of the same subordinate in the current period after reviewing a balanced scorecard. Results of their analysis show that prior experience leads

to bias in performance judgments, but it does not have any impact on the attention placed on the various attributes of the scorecard.

Stimulus Driven Attention

Stimulus driven attention (also known as bottom-up processing or exogenous attention) describes situations where attention is influenced by the attributes of the stimulus. These attributes include saliency, surface size, visual clutter, and position (Corbetta and Schulman 2002; Theeuwes 2010; Orquin and Loose 2013). Eye tracking research relating to stimulus-driven attention is potentially applicable to accounting/auditing tasks. For example, in a set of financial statements, our attention may be influenced by: a full page colorful graphics, bold text, the amount of detail or lengthy footnotes, and the overall organization of the information. Consistent with Orquin and Loose (2013), this paper organizes research observations in this area into the following four subcategories: saliency, surface size, visual clutter, and position.

Saliency

In eye-tracking research saliency refers to objects that stand out compared to others. Eye-tracking research on saliency finds that people pay relatively more attention to attributes that stand out compared to others when making decisions (e.g., Lohse 1997; Biaalkova and van Trijp 2011; Mormann, Navalpakkam, Koch, and Rangel 2012; Mormann, Towal, and Koch 2013). For example, Lohse (1997) examines how people react to changes in advertisement attributes in the yellow pages. He finds that people spend more time viewing advertisements that stand out in terms of color or bold text. Similarly, Bialkova and van Trijp (2011) and Mormann et al. (2012), find, in a consumer purchase setting, that the relatively more salient attributes of products attract greater attention. This

bias ultimately has downstream effects as well (i.e., this bias influences the final decision), as results indicate that consumers tend to make decisions in favor of the more salient option (Lohse 1997; Mormann et al. 2012; Navalpakkam, Kumar, Li, and Sivakumar 2012; Orquin, Scholderer, and Jeppesen 2012).

Surface Size

Surface size refers to the amount of space a visual object takes up. Eye-tracking research on surface size finds that the greater the surface size the greater the level of attention (e.g., Lohse 1997; Janiszewski 1998; Chandon, Hutchinson, Bradlow, and Young 2009). Lohse (1997) finds that advertisements that take up more space attract more attention (i.e., the more fixations and longer dwell times) than smaller advertisements in the yellow pages. Similarly, Chandon et al. (2009) examine surface size when considering in-store arrangements of product. They find that the greater number of facings of a product on a store shelf the more attention that product receives and the greater the likelihood of its selection.

Visual Clutter

Visual clutter refers to the presence of excess items, level of detail, or general organization of information within a specified viewing area. For instance, whether there are five easy to read columns on a spreadsheet versus ten hard to read columns on a spreadsheet. Eye-tracking research on visual clutter finds that people pay less attention to individual attributes with cluttered products (e.g., Visschers et al. 2010; Orth and Crouch 2014). For instance, Visschers et al. (2010) examine consumer choice of breakfast cereals with a focus on selecting a healthy option. Results indicate that with more cluttered product designs participants spend less time (i.e., dwell time) looking at nutrition labels. This

suggests that the more stimuli a person has to take in when making a decision, the less attention that person will use to assess the individual attributes of that decision.

Position

Numerous eye-tracking studies find that positioning of information impacts attention (e.g., Sütterlin, Brunner, and Opwis 2008; Chandon et al., 2009; Huang and Kuo 2011; Scholz, Helversen, and Rieskamp 2015). For example, the location of information in a list or among various options can determine the level of attention it receives. In eye-tracking research, when consulting a list, a list position effect occurs (e.g., Sütterlin et al. 2008; Chen and Pu 2010; Huang and Kuo 2011; Shi, Wedel, and Pieters 2013). For example, Sütterlin et al. (2008) find that items at the top of a list tend to receive more attention (i.e., more fixations and longer dwell times) than items at the bottom of a list. This is possibly a result of decision makers preferring to read left to right or top to bottom (Orquin and Loose 2013). Therefore, items at the bottom of the list or to the right in an assortment of options receive less attention.

In a consumer product choice setting, eye-tracking research finds evidence of a central position effect (e.g., Chandon et al., 2009; Chen and Pu 2010; Glaholt, Wu, and Reingold 2010; Navalpakkam et al. 2012; Shi, Wedel, and Pieters, 2013). For instance, Chandon et al. (2009), examine consumer choice among products located on a store shelf. They find that consumers give products on the center of the shelf more attention (i.e., more fixations and longer dwell times) and are more likely to select them over products located on other areas such as the bottom of the shelf. Tatler, Hayhoe, Land, and Ballard (2011) argue this is because people tend to focus on the center of the screen, but Atalay et al.

(2012) provide evidence that people focus on the centrally positioned item regardless of location of information.

Attention and Working Memory

Eye-tracking research in attention and working memory examines the biological limitation in our ability to process relevant information (Awh, Vogel, and Oh 2006). Although eye-tracking studies in this area include both stimulus-driven and goal-driven attention processes, the unique nature of this research warrants its own separate section. Consistent with Orquin and Loose (2013), this paper organizes research in this area into the following seven subcategories: consideration sets, pairwise comparisons, information complexity, presentation effects, decision difficulty, time pressure, and distractors.

Consideration Sets

Consideration sets are sub-sets of information within a set of choices that decision makers base their decision on (Howard and Sheth 1969). For example, if you have ten initial options, but narrow your final decision down to two or three options then those two or three final options would be the consideration set. Eye-tracking research in this area is motivated by the findings of several studies indicating that people ignore portions of available information when making decisions (e.g., Chen and Pu 2010; Ghaholt, Wu, and Reingold 2010; Toubia et al. 2012; Ashby and Rakow 2015). Thus, eye-tracking research on consideration explores why people ignore portions of available information when making decisions. Consideration sets tend to include one to four alternatives (Shi et al. 2013), options in the consideration set are more likely to be selected as the final choice (Chandon et al. 2009), and there is also a tendency to focus attention on items in the consideration set (Glaholt et al. 2009). Unfortunately, it is still unclear as to why certain

information is included or not included in a decision set. However, it appears that consideration sets may function as an unconscious mechanism for reducing working memory load (i.e., total mental effort).

Pair-wise Comparisons

Pair-wise comparisons refer to a situation where a person compares several items by looking back and forth between them. Eye-tracking research finds that people use pair-wise comparisons to evaluate two, three, or four alternatives (Russo and Rosen 1975; Russo 1978; Russo and Leclerc 1994). Studies in this area find people prefer to perform comparisons among two items versus three or four (Glaholt and Reingold 2011), and that people prefer comparing items located close together or under a similar brand (Russo and Rosen 1975; Van Raaij 1977; Ballard, Hayhoe, and Pelz 1995). Overall, these results suggest people unconsciously seek out ways to reduce working memory load when making decisions.

Information Complexity

As used in eye-tracking research, information complexity refers to the number of choices or number of attributes that must be processed in performing the task. Eye-tracking research finds that as the number of choices or attributes increases, there is an increase in the number of fixations, but a decrease in the total amount of information viewed (e.g., Horstmann, Ahlgrimm, and Glöckner 2009; Reutskaja, Nagel, Camerer, and Rangel 2011; Wang, Yang, Liu, Cao, and Ma 2014). In terms of dwell time, eye-tracking research finds conflicting results. In some instances, dwell time increases (Horstmann et al. 2009; Wang et al. 2014) and others where dwell time decreases as information complexity increases (Chen and Pu 2010; Reutskaja et al. 2011; Orth and Crouch 2014). These findings appear

to suggest that there is a biological limit as to how much available information a person can process in working memory.

Presentation Effects

Presentation effects research in eye-tracking explores how the format of information influences attention. Eye-tracking research indicates that the use of written product representations or descriptions instead of images can lead to fewer fixations, shorter dwell times, and different attributes being fixated on (Van Raaij 1977; Smead, Wilcox, and Wilkes 1981; Van Herpen and Van Trijp 2011; Loose and Orquin 2012). For example, Van Herpen and Van Trijp (2011) examine how consumers react to different nutrition label formats when goals and time constraints are varied. They find that consumers focus on product logos and packaging design instead of information in nutrition tables. Similarly, Townsend and Kahn (2014) compare product choices when confronted with verbal product descriptions versus visual product descriptions, and find evidence that people take longer to process information with the visual stimuli compared to the verbal stimuli. Thus, these studies suggest presentation format can influence working memory load (i.e., total mental effort) and impact what attributes consumers fixate on.

In accounting, several recent eye-tracking studies examine how presentation effects impact decision making (Sirois et al. 2015; Bellora-Bienengräber et al. 2017; Chen et al. 2016). Sirois et al. (2015) investigate whether adding a key audit matters section to an audit report impacts non-professional investors. Their results indicate that the addition of a key audit matters sections can increase attention to specific financial statement disclosures. They also find evidence of a potential negative impact. Specifically, they find that non-

professional investors perceive there to be different levels of assurance between different accounts and investors have lower perceptions of audit quality.

Bellora-Bienengräber et al. (2017) and Chen et al. (2016) both examine manager decision making when using balanced scorecards. Bellora-Bienengräber et al. (2017) examine how the format of corporate social responsibility (CSR) information in a balanced scorecard influences manager evaluations of subordinates. They manipulate the presence of time pressure and the format of CSR information in a balanced scorecard and measure the impact on performance evaluations and bonus allocation. Results of their analysis reveal that separating out CSR information in balanced scorecards leads to more attention being focused on that information, but there is no impact on performance evaluations.

Chen et al. (2016) examine the role of visual attention on the promotion decisions of managers. They manipulate the format of strategic information given in balanced scorecards. Using eye-tracking technology, Chen et al. track what attributes of balanced scorecards managers focus on when making promotion decisions. They find that managers who focus more on strategically linked attributes regardless of presentation format made better promotion decisions (i.e., they recommend promoting people whose prior achievements coincide more with the objectives of the company) than managers who only focus on attributes.

Decision Difficulty

As used in eye-tracking research, decision difficulty refers to the extent to which alternatives differ. The extant literature consists of purchase decisions (where one product is chosen from among several) or gambles (choosing between two gambles with related payouts and probabilities). Basically, research finds that choices between similar options

require more fixations in order to perform the decision making task (Glöckner and Herbold 2011; Krajbich and Rangel 2011; Fiedler and Glöckner 2012). Although, Russo and Dosher (1983) find decision difficulty has no influence on the number of transitions between alternatives. These results suggest difficult decisions increase working memory load, but the number of times attention shifts between alternatives remains constant.

Time Pressure

Eye-tracking studies examining time pressure demonstrate that reduced time leads to shorter fixation duration, fewer fixations on textual elements, more attribute transitions, and less overall information fixated on (Pieters and Warlop 1999; Reutskaja et al. 2011; Van Herpen and Trijp 2011). Furthermore, Mormann et al. (2012) find that time pressure leads to a greater influence of visual saliency on decision choice. Thus, under time pressure people spend less time processing the various attributes and select the more prominent option. These findings suggest that time pressure can reduce the amount of analysis (i.e., working memory load) taking place in order to meet a deadline.

In accounting, Bellora-Bienengräber et al. (2017) examine how time pressure influences a manager's performance evaluation of subordinates. They manipulate the presence of time pressure and the format of corporate social responsibility (CSR) information in a balanced scorecard and measure the impact on performance evaluations and bonus allocation. Results of their analysis reveal that time pressure reduces performance ratings. Thus, this paper suggests that managers under time pressure provide lower performance ratings.

Distractors

A distractor potentially diverts attention away from a task. Eye-tracking research on distractors finds somewhat counterintuitive results (e.g., Day, Shyi, and Wang 2006; Day et al. 2009). For example, Day et al. (2006) examine whether flash banners (i.e., animated interactive website advertisements that can include sound and complex animations like movies) containing irrelevant information distract consumers in an online multi-attribute decision-making setting where one product must be chosen from a set of alternatives. They find that not only are participants not distracted by the flash banners, but their level of arousal and accuracy in decision making actually increases when the flash banners are present.

Similarly, Day et al. (2009) study whether music tempo and task difficulty influences decision making in a multi-attribute decision-making setting. They find that the potential distractor (i.e., a fast music tempo in this case) increases the level of decision accuracy. Specifically, they found that with the faster music tempo led to a different search pattern and more information being searched. These findings suggest distractors may increase the level of interest in tasks and improve outcomes. In view of the unexpected results, one could argue that these studies were not actually testing distractors, but were actually testing enhancers of attention. Intuitively, a distractor should negatively impact on performance in a decision making task, therefore further research is required to explain these findings.

V. DIRECTIONS FOR FUTURE RESEARCH

What role can eye-tracking technology play in accounting research? As noted earlier a distinct advantage of an eye-tracking research tool is that it records unconscious cognitive participant responses. Therefore, the research data is relatively less subject to

participant manipulation, subjectivity bias, social desirability bias, and demand effects. Furthermore, eye-tracking technology can reduce common method bias since its use reduces the reliance on one particular measurement method (Dimoka et al. 2012). In a decision-making setting, we observe the participant's focus of attention which in turn suggests what information is perceived as most relevant to the task. Eye-tracking contributes to the literature by providing additional insight into what information is actually included in the decision versus what the test subjects "say" they think is relevant. In addition eye-tracking allows us to view the visual search strategies employed when performing a task.

Goal-Driven Attention

One potential area for future research involves research in goal-driven attention settings. Eye-tracking researchers in other fields find that people use heuristics in decision-making settings. In accounting, numerous studies over the years examine heuristics (for literature reviews on heuristics see Solomon and Tortman 2003 and Trotman, Tan, and Ang 2011). Therefore, future research could re-examine accounting studies on heuristics incorporating new eye-tracking measures. For instance, in cases where multiple heuristics could lead to the same decision, eye-tracking could be useful in determining which is being used. Specifically, researchers may identify whether there is a particular heuristic used by top performing auditors that helps them perform their duties more effectively. A heuristic employed by top performing auditors could then be incorporated into staff training or even in accounting education.

To illustrate, Griffith, Hammersley, Kadous, and Young (2015) use an experiment to examine whether an auditor's mindset can influence subsequent auditor judgments of

complex estimates. Their primary dependent variables were the reasonableness of the complex estimate, the decision about what action to take next, and the reason for taking that action. They find that auditors prompted to approach the case with a deliberative mindset (i.e., thinking more broadly and incorporating information from a variety of sources) outperform those using different mindsets. In other words, they find that auditors using a deliberative mindset are able to process a wider range of information and better identify unreasonable client estimates. Eye-tracking technology could contribute to this study and studies like this one by allowing researchers to see what particular pieces of information auditors focus on when making their decisions. Specifically, eye-tracking could help Griffith et al. answer questions such as: Did the more effective auditors use a different and a potentially more effective scan path through the case materials? Did the auditors consider all pieces of information available in the case equally or did they focus attention on specific attributes?

Another potential research topic is how the utility effect (i.e., the tendency for people to focus on information they believe to be more relevant) identified in other fields of eye-tracking research applies to accountants. For instance, researchers could use eye-tracking to identify what information audit managers focus on when conducting reviews. For example, Brazel, Jackson, Schaefer, and Stewart (2016) use an experiment to examine whether a supervisor's review of audit staff work is influenced by the outcome of the testing. Their dependent measure was participants' performance evaluation rating of the person in the experimental case. They find that when the additional work performed by staff failed to find a misstatement that supervisors were then more likely to give lower performance evaluations. Eye-tracking could identify the supervisor's focus of attention

while reviewing the workpapers. For example, a lower performance evaluation may also be associated with circumstances where the supervisor's focus of attention suggests concern with the underlying documentation. Therefore, eye-tracking could build upon Brazel et al. (2016) by confirming that the supervisor was impacted by the 'failure to find a misstatement' and not some other attribute of the auditor's work, such as substandard documentation.

Stimulus Driven Attention

With respect to stimulus driven attention settings, researchers could examine what information users of financial information value the most. For instance, what parts of the financial statements receive the most emphasis (i.e., MD&A, footnotes, charts, illustrations, basic financial statements)? What types of information or sections in the MD&A receive the most attention? Is management's explanation for unsatisfactory performance relatively ignored versus forward looking information? In the financial statements, do people pay attention to the footnotes or other substantive information? What line items receive the most attention? How does the format influence the user's focus of attention?

For example, Dilla, Janvrin, and Jeffrey (2013) examine in an experimental setting whether professional and non-professional investors' react differently to pro-forma earnings information when presented in different formats (i.e., graphical vs. textual). They conclude that graphical presentations of earnings information influence non-professional investors' judgments of current year earnings performance, future earnings potential, and potential investment amount. However, graphical presentations only influence professional investors' judgments of future earnings potential and potential investment amount. Eye-

tracking technology could be utilized to build upon Dilla et al. (2013) by allowing for a more precise investigation of the differences between in presentation format in terms of the specific factors focused upon, the search strategies employed, and patterns in considering various pieces of information.

Another potential topic to explore in stimulus driven settings is how proposed regulatory changes influence users of financial statements, tax forms, or audit reports. For example, if regulators propose a revision to the audit report that highlights a specific issue, do users actually pay attention to the new information or does the change go unnoticed or lead to other changes in judgment (e.g., Sirois et al. 2015)? In Assay, Libby, and Rennekamp (2014), they examine the impact of pronoun use in management disclosures on investor reactions in an experimental setting. They find that the increased use of personal pronouns leads to stronger reactions from investors (i.e., larger changes in investor valuation of stock value). Eye-tracking technology could examine whether attributes similar to pronouns (e.g., bold colors, font types, or pictures) leads to stronger reactions from investors. Specifically whether these potential distractors reduce or magnify the positivity or negativity of the information being conveyed.

Attention and Working Memory

Regarding attention and working memory load, researchers could use eye-tracking technology to investigate how accountants cope with large amounts of information. Information overload, or simply receiving too much information has been a topic of interest in accounting research for a number of years (see Brown-Liburd, Issa, and Lombardi 2015 for a brief review). More recently, big data has become a popular area in accounting (e.g., Alles 2015; Warren, Moffitt, and Byrnes 2015; Zhang, Yang, and Appelbaum 2015).

Therefore, future studies could use eye-tracking to help investigate how auditors react to new trends or tools in big-data and at what point information overload becomes an issue. The results could help determine at what point big data is too big to be useful to an accountant, or at what point there is too much information for auditors to process (e.g., while assessing audit risk). It could also be used to investigate the best practices for cognitive processing of high volume information streams. To examine this topic, researchers could explore how accountants handle continuous streams of potentially relevant information from multiple media sources. Research could help accountants train and prepare for effective use of big data.

Eye-tracking could be used to examine how experience, time pressure, and education influence an accountant's ability to handle large or complicated amounts of accounting information. For example, Simnett (1996) examines in an experiment how information selection, information processing and task complexity influence the predictive accuracy of auditors. The study finds that more experienced auditors are better at selecting relevant evidence for their decisions than less experienced auditors, but he finds no difference in information processing ability. Eye-tracking could extend Simnett (1996) by identifying what visual search strategy is employed as well as what particular attributes are selected by more experienced auditors.

Education and Training

Lastly, eye-tracking offers a potentially game-changing benefit in an educational setting. Eye tracking presents an opportunity for students to learn what an expert themselves may not be consciously aware of and able to teach. Specifically, groups of people with certain traits or abilities (e.g., outstanding performance, expertise, or

experience) could be observed to see if they share a similar distinct scan/search paths through a document. If a distinct search path is associated with a preferred outcome, then it could be taught to others or information could be rearranged to facilitate a similar default scan path. To illustrate, in an education study Mason, Pluchino, and Tornatora (2016) use an eye-movement modeling example tool to examine the possibility of improving reading comprehension in students. They randomly assign seventh grade students to a condition where they use the eye-movement tool or to a condition without the tool. They find that students who use the eye-movement modeling tool (i.e., a tool that models how students should be processing illustrated text) outperformed those students that did not use the tool. This same methodology could be applied to an audit setting. Researchers could examine whether more experienced auditors review audit files differently than less experienced auditors. If they find cases where they do, then we could train new auditors to use a similar approach.

In addition, on exams or in case studies, eye-tracking could help identify where students struggle with general concepts or specific terminology. For example, in an auditing case study by Andiola, Lambert, and Lynch (2017), students learn about the audit review process through closing review notes in a set of workpapers. Eye-tracking could contribute to this case study by helping the authors identify specific terms, sentences or concepts that students have difficulty understanding or comprehending. In addition, eye-tracking could identify specific words, sentences or concepts students, accountants, or others are struggling with that they might be embarrassed to admit to, or to which they are not self-aware. Eye tracking could also help identify instances where students or others have difficulty integrating data from tables/financial statements with text.

VI. CONCLUSION

This paper identifies areas where eye-tracking may enhance research in accounting. In addition, this paper reviews extant literature where eye-tracking is applied to various judgment and decision-making contexts. This paper also provides an overview of the common eye-tracking metrics and their potential application to accounting research. Although accounting researchers have very limited experience with eye-tracking, other disciplines such as psychology (e.g., Armstrong and Olatunji 2012), education (e.g., Lai et al. 2013), and marketing (e.g., Wedel and Pieters 2008) extensively use this technology. Therefore, in order to demonstrate the usefulness of eye-tracking and to help generate potential research topics, this paper also reviews extant literature in other disciplines where eye-tracking technology is applied to various judgment and decision-making contexts.

As noted earlier, several accounting studies examine the role of attention in accounting judgment and decision-making contexts. Although these studies thus far narrowly focus on manager promotion and performance evaluations (e.g., Chen et al. 2016 or Kramer and Maas 2016) and changes in the audit report (e.g., Sirois et al. 2015) there remains an abundance of future research opportunities. In an effort to stimulate additional research, this paper suggests how eye-tracking can enhance extant accounting research. Illustrative examples of promising research opportunities (extending extant research) are provided under the categories of goal-driven attention, stimulus-driven attention, and attention and working memory. In addition, this paper identifies how eye-tracking can be applied to more contemporary decision making and educational circumstances. With respect to either extant or contemporary research issues, eye-tracking offers the

incremental benefit of a more precise investigation of the specific factors focused upon in performing a decision making task, as well as the visual search strategy employed.

PART 3: The Effect of Irrelevant Information and Minor Errors in Client Documents on Audit Student Decisions using Eye-Tracking

I. INTRODUCTION

Eye-tracking is the process of measuring a person's eye activity (iMotion 2016). Eye-tracking technology allows researchers to examine where attention is focused while reviewing case materials and audit evidence. As discussed in Part 2, despite a call to use eye-tracking in accounting research by Birnberg and Shields (1984), only four recent studies in accounting utilize eye-tracking technology (Kramer and Maas 2016; Sirois, Bedard, and Bera 2015; Chen et al. 2016; Bellora-Bienengräber, Mertins, and Bassen 2017). Although accounting has very limited experience with eye-tracking, other disciplines such as psychology (e.g., Armstrong and Olatunji 2012), education (e.g., Lai et al. 2013), and marketing (e.g., Wedel and Pieters 2008) extensively use this technology. As noted earlier, a distinct advantage of an eye-tracking research tool is that it records unconscious cognitive participant responses. Therefore, eye-tracking provides additional insight into what information is actually included in the decision.

To further examine the results from Experiment 1, the third part of this paper utilizes eye-tracking to examine how auditing student decisions are influenced by dirty documents. Eye-tracking technology allows for a more precise investigation of the specific factors focused upon in performing a decision-making task, as well as the visual search strategy employed. Consistent with Experiment 1, participants assume the role of a staff auditor completing the accounts receivable portion of an audit. The presence of irrelevant information and minor errors is manipulated between treatment conditions. After participants review the audit evidence they assess the likelihood of account misstatement

and the appropriate sample size. Trait skepticism is measured with the Hurtt (2010) skepticism scale and participants are divided into high and low skeptic groups based on their responses to this scale.

This study offers several contributions to the literature. First, this study answers the long-awaited call by Birnberg and Shields (1984) for the use of eye tracking technology in the study of attention in accounting. Recent auditing research using eye-tracking focuses on investor perceptions of the audit report (e.g., Sirois, Bedard, and Bera 2015). This study builds on this line of literature by applying this new technology to an audit evidence setting and lays the foundation for the development of future research applications.

Second, the eye-tracking results indicate that an individual's level of attention is influenced by the presence of irrelevant information and/or minor errors. Particularly when the Control condition with neither irrelevant information nor minor errors was compared to Treatment 3 where both irrelevant information and minor errors were present. The finding that the two extreme treatment conditions draw the most scrutiny suggests that audit evidence which is not consistent with the auditor's initial level of anticipated risk of restatement (including a perfectly clean record) increases the auditor's attention level. Third, the eye-tracking results also suggest that a dilution effect occurs when irrelevant information is present. In other words, when auditors encounter audit evidence containing irrelevant information they may respond by displaying lower levels of attention than they would if no irrelevant information is present.

The remainder of study will be organized into the following sections: Section II reviews the theories supporting my hypotheses, and concludes with my hypotheses; Section III describes the design of my experiment including details about the participants,

design, and experimental task, as well as the independent and dependent variables; Section IV describes the results; and Section V presents the conclusions on this study.

II. HYPOTHESIS DEVELOPMENT

The PCAOB requires auditors to appropriately apply professional skepticism throughout an audit, including in the areas of identifying and assessing the risk of account misstatements and in the evaluation of audit evidence (PCAOB 2012). Furthermore, the PCAOB states the objective of the auditor is to plan and perform the audit to obtain appropriate audit evidence that is sufficient to support the opinion expressed in the audit report (AS 15 2010). The presence of irrelevant information or minor errors should seemingly have no impact on an auditor's assessment of the sufficiency (i.e., the quantity) and appropriateness (i.e., the quality) of audit evidence obtained or to be obtained. However, as found in Part 1 of this study, the presence of irrelevant information or minor errors does indeed raise a red flag for auditors and can lead to an increase in skeptical judgment and action. Additionally, in practice, the auditor's response to dirty records could have a material impact on overall audit costs as well as audit effectiveness and subsequent legal liability.

Extant theories on attention, such as cognitive load theory (see Sweller 1988), suggest that auditors have a finite mental processing capacity when evaluating audit evidence. Therefore, auditors should ideally focus on evidence that is the most relevant to performing their task. Prior research on irrelevant information and belief updating (e.g., Ashton and Ashton 1988; Shelton 1999), together with this paper's findings in Part 1, suggest that irrelevant information and minor errors can influence auditor decision making.

This is especially the expectation if the presence of irrelevant information and minor errors dilute the perceived informativeness and salience of the audit evidence.

