

DOES THE USE OF DATA ANALYTICS AFFECT AUDITORS' JUDGMENTS?

by

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ABSTRACT

Big Data is causing a disruptive shift in the way that the world generates, collects, stores, and processes data. Specifically, in the auditing profession, Big Data increases the amount of available information that will have implications on the audit process, as well as auditor judgment. However, auditing has been relatively slow to embrace the use of data analytics tools, and there has been a lack of research related to how data analytics will affect specific elements of auditor judgment. Thus, this study seeks to expand current research about audit data analytics and assess its implications on how auditors perform audit procedures and make decisions. This study is an experimental survey using student auditors to examine how the use of Big Data and data analytic tools affects auditors' judgments – specifically professional skepticism, confidence, and information overload – when compared to the traditional sampling methods. The study finds inconclusive results that using data analytics methods compared to sampling methods affects an auditor's judgment. This study offers implications for future research studies related to the role of data analytics in the audit.

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INTRODUCTION

Big Data has transformed the corporate business world due to the exponential amount of data that is available. This allows companies to have greater internal insight, leading to enhanced management decisions. Similarly, Big Data has the potential to change the traditional methods of financial reporting, however auditing falls behind in the adoption of data analytic tools due to hesitation from auditors and lack of proper technology platforms (Vasarhelyi, Kogan, & Tuttle 2015). In the context of auditing, Big Data implies that “the amount of data is at or beyond the limit of what the relevant information systems can store and process” (Brown-Liburd, Issa, & Lombardi 2015). Data analytics enable auditors to analyze patterns in the voluminous amount of Big Data and draw relevant conclusions, potentially allowing auditors to form improved decisions related to the role of financial reporting. Traditionally, auditors use substantive audit sampling from the entire population in order to select the items that they will use to collect additional audit evidence. Auditors perform a variety of audit procedures on the selected sample in order to support management’s assertions. Data analytics tools provide an alternative method to obtain such follow-up audit evidence.

The various forms of Big Data, such as video, images, audio, and text, can be used to improve transparency and usefulness for decision making from a management perspective. Auditors must respond to this paradigm shift in automation by utilizing analytical tools to form valuable and relevant insights. While research acknowledges the implications of data analytics on financial reporting and audit judgment, there is a lack of evidence to explain the reasonings behind such changes in behavior (Brown-Liburd, Issa, & Lombardi 2015). The ability to analyze Big Data in the scope of financial reporting offers the potential to improve audit effectiveness and efficiency

(Brown-Liburd, Issa, & Lombardi 2015). As auditing relies heavily on judgment and professional skepticism, it is necessary to study and understand Big Data's effect on audit quality.

This study examines how the use of data analytic tools affects auditors' judgments, specifically measuring professional skepticism, confidence, and information overload. The independent variable of the study is the auditors' method of performing audit procedures (sampling method vs. data analytics method) using an audit task.

The research conducted is a behavioral study that uses primary data collection to analyze auditor behavior. To compare data analytics tools to traditional sampling methods, the experiment consists of two randomly selected groups of auditors who complete a review of an audit workpaper. One group receives a workpaper using traditional sampling methods, while the other group receives a workpaper using data analytics methods. Auditors will complete a series of behavioral questions before and after the experiment to measure their professional skepticism¹, confidence, and amount of information overload.

This study examines three research questions regarding the influence of data analytics on auditor performance. Specifically, these questions are: (1) Does the use of data analytics affect auditors' professional skepticism? (2) Does the use of data analytics affect auditors' confidence? (3) Does the use of data analytics affect auditors' amount of information overload?

This study provides the groundwork for a more widespread use of Big Data during audit procedures in the external audit profession, which seems to reflect the inevitable trend of

¹ The Public Company Accounting Oversight Board (PCAOB) auditing standards defines professional skepticism as "an attitude that includes a questioning mind and a critical assessment of audit evidence" (PCAOB 2018).

automation. In addition, the findings may provide guidance regarding when to use sampling methods versus data analytics methods throughout the audit engagement.

The remainder of this paper proceeds as follows: Section I presents a literature review of auditing research and practice related to data analytics, sampling, and auditor's judgements. The hypotheses are also presented. Section II provides an explanation of the methods used in the experiment. Section III presents the results. Section IV discusses the findings and analysis of the results. Section V provides further implications and future research areas related to the study. Lastly, Section VI gives a concluding analysis.

Section I: Literature Review

This study seeks to compare the relationship between big data analytics and sampling methods to auditors' professional skepticism and confidence. The remainder of this section defines big data analytics and traditional audit sampling methods. Second, the section reviews literature on professional skepticism, auditors' confidence, and information overload in relation to data analytics and sampling to develop three hypotheses.

Big Data

The business world is constantly evolving, due to technological advancements that are increasing the amount of data that can be collected, as well as the parameters of its availability and accessibility. This breadth of data, commonly referred to as "Big Data," is defined as "high-volume, high-velocity, and high-variety information assets that demand cost-effective, innovative forms of information processing for enhanced insight and decision making" (Gartner Research 2014). Big Data encompasses a "large population of datasets whose size is beyond the ability of

typical database software tools” which can be analyzed to identify patterns and trends beyond that of traditional data processing systems (Brown Liburd, Issa, & Lombardi 2015). Many companies have embraced Big Data, using its information as an analytical tool to transform business processes and functionality. A 2014 Gartner survey revealed that over 75 percent of global organizations plan to invest in Big Data in the next two years (Gartner Research 2014). As the use of Big Data and data analytic methods among organizations continues to progress, the audit profession must appropriately respond by determining how to evolve the audit process in terms of audit theory, standards, and application (Byrnes, Criste, Stewart, & Vasarhely 2014).

Data Analytics in the Audit

Data analytics and the use of Big Data are not limited to organizations wanting to improve their business. Auditors can similarly implement data analytical capabilities to increase the quality of the financial statement audits. Just as companies use Big Data, auditors can utilize these tools to identify patterns in the audit evidence and gain more relevant insights. Researchers have observed that Big Data, specifically in relation to the financial statement audit, provides uncapped potential to increase audit effectiveness and efficiency (Brown-Liburd, Issa, & Lombardi 2015). This application of data analytics, commonly referred to as audit data analytics, is defined as the science of “discovering and analyzing patterns, identifying anomalies, and extracting other useful information in data underlying or related to the subject matter of an audit through analysis, modeling, and visualization of planning or performing the audit” (Byrnes, Criste, Stewart, & Vasarhely 2014). Littleley (2012) states the use of audit data analytics will evolve and revolutionize current audit techniques. In relation to financial accounting, using Big Data accompanied with traditional financial information can improve transparency and decision-making (Warren, Moffitt, & Byrnes 2015). With the implementation of audit data analytics, auditors can potentially save

time sorting through data, and rather focus efforts on analyzing the data to detect patterns and anomalies. The purpose of the audit is to provide assurance that the financial statements provide a “fair and true” representation of the entity’s position (PwC 2013). Auditors can apply audit data analytics to better assess risks and detect material misstatements on the financial statements (Brynes, Criste, Stewart, & Vasarhely 2014).

Data analytics provides external auditors with potential for greater insight by: testing complete sets of data, rather than samples; identifying anomalies and trends during risk assessment; comprehensive analysis of organizations’ general ledgers; and providing auditors with risky items that require further investigation (Murphy & Tysiak 2015). Auditors can implement data analytics in the planning step of the audit engagement to detect patterns and identify financial relationships (Murphy & Tysiak 2015). Data analytics can offer “auditors new insights about the entity and its risk environment and improve the quality of analytical procedures in all phases of the audit” (Murphy & Tysiak 2015). The use of data analytics can help auditors obtain better quality audit evidence² when forming an audit opinion, ultimately resulting in auditors providing increased assurance to external stakeholders. Audit data analytics can also lead to a more economically efficient audit because technology is often faster than performing manual procedures (Murphy & Tysiak 2015). For instance, radio frequency identification (RFID) technology provides a form of inventory management that uses tags to capture inventory data. Rather than perform a

² The reliability of audit evidence depends on the nature and source of the items. Auditors perform audit procedures to obtain evidence, including inspection of documents, records, or physical assets; observation of processes or procedures; inquiry of company personnel; confirmation from third parties; recalculation; reperformance; and analytical procedures. Generally, evidence from a knowledgeable, independent-third party is more reliable than evidence generated internally within the company. Internal evidence is more reliable when obtained from companies with effective internal controls. An auditor’s direct evidence through observation, recalculation, or reperformance is more reliable than indirect evidence (PCAOB 2018).

physical inventory count, auditors can use RFID information from retailers and manufacturers to count, track, and measure inventory levels (Vasarhelyi, Kogan, and Tuttle 2015).

Another example of audit data analytics occurs when performing cut-off testing procedures.³ Auditors can use data analytics to extract the entire record of shipments throughout the year. Then, auditors can manipulate the data using software to drill-down into specific instances where recorded information across the various shipping documents does not agree, such as the shipment date or invoice payment (Olvera et al. 2017). With access to all of the pertinent information related to these shipments, auditors can then perform additional procedures to understand and resolve the discrepancies.

While researchers acknowledge the transformative potential of data analytics in the audit environment, they also point out that the audit profession has not fully adopted and implemented these tools (Alles 2015). Ernst and Young (2015) states reasons for this due to a “lack of efficient technology solutions, problems with data capture, and concerns about privacy.”

Sampling Methods

When performing audit procedures, auditors often test a sample of items within an account balance or transaction, rather than testing the entire population (PCAOB 2018). In terms of feasibility, practicality, and cost effectiveness, auditors cannot provide absolute certainty; auditors perform sampling methods in order to gain reasonable assurance that the client’s financial statements are fairly stated. In addition, sampling helps auditors maintain both a quality and efficient audit. For example, a large commercial bank holds extensive loan portfolios that include

³ The PCAOB defines cut-off procedures as “procedures to test whether revenue was recognized in the correct period” (PCAOB 2014).

residential and commercial mortgages, retail and corporate loans, and credit card loans. Auditors must perform substantive testing on these loan balances to test the existence assertion; they must confirm that the bank is actually holding these loans with the borrowers, and furthermore, that the borrowers are actually making their loan payments. It is not feasible to test the entire population of loans, which may have up to a billion-dollar balance, so auditors select a representative sample of loans from each category for testing. Auditors can then use the results from their sampling to infer characteristics about the bank's total loan portfolio.

In relation to cut-off testing procedures, auditors can use sampling methods to ensure proper revenue recognition by agreeing shipment information to supporting shipping documents. To do this, auditors can select a sample of shipments that occurred in the time period right before and after the year-end. Auditors can then reconcile the shipping documentation to the company's sales report to determine that the sales were recorded in the correct period (Olvera et al. 2017).

Auditing standards permit auditors to use a variety of sampling methods when selecting items for testing. Auditors can use statistical methods or exercise their "professional judgment" when determining the sample size and the sampling method (PCAOB 2018). Sampling techniques may include statistical forms, such as random, systematic or monetary unit sampling, as well as non-statistical methods, such as haphazard or block selection (Christensen, Elder, & Glover 2015).

Professional Skepticism

The Public Company Accounting Oversight Board (PCAOB) defines professional skepticism as "an attitude that involves a questioning mind and a critical assessment of audit evidence" (PCAOB 2018). Professional skepticism is not an approach of distrust, cynicism, or

overt suspicion. Rather, auditors must be “willing to doubt, question, or disagree with client assertions or generally accepted conclusions” (Shaub and Lawrence 1996).

Hurtt (2010) proposes that professional skepticism is made up of six characteristics: a questioning mind, suspension of judgment, search for knowledge, interpersonal understanding, self-esteem, and autonomy. The concept of a questioning mind is consistent with the definition of professional skepticism in auditing standards, as well as accounting standards and other research. Auditors constantly ask questions to further their understanding, gain insights, and derive adequate evidence to support their opinions. (Dimitrova & Sorova 2016). Hurtt (2010) defines suspension of judgment as “withholding judgment until there is an appropriate level of evidence on which to base a conclusion.” This refers to the idea that the auditor does not always hold client assertions or assumptions at face value but takes a step beyond to gather sufficient audit evidence as justification. This is consistent with auditing standards that auditors must obtain “sufficient appropriate audit evidence” before forming an opinion (PCAOB 2018). For example, if a client asserts a certain account balance, auditors may perform recalculations of the balance using documentation from third-parties to verify that the amount is correct. Hurtt’s (2010) characteristic of a search for knowledge refers to an auditor having an instinctive curiosity and interest in learning. The PCAOB recognizes knowledge and understanding as vital skills needed to perform an audit (PCAOB 2018).

The application of interpersonal understanding refers to how auditors interpret the motivations and reasoning behind client behavior. Professionally skeptical auditors must have the ability to discern the underlying bias or misleading information provided by clients (Hurtt 2010). While this is not directly acknowledged in professional auditing standards as an element of professional skepticism, auditing standards provide extensive standards regarding the importance

of risk assessment and pinpointing factors that may contribute to risk (PCAOB 2018). Autonomy denotes a self-determined attitude that an auditor uses to critically evaluate audit evidence and form relevant judgments. Hurtt (2010) proposes that autonomous auditors are not easily swayed or persuaded by others in the decision-making step of an audit. Similar to autonomy, self-esteem relates to an auditor's ability to have confidence and assuredness in his or her ability throughout the audit.

With professional skepticism at the forefront of an auditor's behavior, auditing literature has focused on factors that influence professional skepticism levels. Nelson (2009) proposes that certain traits, such as personal knowledge, self-confidence, and incentives influence an auditor's ability to exhibit professional skepticism. Building on this study, Westermann (2014) addresses various sources of accountability as a factor that impacts professional skepticism levels. Accountability is defined as "implicit or explicit expectation that one may be called to justify one's beliefs, feelings, and actions to others" (Lerner & Tetlock 1999). The study focuses on accountability in relation to sources that are relevant to auditors, such as themselves, the engagement team, the firm, and regulatory bodies. Specific examples of accountability in the auditing profession include "threat of PCAOB inspection, litigation risk, client importance, work-paper review, formal evaluation, and time-budget pressure" (Westermann, Cohen, & Trompeter 2014). The research found that holding an individual accountable, as opposed to holding an entire audit team or firm accountable, leads to higher levels of professional skepticism. This is consistent with prior auditing research that auditors often have an attitude of "penalty avoidance" from superiors or regulators that motivates them to remain professionally skeptical (Peecher et al. 2013).

While there is extensive research on the definition and application of professional skepticism, researchers have not yet analyzed its effects in relation to using audit data analytics. Based on the inherent definition of Big Data – volume, variety, and velocity – using data analytics will provide auditors with increased information to use as audit evidence to ask questions and form insights. In his research, Nelson (2009) uses a presumptive-doubt application of professional skepticism, proposing that auditors with high levels of professional skepticism “need relatively more persuasive evidence (in terms of quality and/or quantity).” Research indicates that Big Data and data analytics offer increased quantities of information which auditors can potentially use as audit evidence. With more information at their fingertips, auditors may have inclinations to look deeper into the audit evidence to form judgments, leading them to make more informed decisions. Thus, the following hypothesis results:

H1: Auditors who use data analytics methods to perform audit procedures have higher professional skepticism.

Auditor Confidence

Auditor confidence is another attribute that presents itself throughout the audit process and when forming the audit opinion of the financial statements. Auditors do not assure absolute confidence due to the limitations and impracticalities of assessing an entity’s entire realm of financial data. Auditors instead aim to provide “reasonable assurance,” which is a vaguely defined high level of confidence that the financial statements are presented free of material misstatement. PCAOB Auditing Standards (PCAOB 2018) acknowledge that a degree of uncertainty arises based on the concept that auditors evaluate audit evidence to form “a reasonable basis for an opinion.”

While sampling is a necessary procedure to analyze large data populations, research argues that sampling essentially diminishes the quality of the complete data population (Vasarhelyi, Kogan, and Tuttle 2015). There is no guarantee that the chosen sampling method selected an inherently representative sample. A 2015 study conducted an open-response survey with input from six large accounting firms, including the Big Four, aiming to gain insights regarding how auditors choose sampling methods and perform sampling during an engagement. Firms reported using both statistical and non-statistical sampling approaches. The survey concluded that while large firms have no preference over which sampling method to use, haphazard sampling is the most common sampling technique. In a series of open-ended questions, participants noted that “engagement teams sometimes select the wrong method of sampling” (Christensen, Elder, & Glover 2015). While auditing standards permit the use of haphazard sampling, research suggests that haphazard sampling may result in a problematic selection of representative audit evidence. A 2001 study testing selection bias in audit sampling suggests that high levels of bias indicate that haphazard sampling is often not a reliable sampling tool (Hall, Herron, Pierce & Witt 2001).

From a psychological perspective, research reports that an increased amount of information results in higher decision-making confidence (Peterson & Pitz 1988). This may have related implications on auditor judgment because data analytics generate exponentially increased amounts of data to use as audit evidence. Therefore, the hypothesis is formed:

H2: Auditors who use data analytics methods to perform audit procedures have greater confidence in their decision-making process.

Information Overload

Information overload in this context refers to receiving too much information and having difficulty making decisions. The focus of information overload research with respect to the accounting profession is based on how decision making varies with the amount of information exposure (Schick, Gordon, & Haka, 1990). The abundance of information may result in an inability to identify relevant data, therefore decreasing performance (O' Reilly 1980). The consensus about information overload across many professions is one's performance, or the quality of one's decisions, is positively correlated with the amount of information he or she is exposed to, up to a certain point. After he or she reaches the peak of information overload, performance and decision making rapidly decreases. Information presented beyond this point "will no longer be integrated into the decision-making process and information overload will be the result" (O'Reilly 1980). Furthermore, pressure upon receiving too much information will "confuse the individual, affect his or her ability to set priorities, and make prior information harder to recall" (Schick, Gordon, & Haka, 1990).

This research suggests implications for the auditing profession when assessing the role of audit data analytics on audit quality and efficiency. Brown-Liburd (2015) states "attention to irrelevant information has the potential to significantly limit the value that can be obtained from incorporating Big Data into the audit process." This is referred to as the dilution effect – a significant amount of non-relevant information tends to "distract decision makers and dilute the quality of their judgment" (Nisbett, Zukier, & Lemley 1981). With judgment as a forefront of the audit process, auditors face the difficult task of how to sift through data from a variety of financial and nonfinancial sources to identify what is actually relevant and appropriate audit evidence.

Auditors currently use sampling as a tool to decrease the level of information overload of audit evidence. Sampling allows auditors to test a representative selection of items, rather than spend an endless amount of time trying to test each individual transaction or balance. Therefore, this study proposes the following hypothesis:

H3: Auditors who use data analytics to perform audit procedures will be more overwhelmed by the amount of provided information.