This study examines how auditor students are influenced by the presence of irrelevant information and minor errors when evaluating audit evidence. Eye-tracking tracking technology is used to observe participants' search paths, including data elements fixated upon, dwell time within areas of interest, and the overall time spent reviewing the evidence. Recent eye-tracking studies on decision making find that people fixate and dwell on attributes they perceive as the most relevant (Glöckner and Herbold 2011; Kim et al. 2012; Oliveira et al. 2016). In addition, recent eye-tracking studies investigating dwell times find that longer dwell times are associated with higher levels of cognitive processing (Velichokovsky 1999; Velichokovsky et al. 2002; Glöckner and Herbold 2011). Therefore, based on the results of Experiment 1, the presence of irrelevant information and minor errors should result in a longer overall time spent reviewing the evidence, including a higher number of fixations and longer dwell times on areas of interest. However, since it is largely unknown how dirty records will impact an auditor's level of attention, I propose the following research question:

> **RQ1:** Does the presence of irrelevant information and/or minor errors result in individuals becoming less efficient (i.e., exhibit longer fixations and dwell times) while reviewing audit evidence?

III. METHOD

Design and Participants

This study employs a 2 x 2 between-subjects design manipulating the presence of irrelevant information in the client documents (i.e., present vs. not present) and whether

there are minor errors in the client documents (i.e., errors vs. no errors). The two primary dependent variables in this study are the number of fixations and dwell time. This study also measures the increase in the participant's beliefs about account misstatement risk and the increase in sample size.

Graduate and senior undergraduate students currently enrolled in auditing courses at a large southeastern university were recruited as participants in this study.[15] Students were compensated for their participation with extra credit points in their audit class. A total of 46 auditing students completed the experiment. Participants were randomly assigned to one of the four treatment conditions. In addition to the Control condition there are three other treatment conditions: Treatment 1 - no irrelevant information but containing minor errors, Treatment 2 - irrelevant information but with no minor errors, and Treatment 3 - both irrelevant information and minor errors are present.

Tasks and Procedures

Sona Systems was used to schedule participants for this study. Sona Systems allows participants to view the available experiment timeslots online, as well as sends them reminders the day before and the day of their lab sessions (Sona Systems 2017). Specifically, participants were recruited through an email sent by their audit professors. The email included a link to Sona Systems that allowed them to schedule a convenient lab time (See Appendix C for a copy of the recruitment email).

As summarized in Figure 9, upon arriving at the lab, each student participant was greeted by one of the experimenters and walked through the consent form line by line (see Appendix C for a copy of the consent form). Next, they were given time to review the

[15] This study was approved by the Internal Review Board at Virginia Commonwealth University.

consent form on their own. Students had to sign-off on the consent form before they could proceed. Students who choose not to participate could get the same amount of extra credit by completing a similar written assignment. No students chose to complete the alternative assignment. After signing the consent form, participants were given a four-digit identification number. Random four-digit identification numbers were assigned to each participant in order to maintain confidentiality of data. A separate list of student names and identification numbers was maintained in case a participant later requested to have their data removed from the study.

Next, the participant was led into the eye-tracking room and seated in front of the eye-tracking computer. Participants were given a brief introduction to the eye-tracking technology and a brief overview of the experimental task and how to use the computer. The Tobii X2-60 eye-tracker was used in this experiment. The technology is unobtrusive and attached to the computer monitor. The benefit of the Tobii software is that it allows participants to freely sit in front of the computer without having to wear special head gear or maintain a specific distance from the monitor. It also has no problem tracking participant's eyes should they momentarily glance away from the monitor.

Prior to the start of the experiment, participants were calibrated to the eye-tracking software. The calibration process required them to visually follow a bouncing ball around the computer screen. The calibration process was uneventful accept for one instance where heavy eye make-up appeared to interfere with the software's ability to track the participant's eye movements.

Following calibration, participants accessed the audit case materials by entering their four-digit identification number into the PC (see Appendix C Slides 1-3). The initial

slides presented participants with a hypothetical case scenario for them to read through. The case scenario had participants assume the role of a staff auditor performing the accounts receivable portion of an audit of a hypothetical company called Sprandel, Inc.[16] The case scenario described Sprandel as a mid-sized public company specializing in the production of plastic shaped bottles. The case indicated that the audit team assessed the inherent risk for the account as being high, and the control risk for the account as being low. Thus, the overall risk for the account was described as being moderate.

Participants were then given the task of assessing the likelihood of account misstatement and determining the appropriate sample size. In order to provide a baseline for assessing the likelihood of account misstatement, participants were informed that their initial estimate of the account being misstated was 20 percent and in prior years the audit team selected 10 items to test.

The next slide contained the audit evidence slide (see Slide 4 in Appendix C). Participants could view the audit evidence slide for as long as they desired. The average time participants viewed this slide across all four conditions was 55 seconds. Unlike Experiment 1 participants were not required to spend any pre-defined length of time on the audit evidence slide. After reviewing the case materials and audit evidence, the participant clicked on a link that connected them to a Qualtrics survey that allowed them to enter their responses for the follow-up assessment. The assessment consisted of questions relating to the dependent variables and occurred immediately following the eye-tracking portion in order to reduce memory loss.

[16] The hypothetical company Sprandel, Inc., is adapted from a teaching case by Andiola, Lambert, and Lynch (2017).

In order to minimize the size of the eye-tracking data file and to facilitate the most efficient use of the eye-tracking computer stations, the participant moved to computer station not equipped with the eye-tracking hardware in order to complete the post-experiment questionnaire. The questionnaire was administered using a second Qualtrics survey (See Slide 10 in Appendix C). Each participant entered their four-digit identification number at the beginning of each stage of the experiment so that eye-tracking data could be linked to the appropriate Qualtrics survey responses.

[Insert Figure 9 here]

Independent Variables

The first independent variable was the presence of irrelevant information. As shown in Appendix C (see Slide 4), this variable was manipulated at two levels (irrelevant information present vs. not present). Participants assigned to the irrelevant information absent treatment condition were presented with a client document that had no irrelevant information. This treatment condition only showed the customer name, invoice number, invoice date, and invoice amount. Alternatively, participants assigned to the irrelevant information present treatment condition were presented with a document that contained irrelevant information in the form of unnecessary columns of information. The unnecessary columns contained information on the state the customer is located in, the phone number of the customer, the skew code of the items sold, and the name and number of items sold.[17]

The second independent variable examined the presence of minor errors. As shown in Appendix C (see Slide 4), this variable was also manipulated at two levels (i.e., minor errors present vs. minor errors absent). In the minor errors present treatment condition,

[17] Three auditors with public accounting experience verified that the irrelevant information used in this study accurately depicts what auditors encounter in practice.

participants were presented with client provided audit evidence that contained five minor errors (e.g., the total account balance did not tie to the balance sheet, there were minor typo errors, and pieces of the information seemed incomplete).[18] Participants assigned to the minor errors absent treatment condition were presented with a client document that was free from errors (i.e., the total account balance tied to the balance sheet, the information was complete, and there were no minor typo errors in the information).

Dependent Variables

The two attention-specific dependent variables in this experiment were total fixations and dwell time. The first dependent variable, total fixations, is the sum of all fixations within an area of interest. Fixation is a term used to describe when someone looks at a particular data element or location for an extended period of time (Duchowski 2002). Areas of interest (AOI) or regions of interest are areas of visual interest defined by the researcher during the experiment (Kim, Seligman, and Kable 2012; Su, Rao, Li, Wang, and Li 2012; Ashby and Rakow 2015).

The second dependent variable is dwell time. Dwell time is a term used to describe the sum of fixations in one area before a participant fixates on another area (Bialkova and van Trijp 2011). In other words, dwell time captures how long someone fixates on an AOI. Panels A, B, C, and D of Figure 10 show the eight AOI's tested in this study. Across all four treatment conditions, AOI's were created for the Customer column, the Invoice Amount column, the Invoice Total area, and the spreadsheet Overall. In the treatment conditions with minor errors (i.e., Treatment 1 and Treatment 3) there were four additional

[18] In order to verify the types of errors participants noticed and how many were necessary to ensure participants noticed them, this instrument was pilot tested with 40 undergraduate auditing students at a large southeastern university.

AOI's created for the errors. Specifically, there were AOI's for the two customer column errors, the date error, and the invoice column error.

[Insert Figure 10 here]

Participants also responded to questions relating to dependent variables from Experiment 1. Specifically, the increase in the account misstatement likelihood and the increase in sample size (see Appendix C Slide 7). The first dependent variable measured the increase in the participant's beliefs about account misstatement risk after encountering a clean versus a dirty client document. Consistent with prior studies mentioned earlier in the belief updating section (e.g., Ashton and Ashton 1988), participants were given an initial estimate in the case description that the likelihood of the account being misstated was 20 percent. Subsequently, after being presented with audit evidence that varied across participants according to treatment condition, participants rated their beliefs about the likelihood of the account being misstated on a scale ranging from 0 percent to 100 percent.

The second dependent variable was the participant's choice of sample size after encountering a clean vs a dirty client document. The initial sample size recommended to participants was 10 client records based on prior experience with the client. However, after reviewing the dirty document, participants were given the opportunity to select a sample size from 0 to 30 client records (0 percent to 100 percent of the items displayed).

Post-Experimental Questionnaire

After addressing the dependent variable questions, participants completed a post-experimental questionnaire. As shown in Appendix C (see Slides 8-16), the post-experimental questionnaire included one manipulation check question, one debriefing question, one attention check question, several demographic questions, and scales

measuring skepticism and risk aversion. The manipulation check question verified errors were present and asked "Agree or Disagree - The file sent by the client appeared to contain potential errors." The debriefing question assessed whether perceived client competence influenced participant responses and asked "Agree or Disagree - Your review of the file increased your confidence in the client's competence." For both questions, participants responded on a seven point Likert scale with 1 representing "strongly disagree" and 7 representing "strongly agree." Since the presence of irrelevant information is something participants may not be consciously aware of, there was no manipulation check question relating to irrelevant information.

An attention check question was added to the case to verify participants were actively reading each question. The attention check question was included as part of the Hurtt (2010) skepticism scale (See Appendix C slide 12). Instead of asking participants to rate how closely a statement described themselves, this attention check question asked participants to "please select strongly disagree for this item." This verified they were actively reading the scale items and not just randomly selecting answers.

The demographic and experience questions captured student status (i.e., what year in school), gender, age, years of professional experience in accounting, other work experience, and whether English was their first language. Lastly, participants completed the Hurtt (2010) 30 item skepticism scale (See Appendix C slide 11 – 13) and the 6-item risk aversion scale from Blais and Weber (2006). The skepticism scale measures skepticism using questions such as "I often accept other people's explanations without further thought" or "I am confident in my abilities." Responses for each item were captured on a seven point Likert scale with 1 representing "strongly disagree" and 7 representing

"strongly agree." The risk aversion scale measures risk aversion by asking participants to rate on a Likert scale from 1 representing "extremely unlikely" to 7 representing "extremely likely" how likely they are to engage in a series of activities. An example of an activity is "betting a day's income at the horse races."

Eye-Tracking Apparatus

The Tobii X2-60 eye-tracker was the primary input device in this experiment. The eye-tracker was connected to the lower portion of a conventional computer monitor. The eye-tracker sampled at 60 Hz with an accuracy of 0.4 degrees. One degree of accuracy represents 11 millimeters (0.43 inches) on a screen at a distance of 65 centimeters or 26 inches away from the participant (about the size of a character or 20 pixels on a computer screen). Raw eye-tracking data was collected and analyzed using Tobii Pro Studio.

IV. RESULTS

Demographics and Covariates

A total of 46 students completed the experiment. Three participants were later removed because they had an eye-tracking accuracy score of less than 10 percent. Tobii accuracy scores are an estimate of how accurately a participant's eyes were tracked. Therefore, 43 students were included in the analyses presented in this section. Of the 43 total participants, 11 students were in the control condition, 8 were in Treatment 1, 12 in Treatment 2, and 12 in Treatment 3.

Table 10 summarizes the demographic information of the remaining 43 participants. The majority (76.70 percent) of participants fell within the age range of 21 to 30, 18.60 percent within the age range of 31 to 40, and 4.70 percent fell within the range of 41 to 50. The majority of participants spoke English as a first language (69.80 percent).

There were slightly more male than female participants (55.80 percent were male). The average years of professional work experience in accounting was 1.18 years, and the average years of other work experience was 6.58 years. The most common student status was Undergraduate Senior (48.80 percent), followed by 25.60 percent pursuing a Post-Baccalaureate Certificate, and 25.60 percent in a Master's program. When these demographic variables were added to the analysis as covariates, there was no evidence that the variables were significant. Therefore, the demographic variables were not included as covariates in subsequent analyses.

To determine whether randomization had been achieved, the presence of irrelevant information and the presence of minor errors were included as independent variables in a MANOVA model, with the demographic variables included as dependent variables. A lack of significance was found for all demographic variables. This finding provides some evidence that randomization was achieved.

[Insert Table 10 here]

Manipulation Check

The manipulation check question addressed the presence of errors using seven point Likert response scales with one representing "strongly disagree" and seven representing "strongly agree." The first manipulation check question asked participants "Agree or Disagree – The file sent by the client appeared to contain potential errors." The mean response for treatment conditions containing errors was 5.42, and for treatment conditions containing no errors the mean was 4.30. There was a significant difference ($p < 0.05$) between treatment conditions with and without errors consistent with a successful manipulation of the presence of errors. The 4.30 overall mean for treatment conditions with

no errors was probably a result of using the "agree or disagree" type Likert scale for responses. Participants who were potentially unsure of whether errors were present or not may have selected a neutral response of 4 representing "neither agree nor disagree" to be safe. Additionally, the mean response for treatment conditions containing irrelevant information was 4.72, and the mean response for treatment conditions without irrelevant information was 5.00. There was no significant difference ($p > 0.10$) between these treatment conditions providing evidence that the presence of irrelevant information did not influence participant's perception of errors being present. Thus, the results of the manipulation check question indicate that the manipulation of the presence of minor errors was successful.

Client Competence Assessment

The debriefing question regarding beliefs about client competency asked "Agree or Disagree – Your review of the file increased your confidence in the client's competence." The mean response for treatment conditions containing errors was 3.32, while the mean response for treatment conditions not containing errors was 4.40. The difference between these values is significant ($p < 0.05$) suggesting that the presence of minor errors influenced participants' assessments of client competence. In addition, the mean response for treatment conditions containing irrelevant information was 3.91, and the mean response for treatment conditions not containing irrelevant information was 3.78. The difference between these values was not significant ($p > 0.10$) suggesting that the presence of irrelevant information did not influence participant's assessment of client competence.

Research Question Analysis

Heat Maps

Research Question 1 seeks to examine whether the presence of irrelevant information or minor errors influences the level of attention participants give to audit evidence when evaluating misstatement risk and the appropriate sample size. To examine RQ1, a heat map analysis was conducted. Tobii studio creates heat maps based on the time spent on each treatment condition (see Figure 11 Panels A-D). The warmer colored areas (i.e., the brighter red colored areas) show increased levels of attention where there were more fixations and longer dwell times. If there were no differences in attention levels across treatment conditions, then we would expect to see similar colors and patterns of colors on each heat map.

As shown in Figure 11, there was a clear difference in the attention levels between the various treatment conditions. Based on a visual inspection of the heat maps, it appears that the Control condition, which had no irrelevant information or minor errors present (Figure 11 Panel A), and Treatment 3, which had both minor errors and irrelevant information (Figure 11 Panel D), had the most warm-colored red areas indicating more fixations and longer dwell times. Thus, the two extreme treatment conditions seemed to draw the most scrutiny. This suggests that audit evidence which is not consistent with the auditor's initial level of anticipated risk of restatement (including a perfectly clean record) increases the auditor's attention level.

[Insert Figure 11 here]

Furthermore, a visual inspection of the heat maps for the Control condition and Treatment 2 (which contained irrelevant information without minor errors) is noteworthy. There was significantly less attention focused on Treatment 2 than on the Control condition (see Figure 11, Panels A and C). This result provides evidence of a dilution effect occurring

when irrelevant information was present. In other words, when participants encounter audit evidence containing irrelevant information they respond by displaying lower levels of attention than they would if no irrelevant information was present. Overall, the results of this heat map analysis suggest that attention is influenced by the presence of irrelevant information and minor errors.

One-Way ANOVA Analysis of Overall Differences across Treatment Conditions

The primary dependent variables in this experiment were the number of fixations and dwell time (see Table 11 for means and standard deviations). To further examine RQ1, a one-way analysis of variance was conducted for the overall number of fixations and overall dwell time variables. If there were no differences in participant level of attention (i.e., number of fixations and dwell time) then there should be no significant differences across treatment conditions. As shown in Table 11 Panel A, there was a significant difference in fixation counts between treatment conditions ($F(3, 39) = 6.15$, $p < 0.05$). These results suggest that there were significant differences in the level of attention across treatment conditions.

To further analyze the result for number of fixations, a Tukey post hoc test was conducted. Results of the Tukey post hoc test reveal that the Control condition (where neither irrelevant information nor minor errors were present) and Treatment 3 (where both irrelevant information and minor errors were present) were significantly different from each other ($p < 0.05$). Additionally, Treatment 2 (where irrelevant information was present and there were no minor errors) and Treatment 3 (where both irrelevant information and minor errors were present) were significantly different from each other ($p < 0.01$). These results confirm that participants had significantly more fixations on audit evidence when

both irrelevant information and minor errors were present. Thus, overall the results of these tests provide evidence that the presence of irrelevant information or minor errors raises attention levels.

[Insert Table 11 here]

Table 11 Panel B contains the results for the dwell time. The results for dwell time are similar to Panel A. There was a significant overall difference between treatment conditions ($F(3, 39) = 5.35$, $p < 0.05$). Similar to Panel A this result suggests that participants spent different amounts of time viewing the overall spreadsheet depending on the presence of irrelevant information or minor errors. To further analyze the dwell time results, a Games-Howell post hoc test was conducted. A Games-Howell post hoc test was used after a Levene's test for homogeneity was found to be significant. Therefore, the assumption of equal variances could not be assumed. Results of the Games' Howell post hoc test reveal that Treatment 2 (where irrelevant information was present and there were no minor errors) was significantly different ($p < 0.05$) from Treatment 3 (where both irrelevant information and minor errors were present). Since irrelevant information was present in both of the treatment conditions, this result suggests that participants spent significantly more time viewing the audit evidence when minor errors were present compared to when there were no minor errors. Overall the one-way ANOVA results support the findings of the heat map analysis and provide further evidence that the presence of irrelevant information or minor errors can influence how auditors focus their attention.

Kruskal-Wallace Test

There are only 8 to 12 participants in each treatment condition. To address the lack of power due to small sample sizes the Kruskal-Wallace test was conducted for fixations

and dwell times. The Kruskal-Wallace test is the nonparametric version of the one-way ANOVA. Results of the Kruskal-Wallace test are shown in Table 12. Table 12 Panel A shows the results for the analysis of fixations. The Kruskal-Wallace test found a significant difference ($p < 0.05$) in the total number of fixations between the four treatment conditions. Table 12 Panel B shows the Kruskal-Wallace test for dwell time. Consistent with Panel A, there was a significant difference ($p < 0.05$) in the overall dwell time between the four conditions. Overall these results are consistent with the parametric tests above and suggest that the number of fixations and overall dwell time by participants significantly varied depending on the presence of irrelevant information or minor errors.

[Insert Table 12 here]

Supplemental Analysis

To further investigate the differences in the eye-tracking results across treatment conditions an additional mediation analysis was conducted. This additional analysis was performed using the Haye's (2010) PROCESS tool for SPSS to examine the relationship between participant level of skepticism, attention in specific areas of interest, and assessments of the misstatement likelihood and sample size. See Appendix D for the results of these tests.

V. CONCLUSION

The purpose of Experiment 2 is to utilize eye-tracking technology to examine how auditing students react to dirty documents. Eye-tracking is the process of measuring a person's eye activity (iMotion 2016). Specifically, eye-tracking technology allows for a more precise investigation of the specific factors focused upon in performing a decision-making task, as well as the visual search strategy employed. In Experiment 2, auditing

students from a large southeastern university assumed the role of staff auditors in the same audit scenario as Experiment 1. However, in this experiment, the participant's eye movements were recorded while they reviewed the case materials and audit evidence.

Results of this experiment showed that participants focused their attention differently depending on whether irrelevant information or minor errors were present. In addition, eye-tracking offered additional insight into the influence of irrelevant information and minor errors. Experiment 1 found no dilution effect when both irrelevant information and minor errors were present. However, contrary to the results in Experiment 1, the eye-tracking results suggest that irrelevant information triggers a dilution effect. In other words, when auditors encounter audit evidence containing irrelevant information they respond by displaying lower levels of attention than they would if no irrelevant information was present. Another insight gained from eye-tracking is that audit evidence which is not consistent with the initial level of anticipated risk of restatement (including a perfectly clean record) increases the auditor's attention level.

Future researchers could explore whether more experienced auditors or auditors scoring high in trait skepticism are found to share a unique but similar scan path and/or fixation points while processing a dirty record effectively. If so, audit firms and educators can adapt the findings to enhance training in the appropriate application of professional skepticism. For example, the results could help develop a preferred analytical framework for reading/reviewing/analyzing client records.

The results of this study are subject to the same limitations that apply to any research that employs a judgment and decision making setting. For example, the results may have been different with professional participants. However, researchers have argued

that the use of professional participants should be avoided unless they are determined to be essential to achieving specific research goals (Libby, Bloomfield, and Nelsen 2002). Given that the students were trained to react similarly to professionals in our research scenario, and the extensive history of using students in similar tests of economic theory (Smith 2008), I believe the use of students is appropriate in this setting. Additionally, the lack of significant difference in the Hurtt Skepticism scale (2010) scores between the audit participants in Experiment 1 and the students in Experiment 2 (see Table 6) provide evidence that students were similar to auditors in their levels of trait skepticism. Another limitation of this study, is that although it was designed to be realistic, the experimental setting was far more simplified than a real-world audit setting. Thus, the responses in both experiments may not reflect how auditors would respond in a more complex setting in practice. Further, a lack of power with Experiment 2 was certainly a possible limitation in interpreting the results for those tests.

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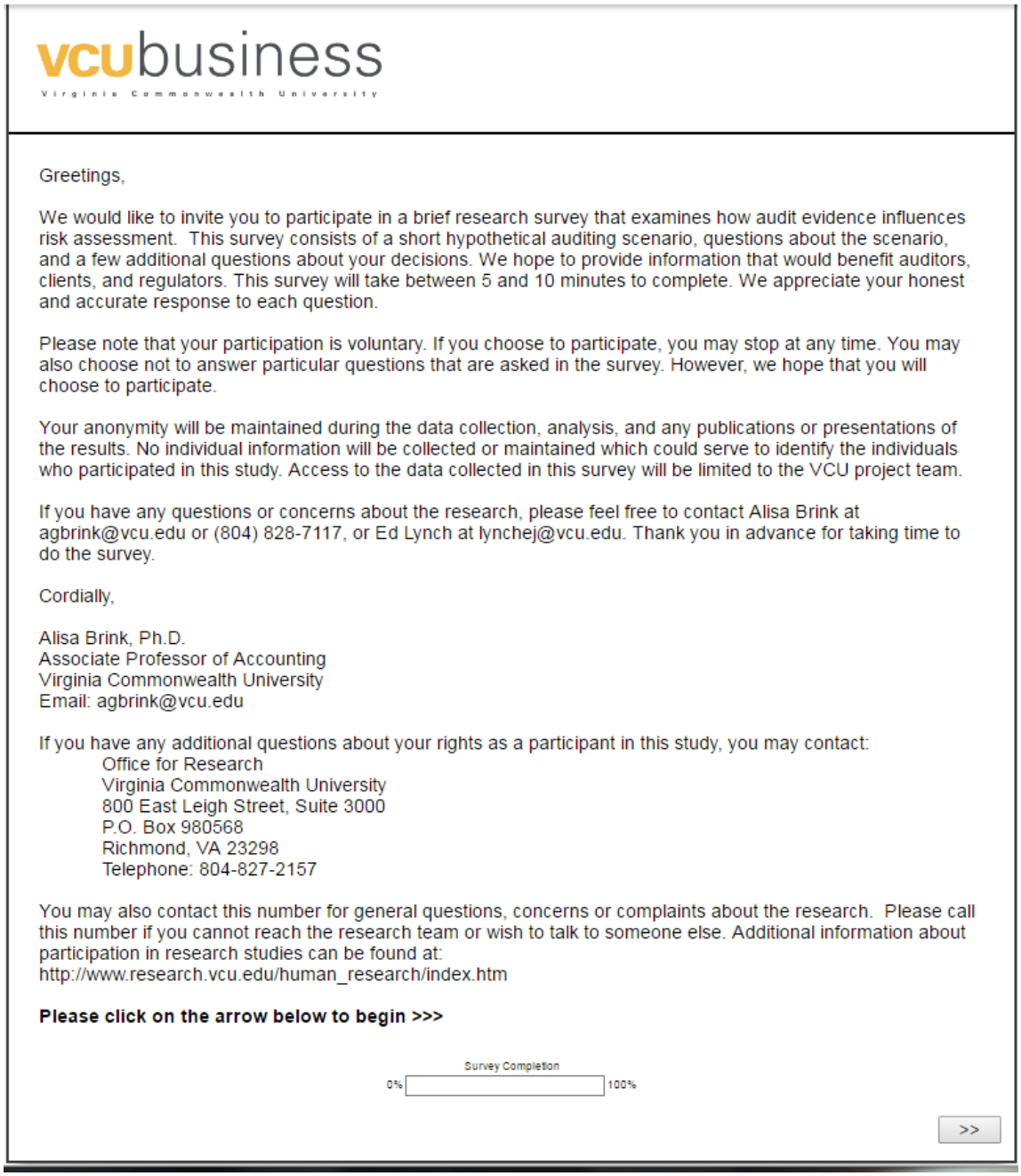
Appendix A
Associated Materials Overview

Online Instrument

Screen 1 – IRB Information and Consent Sheet



vcubusiness
Virginia Commonwealth University

Greetings,

We would like to invite you to participate in a brief research survey that examines how audit evidence influences risk assessment. This survey consists of a short hypothetical auditing scenario, questions about the scenario, and a few additional questions about your decisions. We hope to provide information that would benefit auditors, clients, and regulators. This survey will take between 5 and 10 minutes to complete. We appreciate your honest and accurate response to each question.

Please note that your participation is voluntary. If you choose to participate, you may stop at any time. You may also choose not to answer particular questions that are asked in the survey. However, we hope that you will choose to participate.

Your anonymity will be maintained during the data collection, analysis, and any publications or presentations of the results. No individual information will be collected or maintained which could serve to identify the individuals who participated in this study. Access to the data collected in this survey will be limited to the VCU project team.

If you have any questions or concerns about the research, please feel free to contact Alisa Brink at agbrink@vcu.edu or (804) 828-7117, or Ed Lynch at lynchej@vcu.edu. Thank you in advance for taking time to do the survey.