Section II: Methodology

Sample

The population included in the data collection consists of twenty-four student auditors from Texas Christian University with a mean age of approximately 22.65 years. See Table 1 for a demographic breakdown of the participants. Participation was voluntary, and the survey responses are confidential. All of the students were accounting graduate students who had taken an average number of ten accounting courses throughout their undergraduate and graduate studies. This research chose to use graduate students because they have audit work experience at the intern level, but have not yet started working full time nor have they begun taking their Certified Public Account (CPA) exams. The case involved documentation of cut-off testing procedures for the financial year-end. All participants had previously taken audit courses that gave them experience working with both sampling and data analytics methods, as well as cut-off testing procedures.

Table 1: Demographics of the Sample

	<i>Number</i>	<i>Percentage</i>
<i>Male</i>	15	62.5%
<i>Female</i>	9	37.5%
Total	24	100%

Experimental Design and Procedure

The survey was an experimental design where the manipulated independent variable was audit procedure method (data analytics vs. sampling methods); and the dependent variables were levels of professional skepticism, confidence, and knowledge. The purpose of the study was to examine how the use of Big Data and data analytic tools affects auditors' judgments compared to the traditional sampling methods.

Survey Instrument

This survey instrument used the case from Olvera et al. 2017 (See Appendix A for full instrument). The survey involves manipulation of the provided Excel document via sampling methods or data analytics. Per PCAOB Auditing Standards (PCAOB 2018), sampling method in this research refers to "the application of an audit procedure to less than 100 percent of the items within an account balance or class of transactions for the purpose of evaluating some characteristic of the balance or class." Data analytics in this research refers to the use of software solutions, specifically Tableau in the survey, to provide auditors with new audit evidence and insights. Tableau is a software program that offers business intelligence capabilities for visualization and manipulation of data. Auditors regularly perform analytical procedures in the audit process to identify potential risks. Tableau offers a method to extract large amounts of company data and create visualizations. Almost instantly, Tableau can transform data into a wide variety of graphs and other visualizations that can be manipulated per user. Data analytics allows for the exploration of large sets of audit relevant data from internal and external sources.

Survey Task

The survey was conducted in three phases. In Phase One, participants were introduced to the study and completed the Hurt (2010) questionnaire. The questionnaire consists of thirty questions designed to provide a scale to measure professional skepticism. Examples of these questions include “I often accept other people’s explanations without further thought” and “I usually accept things I see, read, or hear at face value.” Responses are ranked on a scale from 1-6, with 1 meaning “Strongly Disagree” and 6 meaning “Strongly Agree.” The scores can range from 30 to 180.

In Phase Two, participants were asked to review a company’s audit workpaper and answer questions related to the workpaper. The participants were to assume they were an audit senior at a fictitious company using a workpaper submitted by their audit staff. The information included the purpose of the workpaper, the procedures used to complete the cut-off testing, and the shipment information. Participants were not given any additional information regarding company background or the specific individuals involved. After reviewing the workpaper, participants answered questions about the facts of the case and financial statement assertions. In addition, participants indicated the likelihood of needing additional information using scaled-questions ranging from “very little” to “to a great extent.” They were permitted to use the workpaper in order to answer these questions.

Phase Three asks participants additional questions about the case used to determine their skepticism, confidence, and information overload during the case. Participants were not permitted to return to the workpaper to answer these questions. This phase also asks general demographic information such as age, year in school, and number of accounting classes completed.

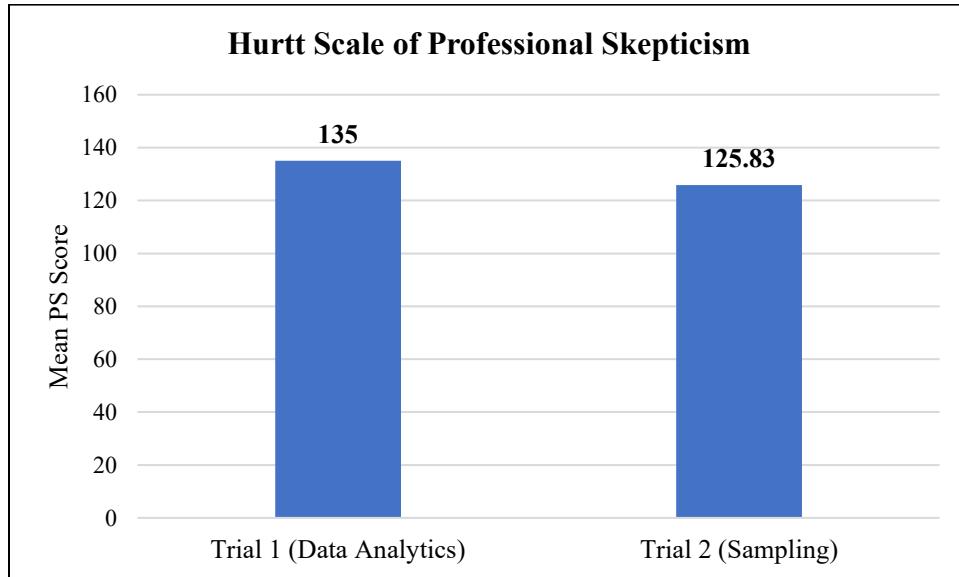
Section III: Results

This section presents the results of the experimental survey using statistical testing to interpret the participants' responses. First, the results of the Hurtt scale used to measure participants' professional skepticism in Phase 1 are discussed. Then, the results of the manipulation check and the hypothesis testing results are presented.

Hurtt Professional Skepticism Scale

From Phase 1, I calculated an overall professional skepticism score for each individual participant by using the sum of his or her answers to the thirty professional skepticism questions. The range of professional skepticism scores among all participants was between 102 and 160, with an average score of 130.42. Specifically, the mean for the data analytics group was 135.00 and the mean for the sampling group was 125.83. This indicates that prior to beginning the actual case, the data analytics group had higher levels of professional skepticism. Using a two-tailed t-test, the p-value for the responses is 0.128 which is insignificant at a $p < 0.05$ level. This indicates that the initial levels of professional skepticism are not significantly different among the data analytics group versus the sampling group. The graph below shows the mean professional skepticism score for both groups of participants.

Exhibit 1: Initial Professional Skepticism Levels



Manipulation Check

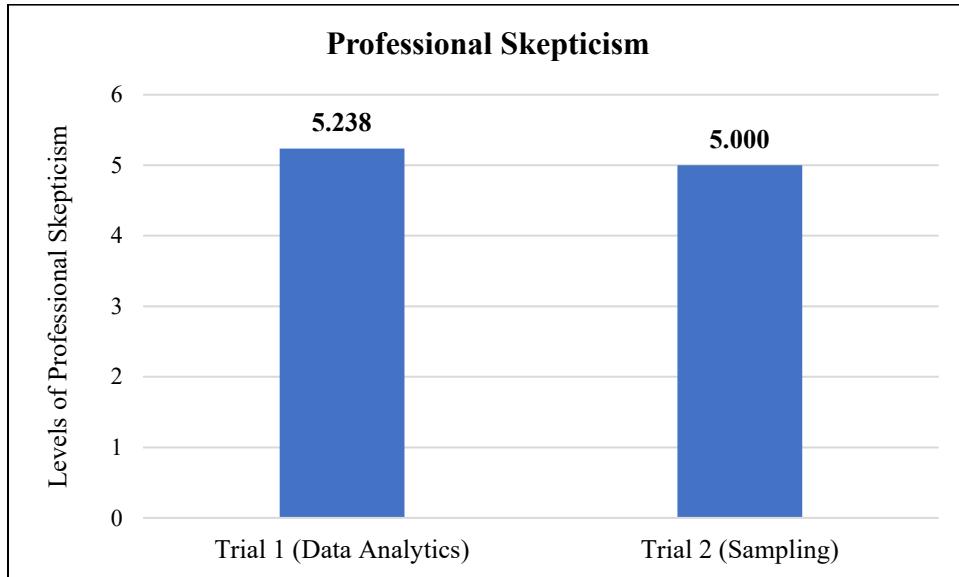
In Phase 2, the survey asked two questions designed as a manipulation check to assess if participants were aware of the professional approach that they should have in order to form opinions about the audit case. The case presented these questions before participants answered any questions related to their levels of professional skepticism, confidence, and information overload about the audit procedure. The first question was: “Is the following question true or false? You are to assume you are an audit senior in charge of the ABC Company audit.” All of the participants answered with the correct response that the statement was true. The second question asked: “Is the following question true or false? You are the preparer of the above audit workpaper.” All of the participants answered with the correct response that the statement was false. The responses of the manipulation check indicate that all respondents were viewing themselves as audit seniors reviewing their audit staff’s work throughout the case.

Hypothesis Testing

The first hypothesis measured participants' level of professional skepticism: Auditors who use data analytics methods to perform audit procedures have higher professional skepticism. To measure professional skepticism upon completing the case in Phase 3, participants responded to seven questions on a 7-point scale. A response of 1 indicated "Strongly disagree," and a response of 7 indicated "Strongly agree." Question 13 asked participants: "While working on the case, I frequently questioned things that I saw or read." Question 14 asked participants: "While working on this case, I had a tendency to reject statements unless I had proof that they were true." Question 15 asked participants: "While working on this case, I took my time making decisions." Question 16 asked participants: "I did not like to make decisions quickly while working on the case." Question 17 asked participants: "While working on this case, I tried to ensure that I had considered most available information before making a decision." Question 18 asked participants: "I tended to perform additional analysis before deciding which accounts to investigate during this case." Lastly, Question 19 asked participants: "In the case, I used all of the resources available to me to get all of the information I could."