Cordially,

Alisa Brink, Ph.D.
Associate Professor of Accounting
Virginia Commonwealth University
Email: agbrink@vcu.edu

If you have any additional questions about your rights as a participant in this study, you may contact:
Office for Research
Virginia Commonwealth University
800 East Leigh Street, Suite 3000
P.O. Box 980568
Richmond, VA 23298
Telephone: 804-827-2157

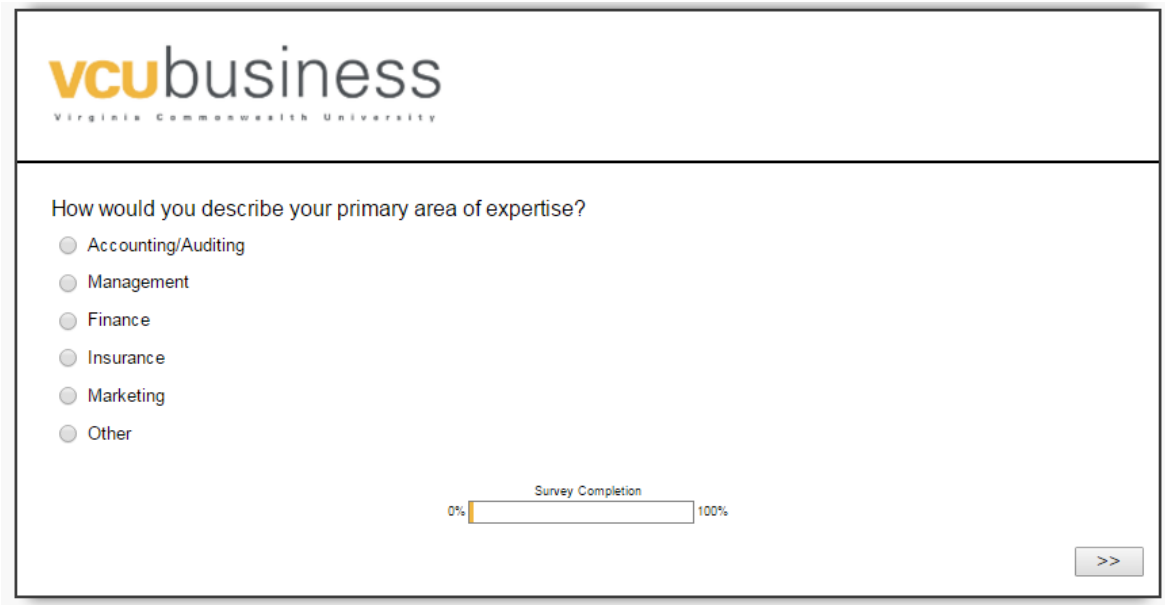
You may also contact this number for general questions, concerns or complaints about the research. Please call this number if you cannot reach the research team or wish to talk to someone else. Additional information about participation in research studies can be found at:
http://www.research.vcu.edu/human_research/index.htm

Please click on the arrow below to begin >>>

Survey Completion
0% 100%

>>

Screens 2 - 5 – Screening Questions (participants that answered the questions below incorrectly were removed from the study)

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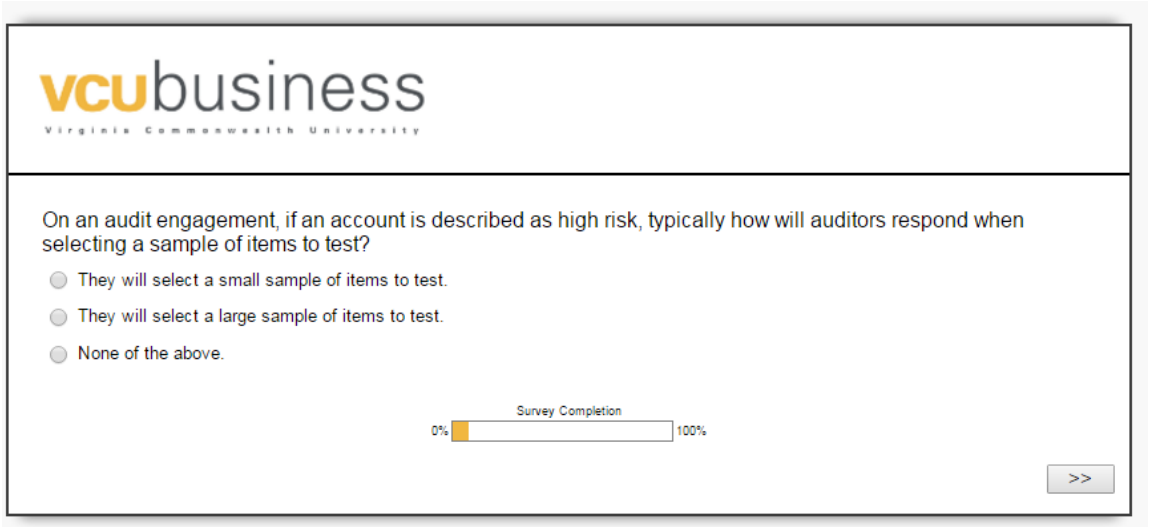
On an audit engagement, if an account is described as high risk then which of the following could take place?
It's highly likely the account is misstated.
It's highly unlikely the account is misstated.
None of the above.
Survey Completion
0%
100%
>>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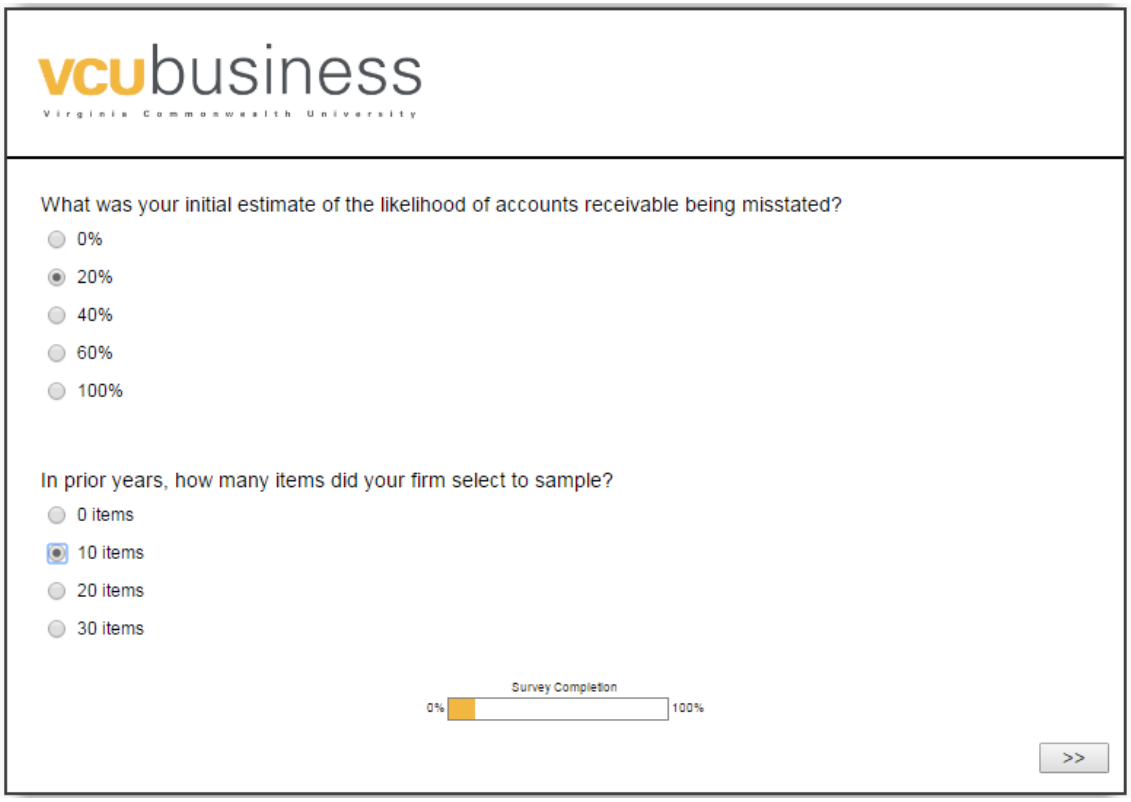
On an audit engagement, if an account is described as high risk, typically how will auditors respond when selecting a sample of items to test?
They will select a small sample of items to test.
They will select a large sample of items to test.
None of the above.
Survey Completion
0%
100%
>>

Screen 6 – Case Description

Screen 7 – Key Information Quiz (participants had to select the correct answer to proceed)



Screen 8 – Task Reminder Screen

Screen 9 - Audit Evidence Screen (1 of the following 4 is randomly shown to participants)

Control Condition (no irrelevant information or minor errors):

	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		**Customer**	**Invoice Number**	**Invoice Date**	**Invoice Amount**	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15	Petrol TX	41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	12/15/2015	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	88,666.00	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28	Kiddel Co.	42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				**Sum Total:**	**50,724,160.96**	GL
36				**Total per GL:**	**50,724,160.96**	
37						

Treatment 1 (minor errors and no irrelevant information):

	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		**Customer**	**Invoice Number**	**Invoice Date**	**Invoice Amount**	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15		41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	5782	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	ABC	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28		42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				**Sum Total:**	**48,179,112.96**	GL
36				**Total per GL:**	**50,724,160.96**	
37						

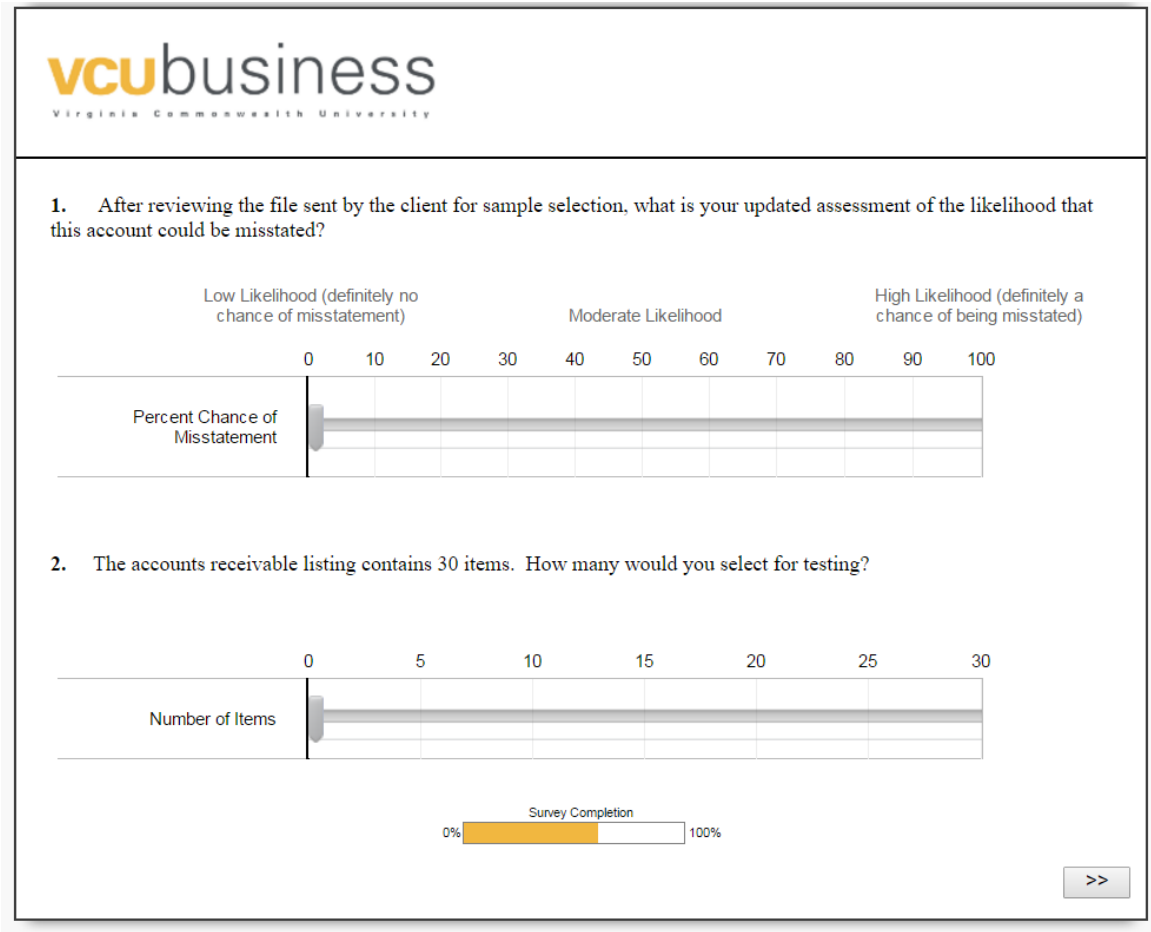
Treatment 2 (irrelevant information and no minor errors):

	A	B	C	D	E	F	G	H	I	J	K	L
1	A/R Balance as of: 12/31/2015										PBC	
2												
3		**Customer**	**State**	**Invoice Number**	**Phone**	**Contact**	**Invoice Date**	**Items**	**Number**	**Skew**	**Invoice Amount**	
4	1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90	
5	2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30	
6	3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85	
7	4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40	
8	5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00	
9	6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31	
10	7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20	
11	8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00	
12	9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99	
13	10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00	
14	11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15	
15	12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96	
16	13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37	
17	14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00	
18	15	Petrol TX	TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12	
19	16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42	
20	17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11	
21	18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50	
22	19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	12/15/2015	B bottles	6,000	F	98,546.25	
23	20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71	
24	21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00	
25	22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13	
26	23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00	
27	24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95	
28	25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	88,666.00	
29	26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15	
30	27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61	
31	28	Kiddel Co.	GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16	
32	29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42	
33	30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00	
34												
35										**Sum Total:**	**50,724,160.96**	GL
36										**Total per GL:**	**50,724,160.96**	

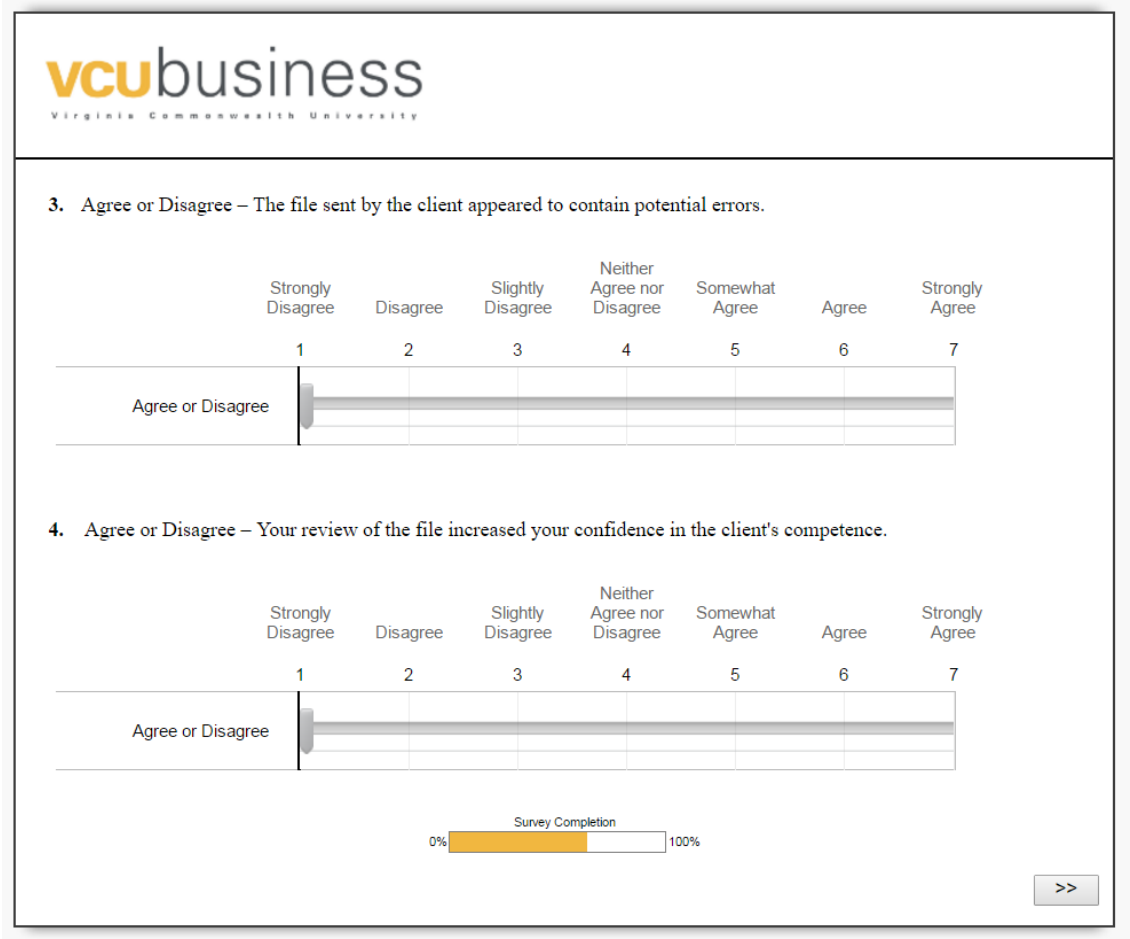
Treatment 3 (both irrelevant information and minor errors):

	A	B	C	D	E	F	G	H	I	J	K	L
1	A/R Balance as of: 12/31/2015										PBC	
2												
3		**Customer**	**State**	**Invoice Number**	**Phone**	**Contact**	**Invoice Date**	**Items**	**Number**	**Skew**	**Invoice Amount**	
4	1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90	
5	2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30	
6	3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85	
7	4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40	
8	5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00	
9	6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31	
10	7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20	
11	8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00	
12	9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99	
13	10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00	
14	11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15	
15	12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96	
16	13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37	
17	14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00	
18	15		TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12	
19	16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42	
20	17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11	
21	18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50	
22	19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	5782	B bottles	6,000	F	98,546.25	
23	20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71	
24	21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00	
25	22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13	
26	23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00	
27	24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95	
28	25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	ABC	
29	26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15	
30	27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61	
31	28		GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16	
32	29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42	
33	30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00	
34												
35										**Sum Total:**	**48,179,112.96**	GL
36										**Total per GL:**	**50,724,160.96**	

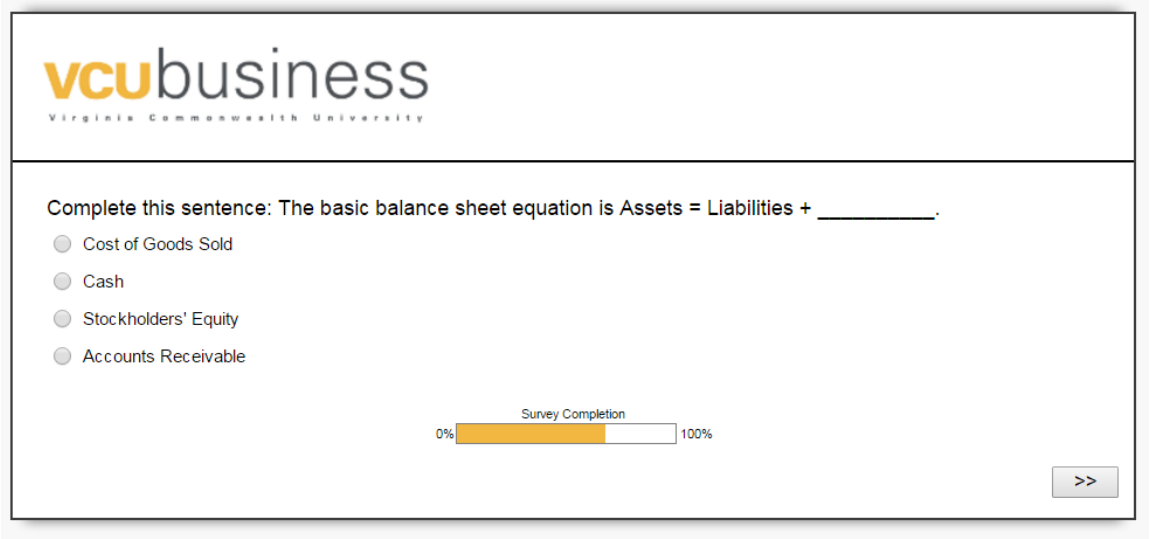
Screen 10 – Follow-up Assessment Questions



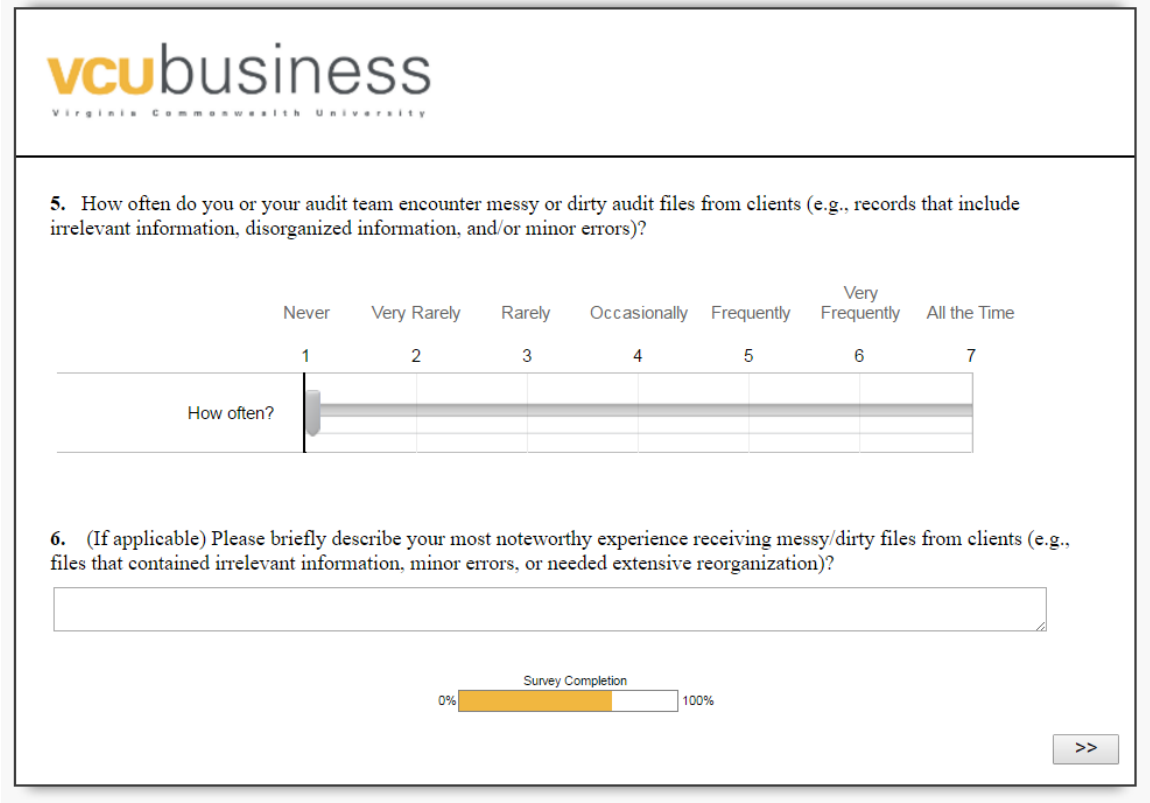
Screen 11 – Follow-up Assessment Questions Continued



Screen 12 – Attention Check Question (participants had to get this question correct to continue)



Screen 13 – Post-Experimental Debrief Survey



Screen 14 – Post-Experimental Debrief Survey Continued

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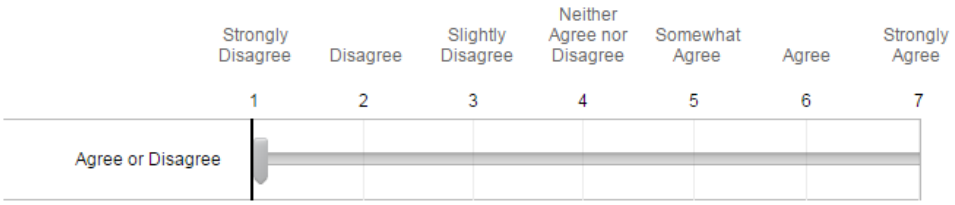
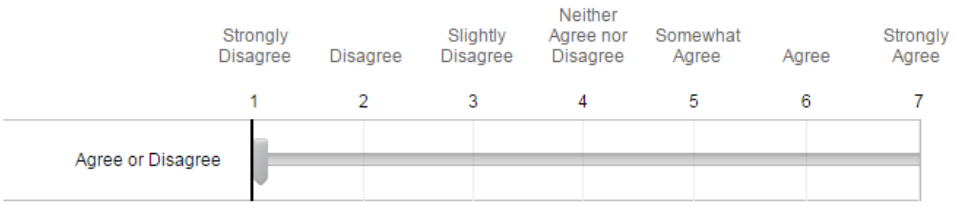
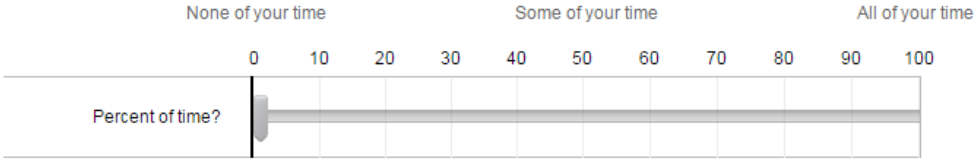
7. Agree or Disagree – Client files that are messy/dirty impact my application of professional skepticism.

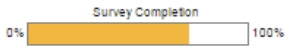


8. Agree or Disagree – Messy/dirty documents provided by the client can influence the application of professional skepticism by other members of my audit team.



9. On average, how much of your time on a client site is spent cleaning up messy/dirty documents?





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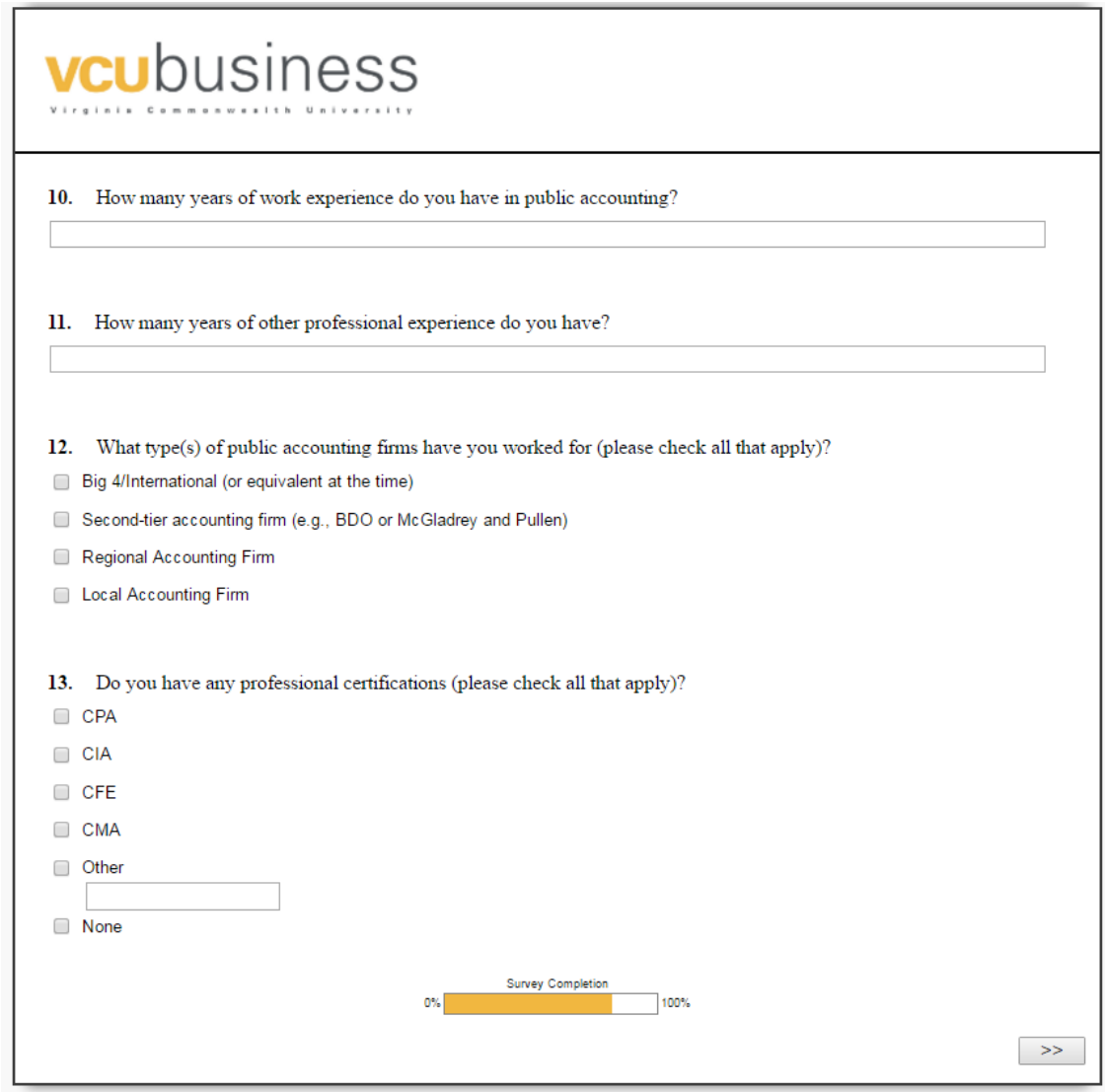
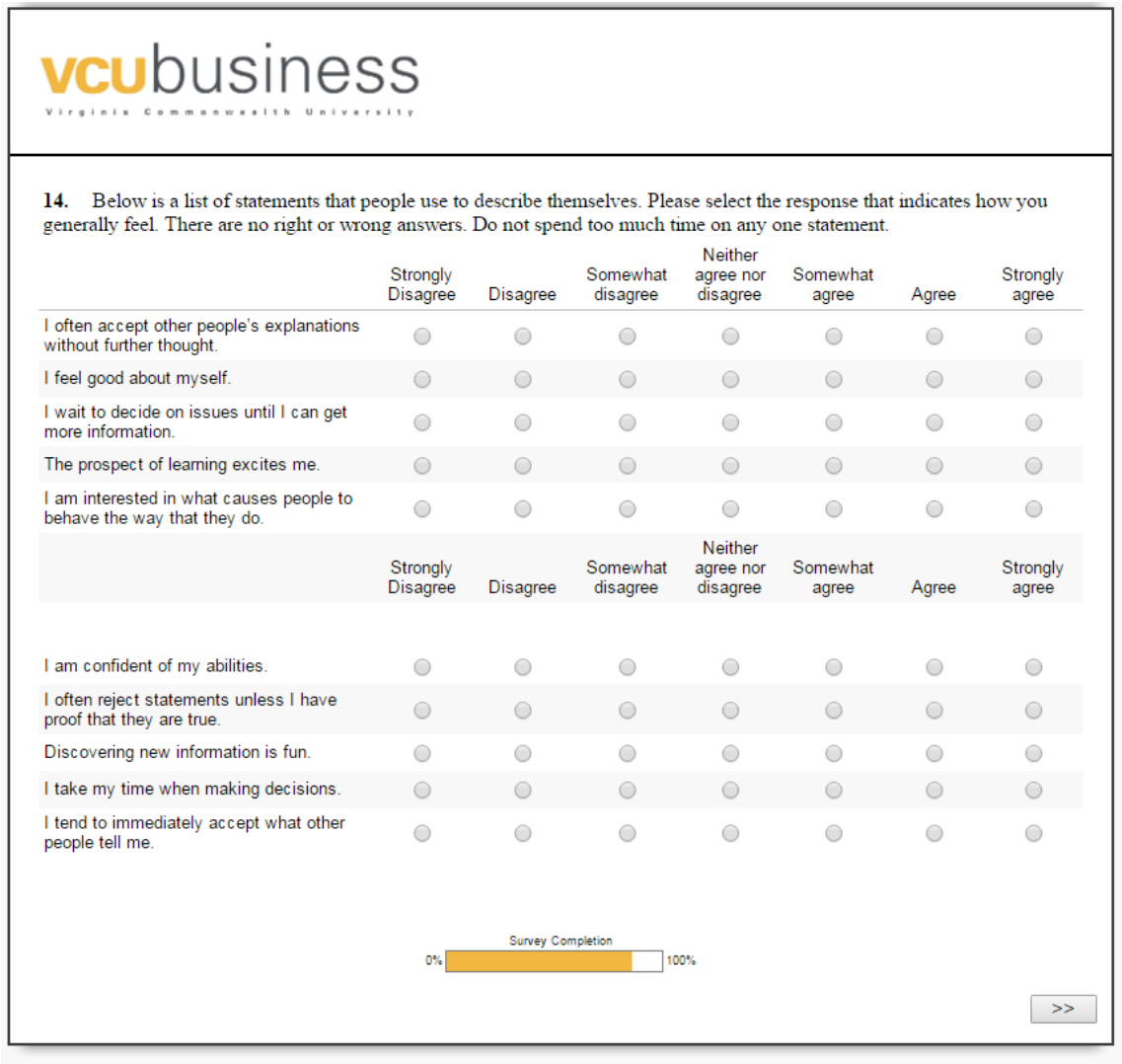
Screen 15 – Demographic Questions



Screens 16 - 18 – Skepticism Survey (Hurtt 2010)



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14. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I often accept other people's explanations without further thought.	○	○	○	○	○	○	○
I feel good about myself.	○	○	○	○	○	○	○
I wait to decide on issues until I can get more information.	○	○	○	○	○	○	○
The prospect of learning excites me.	○	○	○	○	○	○	○
I am interested in what causes people to behave the way that they do.	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I am confident of my abilities.	○	○	○	○	○	○	○
I often reject statements unless I have proof that they are true.	○	○	○	○	○	○	○
Discovering new information is fun.	○	○	○	○	○	○	○
I take my time when making decisions.	○	○	○	○	○	○	○
I tend to immediately accept what other people tell me.	○	○	○	○	○	○	○

Survey Completion
0% 100%

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15. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Aisagree	Somewhat Agree	Agree	Strongly Agree
Other people's behavior does not interest me.	○	○	○	○	○	○	○
I am self-assured.	○	○	○	○	○	○	○
My friends tell me that I usually question things that I see or hear.	○	○	○	○	○	○	○
I like to understand the reason for other people's behavior.	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Aisagree	Somewhat Agree	Agree	Strongly Agree
I think that learning is exciting.	○	○	○	○	○	○	○
I usually accept things I see, read, or hear at face value.	○	○	○	○	○	○	○
I do not feel sure of myself.	○	○	○	○	○	○	○
I usually notice inconsistencies in explanations.	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Aisagree	Somewhat Agree	Agree	Strongly Agree
Most often I agree with what the others in my group think.	○	○	○	○	○	○	○
Please select strongly disagree for this statement	○	○	○	○	○	○	○
I dislike having to make decisions quickly.	○	○	○	○	○	○	○

Survey Completion
0% 100%

>>

vcubusiness
Virginia Commonwealth University

16. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

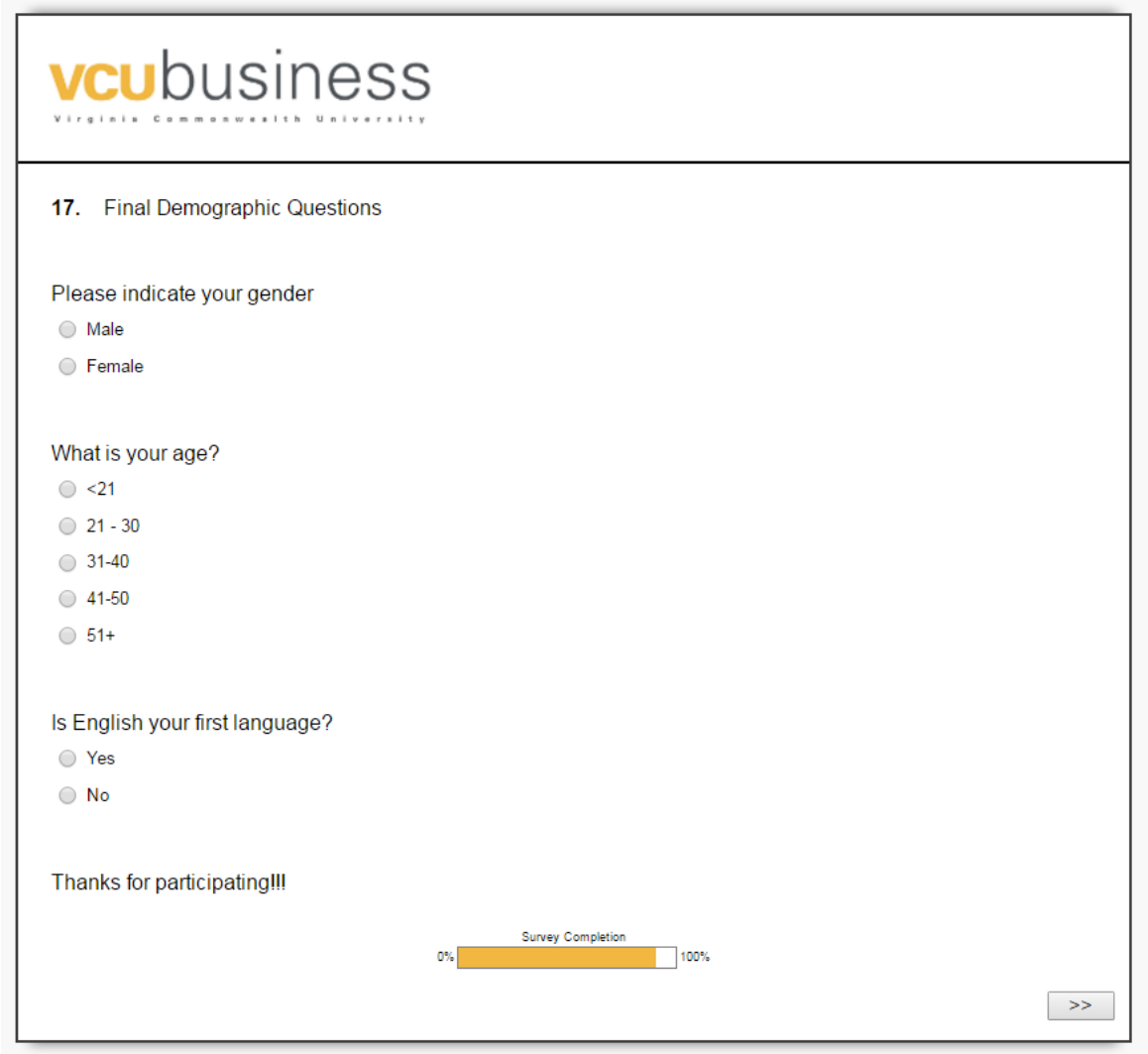
	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Aisagree	Somewhat Agree	Agree	Strongly Agree
I have confidence in myself.	○	○	○	○	○	○	○
I do not like to decide until I've looked at all of the readily available information.	○	○	○	○	○	○	○
I like searching for knowledge.	○	○	○	○	○	○	○
I frequently question things that I see or hear.	○	○	○	○	○	○	○
It is easy for other people to convince me.	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Aisagree	Somewhat Agree	Agree	Strongly Agree
I seldom consider why people behave in a certain way.	○	○	○	○	○	○	○
I like to ensure that I've considered most available information before making a decision.	○	○	○	○	○	○	○
I enjoy trying to determine if what I read or hear is true.	○	○	○	○	○	○	○
I relish learning.	○	○	○	○	○	○	○
The actions people take and the reasons for those actions are fascinating.	○	○	○	○	○	○	○

Survey Completion
0% 100%

>>

Screen 19 – Final Demographic Information



Appendix B
Responses to the Open-Ended Question

"Typical Shoebox, just trying to drill down to the necessary information. Clients either send too much or not enough."

"Loan files from a client were in a huge basket and they were not organized. They told us to find everything on our own."

"I've received literal shoeboxes of unorganized paperwork."

"Request the client "refurbish" the files provided and prepare better organized workpapers and source documents. Most of our clients are quite small and have limited staff."

"Irrelevant information, major errors in estimates"

"Client provided trial balance prior to making any adjusting entries that they knew needed to be made."

"Details did not agree to the trial balance. Several entries had to be made."

"We have a bookkeeper for several small clients that keeps files in milk crates."

"Tax client who was personal assistant that hadn't filed for 3 years. Spent several days just sorting receipts into personal and business by year. Huge waste of time."

"Not recording revenues in the appropriate month"

"Needed to be completely resubmitted due to not following directions. Materially incomplete."

"Shoe box no longer client"

"Sub-ledgers did not tie to general ledger

"Many out of period transactions"

"Minor errors"

"Errors and messy"

"A box of invoices that had never been entered"

"Go percentage was higher than expected. On examination returned good were placed back in inventory without the sale being reversed"

“Beginning retained earning doesn't tie to prior year”

“Received a file that had no date order, missing documents”

“Home builder not using the percentage-of-completion method for costs.”

“Doesn't agree to GL”

“Partner helped with notes receivable”

“We have audited companies with false amounts and merchandise with different faults”

“Was a Japanese client and [they] had many unneeded columns for our audit work.”

“I uncovered a suspicious amount of open invoices to one single customer. It represented about 30% of the total A/R. It turned out to be an entity related to the owner's family, and should have been considered an owner's distribution, rather than a sale.”

“Irrelevant information with many minor and some major errors.”

“Client Quickbokks file consisted of journalist entries and no detail information and did not reconcile”

“Client updated to a new software and we had to reformat and piecemeal files to meet our audit requirements”

“[Client files were] Not agreed to GL”

“Having files that are not of year-end, so numbers are just slightly off”

“When the client throws everything (and I mean everything) into a box and brings it to you.”

“A client was using quickbooks without any prior training and his books were almost completely unusable.”

“I'm a CPA and have been in public accounting for my whole working career of 5 years and have only done tax. Certainly, there are many times were I receive client prepared financial statements in which there have been no attestation services performed and I have to do many adjusting journal entries for the client to properly prepare the financials.”

“Client hadn't completed bank reconciliations from May through the end of the year.”

Appendix C

Eye-Tracking Associated Materials Overview

Recruitment Email:

Greetings,

Would you be interested in participating in a 15-20 minute auditor research study here at VCU? If so, we invite you to participate in a study at the School of Business about how auditors respond to different client documents.

As a currently enrolled auditing student age 18 or older, you are uniquely qualified to participate in this research study.

The purpose of this study is to improve auditing students' learning and understanding of key auditing concepts through the application of class concepts to a real world audit setting. Specifically, you will be asked to review audit evidence and perform audit tasks based on your professional judgment while your eye movements are being tracked.

For participating in this study you will receive 5 opportunity points.
Here's how to participate:
Step 1. Click on the link below to schedule a date and time for your 20-minute research session. (Please note, there is limited space to participate in this research study. Sign-ups for the study are on a first-come, first-serve basis)
Step 2. Details about the research session, including what to bring and where to go will be emailed to you before your session.
Step 3. Attend your scheduled research session.

CLICK HERE TO SIGN UP: https://vcu-celab.sona-systems.com/Default.aspx?ReturnUrl=%2f

If you have any questions, complaints, or concerns about the research, contact Alisa Brink (804) 828-7117 or agbrink@vcu.edu.

Note - Alternatively, you can also receive the same opportunity points by completing a homework assignment on your own (see your instructor for a copy of the homework assignment) and turning in a 2-3 page written response to your instructor. The homework assignment requires you to read an audit scenario and respond to a list of case questions.

Consent Form:

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

TITLE: The Accounts Receivable Sample Selection Case

VCU IRB NO.: HM20009511

INVESTIGATORS: Alisa Brink, Ph.D., Jodie Ferguson Ph.D., Lindsay Andiola Ph.D., and Edward Lynch CPA

PURPOSE OF THE STUDY

The purpose of this study is to better understand how auditors respond to different client documents. You are being asked to participate in this study to find out if audit students react differently depending on the attributes of audit evidence.

DESCRIPTION OF THE STUDY AND YOUR INVOLVEMENT

If you decide to participate in this research study, you will be asked to sign this consent form after you have had all your questions answered and understand what will happen to you.

In this study, you will be asked to sit at a regular computer desk that has an eye tracking device attached to it. You will be asked to review some audit evidence provided by a fictitious client, and make some judgements. As you read the information on the computer screen, your eye gaze location on the computer screen will be measured. Only your eye movements will be tracked and no actual video of your eyes or your face will be recorded. Your participation in the study should take about 15 minutes.

RISKS AND DISCOMFORTS

The eye tracking equipment used in this study is not attached to you and does not pose any danger to you physically. There is also a risk of loss of confidentiality or privacy. There are no risks involved with participating in this research beyond what is experienced in everyday life.

BENEFITS TO YOU AND OTHERS

You may not get any direct benefit from this study, but the information we learn in this study could help us to better understand how audit students evaluate audit evidence.

COSTS

There are no costs for participating in this study beyond the time for you to participate in the research.

PAYMENT FOR PARTICIPATION

Students will receive five extra credit points for their participation in this study. Those students who wish not to participate will have the opportunity to complete an equivalent task for the same amount of extra credit. The equivalent task will involve students analyzing a similar case on their own and writing up a typed response to the case questions and turning it into their professors.

CONFIDENTIALITY

Your identifiable information, such as your name, will be separate from your responses.

We will not share the responses you give us; however, information from the study and the consent form signed by you may be looked at or copied for research or legal purposes by Virginia Commonwealth University. Records may also be accessed by the Office of Human Research Protections (OHRP).

The research findings may be presented at meetings or published in papers, but your name will not ever be used in these presentations or papers.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Your participation in this study is voluntary. You may decide to not participate in this study. Your decision not to take part will involve no penalty or loss of benefits to which you are otherwise entitled. In addition, your decision to participate will not affect your grade or academic standing. If you do participate, you may freely withdraw from the study at any time. Your decision to with draw will involve no penalty or loss of benefits to which you are otherwise entitled.

Your participation in this study may be stopped at any time by the study staff without your consent. The reasons might include:

- the study staff thinks it necessary for your health or safety;
- you have not followed study instructions; or
- administrative reasons require your withdrawal.

If you leave the study before the data collection is complete, your data will be removed from the analysis. If after you leave the study, you still may have your information removed from the study up to one month after your participation in this study. To have your information removed after you leave, please email or call Dr. Brink at agbrink@vcu.edu or (804)828-7117.

QUESTIONS

If you have any questions, complaints, or concerns about your participation in this research, contact:

Alisa Brink, Ph.D.
Associate Professor of Accounting
Virginia Commonwealth University
Email: agbrink@vcu.edu
Phone: (804) 828-7117

The researcher named above is the best person to call for questions about your participation in this study.

If you have any general questions about your rights as a participant in this or any other research, you may contact:

Office of Research
Virginia Commonwealth University
800 East Leigh Street, Suite 3000
P.O. Box 980568
Richmond, VA 23298
Telephone: (804) 827-2157

Contact this number to ask general questions, to obtain information or offer input, and to express concerns or complaints about research. You may also call this number if you cannot reach the research team or if you wish to talk with someone else. General information about participation in research studies can also be found at

http://www.research.vcu.edu/human_research/volunteers.htm.

CONSENT

I have been given the chance to read this consent form. I understand the information about this study. Questions that I wanted to ask about the study have been answered. My signature says that I am willing to participate in this study. I will receive a copy of the consent form once I have agreed to participate.

Participant name printed Participant signature Date

_____

Name of Person Conducting Informed Consent Discussion

(Printed)

_____

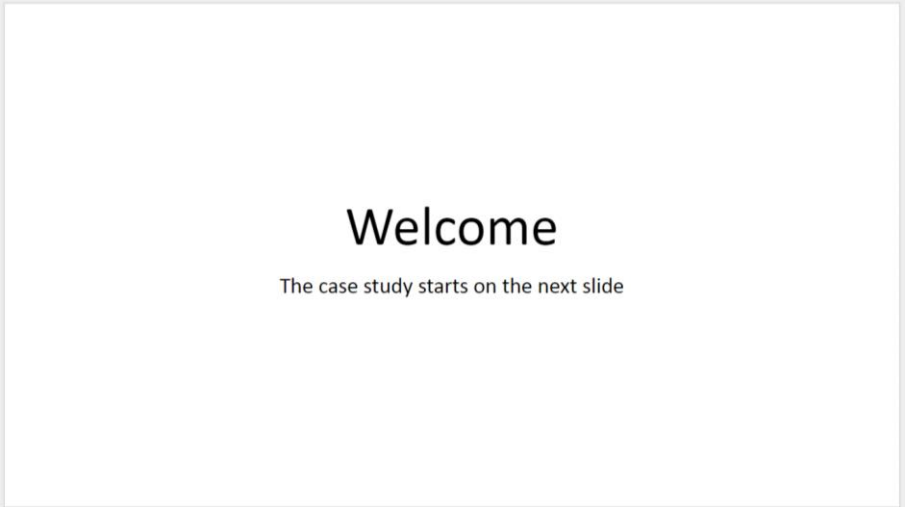
Signature of Person Conducting Informed Consent Discussion Date

_____

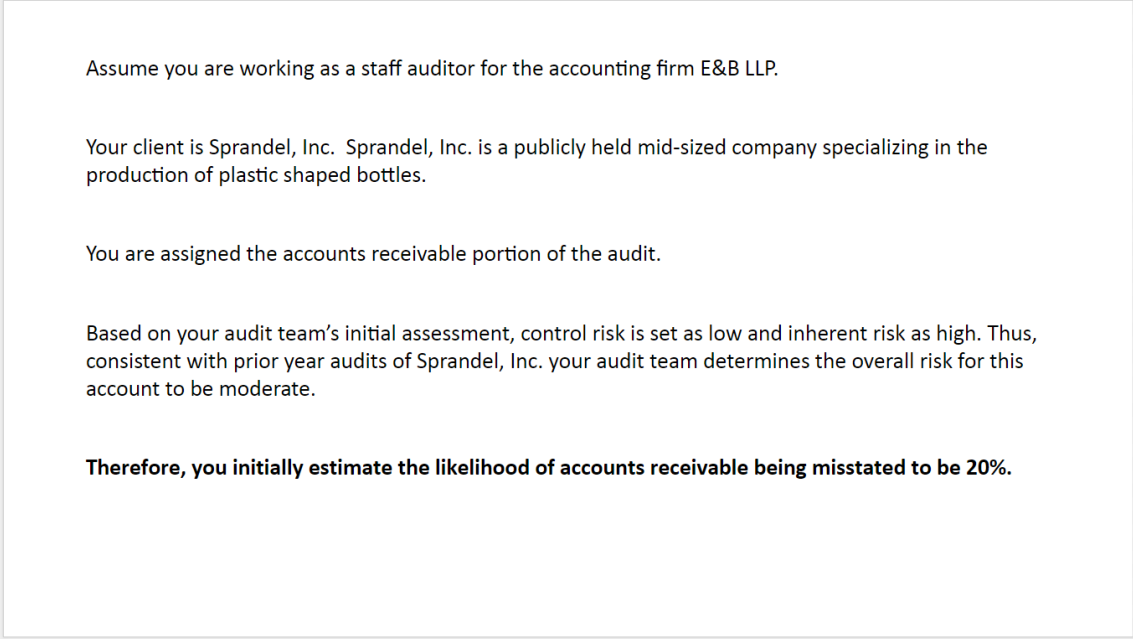
Principal Investigator Signature (if different from above) Date

Eye-Tracking Slides:

Slide 1: Welcome Screen



Slide 2 & 3: Task Outline Screens



In the next slide you will be shown the accounts receivable listing provided by the client. Your task is to review the accounts receivable listing for possible errors. **In prior years, your firm selected 10 items to sample, but the final number for this year is up to you.**

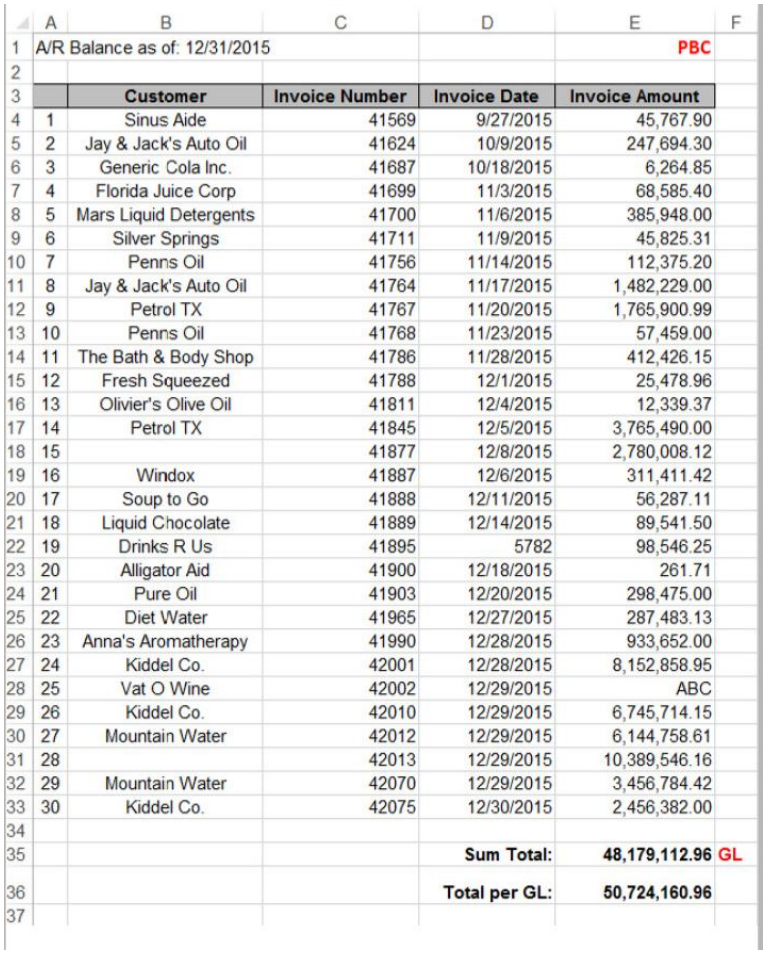
Based on your review, provide an updated likelihood of the account being misstated and select the number of items you would like to review.