The mean for all participants was 5.12. The mean for the data analytics group was 5.238, which consists of an aggregated mean of these participants' responses for Questions 13-19. Using similar methods, the mean for the sampling group was 5.000. These results indicate that both administrations experienced similar levels of professional skepticism. The results of the two-tailed t-test have a p-value of 0.514, which is not significant at the $p < 0.05$ level. Therefore, the study cannot indicate a statistically significant difference in professional skepticism levels between data analytics and sampling methods. Table 2 presents the mean professional skepticism levels for both groups.

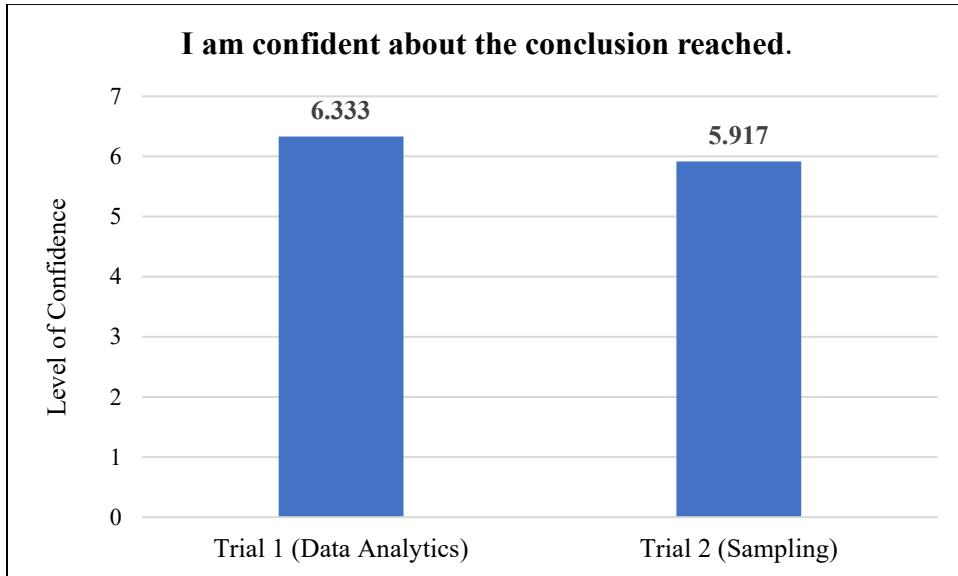
Exhibit 2: Hypothesis 1 – Professional Skepticism Level



The second hypothesis measured participants' confidence level: Auditors who use data analytics methods to perform audit procedures have greater confidence in their decision-making process. During Phase 3, participants answered a question related to their confidence level while performing the task: "I am confident about the conclusion reached." The phrase conclusion reached refers to the workpaper's assumption that the cut-off procedures were performed correctly and free from material error. Participants responded on a 10-point scale: a level 1 response indicated "Strongly disagree," while a level 10 response indicated "Strongly agree."

The mean for all participants was 6.125. The mean for the data analytics group was 6.333 and the mean for the sampling group was 5.917, indicating that the data analytics group had slightly higher confidence when reviewing the audit task. Significance is tested at $p < 0.05$. The results have a p-value of 0.649, and therefore do not indicate a statistically significant difference between confidence levels using data analytics compared with sampling. Table 3 presents the mean confidence levels for both groups.

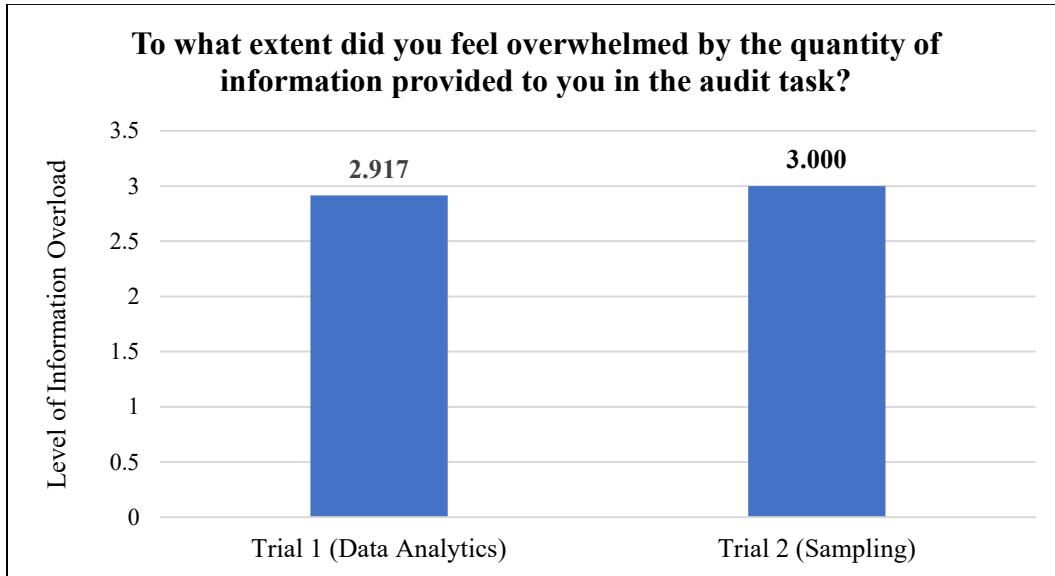
Exhibit 3: Hypothesis 2 – Confidence Level



The third hypothesis measured participants' level of information overload: Auditors who use data analytics to perform audit procedures will be more overwhelmed by the amount of provided information. In Phase 3, Question 3 tested this hypothesis by asking participants the statement: "To what extent did you feel overwhelmed by the quantity of information provided to you in the audit task?" Participants responded on a 10-point scale, where a level 1 response indicated "Strongly disagree" and a level 10 response indicated "Strongly agree."

The mean for all participants was 2.958. The mean for the data analytics group was 2.917 and the mean for the sampling group was 3.000, indicating that participants in both groups experienced similar levels of low information overload from the audit task. Significance is tested at $p < 0.05$. With a p-value of 0.902, the results do not indicate a statistically significant difference between information overload when using data analytics methods versus sampling methods. Table 4 presents the mean levels of information overload for both groups.

Exhibit 4: Hypothesis 3 – Information Overload



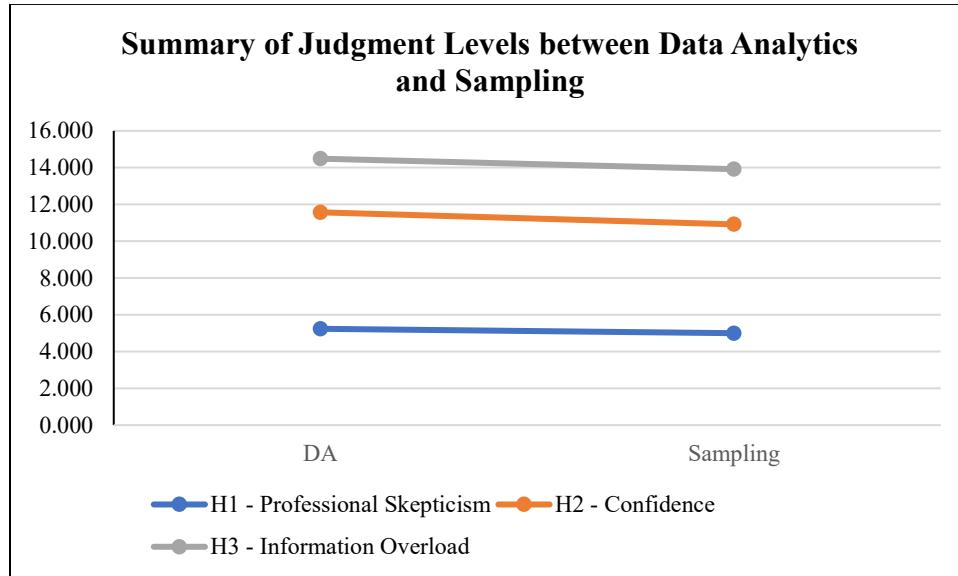
The following table presents the mean levels of professional skepticism, confidence, and information overload and the results of the t-test for the data analytics group and the sampling group.

Table 2: Summary of Mean Judgment Levels for Data Analytics and Sampling

	Data Analytics	Sampling	P-Value
H1 - Professional Skepticism	5.238	5.000	0.514
H2 - Confidence	6.333	5.917	0.649
H3 - Information Overload	2.917	3.000	0.902

The following table presents a summarized visualization of the manipulated judgment levels – professional skepticism, confidence, and information overload – for the two groups.

Exhibit 5: Comparison of Judgment Levels between Data Analytics and Sampling



Section IV: Discussion

This section analyzes the results of the survey and discusses if the original hypotheses were correct. The section then considers the limitations of the study.

Analysis

Recall H1: Auditors who use data analytics methods to perform audit procedures have higher professional skepticism. The mean level of professional skepticism was slightly higher for the data analytics group than the sampling group, demonstrating that the original hypotheses was correct. Recall H2: Auditors who use data analytics methods to perform audit procedures have greater confidence in their decision-making process. The mean confidence level of the data analytics group was higher than the sampling group, indicating that they were more confident that the audit procedure was complete and free from material error. Recall H3: Auditors who use data analytics to perform audit procedures will be more overwhelmed by the amount of provided information. In the study, the sampling method group indicated that they were slightly more

overwhelmed than the data analytics group. The original hypothesis was incorrect because the sampling group experienced higher information overload from the case.

However, the p-values of the three hypotheses were greater than 0.05 and therefore statistically insignificant; the study cannot conclude that there is a difference in auditors' judgments when using data analytics versus sampling methods.

Limitations

The survey has several limitations, which may have been a contributing factor to the statistically insignificant results. The first limitation stems from the difficulty in acquiring data from a wide variety of participants. The population of twenty-four participants was relatively small. Additionally, the population was subject to selection bias because all of the participants were current graduate students at TCU. The participants have had intern-level audit experience as well an adequate understanding of the fundamental concepts of sampling and data analytics from their accounting courses. However, the results may have been more indicative if the survey collected data from experienced auditors who had more familiarity performing audit procedures.

The survey was administered during the participants' class period with no incentives or consequences, and it is possible that students were not fully engaged while completing the task. The participants were limited to a time constraint of a fifty-minute class period, whereas they may have more time to work on such tasks in a real-world audit engagement. The participants were not asked to perform the data manipulation or select the sample items, but rather to observe the case and answer related questions. This may have affected the level of participants' understanding, judgment, and opinions about the case. Additionally, the data analytics workpaper presented Tableau as the analytical tool to interpret the audit evidence. While Tableau is a software that

auditors use to visualize and manipulate data, it does not encompass the entire range of tools that auditors may use in an actual environment.

Section V: Future Research and Implications

While noting the limitations of the survey, this study provides a foundation for future research about understanding the role of Big Data in the audit. For example, how can firms interpret Big Data and sort through the exponential amounts of information in an effective manner while maintaining a focus on improving audit quality? Audit research should explore the various types of analytical tools available to discern which will provide the most benefit to the financial audit, perhaps by studying software-processing systems that have had success in other industries. Additionally, by comparing the use of data analytics to test entire populations of audit evidence versus testing a sample of items, firms may gain insight into when using each method is more appropriate. In addition, future research and practical application may also consider how to use analytical tools to enhance sampling and other traditional audit methods, rather than replace them.

Data analytics has implications on the current auditing standards. Current research proposes that the audit standards themselves must acknowledge the shift toward a more automated audit in order for auditors to fully embrace audit data analytics (Krahel & Titera 2015). Big Data consists of information from an unlimited number of sources, including both financial and nonfinancial data. Standard-setters must provide a means to classify Big Data, specifying what exactly auditors can use as appropriate audit evidence. Similarly, standards need to reflect how to quantify and measure Big Data in accordance with generally accepted accounting principles.

Big Data will not provide any benefits if users do not have adequate knowledge of how to analyze the information for decision-making. Auditors must possess the proper skills and

knowledge to data analytics in an effective manner that improves the overall audit process. This begins with broadening curriculum taught in accounting courses to provide practical applications of data analytics and technology in the audit. For example, consider a group of students who learned how to use analytical software such as Tableau in an audit course. As these students transition into their job as auditors, they can then incorporate these skills into the real-world audit environment to manipulate audit evidence.

Perhaps the greatest implication of data analytics in the audit is the incorporation of automation and how it will change the traditional audit as we know it. The current form of the financial audit is retrospective in nature, providing an opinion of a company's financial performance and position from the prior fiscal year. However, Big Data could lead to a deviation from the historical audit into a continuous audit that would allow auditors to collect financial transactions information and report related disclosures as they are happening (Gal 2008). Additionally, the application of performing continuous audit testing and procedures may increase efficiency especially during busy season, where auditors have a short window of time to complete the majority of their audit testing.

Section VI: Conclusion

Big Data and the increasingly automated world are changing the functional nature of how businesses collect, generate, and process data for decision-making and operations, which includes financial information that is used in forming an audit opinion. The objective of the financial auditor is to provide an independent audit of an entity's financial statements to assure stakeholders that the financial statements are free from material misstatement. As the use and implementation of Big Data across all applications becomes increasingly commonplace, the audit profession must study the role that it will play in the audit process. Currently, there is a lack of research that

compares the effects of auditor judgment using data analytics methods versus sampling methods during the financial audit process. This study aims to bridge the gap and identify the attributes that affect how auditors make decisions and interpret data, specifically professional skepticism, auditor confidence, and information overload.

The research conducted was a behavioral study using accounting graduate students as its participants. The experimental survey consisted of three phases: In Phase One, participants completed the Hurt (2010) questionnaire to measure their levels of professional skepticism. In Phase Two, participants were given an audit workpaper related to cut-off testing procedures and asked to answer related questions. The workpaper included the purpose of the audit procedure, the procedures used to complete the cut-off testing, and the shipment information. Half of the participants received a workpaper that used data analytics, while the other half received a workpaper that used sampling. In Phase Three, participants answered a series of statements designed to measure their levels of professional skepticism, confidence, and information overload. These statements were scaled ranging from “very little” to “to a great extent,” or “strongly disagree” to “strongly agree.”

This study found that the type of method used during an audit procedure, data analytics or sampling, had inconclusive effects on participants’ levels of professional skepticism, confidence, and information overload. Using a two-tailed t-test to statistically analyze the responses, the results were not statistically significant.

Big Data has an untapped potential for its implementation and disruption of current auditing practices. It is important for the audit profession to continually research the ways in which data analytics will ultimately affect auditor judgment. This will provide a framework to determine

how to implement data analytics into the audit environment, while maintaining a focus on audit quality, effectiveness, and efficiency.

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APPENDIX A: INSTRUMENT

See the following pages

<sampling condition>



CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Does the Use of Data Analytics Affect Auditors'

Judgments? **Funding Agency/Sponsor:** none **Study Investigators:**

Principal Investigator: Dr. Renee M. Olvera, CPA

Student Investigator: Hayley Greenspan

What is the purpose of the research?

The purpose of this study is to examine how the use of Big Data and data analytic tools affects auditors' judgments, compared to the traditional sampling methods.

How many people will participate in this study?

Approximately 25 people will participate in this study

What is my involvement for participating in this study?

You will be asked to participate in an audit task and review the findings and conclusions reached. You will also be asked to answer questions about yourself and about the case.

How long am I expected to be in this study for and how much of my time is required?

This study will take approximately 20 minutes to complete. It will take place in Smith Building, Room 201.

What are the risks of participating in this study and how will they be minimized?

This study involves minimal risk. You may feel slight anxiety over reviewing audit findings for a fictitious client. If you feel overly anxious, you are not required to complete the study and may leave at any time. There is no penalty for withdrawal.

What are the benefit(s) for participating in this study?

The project will benefit audit firms as they integrate data analytics into audit tasks within the audit. If you would like to learn of the findings of this study, you may attend the student investigator's honors presentation in April 2018.

Will I be compensated for participating in this study?

There is no compensation associated with your participation in this study.

What is an alternate procedure(s) that I can choose instead of participating in this study?

Since this study is conducted during a class time, students who choose not to participate may work on other homework or study materials.

How will my confidentiality be protected?

Informed consent will be kept separate from survey responses. Therefore, the survey responses are completely confidential.

Is my participation voluntary?

Yes, your participation is completely voluntary.

Can I stop taking part in this research?

Yes, at any time you may stop taking part in the study. There is no penalty for withdrawal.

What are the procedures for withdrawal?

To withdraw, you should compile the case materials and give them to the investigators in the room. For any questions, contact the principal investigator Dr. Renee M. Olvera (renee.olvera@tcu.edu) or at 817-257-7578.

Will I be given a copy of the consent document to keep? Yes.**Who should I contact if I have questions regarding the study?**

Principal Investigator – Dr. Renee M. Olvera (renee.olvera@tcu.edu) or at 817257-7578

Student Investigator – Hayley Greenspan (h.greenspan@tcu.edu) or at 480-3356868

Who should I contact if I have concerns regarding my rights as a study participant?

Dr. Cathy R. Cox, Chair, Institutional Review Board (c.cox@tcu.edu) or at 817-257-6418

Dr. Bonnie Melhart, TCU Research Integrity Office, 817-257-7104

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

Participant Name (please print): _____

Participant Signature: _____ **Date:** _____

Investigator Name (please print): _____

Investigator Signature: _____ **Date:** _____

General Instructions

Thank you for taking your time to participate in this study. The purpose of this study is to better understand auditor's judgements.

This is a three-phase study.

1. In the first phase you will answer questions about yourself
2. In the second phase you are to assume you are an audit senior asked to review a fictitious company's audit workpapers, which were prepared by your audit staff. You will also answer questions regarding the audit workpaper.
3. In the third phase you will answer questions about the workpapers, your overall conclusions regarding the audited account, and demographic questions.