Slide 4: Audit Evidence Slide (1 of the following 4 is randomly shown to participants)

Control Condition (no irrelevant information or minor errors):

	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		**Customer**	**Invoice Number**	**Invoice Date**	**Invoice Amount**	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15	Petrol TX	41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	12/15/2015	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	88,666.00	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28	Kiddel Co.	42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				**Sum Total:**	**50,724,160.96**	GL
36				**Total per GL:**	**50,724,160.96**	
37						

Treatment 1 (minor errors and no irrelevant information):



	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		Customer	Invoice Number	Invoice Date	Invoice Amount	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15		41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	5782	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	ABC	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28		42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				Sum Total:	48,179,112.96	GL
36				Total per GL:	50,724,160.96	
37						

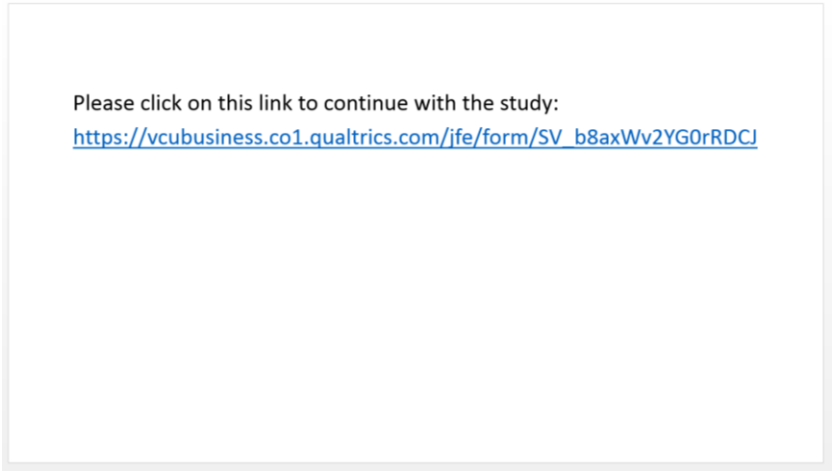
Treatment 2 (irrelevant information and no minor errors):

	A	B	C	D	E	F	G	H	I	J	K	L
1	A/R Balance as of: 12/31/2015										PBC	
2												
3		Customer	State	Invoice Number	Phone	Contact	Invoice Date	Items	Number	Skew	Invoice Amount	
4	1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90	
5	2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30	
6	3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85	
7	4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40	
8	5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00	
9	6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31	
10	7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20	
11	8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00	
12	9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99	
13	10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00	
14	11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15	
15	12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96	
16	13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37	
17	14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00	
18	15	Petrol TX	TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12	
19	16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42	
20	17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11	
21	18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50	
22	19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	12/15/2015	B bottles	6,000	F	98,546.25	
23	20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71	
24	21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00	
25	22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13	
26	23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00	
27	24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95	
28	25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	88,666.00	
29	26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15	
30	27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61	
31	28	Kiddel Co.	GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16	
32	29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42	
33	30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00	
34												
35										Sum Total:	50,724,160.96	GL
36										Total per GL:	50,724,160.96	

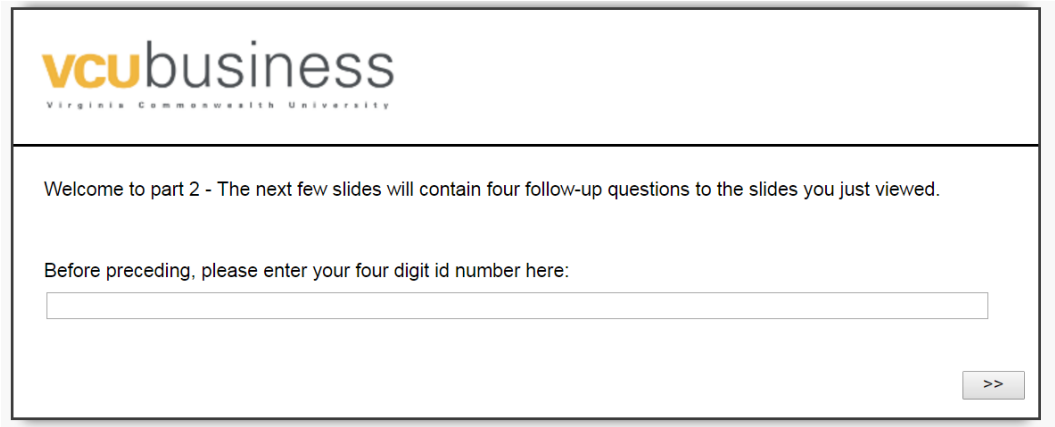
Treatment 3 (both irrelevant information and minor errors):

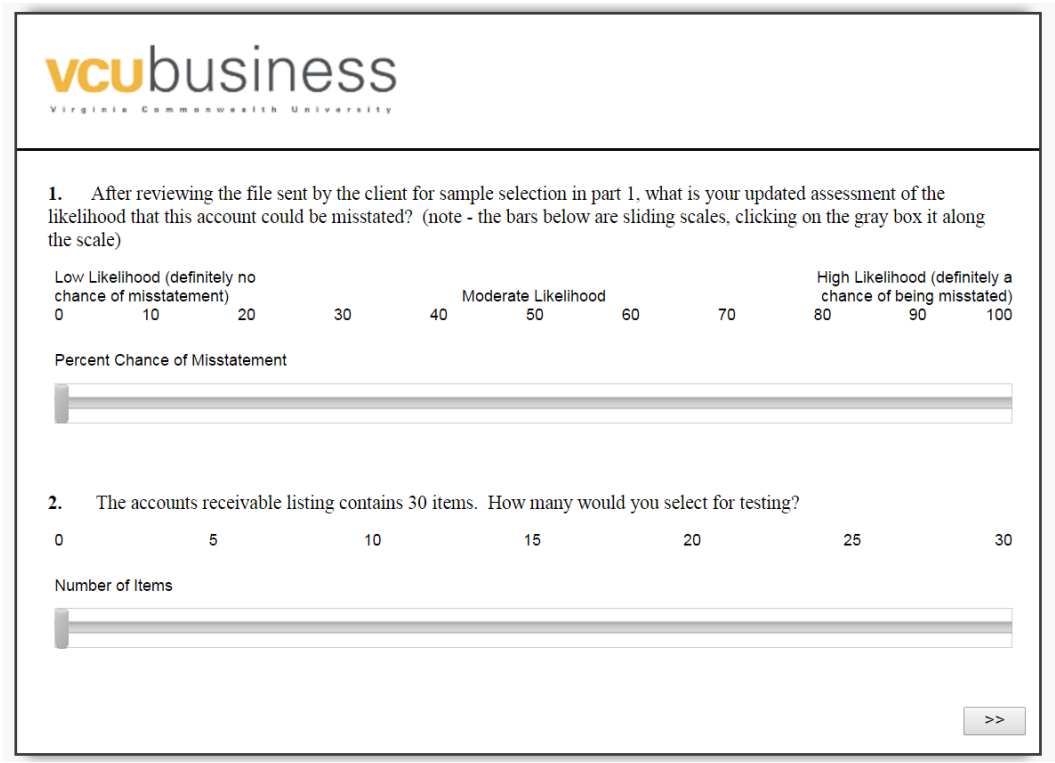
	A	B	C	D	E	F	G	H	I	J	K	L
1	A/R Balance as of: 12/31/2015										PBC	
2												
3		**Customer**	**State**	**Invoice Number**	**Phone**	**Contact**	**Invoice Date**	**Items**	**Number**	**Skew**	**Invoice Amount**	
4	1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90	
5	2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30	
6	3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85	
7	4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40	
8	5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00	
9	6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31	
10	7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20	
11	8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00	
12	9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99	
13	10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00	
14	11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15	
15	12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96	
16	13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37	
17	14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00	
18	15		TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12	
19	16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42	
20	17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11	
21	18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50	
22	19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	5782	B bottles	6,000	F	98,546.25	
23	20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71	
24	21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00	
25	22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13	
26	23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00	
27	24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95	
28	25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	ABC	
29	26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15	
30	27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61	
31	28		GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16	
32	29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42	
33	30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00	
34												
35										**Sum Total:**	**48,179,112.96**	GL
36										**Total per GL:**	**50,724,160.96**	

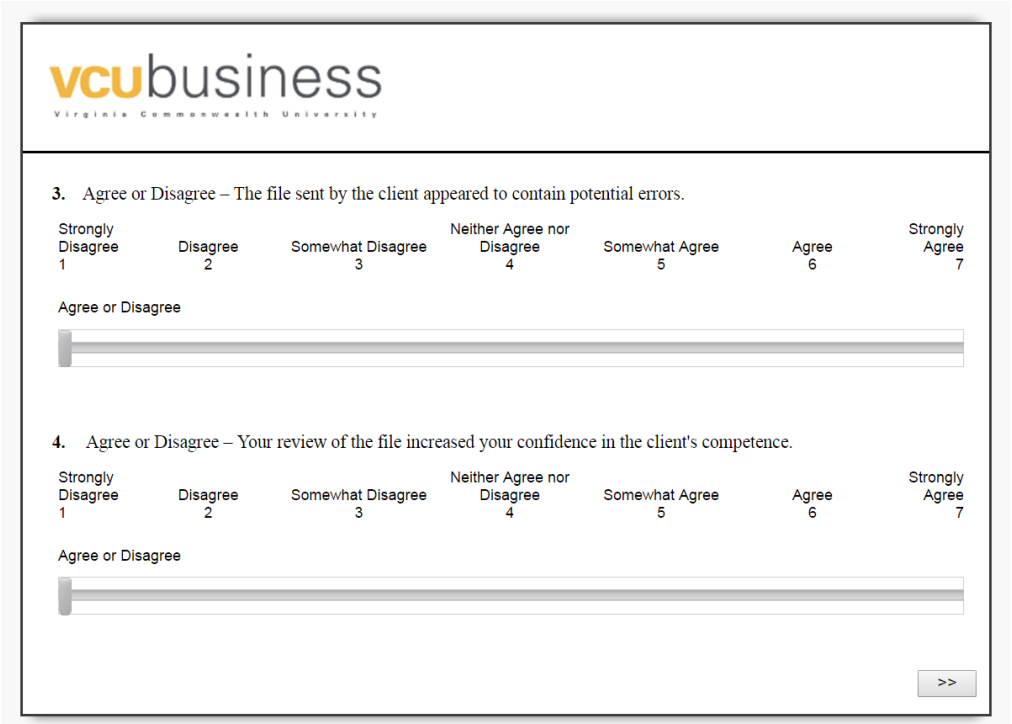
Slide 5: Qualtrics Survey Link

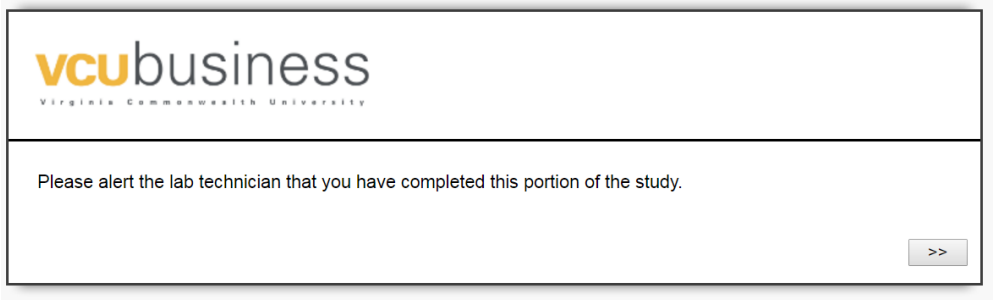


Slides 6 – 9: Part 2 Follow-up Assessment Questions in Qualtrics

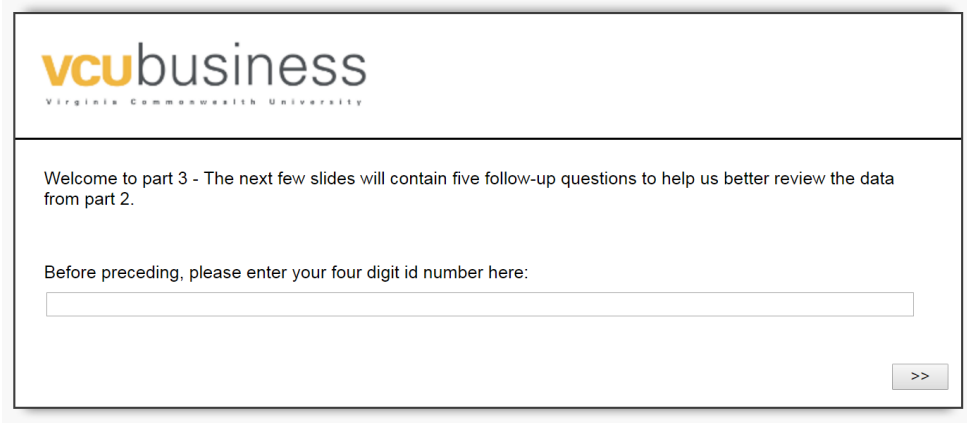




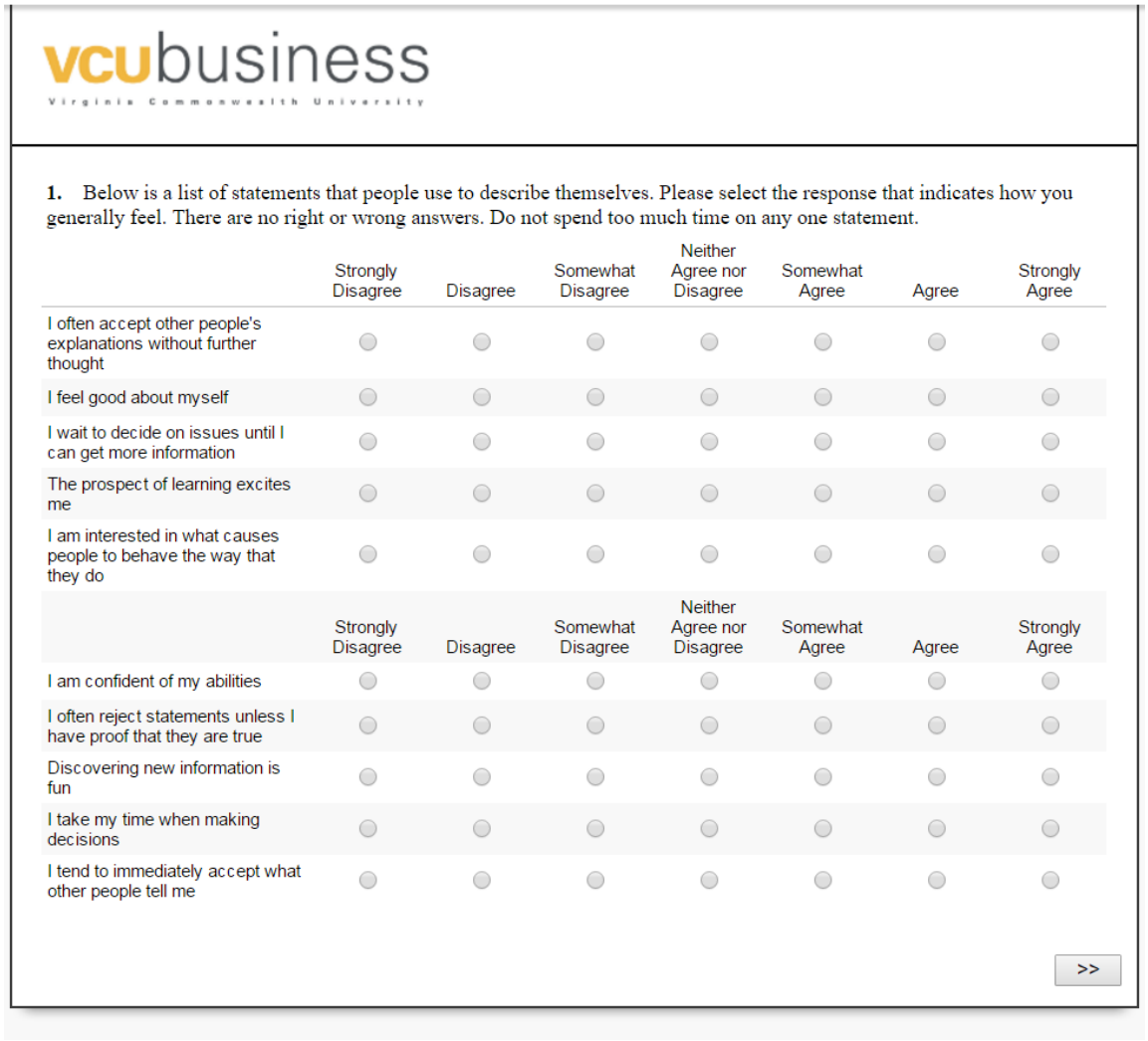




Slides 10 – 16: Part 3 Follow-up Survey in Qualtrics



Slide 11 – 13: Hurt (2010) Skepticism Scale Slides



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1. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I often accept other people's explanations without further thought	○	○	○	○	○	○	○
I feel good about myself	○	○	○	○	○	○	○
I wait to decide on issues until I can get more information	○	○	○	○	○	○	○
The prospect of learning excites me	○	○	○	○	○	○	○
I am interested in what causes people to behave the way that they do	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I am confident of my abilities	○	○	○	○	○	○	○
I often reject statements unless I have proof that they are true	○	○	○	○	○	○	○
Discovering new information is fun	○	○	○	○	○	○	○
I take my time when making decisions	○	○	○	○	○	○	○
I tend to immediately accept what other people tell me	○	○	○	○	○	○	○

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2. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Other people's behavior does not interest me	○	○	○	○	○	○	○
I am self-assured	○	○	○	○	○	○	○
My friends tell me that I usually question things that I see or hear	○	○	○	○	○	○	○
I like to understand the reason for other people's behavior	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I think that learning is exciting	○	○	○	○	○	○	○
I usually accept things I see, read, or hear at face value	○	○	○	○	○	○	○
I do not feel sure of myself	○	○	○	○	○	○	○
I usually notice inconsistencies in explanations	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
Most often I agree with what the others in my group think	○	○	○	○	○	○	○
I dislike having to make decisions quickly	○	○	○	○	○	○	○
Please select strongly disagree for this statement	○	○	○	○	○	○	○

>>

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3. Below is a list of statements that people use to describe themselves. Please select the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I have confidence in myself	○	○	○	○	○	○	○
I do not like to decide until I've looked at all of the readily available information	○	○	○	○	○	○	○
I like searching for knowledge	○	○	○	○	○	○	○
I frequently question things that I see or hear	○	○	○	○	○	○	○
It is easy for other people to convince me	○	○	○	○	○	○	○

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
I seldom consider why people behave in a certain way	○	○	○	○	○	○	○
I like to ensure that I've considered most available information before making a decision	○	○	○	○	○	○	○
I enjoy trying to determine if what I read or hear is true	○	○	○	○	○	○	○
I relish learning	○	○	○	○	○	○	○
The actions people take and the reasons for those actions are fascinating	○	○	○	○	○	○	○

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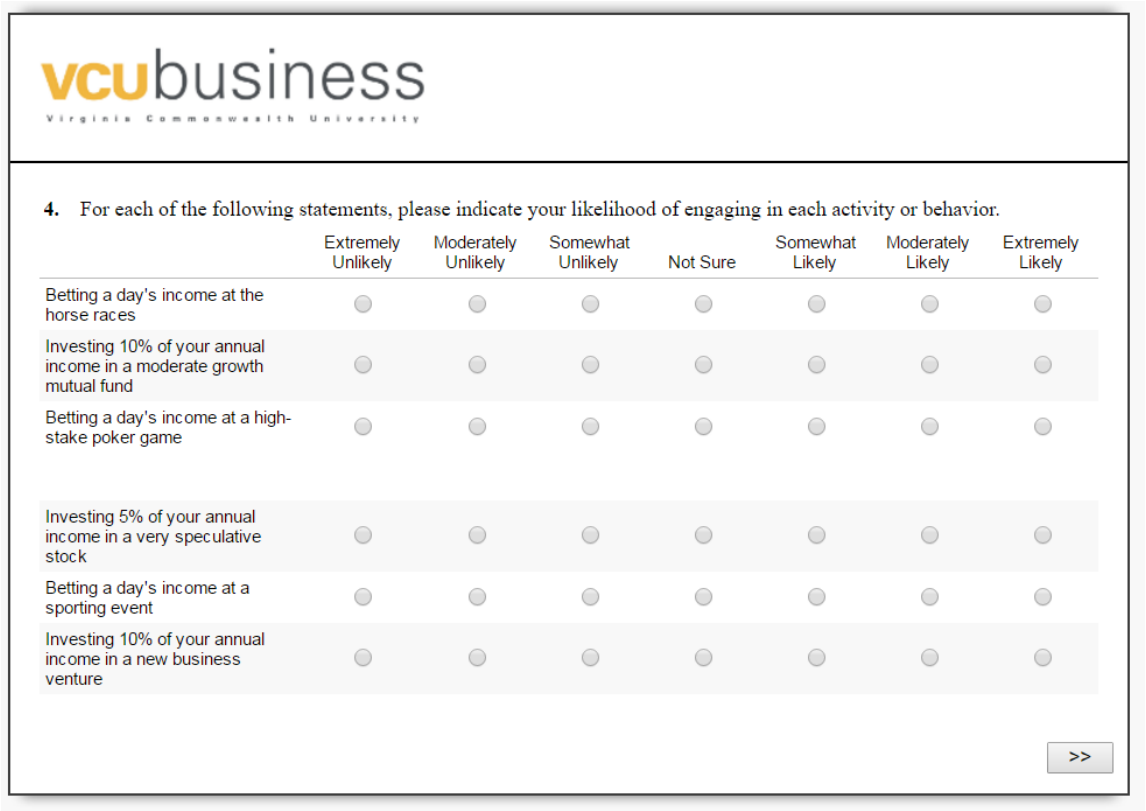
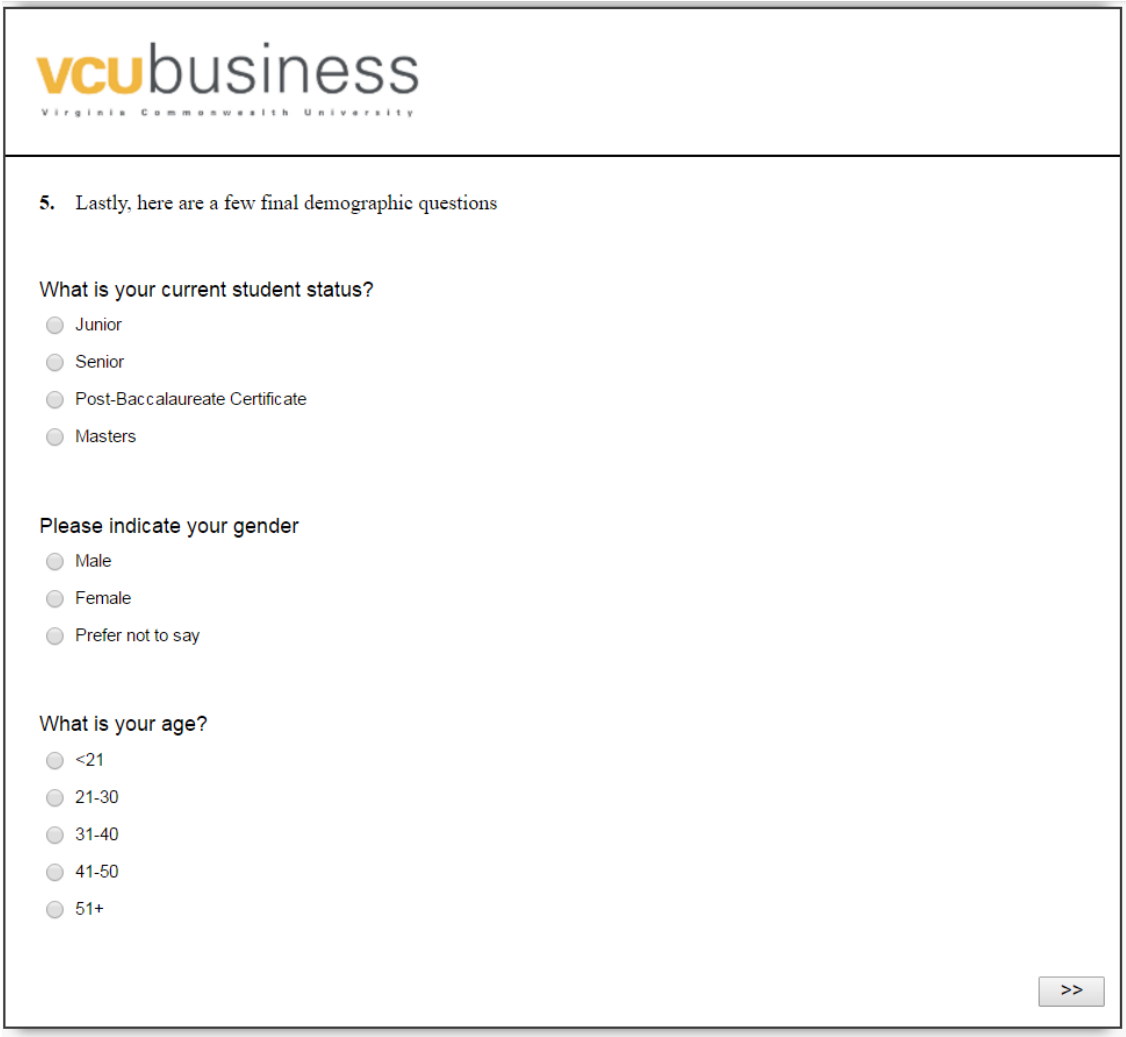
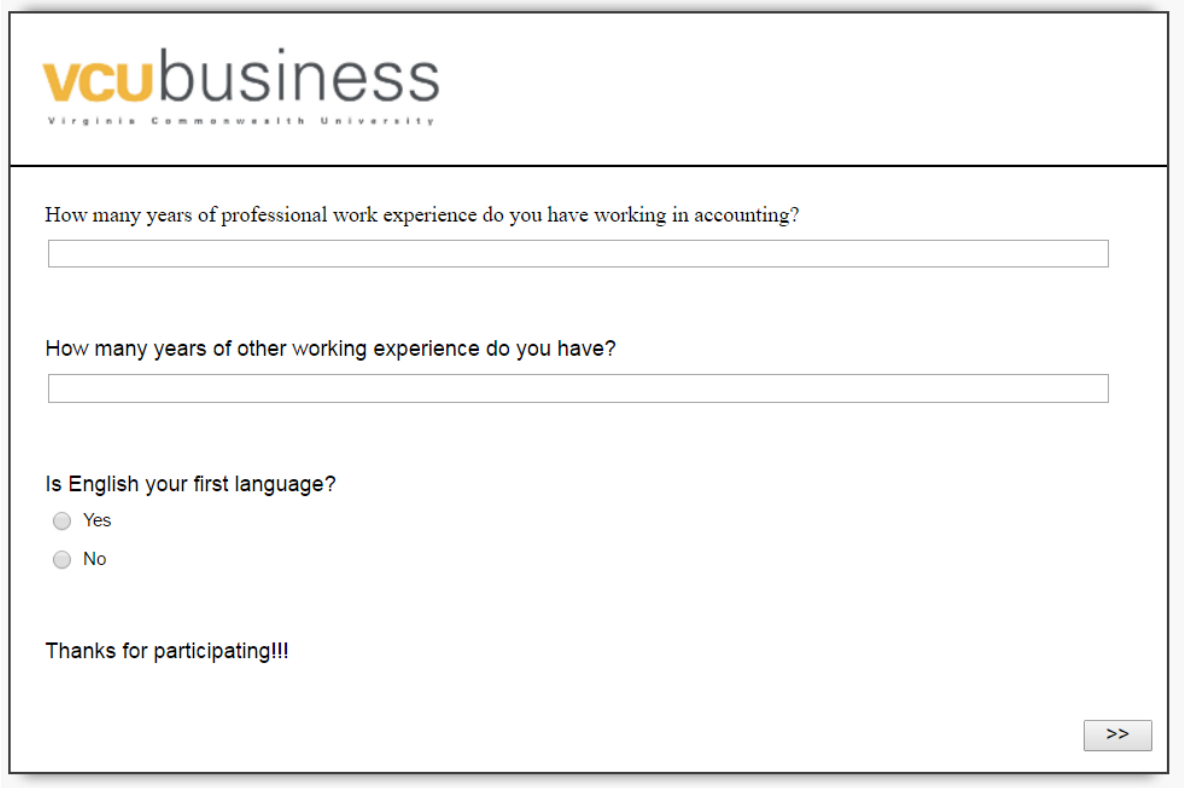
Slide 14: Risk Aversion Scale



Slide 15 – 16: Demographic Questions

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How many years of professional work experience do you have working in accounting?
How many years of other working experience do you have?
Is English your first language?
Yes
No
Thanks for participating!!!
>>

Appendix D

Eye-Tracking Mediation Analysis

To further investigate the eye-tracking results from Experiment 2, a moderated mediation regression exploratory analysis was conducted using Haye's (2012) PROCESS macro for SPSS. Consistent with Experiment 1, to measure participant skepticism the 30 item Hurtt (2010) scale was used. As shown in Table 5, the average skepticism score for participants in this experiment was 76.65.[19] The scores of the student participants were not significantly different ($F(1, 58) = 0.39$, $p > 0.10$) from the scores of the experienced accountants used in Experiment 1. Furthermore, the scores for Experiment 1 and Experiment 2 were very similar to the two samples of auditors surveyed in Hurtt (2010).[20] This finding provides further evidence that students are a good proxy for professionals in laboratory settings.

The moderated mediation model tested the direct effect of skepticism on the outcome variables from Experiment 1 (i.e., the likelihood of misstatement and the increase in sample size). It also tested the mediating effect of the variables Total Fixations, Dwell Time, Time to First Fixation, and Fixations Before on the relationship between irrelevant information, minor errors, and skepticism on the outcome variables. Time to first fixation measures the time a participant spends reviewing the file before fixating on a specific AOI (Schotter et al. 2010; Schotter, Gerety, and Rayner 2012). While fixations before measures the number of fixations a participant makes before they reach a specific AOI (See Table

[19] The consistency of trait skepticism scores was tested across the four treatment conditions using a one-way ANOVA. No significant differences were noted ($p > 0.10$). This suggests that the average trait skepticism score of participants was constant across the four treatment conditions, and that viewing different manipulations did not inadvertently bias skepticism scale scores.

[20] Auditors surveyed in Hurtt (2010) scored a 75 on one occasion and a 77 on another occasion.

13 for means and standard deviations). These variables help determine the order in which AOI's were examined by participants. In addition, they help determine the importance and prominence of AOI's to participants. If participants focus on one AOI earlier than another, the AOI first focused upon most likely drew their attention for a specific reason or they deemed that area to be important.

TABLE 13

Means and Standard Deviations for the Time to First Fixation and Number of Fixations Before Across Variables

Panel A: Mean (Standard Deviation) Time to First Fixation

	Treatment Condition			
AOI[d]	**Control[a]**	**Errors[b]**	**Irrl_Info[c]**	**Both Irrl_Info and Errors**
Customer Column	3.84 (6.99)	1.51 (2.25)	8.89 (11.19)	2.53 (3.23)
Invoice Column	5.81 (4.07)	2.95 (1.65)	17.55 (25.62)	20.05 (26.75)
Cust. Col. Error 1		27.49 (18.02)		27.22 (20.28)
Cust. Col. Error 2		22.42 (17.36)		39.95 (21.37)
Date Error		37.07 (11.23)		48.09 (13.64)
Invoice Error		24.33 (14.85)		44.97 (25.14)
Totals	7.33 (6.31)	2.40 (1.27)	18.99 (30.59)	25.11 (38.20)
N	11	8	12	12

Panel B: Mean (Standard Deviation) Number of Fixations Before

	Treatment Condition			
AOI	**Control**	**Errors**	**Irrl_Info**	**Both Irrl_Info and Errors**
Customer Column	5.27 (8.36)	3.25 (5.12)	10.64 (14.83)	4.42 (3.78)
Invoice Column	11.91 (7.89)	8.00 (5.90)	15.27 (11.17)	51.08 (48.14)
Cust. Col. Error 1		75.20 (51.96)		79.56 (68.47)
Cust. Col. Error 2		74.60 (52.26)		129.87 (74.61)
Date Error		117.75 (49.69)		138.33 (28.54)
Invoice Error		79.50 (52.83)		120.57 (28.93)
Totals	19.90 (19.99)	7.14 (5.81)	17.56 (22.28)	67.45 (110.21)
N	11	8	12	12

Notes:

[a] Control represents the treatment condition with no irrelevant information or minor errors were present.

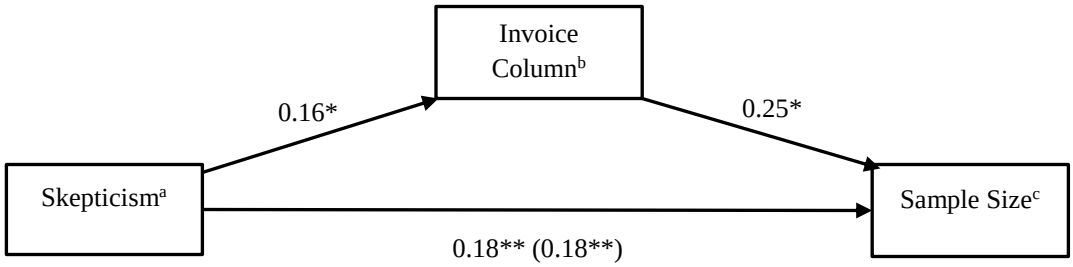
[b] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.

[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.

[d] AOI represents Area of Interest.

The PROCESS macro in SPSS works similar to path analysis, in that it provides an analysis of moderated mediation, including covariates, in an integrated conditional process model (Hayes 2012). The analysis included three experimental factors and one mediator. The PROCESS boot-strap model was set to 5,000 samples. PROCESS models 4, 5, 7, 8, 14, and 15 were examined for each of the common AOI variables (i.e., Customer Column, Invoice Column, Totals area). Table 14 and Figure 12 shows the results of the PROCESS Model 4 for the fixations before variable. Prior literature suggests more skeptical people should spend more time reviewing the audit evidence (Hurtt et al. 2013). Therefore, longer dwell times should be associated with the outcome variables. Therefore, a simple mediation model (PROCESS model 4) was tested first to see if mediation was present before testing the more complicated models. As shown in Table 14 mediation was not present in any of the models examining the fixations before variable. However, as shown in Table 15, when dwell time was tested as a mediating variable, partial mediation was present when sample size was used the dependent variable ($coeff_{skepticism} = 0.18$, $p = 0.04$ and $coeff_{invoicecol} = 0.25$, $p = 0.07$). This suggests that the trait skepticism of participants is related to both their dwell time on the invoice column as well as their assessment of the appropriate sample size. In other words, people higher in trait skepticism are more likely to spend more time dwelling on the invoice column in the audit evidence and select large sample sizes.

FIGURE 12
Experiment 2 Skepticism Analysis (PROCESS Model 4)



Note:
[a] Skepticism is the continuous variable for skepticism measured using the Hurtt (2010) skepticism scale.
[b] Invoice column represents dwell time around the area of interest for the invoice column in the spreadsheet.
[c] Sample size represents the increase in the number of items selected for sampling.
*** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$ (all p-values are two tailed)

TABLE 14
Experiment 2 Mediation Model Results (PROCESS Model 4)

Panel A – Fixations Before Customer Column

	Misstatement[a]		***Sample Size***[b]	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	19.99 (12.43)	20.06 (33.71)	19.98 (12.43)	-3.31 (6.63)
Skepticism[c]	-0.18 (0.16)	0.34 (0.43)	-0.18 (0.16)	0.21 (0.08)
Customer Col.		-0.29 (0.42)		-0.08 (0.08)
R-sq	0.03	0.04	0.03	0.18
MSE	89.63	0.68	89.63	23.88
F(df1, df2)	1.23 (1,38)	0.69 (2,37)	1.23 (1,38)	3.97 (2,37)

Panel B – Fixations Before Totals AOI

	Misstatement		***Sample Size***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	56.69 (90.13)	-0.53 (31.86)	56.69 (90.13)	-6.98 (5.86)
Skepticism	-0.31 (1.17)	0.56 (0.41)	-0.31 (1.17)	**0.25 (0.08)****
Totals AOI		0.04 (0.06)		0.01 (0.01)
R-sq	0.00	0.07	0.00	0.27
MSE	4520.57	558.30	4520.57	18.94
F(df1, df2)	0.07 (1,33)	1.12 (2,32)	0.07 (1,33)	**5.80 (2,32)****

Panel C – Fixations Before Invoice Column

	Misstatement		***Sample Size***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-66.53 (40.55)	19.73 (33.29)	-66.53 (40.55)	-4.01 (6.63)
Skepticism	**1.18 (0.53)****	0.28 (0.44)	**1.18 (0.53)****	**0.21 (0.09)****
Invoice Col.		0.14 (0.13)		0.02 (0.02)
R-sq	0.12	0.06	0.12	0.19
MSE	941.18	592.67	941.18	23.50
F(df1, df2)	**5.03 (1,38)****	1.17 (2,37)	**5.03 (1,38)****	**4.24 (2,37)****

Notes:
[a] Misstatement likelihood was the dependent variable in these models.
[b] Increase in sample size was the dependent variable in these models.
[c] Skepticism is a continuous variable based on participants' scores on the Hurtt (2010) skepticism scale.
* and ** denote a significance at the 0.10 and 0.05 level (two-tailed).

TABLE 15
Experiment 2 Mediation Model Results (PROCESS Model 4)

Panel A – Dwell Time on the Customer Column

	Misstatement[a]		***Sample Size***[b]	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-3.14 (7.92)	16.31 (32.50)	-3.14 (7.92)	-4.28 (6.29)
Skepticism[c]	0.11 (0.10)	0.34 (0.43)	0.11 (0.10)	0.20 (0.08)
Customer Col.		0.31 (0.66)		0.15 (0.13)
R-sq	0.03	0.03	0.03	0.19
MSE	36.57	612.89	36.57	23.02
F(df1, df2)	1.21 (1,39)	0.51 (2,38)	1.21 (1,39)	4.33 (2,38)

Panel B – Dwell Time on Totals AOI

	Misstatement		***Sample Size***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-1.02 (1.75)	10.95 (31.76)	-1.02 (1.75)	-3.98 (6.28)
Skepticism	0.03 (0.02)	0.51 (0.42)	0.03 (0.02)	0.19 (0.08)
Totals AOI		-4.30 (2.88)		0.74 (0.57)
R-sq	0.05	0.08	0.05	0.19
MSE	1.79	582.47	1.79	22.79
F(df1, df2)	1.98 (1,39)	1.53 (2,38)	1.98 (1,39)	**4.55 (2,38)***

Panel C – Dwell Time on the Invoice Column

	Misstatement		***Sample Size***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-6.87 (32.62)	19.14 (32.62)	-6.87 (32.62)	-3.06 (6.19)
Skepticism	**0.16 (0.09)***	0.29 (0.43)	**0.16 (0.09)***	**0.18 (0.8)****
Invoice Col.		0.55 (0.69)		**0.25 (0.13)***
R-sq	0.07	0.04	0.7	0.23
MSE	32.17	606.42	32.17	21.83
F(df1, df2)	**2.93 (1,39)***	0.72(2,38)	**2.93 (1,39)***	**5.59 (2,38)****

Notes:
[a] Misstatement likelihood was the dependent variable in these models.
[b] Increase in sample size was the dependent variable in these models.
[c] Skepticism is a continuous variable based on participants' scores on the Hurtt (2010) skepticism scale.
* and ** denote a significance at the 0.10 and 0.05 level (two-tailed).

Since the results indicate trait skepticism is most related to the dwell time and sample size outcome variable, PROCESS model 5 was tested to see whether the presence of minor errors or irrelevant information acts a moderator in the model. As shown in Table 15 and Figure 13, consistent with model 4 above, there were no significant results for the customer column and totals AOI variables. However, full mediation was found to be present for the invoice column AOI variable for both minor errors and irrelevant information. In other words, the direct effect relationship between trait skepticism and sample size was significant until the variable for dwell time for the invoice column was included as an indirect path in the model. Then the direct effect of skepticism on sample size was no longer significant. These results extend the findings from model 4 above, and suggest that when minor errors or irrelevant information are present the amount of time spent dwelling on the invoice column explains the sample size selected by participants. In other words, more skeptical people spend more time carefully reviewing the document, and subsequently select a larger sample size.

TABLE 16
Experiment 2 Mediation Model Results (PROCESS Model 5)

Panel A – Dwell Time on the Customer Column (DV = Sample Size)

	Minor Errors[a]		***Irrelevant Information***[b]	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-3.14 (7.92)	-0.64 (9.33)	-3.14 (7.92)	7.95 (10.79)
Skepticism[c]	0.11 (0.10)	0.16 (0.12)	0.11 (0.10)	0.06 (0.14)
Customer Col.		0.16 (0.13)		0.16 (0.12)
Moderator		-8.64 (13.27)		-18.40 (13.25)
Intercept		0.10 (0.17)		0.22 (0.17)
R-sq	0.03	0.20	0.03	0.24
MSE	36.57	36.57	36.57	22.66
F(df1, df2)	1.21 (1,39)	**1.21 (1,39)***	1.21 (1,39)	**2.85 (4,36)***

Panel B – Dwell Time on the Totals AOI (DV = Sample Size)

	Minor Errors		***Irrelevant Information***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-1.02 (1.75)	-2.95 (9.35)	-1.02 (1.75)	6.78 (10.75)
Skepticism	0.03 (0.02)	0.18 (0.12)	0.03 (0.02)	0.07 (0.14)
Totals AOI		0.78 (0.61)		0.67 (0.58)
Moderator		-4.41 (13.47)		-16.36 (13.21)
Intercept		0.05 (0.18)		0.20 (0.17)
R-sq	0.5	0.20	0.5	0.24
MSE	1.79	23.83	1.79	22.79
F(df1, df2)	1.97 (1,39)	2.27 (4,36)	1.97 (1,39)	**2.77 (4,36)****

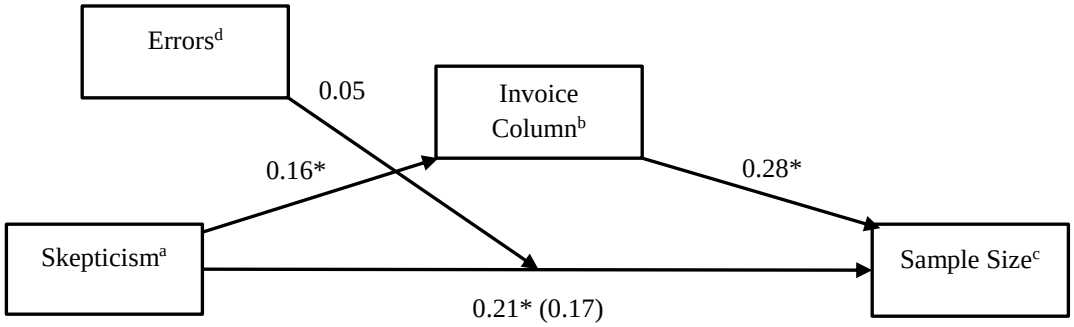
Panel C – Dwell Time on the Invoice Column (DV = Sample Size)

	Minor Errors		***Irrelevant Information***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	-6.87 (7.43)	-1.72 (9.04)	-6.87 (7.43)	10.59 (10.63)
Skepticism	**0.16 (0.09)***	0.17 (0.12)	**0.16 (0.09)***	0.01 (0.14)
Invoice Col.		**0.28 (12)***		**0.26 (0.13)***
Moderator		-5.09 (12.92)		-20.44 (12.94)
Intercept		0.05 (0.17)		0.25 (0.17)
R-sq	0.7	0.25	0.7	0.28
MSE	32.17	22.52	32.17	21.35
F(df1, df2)	**2.93 (1,39)***	**2.93 (1,39)****	**2.93 (1,39)***	**3.57 (4,36)****

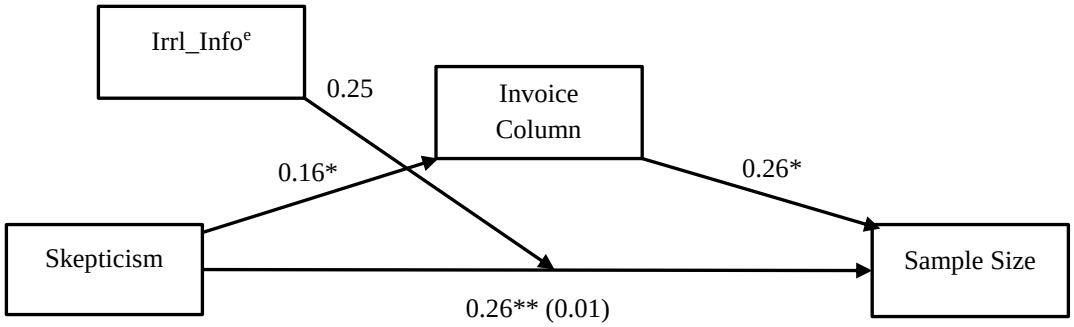
Notes:
[a] The dichotomous variable for minor errors was the moderator in these models.
[b] The dichotomous variable for irrelevant information was the moderator in these models.
[c] Skepticism is a continuous variable based on participants' scores on the Hurtt (2010) skepticism scale.
* and ** denote a significance at the 0.10 and 0.05 level (two-tailed).

FIGURE 13
Experiment 2 Skepticism Analysis (PROCESS Model 5)

Panel A: Increase in Misstatement Likelihood



Panel B: Increase in Sample Size



Note:
[a] Skepticism is the continuous variable for skepticism measured using the Hurtt (2010) skepticism scale.
[b] Invoice column represents dwell time around the area of interest for the invoice column in the spreadsheet.
[c] Sample size represents the increase in the number of items selected for sampling.
[d] Represents the independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.
[e] Represents the independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.
*** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$ (all p-values are two tailed)

Appendix E

Tables and Figures

TABLE 1
Experiment 1 Participant Demographic Information
(number of respondents: n = 97)

Age	
21 – 30	32%
31 – 40	26%
41 – 50	16%
51+	27%
Is English your first language?	
Yes	93%
No	6%
No response	1%
Gender	
Female	56%
Male	44%
Years of Work Experience in Public Accounting	
Mean	9.60
Std. Dev.	9.72
Years of Professional Experience	
Mean	8.58
Std. Dev.	10.33
Certifications*	
CPA	71%
CIA	4%
CFE	4%
CMA	4%
Other	14%
None	17%
What type of public accounting firms have you worked for?	
Big 4 (or equivalent at the time)	27%
Second tier accounting firm (e.g., BDO or McGladrey & Pullen)	26%
Regional accounting firm	28%
Local accounting firm	47%

Note:
*Participants could select multiple certifications, so that section does not add up to 100 percent.

TABLE 2
Participant Responses to Debriefing Questions
(number of respondents: n = 97)

1.	Agree or Disagree – your review of the file increased your confidence in the client's competence.	
	Mean with errors (Std. Dev.)	2.52 (1.28)
	Mean without errors (Std. Dev.)	4.04 (1.16)
2.	How often do you or your audit team encounter messy or dirty audit files from clients (e.g., records that include irrelevant information, disorganized information, and/or minor errors)?	
	Mean	4.24
	Std. Dev.	1.34
3.	Agree or Disagree – Client files that are messy/dirty impact my application of professional skepticism.	
	Mean	5.36
	Std. Dev.	1.16
4.	Agree or Disagree – Messy/dirty documents provided by the client can influence the application of professional skepticism by other members of my audit team.	
	Mean	5.22
	Std. Dev.	1.21
5.	On average, how much of your time on a client site is spent cleaning up messy/dirty documents?	
	Mean	32%
	Std. Dev.	18%

Note:
Question 1 had a range of 1 – 7 with 1 = "strongly disagree" and 7 = "strongly agree"
Question 2 had a range of 1 – 7 with 1 = "never" and 7 = "all the time"
Question 3 and 4 had a range of 1 – 7 with 1 = "strongly disagree and 7 = "strongly disagree"
Question 5 had a range of options from 0 – 100 with 0 percent = "none of your time" and 100 percent = "all of your time"

TABLE 3
Means and Standard Deviations for Misstatement Likelihood and Sample Size

Panel A: Mean (Std. Deviation) for Change in Misstatement Likelihood[a]

	Irrelevant Information[c]		
Errors[d]	***Absent***	***Present***	***Total***
No Errors Present	16.52 (15.91) n = 23	23.00 (21.82) n = 24	19.83 (19.24) n = 47
Errors Present	26.93 (26.82) n = 29	35.14 (28.59) n = 21	30.38 (27.60) n = 50
Total	22.33 (23.06) n = 52	28.67 (25.66) n = 45	

Panel B: Mean (Std. Deviation) for Change in Sample Size[b]

	Irrelevant Information		
Errors	***Absent***	***Present***	***Total***
No Errors Present	1.82 (3.79) n = 23	3.17 (5.74) n = 24	2.51 (4.88) n = 47
Errors Present	3.17 (3.12) n = 29	5.76 (4.43) n = 21	4.26 (3.90) n = 50
Total	2.58 (3.47) n = 52	4.38 (5.28) n = 45	

Notes:
[a] The change from the initial misstatement estimate of 20 percent (ranging from 0 percent to 100 percent).
[b] The change from the initial sample size of 10 items (ranging from 0 to 30 items).
[c] Irrelevant Information = 0 if no irrelevant information is present, 1 if irrelevant information is present.
[d] Errors = 0 if no minor errors are present, 1 if minor errors are present.

TABLE 4

Multivariate Analysis of Variance for the Increase in Misstatement Likelihood and Increase in Sample Size as a Function of the Presence of Irrelevant Information and the Presence of Minor Errors

Source	Dependent Variable	*df*	*MS*	*F*	*p-value*[e]	η^2
Irrl_Info[c]	Percent Increase[a]	1	1290.301	5.332	0.136	0.024
	Sample Increase[b]	1	92.892	4.940	0.029	0.050
Errors[d]	Percent Increase	1	3041.014	5.332	0.023	0.054
	Sample Increase	1	92.892	4.969	0.028	0.051
Irrl_Info* Errors	Percent Increase	1	17.969	0.032	0.859	0.000
	Sample Increase	1	9.326	0.499	0.482	0.005
Error	Percent Increase	93	570.281			
	Sample Increase	93	18.694			

Notes:

[a] The percent increase in the likelihood of account misstatement.

[b] The increase in the number of items selected for sampling.

[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.

[d] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.

[e] All p-values are two-tailed.

TABLE 5

Hurtt (2010) Scale Responses

Scale Item	Exp. 1 Mean Score (std. dev.)	Exp. 2 Mean Score (std. dev.)
1. I often accept other people's explanation without further thought.	5.06 (1.34)	5.35 (1.31)
2. I feel good about myself	5.72 (0.89)	5.77 (1.07)
3. I wait to decide on issues until I can get more information	5.62 (0.91)	5.79 (0.94)
4. The prospect of learning excites me.	5.73 (0.84)	5.91 (1.04)
5. I am interested in what causes people to behave the way they do.	5.70 (1.05)	6.00 (1.16)
6. I am confident in my abilities	5.75 (1.02)	5.72 (1.12)
7. I often reject statements unless I have proof they are true.	4.85 (1.05)	5.09 (1.27)
8. Discovering new information is fun.	5.76 (0.77)	6.21 (0.83)
9. I take my time when making decisions.	5.66 (0.85)	5.56 (1.16)
10. I tend to immediately accept what other people tell me.	5.16 (1.15)	5.26 (1.35)
11. Other people's behavior does not interest me.	5.08 (1.14)	4.91 (1.17)
12. I am self-assured.	5.32 (0.99)	5.19 (1.24)
13. My friends tell me that I usually question things that I see or hear.	4.70 (1.26)	4.70 (1.37)
14. I like to understand the reason for other people's behavior.	5.56 (0.96)	5.60 (1.26)
15. I think that learning is exciting.	5.72 (0.94)	6.00 (0.93)
16. I usually accept things I see.	4.54 (1.23)	4.51 (1.40)
17. I do not feel sure of myself.	5.41 (1.32)	5.67 (1.29)
18. I usually notice inconsistencies in explanations.	5.16 (1.13)	4.93 (1.47)
19. Most often I agree with what others in my group think.	4.08 (1.09)	3.98 (1.44)
20. I dislike having to make decisions quickly.	4.87 (1.31)	5.00 (1.27)
21. I have confidence in myself.	5.66 (1.20)	5.81 (1.01)
22. I do not like to decide until I've looked at all of the readily available information.	5.55 (0.96)	5.74 (0.76)
23. I like searching for knowledge.	5.55 (0.96)	5.72 (1.08)
24. I frequently question things I see or hear.	5.23 (0.93)	5.28 (1.16)
25. It is easy for other people to convince me.	4.66 (1.09)	4.63 (1.33)
26. I seldom consider why people behave in a certain way.	5.08 (1.23)	4.67 (1.61)
27. I like to ensure that I've considered most available information before making a decision.	5.58 (0.86)	5.84 (0.89)
28. I enjoy trying to determine if what I read or hear is true.	5.19 (1.00)	5.42 (1.18)
29. I relish learning.	5.37 (1.05)	5.37 (1.46)
30. The actions people take and reasons for those actions are fascinating.	5.40 (1.01)	5.33 (1.25)
Total:	**75.58 (7.44)**	**76.65 (9.23)**
n:	97	43

Note:
Exp. 1 refers to Experiment 1, while Exp. 2 refers to Experiment 2.
The means from Experiment 1 and 2 were not significantly different from one another ($p > 0.10$).
Each item had a scale of responses ranging from 1 representing "strongly disagree" to 7 "strongly agree."
Items 1, 10, 11, 16, 17, 19, 25, 26 are reverse coded when scoring.
Auditors surveyed in Hurtt (2010) scored a 75 on one occasion and a 77 on another occasion.