Phase 1: Questions about yourself

Instructions: Statements that people use to describe themselves are given below. Please circle 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					Strongly Agree
	1	2	3	4	5	6
I often accept other people's explanations without further thought.						
I feel good about myself.	1	2	3	4	5	6
I wait to decide on issues until I can get more information.	1	2	3	4	5	6
The prospect of learning excites me.	1	2	3	4	5	6
I am interested in what causes people to behave the way that they do.	1	2	3	4	5	6
I am confident of my abilities.	1	2	3	4	5	6
I often reject statements unless I have proof that they are true.	1	2	3	4	5	6
Discovering new information is fun.	1	2	3	4	5	6
I take my time when making decisions.	1	2	3	4	5	6
I tend to immediately accept what other people tell me.	1	2	3	4	5	6
Other people's behavior does not interest me.	1	2	3	4	5	6
I am self-assured.	1	2	3	4	5	6
My friends tell me that I usually question things that I see or hear.	1	2	3	4	5	6
I like to understand the reason for other people's behavior.	1	2	3	4	5	6
I think that learning is exciting.	1	2	3	4	5	6
I usually accept things I see, read, or hear at face value.	1	2	3	4	5	6
I do not feel sure of myself.	1	2	3	4	5	6

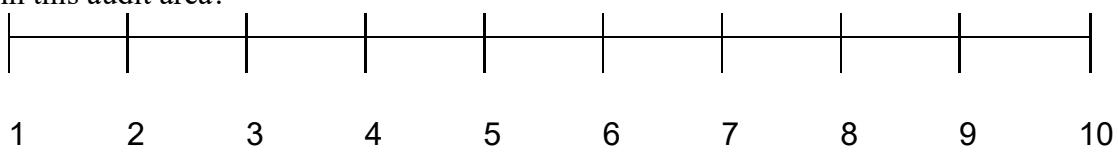
I usually notice inconsistencies in explanations.	1	2	3	4	5	6
Most often I agree with what the others in my group think.	1	2	3	4	5	6
I dislike having to make decisions quickly.	1	2	3	4	5	6
I have confidence in myself.	1	2	3	4	5	6
I do not like to decide until I've looked at all of the readily available information.	1	2	3	4	5	6
I like searching for knowledge.	1	2	3	4	5	6
I frequently question things that I see or hear.	1	2	3	4	5	6
It is easy for other people to convince me.	1	2	3	4	5	6
I seldom consider why people behave in a certain way.	1	2	3	4	5	6
I like to ensure that I've considered most available information before making a decision.	1	2	3	4	5	6
I enjoy trying to determine if what I read or hear is true.	1	2	3	4	5	6
I relish learning.	1	2	3	4	5	6
The actions people take and the reasons for those actions are fascinating.	1	2	3	4	5	6

Phase 2: Review of Audit Workpaper

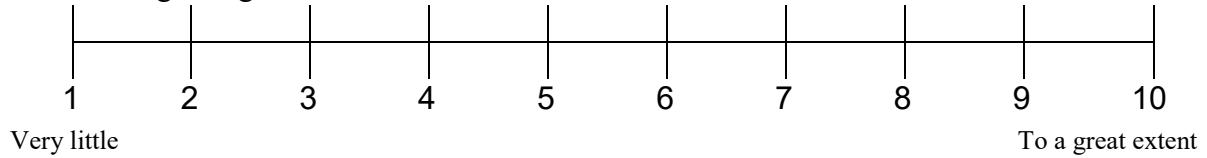
Assume you are an audit senior in charge of the ABC Company audit for the financial year ended December 31, 2016. Your audit staff has completed this workpaper and has submitted the workpaper for your review and consideration. You are in the initial phases of review. Please review this workpaper and answer the questions that follow.

ABC Company																																															
Sales Cut-off testing																																															
FYE: 12/31/2016																																															
Purpose: The purpose of this workpaper is to document cut-off testing procedures for sales for the financial year ended December 31, 2016.																																															
Procedures: Auditors selected the first 5 shipments made during FYE 2017, which occurred on January 4, 2016 and agreed to supporting documentation to confirm shipping date. Auditors also selected the last 5 shipments made during FYE 2016, which occurred on December 31, 2016, and agreed to supporting documentation.																																															
First 5 Shipments in FYE 2017 <table border="1"> <thead> <tr> <th><u>Ship date</u></th><th><u>Customer Name</u></th><th><u>Customer Number</u></th><th><u>ShipNum</u></th><th><u>InvoiceAmount</u></th><th><u>t/m</u></th></tr> <tr> <th>{a}</th><th>{a} {b}</th><th>{a} {b}</th><th>{a} {b}</th><th>{a} {b}</th><th></th></tr> </thead> <tbody> <tr> <td>1/4/2017</td><td>Awesome Threads</td><td>1911</td><td>202407</td><td>13,082.94</td><td>[A]</td></tr> <tr> <td>1/4/2017</td><td>Boston Marathon</td><td>1901</td><td>201128</td><td>24,687.87</td><td>[B]</td></tr> <tr> <td>1/4/2017</td><td>California Clothes</td><td>1900</td><td>202428</td><td>45,643</td><td>[A]</td></tr> <tr> <td>1/4/2017</td><td>Finishers' World</td><td>1905</td><td>202091</td><td>9,736</td><td>[A]</td></tr> <tr> <td>1/5/2017</td><td>Great Run</td><td>1913</td><td>201570</td><td>17,142.35</td><td>[B]</td></tr> </tbody> </table>						<u>Ship date</u>	<u>Customer Name</u>	<u>Customer Number</u>	<u>ShipNum</u>	<u>InvoiceAmount</u>	<u>t/m</u>	{a}	{a} {b}	{a} {b}	{a} {b}	{a} {b}		1/4/2017	Awesome Threads	1911	202407	13,082.94	[A]	1/4/2017	Boston Marathon	1901	201128	24,687.87	[B]	1/4/2017	California Clothes	1900	202428	45,643	[A]	1/4/2017	Finishers' World	1905	202091	9,736	[A]	1/5/2017	Great Run	1913	201570	17,142.35	[B]
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1/5/2017	Great Run	1913	201570	17,142.35	[B]																																										
<p>{a} Agreed to report of all shipments made between December 15, 2016 and January 15, 2017 w/o/e.</p> <p>{b} Agreed to invoice w/o/e.</p> <p>[A] Selected first five shipments from list of all shipments provided by the company's shipping department noting the ship date, customer number, customer name, shipnumber and amount. Agreed to copy of bill of lading provided by the shipment department noting that item selected was shipped during FY 2017 and therefore should not be included in the company's revenue recognition calculation. Obtained company's sales by day report noting that sale was recorded on ship date of January 4, 2017. Therefore, no cutoff issues noted for this item</p> <p>[B] Auditor noted that shipment occurred on January 5, 2017 however invoice is dated 12/31/2016</p>																																															
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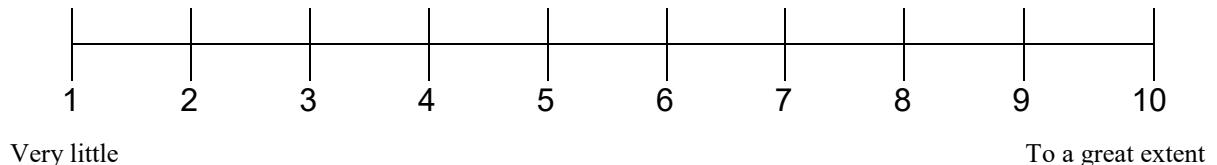
1. On what account is the audit staff performing procedures?
 - a. Revenue
 - b. Cost of goods sold
 - c. Payroll
 - d. Manufacturing overhead
2. For which financial year end is the company performing audit work?
 - a. FYE 12/31/2016
 - b. FYE 12/31/2017
 - c. FYE 12/31/2015
 - d. None of the above
3. For which financial statement assertion is the staff auditor performing procedures?
 - a. Presentation and disclosures
 - b. Existence/occurrence
 - c. Rights and obligation
 - d. Completeness/cutoff
 - e. Valuation
4. Is the following question true or false? You are to assume you are an audit senior incharge of the ABC Company audit.
 - a. True
 - b. False
5. Is the following question true or false? You are the preparer of the above audit workpaper.
 - a. True
 - b. False
6. To what extent are you likely to conclude that there are no issues identified in this audit area?



7. To what extent are you likely to request additional information from the client regarding this audit area?

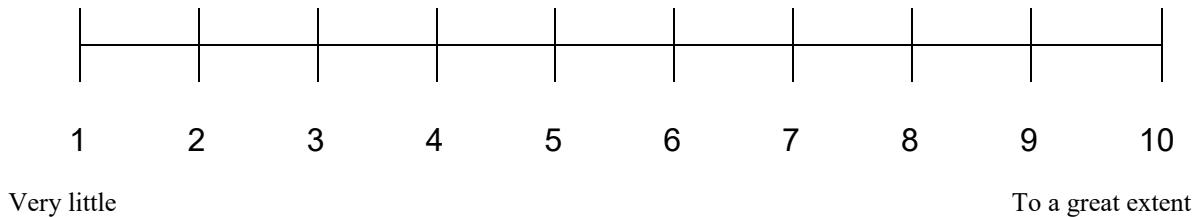


8. To what extent are you likely to expand the testing of this audit area?

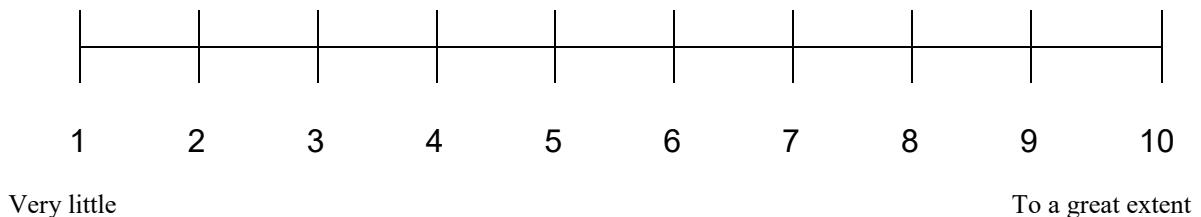


Phase 3: Please respond to the following questions. You may not return to your excel file to respond to these questions.

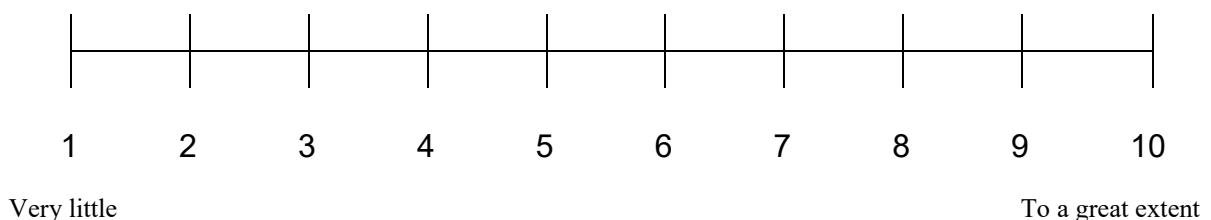
1. To what extent did you feel overwhelmed by audit task you just performed?



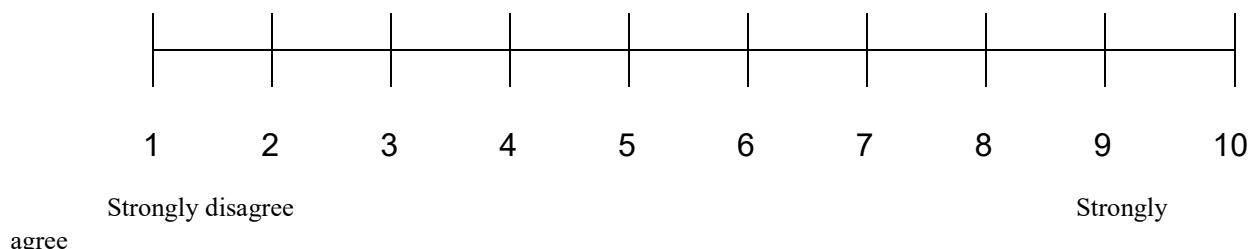
2. To what extent do you believe that you were provided with more information than necessary to complete the audit task?



3. To what extent did you feel overwhelmed by the quantity of information provided to you in the audit task?



4. I am confident about my conclusions.



For each of the following statements below select “1” if you strongly disagree and “7” if you strongly agree:

While working on this case, I frequently questioned things that I saw or read	1 2 3 4 5 6 7
While working on this case, I had a tendency to reject statements unless I had proof that they were true.	1 2 3 4 5 6 7
While working on this case, I took my time making decisions	1 2 3 4 5 6 7
I did not like to make decisions quickly while working on the case	1 2 3 4 5 6 7
While working on this case, I tried to ensure that I had considered most available information before making a decision	1 2 3 4 5 6 7
I tended to perform additional analysis before deciding which accounts to investigate during this case	1 2 3 4 5 6 7
In the case, I used all of the resources available to me to get all of the information I could	1 2 3 4 5 6 7
Audit sampling may not be an effective way to identify risky accounts in the planning phase of an audit	1 2 3 4 5 6 7
This case was interesting	1 2 3 4 5 6 7
I put a lot of effort into completing this case	1 2 3 4 5 6 7
I find Excel easy to use	1 2 3 4 5 6 7
Use of new technology enhances my task effectiveness	1 2 3 4 5 6 7
I find new technology useful	1 2 3 4 5 6 7

Your gender is? Male _____ Female _____

What is your age? _____ years

What is your year in school? (check one)

Freshman _____ Sophomore _____ Junior _____

Senior _____ Other _____

How many accounting classes have you completed? _____

Which accounting classes have you completed?

Please provide any comments you have about this study in the space below.

Thank you for your participation!

<data analytics condition>



CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Does the Use of Data Analytics Affect Auditors'

Judgments? Funding Agency/Sponsor: none

Study Investigators: Principal Investigator: Dr. Renee M. Olvera, CPA

Student Investigator: Hayley Greenspan

What is the purpose of the research?

The purpose of this study is to examine how the use of Big Data and data analytic tools affects auditors' judgments, compared to the traditional sampling methods.

How many people will participate in this study?

Approximately 25 people will participate in this study.

What is my involvement for participating in this study?

You will be asked to participate in an audit task and review the findings and conclusions reached. You will also be asked to answer questions about yourself and about the case.

How long am I expected to be in this study for and how much of my time is required? This study will take approximately 20 minutes to complete. It will take place in Smith Building, Room 201.

What are the risks of participating in this study and how will they be minimized?

This study involves minimal risk. You may feel slight anxiety over reviewing audit findings for a fictitious client. If you feel overly anxious, you are not required to complete the study and may leave at any time. There is no penalty for withdrawal.

What are the benefit(s) for participating in this study?

The project will benefit audit firms as they integrate data analytics into audit tasks within the audit. If you would like to learn of the findings of this study, you may attend the student investigator's honors presentation in April 2018.

Will I be compensated for participating in this study?

There is no compensation associated with your participation in this study.

What is an alternate procedure(s) that I can choose instead of participating in this study?

Since this study is conducted during a class time, students who choose not to participate may work on other homework or study materials.

How will my confidentiality be protected?

Informed consent will be kept separate from survey responses. Therefore, the survey responses are completely confidential.

Is my participation voluntary?

Yes, your participation is completely voluntary.

Can I stop taking part in this research?

Yes, at any time you may stop taking part in the study. There is no penalty for withdrawal.

What are the procedures for withdrawal?

To withdraw, you should compile the case materials and give them to the investigators in the room. For any questions, contact the principal investigator Dr. Renee M. Olvera (renee.olvera@tcu.edu) or at 817-257-7578.

Will I be given a copy of the consent document to keep? Yes.**Who should I contact if I have questions regarding the study?**

Principal Investigator – Dr. Renee M. Olvera (renee.olvera@tcu.edu) or at 817257-7578

Student Investigator – Hayley Greenspan (h.greenspan@tcu.edu) or at 480-3356868

Who should I contact if I have concerns regarding my rights as a study participant?

Dr. Cathy R. Cox, Chair, Institutional Review Board (c.cox@tcu.edu) or at 817-257-6418

Dr. Bonnie Melhart, TCU Research Integrity Office, Telephone 817-257-7104

Your signature below indicates that you have read or been read the information provided above, you have received answers to all of your questions and have been told who to call if you have any more questions, you have freely decided to participate in this research, and you understand that you are not giving up any of your legal rights.

Participant Name (please print): _____

Participant Signature: _____ **Date:** _____

Investigator Name (please print): _____

Investigator Signature: _____ **Date:** _____

General Instructions

Thank you for taking your time to participate in this study. The purpose of this study is to better understand auditor's judgements.

This is a three-phase study.

1. In the first phase you will answer questions about yourself
2. In the second phase you are to assume you are an audit senior asked to review a fictitious company's audit workpapers, which were prepared by your audit staff. You will also answer questions regarding the audit workpaper.
3. In the third phase you will answer questions about the workpapers, your overall conclusions regarding the audited account, and demographic questions.

Phase 1: Questions about yourself

Instructions: Statements that people use to describe themselves are given below.

Please circle 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					Strongly Agree
I often accept other people's explanations without further thought.	1	2	3	4	5	6
I feel good about myself.	1	2	3	4	5	6
I wait to decide on issues until I can get more information.	1	2	3	4	5	6
The prospect of learning excites me.	1	2	3	4	5	6
I am interested in what causes people to behave the way that they do.	1	2	3	4	5	6
I am confident of my abilities.	1	2	3	4	5	6
I often reject statements unless I have proof that they are true.	1	2	3	4	5	6
Discovering new information is fun.	1	2	3	4	5	6
I take my time when making decisions.	1	2	3	4	5	6
I tend to immediately accept what other people tell me.	1	2	3	4	5	6
Other people's behavior does not interest me.	1	2	3	4	5	6
I am self-assured.	1	2	3	4	5	6
My friends tell me that I usually question things that I see or hear.	1	2	3	4	5	6
I like to understand the reason for other people's behavior.	1	2	3	4	5	6
I think that learning is exciting.	1	2	3	4	5	6
I usually accept things I see, read, or hear at face value.	1	2	3	4	5	6
I do not feel sure of myself.	1	2	3	4	5	6

I usually notice inconsistencies in explanations.	1	2	3	4	5	6
Most often I agree with what the others in my group think.	1	2	3	4	5	6
I dislike having to make decisions quickly.	1	2	3	4	5	6
I have confidence in myself.	1	2	3	4	5	6
I do not like to decide until I've looked at all of the readily available information.	1	2	3	4	5	6
I like searching for knowledge.	1	2	3	4	5	6
I frequently question things that I see or hear.	1	2	3	4	5	6
It is easy for other people to convince me.	1	2	3	4	5	6
I seldom consider why people behave in a certain way.	1	2	3	4	5	6
I like to ensure that I've considered most available information before making a decision.	1	2	3	4	5	6
I enjoy trying to determine if what I read or hear is true.	1	2	3	4	5	6
I relish learning.	1	2	3	4	5	6
The actions people take and the reasons for those actions are fascinating.	1	2	3	4	5	6

Phase 2:

Assume you are an audit senior in charge of the ABC Company audit for the financial year ended December 31, 2016. Your audit staff has completed this workpaper and has submitted the workpaper for your review and consideration. You are in the initial phases of review. Please review this workpaper and answer the questions that follow.