TABLE 6

Multivariate Analysis of Variance for the Increase in Misstatement Likelihood and Increase in Sample Size as a Function of the Presence of Irrelevant Information and the Presence of Minor Errors and Level of Skepticism

Source	Dependent Variable	*df*	*MS*	*F*	*p-value*[f]	η^2
Irrl_Info[c]	Percent Increase[a]	1	1282.088	2.193	0.142	0.024
	Sample Increase[b]	1	91.646	4.414	0.031	0.051
Errors[d]	Percent Increase	1	3041.014	5.332	0.038	0.047
	Sample Increase	1	92.892	4.969	0.058	0.040
Skept.[e]	Percent Increase	1	490.527	0.839	0.362	0.009
	Sample Increase	1	30.658	1.613	0.207	0.018
Irrl_Info* Errors	Percent Increase	1	24.190	0.041	0.839	0.000
	Sample Increase	1	5.125	0.270	0.605	0.003
Irrl_Info*Skept.	Percent Increase	1	37.053	0.063	0.802	0.001
	Sample Increase	1	14.313	0.753	0.388	0.008
Errors*Skept.	Percent Increase	1	487.943	0.835	0.363	0.009
	Sample Increase	1	1.183	0.062	0.804	0.001
Irrl_Info*Errors *Skept.	Percent Increase	1	0.130	0.000	0.988	0.000
	Sample Increase	1	1.869	0.098	0.755	0.001
Error	Percent Increase	89	584.542			
	Sample Increase	89	19.005			

Notes:
[a] The percent increase in the likelihood of account misstatement.
[b] The increase in the number of items selected for sampling.
[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.
[d] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.
[e] Skepticism was calculated using the Hurtt (2010) skepticism scale, and participants were separated into high and low groups using a median split.
[f] All p-values are two-tailed.

TABLE 7
Experiment 1 Client Competency Mediation Test Results (PROCESS Model 4)

Panel A – Irrelevant Information and Client Competency

	Misstatement[a]		***Sample Size***[b]	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	**3.14 (0.20)*** **	**62.14 (5.95)*** **	**3.14 (0.20)*** **	**14.96 (1.13)*** **
Irrl_Info.[c]	0.26 (0.29)	**8.02 (4.63)***	0.26 (0.29)	**2.00 (0.88)****
Competency		**-6.32 (1.61)****		**-0.76 (0.31)****
R-sq	0.01	0.15	0.01	0.10
MSE	2.07	512.90	2.07	18.33
F(df1, df2)	0.82 (1, 95)	**8.61 (2, 94)****	0.82 (1, 95)	**0.82 (2, 94)****

Panel B – Minor Errors and Client Competency

	Misstatement		***Sample Size***	
	X to M	Direct Effect	X to M	Direct Effect
(Constant)	**4.04 (0.18)*** **	**62.95 (8.48)*** **	**4.04 (0.18)*** **	**14.61 (1.62)*** **
Errors	**-1.52 (0.25)*** **	1.84 (5.52)	**-1.52 (0.25)*** **	0.96 (1.05)
Competency		**-5.72 (1.93)****		-0.52 (0.37)
R-sq	0.28	0.13	0.28	0.06
MSE	1.50	528.62	1.50	19.18
F(df1, df2)	**37.47 (1,95)*** **	**6.96 (2, 94)****	**37.47 (1,95)*** **	**2.92 (2, 94)***

Notes:
[a] Misstatement likelihood was the dependent variable in these models.
[b] Sample size was the dependent variable in these models.
[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.
[d] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.
*, **, and *** denote a significance at the 0.10, 0.05, and 0.01 level (two-tailed).

TABLE 8
Common Eye-Tracking Hardware Companies

Company	Number of mentions on Google Scholar*
Tobii	9,230
SensoMotoric Instruments (SMI)	6,040
EyeLink	5,530
ISCAN	2,650
LC Technologies	1,130
EyeTech	441
The Eye Tribe	227
Ergoneers	185
Smart Eye	149
Mirametrix	92
Pupil Labs	80
Gazepoint	39

*Per Imotion January 2017 blog.

**Note - The number of search results shown on google scholar includes a mix of scholarly publications, patents, and book chapters.

TABLE 9
Key Terms Summary

Term	Definition	Use
Eye Fixations	A term used to describe when someone looks at a particular location for an extended period of time.	Fixations suggest attributes relevant to completing a decision making task.
Saccades	A term used to describe quick eye movements between locations or fixations.	Saccades are used to track eye movements between locations and the number of times participants shift between areas of interest.
Dwell Time	A term used to describe the sum of fixations in one area before a participant moves on to the next area.	Dwell times are used to determine interest or confusion. Longer dwell times could signal confusion or higher levels of processing.
Areas of Interest	An area of interest is an area or region of a visual stimulus highlighted by the researcher during an experiment.	Areas of interest are used to compare and contrast the amount of time participants spend on visual areas.
Gaze Plot	A plot showing the sequence of a participant's scan through a document.	Gaze plots are used to determine the viewing order of objects in a visual stimulus in order to identify common trends.
Heat Map	Heat maps are color coordinated maps that provide a visual representation of the viewing intensity of participants. The brighter the color the longer participants focused on that area of the visual stimulus.	Heat maps are used to highlight areas of interest, and to determine where people focus their visual attention.

TABLE 10
Experiment 2 Participant Demographic Information
(number of respondents: n = 43)

Age	
21 – 30	76.70%
31 – 40	18.60%
41 – 50	4.70%
51+	0%
Is English your first language?	
Yes	69.80%
No	30.20%
Gender	
Female	44.20%
Male	55.80%
How many years of professional work experience do you have working in accounting?	
Mean	1.18
Std. Dev.	2.61
How many years of other work experience do you have?	
Mean	6.58
Std. Dev.	4.77
What is your current student status?	
Senior	48.80%
Post-Baccalaureate Certificate	25.60%
Masters	25.60%

TABLE 11

One-way Analysis of Variance for the Overall Fixation Count and Duration Across Treatment Conditions

Panel A: Mean (Standard Deviation) Fixation Count

	Treatment Condition				
AOI[e]	**Control[a]**	**Errors[b]**	**Irrl_Info[c]**	**Both Irrl_Info and Errors**	***F (p-value)***
Customer Column	39.64 (46.83)	30.13 (17.71)	14.25 (14.96)	40.08 (24.13)	
Invoice Column	31.91 (26.47)	39.88 (27.41)	11.58 (11.01)	34.25 (28.82)	
Cust. Col. Error 1		1.63 (1.20)		3.75 (4.27)	
Cust. Col. Error 2		2.75 (3.01)		2.50 (2.20)	
Date Error		0.75 (0.89)		1.67 (2.46)	
Invoice Error		1.88 (2.59)		2.08 (2.15)	
Totals	9.09 (7.41)	9.63 (6.05)	4.17 (4.75)	10.33 (6.61)	
Overall[d] (combined)	123.09 (87.84)	131.63 (97.39)	73.50 (40.79)	228.50 (119.45)	**6.15 (0.002)**
N	11	8	12	12	

Panel B: Mean (Standard Deviation) Dwell Time

	Treatment Condition				
AOI	**Control**	**Errors**	**Irrl_Info**	**Both Irrl_Info and Errors**	***F (p-value)***
Customer Column	6.55 (8.07)	4.89 (3.41)	2.50 (2.94)	8.19 (6.36)	
Invoice Column	5.53 (4.95)	7.96 (7.51)	1.75 (1.85)	7.80 (6.24)	
Cust. Col. Error 1		0.23 (0.35)		0.82 (1.12)	
Cust. Col. Error 2		0.36 (0.43)		0.50 (0.53)	
Date Error		0.15 (0.18)		0.31 (0.47)	
Invoice Error		0.42 (0.76)		0.59 (1.01)	
Totals	1.51 (1.43)	1.80 (1.51)	0.66 (0.91)	1.76 (1.32)	
Overall[e] (combined)	21.52 (17.76)	24.85 (25.18)	12.20 (12.20)	47.04 (31.15)	**5.35 (0.002)**
N	11	8	12	12	

Notes:

[a] Control represents the treatment condition with no irrelevant information or minor errors were present.

[b] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.

[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.

[d] The Overall variable represents the number of fixations across the entire spreadsheet for all participants in that treatment condition. The numbers in parentheses are standard deviations.

[e] AOI represents Area of Interest.

TABLE 12
Kruskal-Wallis Test Results for Fixations and Dwell Times

Panel A: Mean (Standard Deviation) Fixation Count

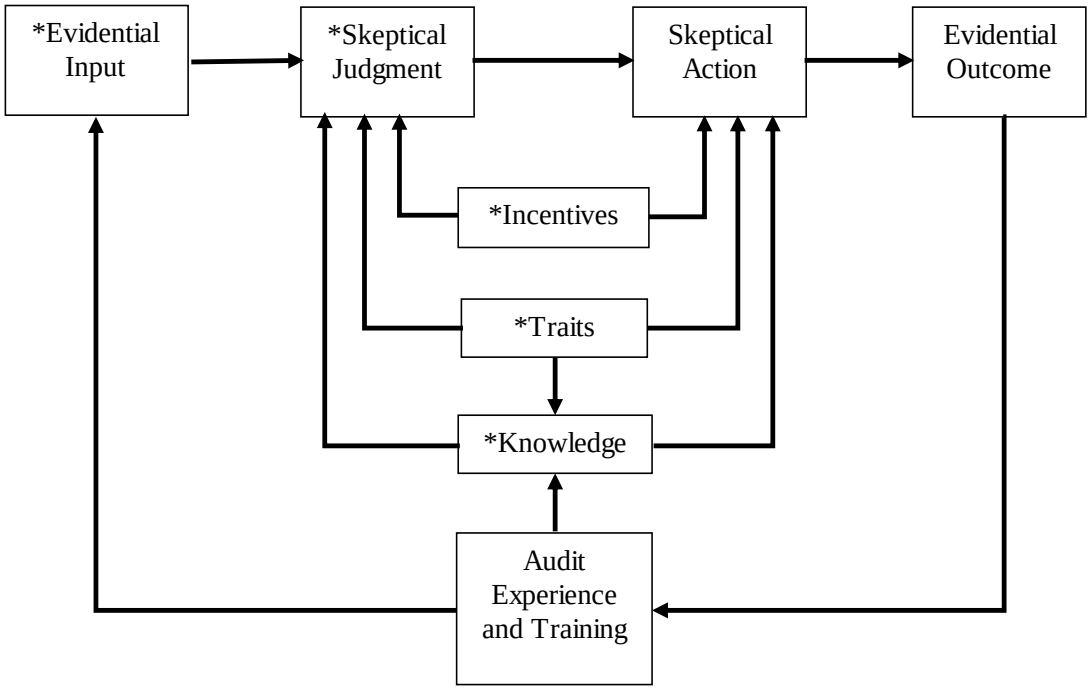
	Treatment Condition				
AOI[e]	**Control[a]**	**Errors[b]**	**Irrl_Info[c]**	**Both Irrl_Info and Errors**	***(p-value)***
Customer Column	39.64 (46.83)	30.13 (17.71)	14.25 (14.96)	40.08 (24.13)	
Invoice Column	31.91 (26.47)	39.88 (27.41)	11.58 (11.01)	34.25 (28.82)	
Cust. Col. Error 1		1.63 (1.20)		3.75 (4.27)	
Cust. Col. Error 2		2.75 (3.01)		2.50 (2.20)	
Date Error		0.75 (0.89)		1.67 (2.46)	
Invoice Error		1.88 (2.59)		2.08 (2.15)	
Totals	9.09 (7.41)	9.63 (6.05)	4.17 (4.75)	10.33 (6.61)	
Overall[d] (combined)	123.09 (87.84)	131.63 (97.39)	73.50 (40.79)	228.50 (119.45)	**(0.001)**
N	11	8	12	12	

Panel B: Mean (Standard Deviation) Dwell Time

	Treatment Condition			
AOI	**Control**	**Errors**	**Irrl_Info**	**Both Irrl_Info and Errors**
Customer Column	6.55 (8.07)	4.89 (3.41)	2.50 (2.94)	8.19 (6.36)
Invoice Column	5.53 (4.95)	7.96 (7.51)	1.75 (1.85)	7.80 (6.24)
Cust. Col. Error 1		0.23 (0.35)		0.82 (1.12)
Cust. Col. Error 2		0.36 (0.43)		0.50 (0.53)
Date Error		0.15 (0.18)		0.31 (0.47)
Invoice Error		0.42 (0.76)		0.59 (1.01)
Totals	1.51 (1.43)	1.80 (1.51)	0.66 (0.91)	1.76 (1.32)
Overall (combined)	21.52 (17.76)	24.85 (25.18)	12.20 (12.20)	47.04 (31.15) **(0.001)**
N	11	8	12	12

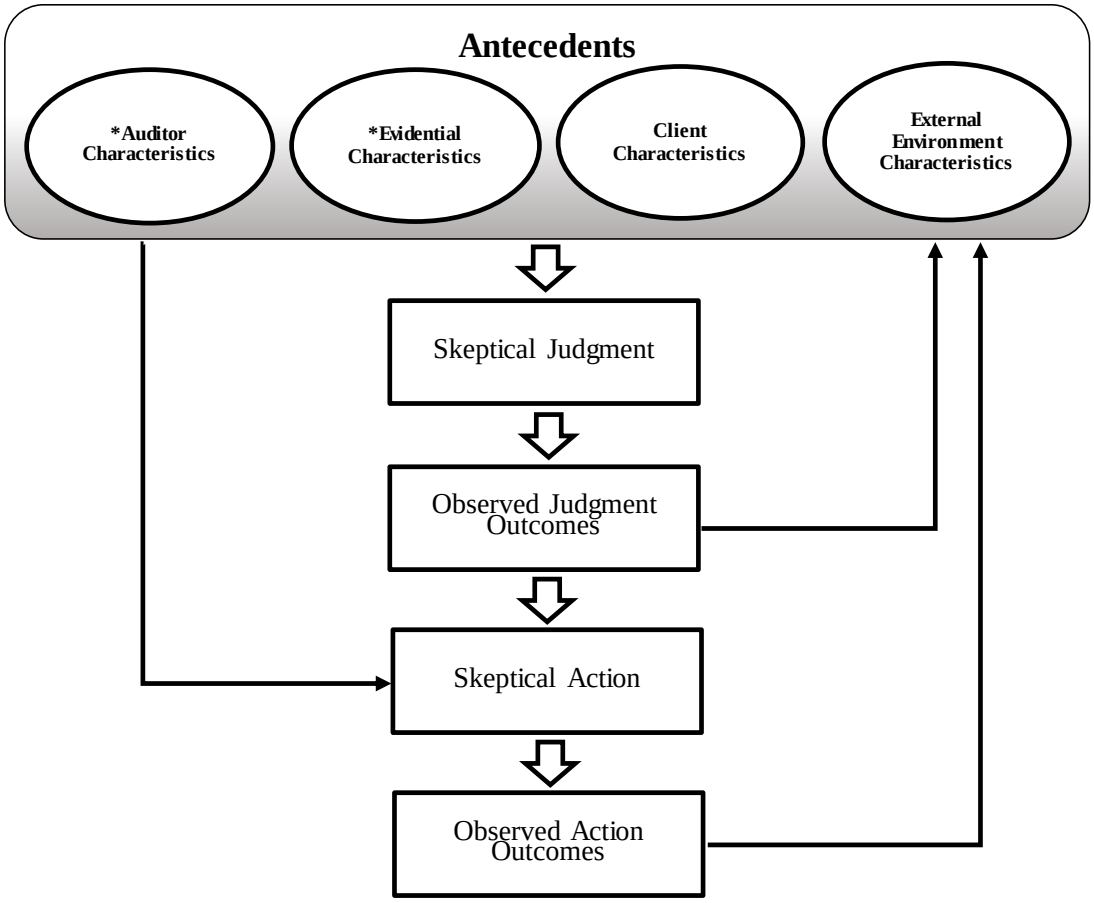
Notes:
This table shows the results of the Kruskal-Wallis analysis to see if there were significant differences between the four treatments for the overall fixation count and dwell time.
[a] Control represents the treatment condition with no irrelevant information or minor errors were present.
[b] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.
[c] Irrl_Info is an independent variable with two levels, where in the first level irrelevant information is not present, and in the second level irrelevant information is present.
[d]The Overall variable represents the number of fixations or dwell time across the entire spreadsheet for all participants in that treatment condition. The numbers in parentheses are standard deviations.
[e]AOI represents Area of Interest.

FIGURE 1
Model of Determinants of Professional Skepticism in Audit Performance
(from Nelson 2009)



*Included in the literature review

FIGURE 2
A Model of Antecedents to and Outcomes of Skeptical Judgment and Skeptical Action (from Hurtt et al. 2013)



*Included in the literature review

FIGURE 3
Proposed Interaction for Experiment 1

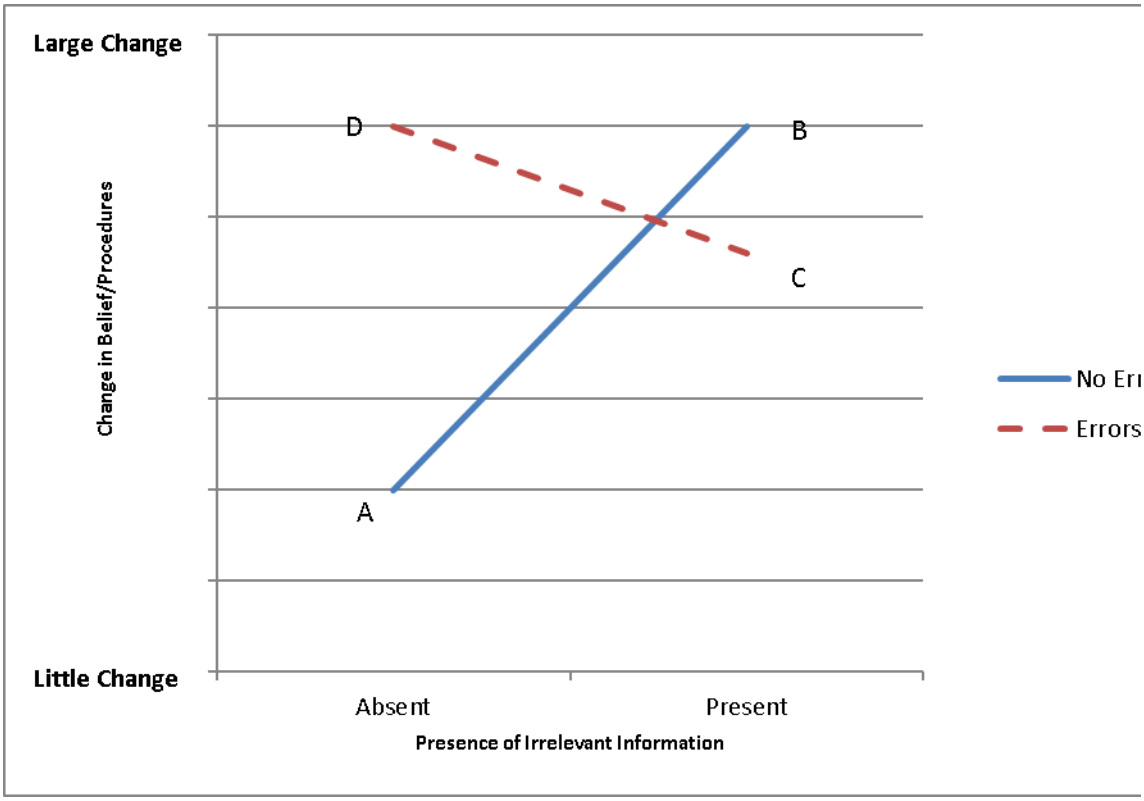
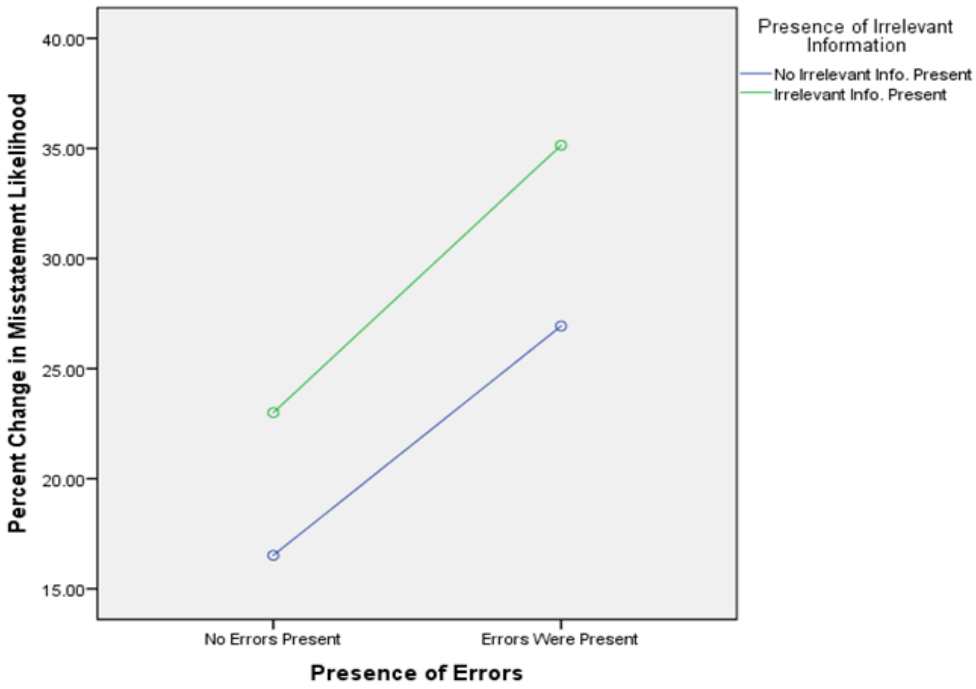
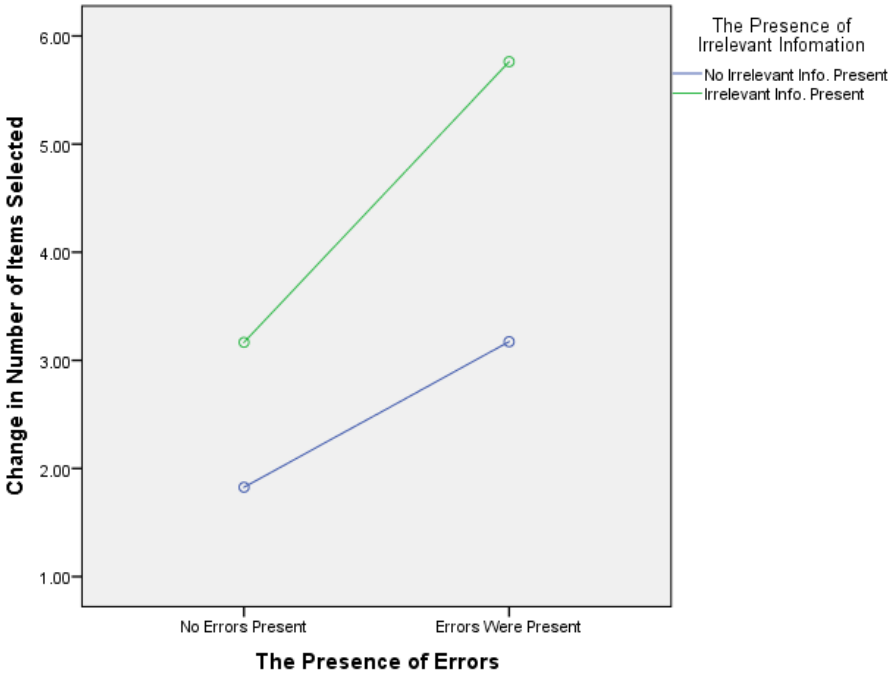


FIGURE 4
Change in Misstatement Likelihood



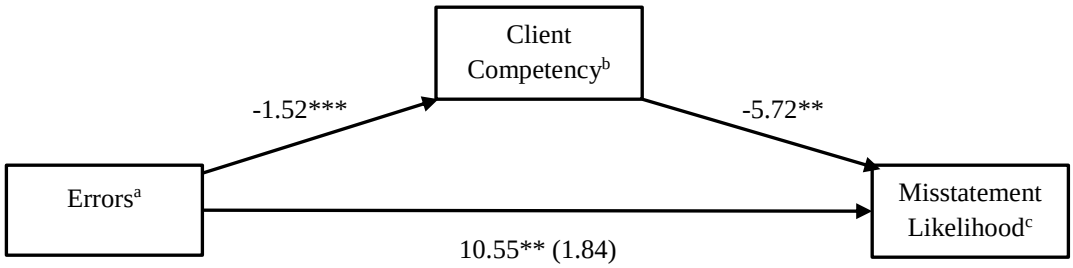
This figure presents the mean change in misstatement likelihood across the four treatment conditions.

FIGURE 5
Change in Number of Items Selected



This figure presents the mean change in number of items selected for sampling across the four treatment conditions.

FIGURE 6
Experiment 1 Client Competency Analysis (PROCESS Model 4)



Note:
[a] Errors is an independent variable at two levels, where in the first level minor errors are not present, and in the second minor level errors are present.
[b] Client competency was measured as part of a series of debriefing questions. It asked: "Agree or disagree, your review of the file increased your confidence in the client's competence". Answers were captured on a seven point Likert scale with 1 representing "strongly disagree" and 7 representing "strongly agree".
[c] Misstatement likelihood is the likelihood of the account being misstated.
*** $p < 0.001$, ** $p < 0.05$, * $p < 0.10$ (all p-values are two tailed)

Figure 7: Example of a Heat Map

	A	B	C	D	E	F	G	H	I	J	K	L
1	A/R Balance as of: 12/31/2015										PBC	
2												
3		Cu	St	In ce Nu er	Ph	Contact		ems	Number	Skew	In ce Amount	
4	1	Sin	VA		xx..-xx..	Johnson	9/ 0	ttles	1,000	F	767.90	
5	2	Jay & Auto Oil		4	xxx-xxxx	Pe e Barnell	015	les	5,000	AF1	894.30	
6	3	Ge Inc.	NY	4	xxx-xxxx	Ben A son	10/ 015	ottles	0	F	6,267.85	
7	4	Florid e Corp	FL	41699	xxx-xxxx	uy M.	11/3/2015	F bottles	800	B	3,5 40	
8	5	Mars Liq Detergents	VA	41700	xxx-xxxx	Bob nch	11/6/2015	A bottles	6,000	AF	85,948.00	
9	6	Silv prings	MD	41711	xxx-xxxx	Sha S.	11/9/2015	A bottles	4,500	AF	45,825.31	
10	7	P s Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20	
11	8	Jay & J Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00	
12	9	P	TX	41767	xxx-xxxx	om S.	11/20/2015	Z bottles	0,000	FB12	85,900.99	
13	10	Pe il	TX	41 8	xxx-xxxx	Chandle Moore	11/23/2015	T bottles	3,000	XX2	57,459.00	
14	11	The Batt hop	WA	417	xxx-xxxx	Jess man	11/28/2015	B bottles	25,000	C2	412,426.15	
15	12	Fres queezed	FL	41788	xxx-xxxx	Andy G dman	12/1/2015	T bottles	2,000	XX2	25,478.96	
16	13	Olivie Olive Oi	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37	
17	14	Pet	TX	41 45	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	765,490.00	
18				41	xxx-xxxx	S.	/8/2015	Z bottles	25,000	FB	0,008.12	
19		Wi	TN	4	xxx-xxxx	Rober ock	12/6/2015	AA bottles	6,000	A	1,411.42	
20	17	Soup to Go	SC	4 888	xxx-xxxx	Cam on Baxter	12/11/2015	A bottles	2,000	A	56,287.11	
21	18	Liquid C ocolate	CA	41889	xxx-xxxx	To Guan	12/14/2015	F bottles	8,000	B	89,541.50	
22	19	Drink Us	CA	41895	xxx-xxxx	Dani Brown	2	B bottles	6,000	F	98,546.25	
23	20	Alliga id	FL	41900	xxx-xxxx	A Phung	5	Z bottles	25	FB12	261.71	
24	21	Pure	CA	41903	xxx-xxxx	Sara ighton	12/20/2015	C bottles	3,0		298,475.00	
25	22	Diet Wate	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	87,4 3.13	
26	23	Anna's A apy	WA	41990	xxx-xxxx	erry	12/28/2015	AA bottles	4,500	AF	933,652.00	
27	24	Kido o.	GA	42 1	xxx-xxxx	Ed es	12/28/2015	AA bottles	50,000	AF	152,858.95	
28	25	Vat O Wine	WA	42002	xxx-xxxx	C.	12/29/2 5	F bottles	7,000	B	ABC	
29	26	Kiddel Co.	GA	42010	xxx-xxxx	E nes	12/29/2015	AA bottles	50,000	AF1	4.15	
30	27	Mou Water	CO	42012	xxx-xxxx	Willia wa	12/29/2015	C bottles	50,000	C2	4,758.61	
31	28		GA	4 013	xxx-xxxx	ones	12/29/2015	T bottles	60,000	C2	6.16	
32	29	Mountai ter	C	42070	xxx-xxxx	Wil ewart	2/29/2015	C bottles	30,000	C	56,784.42	
33	30	Kidde Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C	382.00	
34												
35										ta	179	GL
36										el	60,724,160.96	

FIGURE 8

Literature Review Organization

Goal-driven Attention
- -Task Instructions
- -Utility Effect
- -Heuristics
- -Attention Phases
- -Learning Effects

Stimulus-driven Attention
- -Saliency
- -Surface Size
- -Visual Clutter
- -Position

Attention and Working Memory
- -Consideration Sets
- -Pair-wise Comparisons
- -Information Complexity
- -Presentation Effects
- -Decision Difficulty
- -Time Pressure
- -Distractors

Note - The category names above are from Orquin and Loose (2013).

Figure 9: Illustration of the Experimental Process

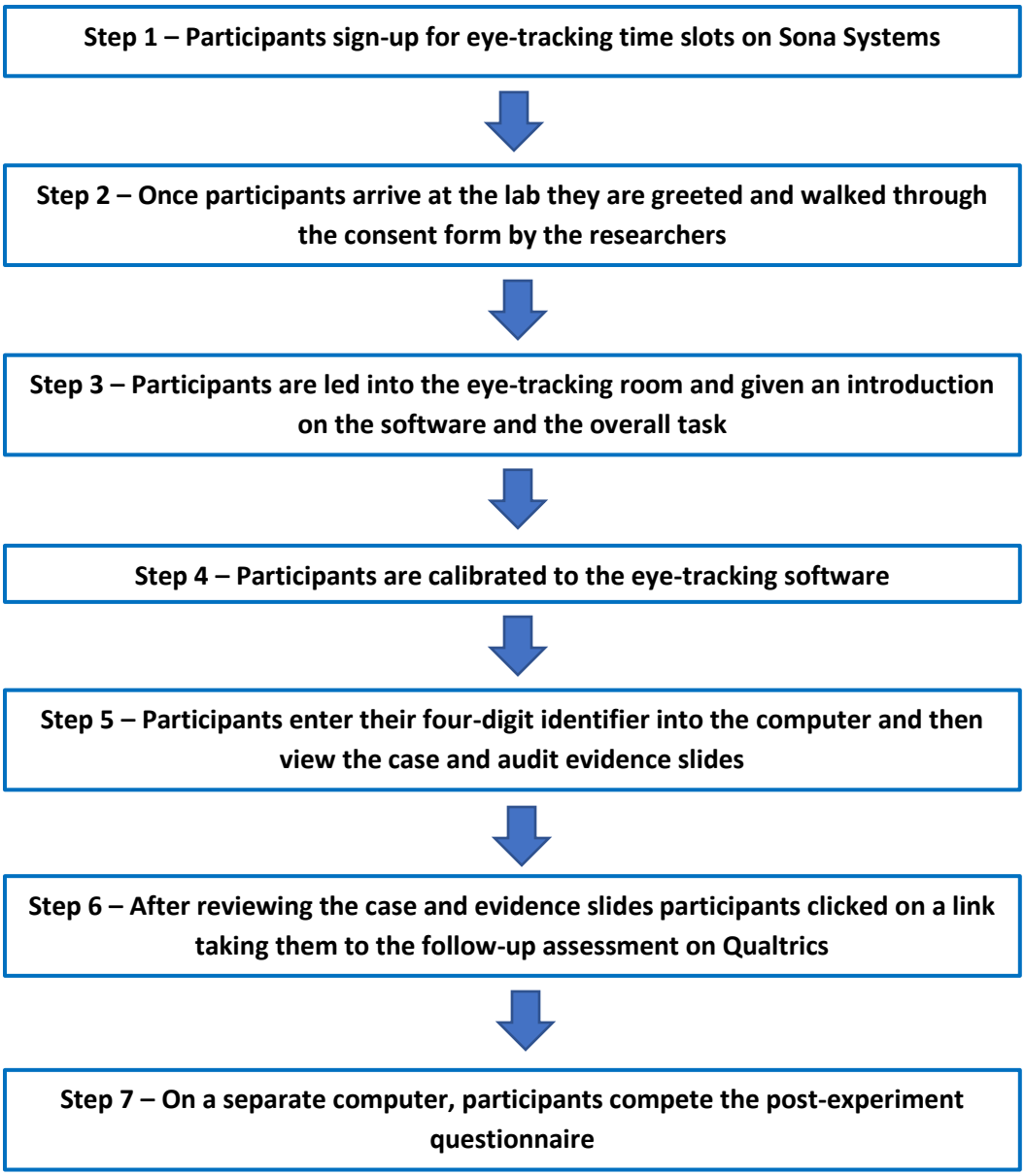
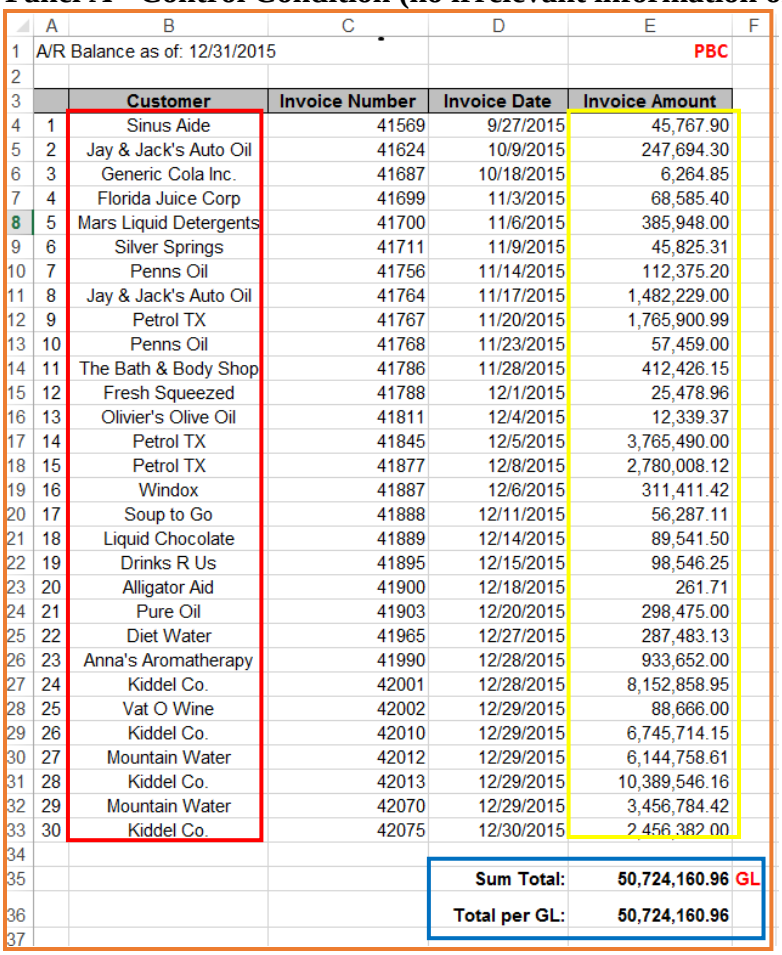


Figure 10: Audit Evidence Slides with Areas of Interest Indicated

Panel A - Control Condition (no irrelevant information or minor errors):



	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		Customer	Invoice Number	Invoice Date	Invoice Amount	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15	Petrol TX	41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	12/15/2015	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	88,666.00	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28	Kiddel Co.	42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				Sum Total:	50,724,160.96	GL
36				Total per GL:	50,724,160.96	
37						

Note: Red = Customer column, Yellow = Invoice Amount column, Blue = Invoice Total, Orange = Overall Spreadsheet

Panel B - Treatment 1 (minor errors and no irrelevant information):

	A	B	C	D	E	F
1	A/R Balance as of: 12/31/2015				PBC	
2						
3		Customer	Invoice Number	Invoice Date	Invoice Amount	
4	1	Sinus Aide	41569	9/27/2015	45,767.90	
5	2	Jay & Jack's Auto Oil	41624	10/9/2015	247,694.30	
6	3	Generic Cola Inc.	41687	10/18/2015	6,264.85	
7	4	Florida Juice Corp	41699	11/3/2015	68,585.40	
8	5	Mars Liquid Detergents	41700	11/6/2015	385,948.00	
9	6	Silver Springs	41711	11/9/2015	45,825.31	
10	7	Penns Oil	41756	11/14/2015	112,375.20	
11	8	Jay & Jack's Auto Oil	41764	11/17/2015	1,482,229.00	
12	9	Petrol TX	41767	11/20/2015	1,765,900.99	
13	10	Penns Oil	41768	11/23/2015	57,459.00	
14	11	The Bath & Body Shop	41786	11/28/2015	412,426.15	
15	12	Fresh Squeezed	41788	12/1/2015	25,478.96	
16	13	Olivier's Olive Oil	41811	12/4/2015	12,339.37	
17	14	Petrol TX	41845	12/5/2015	3,765,490.00	
18	15		41877	12/8/2015	2,780,008.12	
19	16	Windox	41887	12/6/2015	311,411.42	
20	17	Soup to Go	41888	12/11/2015	56,287.11	
21	18	Liquid Chocolate	41889	12/14/2015	89,541.50	
22	19	Drinks R Us	41895	5782	98,546.25	
23	20	Alligator Aid	41900	12/18/2015	261.71	
24	21	Pure Oil	41903	12/20/2015	298,475.00	
25	22	Diet Water	41965	12/27/2015	287,483.13	
26	23	Anna's Aromatherapy	41990	12/28/2015	933,652.00	
27	24	Kiddel Co.	42001	12/28/2015	8,152,858.95	
28	25	Vat O Wine	42002	12/29/2015	ABC	
29	26	Kiddel Co.	42010	12/29/2015	6,745,714.15	
30	27	Mountain Water	42012	12/29/2015	6,144,758.61	
31	28		42013	12/29/2015	10,389,546.16	
32	29	Mountain Water	42070	12/29/2015	3,456,784.42	
33	30	Kiddel Co.	42075	12/30/2015	2,456,382.00	
34						
35				Sum Total:	48,179,112.96	GL
36				Total per GL:	50,724,160.96	
37						

Note: Red = Customer column, Yellow = Invoice Amount column, Blue = Invoice Total, Orange = Overall Spreadsheet, Green = Customer column errors, Orange = Date column error, and Purple = Invoice column error.

Panel C - Treatment 2 (irrelevant information and no minor errors):

A/R Balance as of: 12/31/2015 PBC

	Customer	State	Invoice Number	Phone	Contact	Invoice Date	Items	Number	Skew	Invoice Amount
1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90
2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30
3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85
4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40
5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00
6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31
7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20
8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00
9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99
10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00
11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15
12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96
13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37
14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00
15	Petrol TX	TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12
16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42
17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11
18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50
19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	12/15/2015	B bottles	6,000	F	98,546.25
20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71
21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00
22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13
23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00
24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95
25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	88,666.00
26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15
27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61
28	Kiddel Co.	GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16
29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42
30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00

Sum Total: 50,724,160.96 GL

Total per GL: 50,724,160.96

Note: Red = Customer column, Yellow = Invoice Amount column, Blue = Invoice Total, Orange = Overall Spreadsheet

Panel D - Treatment 3 (both irrelevant information and minor errors):

A/R Balance as of: 12/31/2015 PBC

	Customer	State	Invoice Number	Phone	Contact	Invoice Date	Items	Number	Skew	Invoice Amount
1	Sinus Aide	VA	41569	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90
2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	AA bottles	5,000	AF1	247,694.30
3	Generic Cola Inc.	NY	41687	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	500	F	6,264.85
4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40
5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00
6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31
7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20
8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00
9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99
10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00
11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15
12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96
13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37
14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00
15		TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12
16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42
17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11
18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50
19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	5782	B bottles	6,000	F	98,546.25
20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71
21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00
22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13
23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00
24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95
25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	ABC
26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15
27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	6,144,758.61
28		GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	10,389,546.16
29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42
30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00

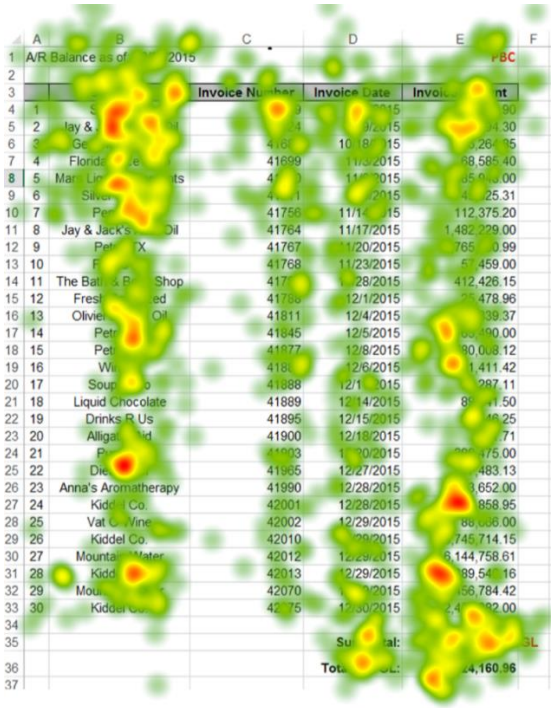
Sum Total: 48,179,112.96 GL

Total per GL: 50,724,160.96

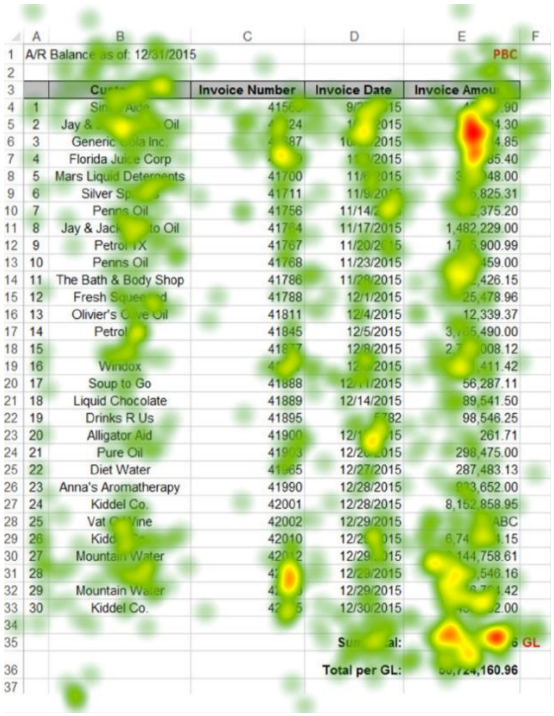
Note: Red = Customer column, Yellow = Invoice Amount column, Blue = Invoice Total, Orange = Overall Spreadsheet, Green = Customer column errors, Orange = Date column error, and Purple = Invoice column error.

Figure 11: Heat Maps

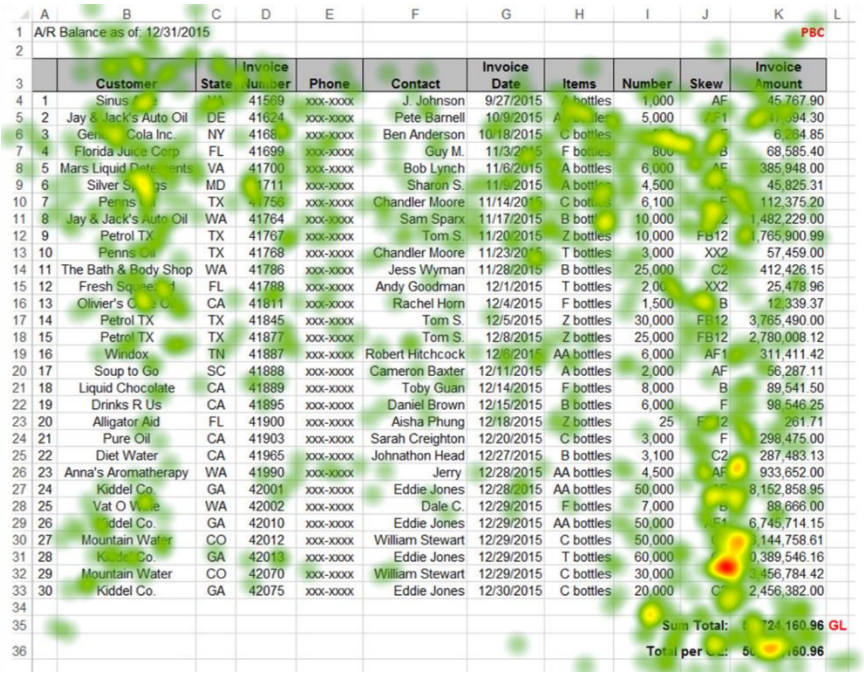
Panel A – Control Condition (No irrelevant information or minor errors)



Panel B – Treatment 1 (Minor errors and no irrelevant information)



Panel C – Treatment 2 (Irrelevant information and no minor errors)



A/R Balance as of: 12/31/2015 PBC

	Customer	State	Invoice Number	Phone	Contact	Invoice Date	Items	Number	Skew	Invoice Amount
1	Sinus		41689	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90
2	Jay & Jack's Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	A bottles	5,000		394.30
3	Gen Cola Inc.	NY	4168	xxx-xxxx	Ben Anderson	10/18/2015	C bottles			6,284.85
4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40
5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00
6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31
7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20
8	Jay & Jack's Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00
9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99
10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00
11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15
12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96
13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37
14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00
15	Petrol TX	TX	41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12
16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42
17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11
18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50
19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	12/15/2015	B bottles	6,000	F	98,546.25
20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71
21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00
22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13
23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00
24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95
25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	88,666.00
26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15
27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	4,144,758.61
28	Kiddel Co.	GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	2,389,546.16
29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42
30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00
								Sum Total:		724,160.96 GL
								Total per GL:		50,724,160.96

Panel D – Treatment 3 (Both irrelevant information and minor errors)

A/R Balance as of: 12/31/2015 PBC

	Customer	State	Invoice Number	Phone	Contact	Invoice Date	Items	Number	Skew	Invoice Amount
1	Sinus	VA	41689	xxx-xxxx	J. Johnson	9/27/2015	A bottles	1,000	AF	45,767.90
2	Jay & Auto Oil	DE	41624	xxx-xxxx	Pete Barnell	10/9/2015	A bottles	5,000	AF1	394.30
3	Gen Cola Inc.	NY	4168	xxx-xxxx	Ben Anderson	10/18/2015	C bottles	0	F	6,284.85
4	Florida Juice Corp	FL	41699	xxx-xxxx	Guy M.	11/3/2015	F bottles	800	B	68,585.40
5	Mars Liquid Detergents	VA	41700	xxx-xxxx	Bob Lynch	11/6/2015	A bottles	6,000	AF	385,948.00
6	Silver Springs	MD	41711	xxx-xxxx	Sharon S.	11/9/2015	A bottles	4,500	AF	45,825.31
7	Penns Oil	TX	41756	xxx-xxxx	Chandler Moore	11/14/2015	C bottles	6,100	F	112,375.20
8	Jay & Auto Oil	WA	41764	xxx-xxxx	Sam Sparx	11/17/2015	B bottles	10,000	C2	1,482,229.00
9	Petrol TX	TX	41767	xxx-xxxx	Tom S.	11/20/2015	Z bottles	10,000	FB12	1,765,900.99
10	Penns Oil	TX	41768	xxx-xxxx	Chandler Moore	11/23/2015	T bottles	3,000	XX2	57,459.00
11	The Bath & Body Shop	WA	41786	xxx-xxxx	Jess Wyman	11/28/2015	B bottles	25,000	C2	412,426.15
12	Fresh Squeezed	FL	41788	xxx-xxxx	Andy Goodman	12/1/2015	T bottles	2,000	XX2	25,478.96
13	Olivier's Olive Oil	CA	41811	xxx-xxxx	Rachel Horn	12/4/2015	F bottles	1,500	B	12,339.37
14	Petrol TX	TX	41845	xxx-xxxx	Tom S.	12/5/2015	Z bottles	30,000	FB12	3,765,490.00
15			41877	xxx-xxxx	Tom S.	12/8/2015	Z bottles	25,000	FB12	2,780,008.12
16	Windox	TN	41887	xxx-xxxx	Robert Hitchcock	12/6/2015	AA bottles	6,000	AF1	311,411.42
17	Soup to Go	SC	41888	xxx-xxxx	Cameron Baxter	12/11/2015	A bottles	2,000	AF	56,287.11
18	Liquid Chocolate	CA	41889	xxx-xxxx	Toby Guan	12/14/2015	F bottles	8,000	B	89,541.50
19	Drinks R Us	CA	41895	xxx-xxxx	Daniel Brown	12/15/2015	B bottles	6,000	F	98,546.25
20	Alligator Aid	FL	41900	xxx-xxxx	Aisha Phung	12/18/2015	Z bottles	25	FB12	261.71
21	Pure Oil	CA	41903	xxx-xxxx	Sarah Creighton	12/20/2015	C bottles	3,000	F	298,475.00
22	Diet Water	CA	41965	xxx-xxxx	Johnathon Head	12/27/2015	B bottles	3,100	C2	287,483.13
23	Anna's Aromatherapy	WA	41990	xxx-xxxx	Jerry	12/28/2015	AA bottles	4,500	AF	933,652.00
24	Kiddel Co.	GA	42001	xxx-xxxx	Eddie Jones	12/28/2015	AA bottles	50,000	AF	8,152,858.95
25	Vat O Wine	WA	42002	xxx-xxxx	Dale C.	12/29/2015	F bottles	7,000	B	ABC
26	Kiddel Co.	GA	42010	xxx-xxxx	Eddie Jones	12/29/2015	AA bottles	50,000	AF1	6,745,714.15
27	Mountain Water	CO	42012	xxx-xxxx	William Stewart	12/29/2015	C bottles	50,000	C2	4,144,758.61
28		GA	42013	xxx-xxxx	Eddie Jones	12/29/2015	T bottles	60,000	C2	2,389,546.16
29	Mountain Water	CO	42070	xxx-xxxx	William Stewart	12/29/2015	C bottles	30,000	C2	3,456,784.42
30	Kiddel Co.	GA	42075	xxx-xxxx	Eddie Jones	12/30/2015	C bottles	20,000	C2	2,456,382.00
								Sum Total:		724,160.96 GL
								Total per GL:		50,724,160.96

Vita

Edward Lynch was born in Washington D.C. and raised in Arlington Virginia. He earned his B.S. in Accounting (Magna Cum Laude) and M.S. in Accounting from Virginia Commonwealth University in 2010. Following graduation, he worked at Altria as an auditor and then later in public accounting at Bazilio Cobb and Associates. In 2013, he returned to Virginia Commonwealth University to start his Ph.D. in Accounting. During his graduate studies, Edward was recognized as the J. Michael Cook Doctoral Consortium Fellow, and was awarded the VSCPA Ph.D. accounting scholarship in 2015 and 2016. Edward accepted a full-time position as an Assistant Professor in Accounting at California State University at Fullerton in August 2017.