ABC Company

Sales Cut-off testing

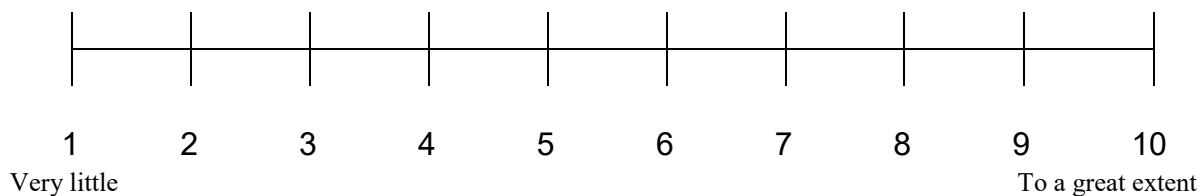
FYE: 12/31/2016

Purpose: The purpose of this workpaper is to document cut-off testing procedures for sales for the financial year ended December 31, 2016.

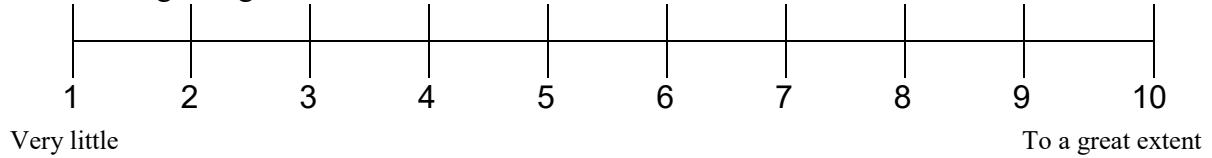
Procedures: Auditors received the shipments file for the period between December 15, 2016 and January 15, 2017. Auditor agree total number of shipments in the period to the record count of bill of ladings prepared during the same time period noting the same number of bills of lading were created as records in the shipments file. Auditor performed analysis using Tableau to identify any instances where shipdate and invoice date date did not agree.

Year of Invo..	Cust Name	Year of Tra..	Day of Ship Date
2016	Awesome Threads	2016	January 5, 2017
			January 9, 2017
	Best Time	2016	January 9, 2017
			January 10, 2017
	Bigmart	2016	January 9, 2017
			January 10, 2017
	Boston Marathon	2016	January 6, 2017
			January 10, 2017
	California Clothes	2016	January 6, 2017
			January 10, 2017
	Cool Runnings	2016	January 9, 2017
			January 10, 2017
	Cool Threads	2016	January 10, 2017
			January 11, 2017
	Corner Runner	2016	January 6, 2017
			January 10, 2017
	Cross Country Mart	2016	January 6, 2017
			January 10, 2017
	Fast N Fit	2016	January 9, 2017
			January 10, 2017
	Finishers' World	2016	January 6, 2017
			January 9, 2017
	Fit N Fun	2016	January 6, 2017
			January 10, 2017
	Great Run	2016	January 9, 2017
			January 11, 2017
	Hot Sox	2016	January 6, 2017
			January 10, 2017
	Millennial Mile	2016	January 9, 2017
			January 11, 2017
	Oakland Athletics	2016	January 5, 2017
			January 9, 2017
	On Your Mark	2016	January 9, 2017
			January 10, 2017
	Southeast Regional	2016	January 5, 2017
			January 9, 2017
	Track Time	2016	January 9, 2017
			January 10, 2017
	Urban Runner	2016	January 10, 2017
			January 11, 2017
	ValueChoice	2016	January 10, 2017
			January 11, 2017
		Grand Total	1,243,917

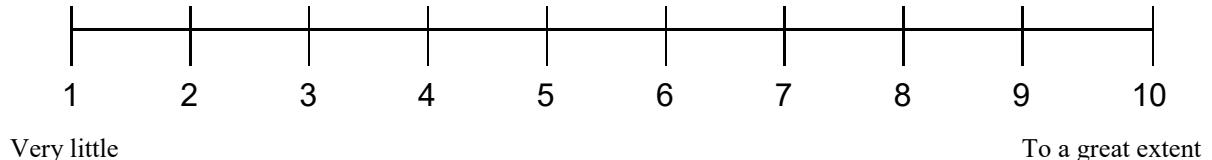
1. On what account is the audit staff performing procedures?
 - a. Revenue
 - b. Cost of goods sold
 - c. Payroll
 - d. Manufacturing overhead
 2. For which financial year end is the company performing audit work?
 - a. FYE 12/31/2016
 - b. FYE 12/31/2017
 - c. FYE 12/31/2015
 - d. None of the above
 3. For which financial statement assertion is the staff auditor performing procedures?
 - a. Presentation and disclosures
 - b. Existence/occurrence
 - c. Rights and obligation
 - d. Completeness/cutoff
 - e. Valuation
 4. Is the following question true or false? You are to assume you are an audit senior incharge of the ABC Company audit.
 - a. True
 - b. False
 5. Is the following question true or false? You are the preparer of the above audit workpaper.
 - a. True
 - b. False
 6. To what extent are you likely to conclude that there are no issues identified in this audit area?



7. To what extent are you likely to request additional information from the client regarding this audit area?

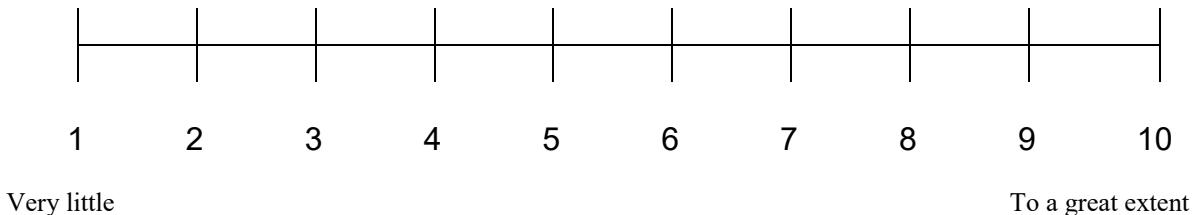


8. To what extent are you likely to expand the testing of this audit area?

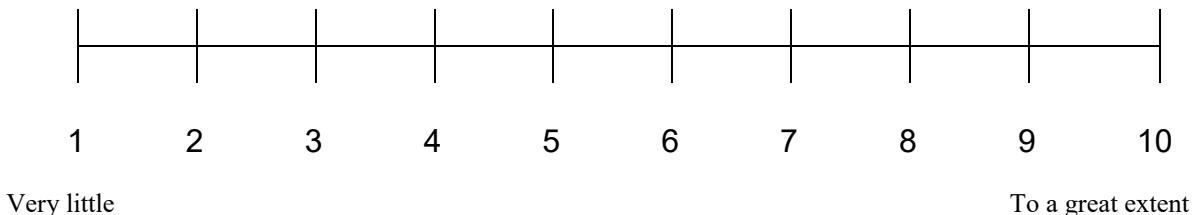


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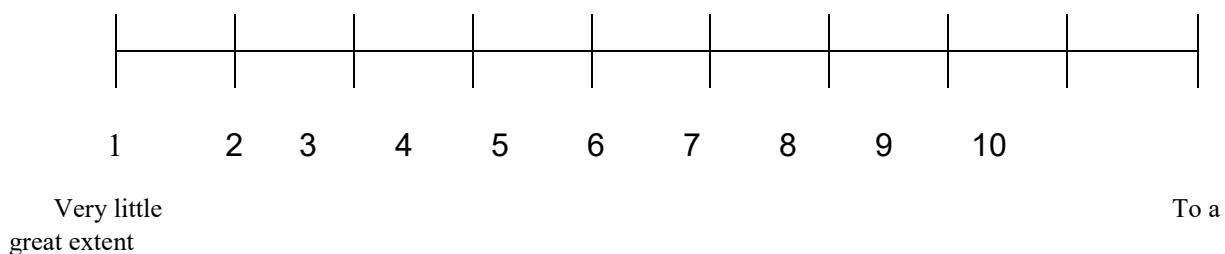
5. To what extent did you feel overwhelmed by the analytical procedures task you just performed?



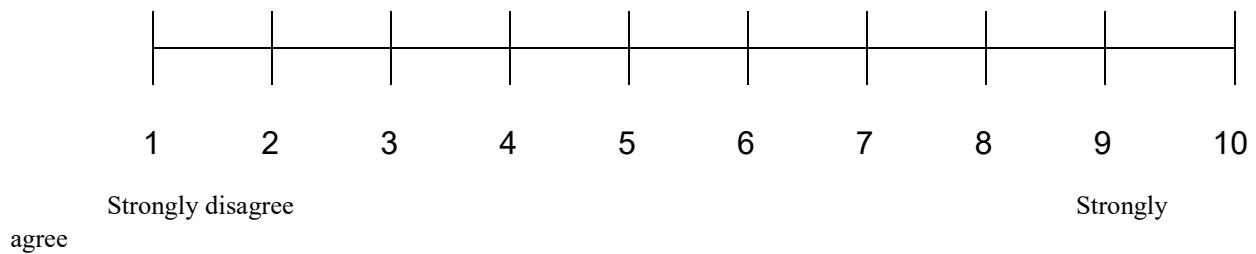
6. To what extent do you believe that you were provided with more information than necessary to complete the audit task?



7. To what extent did you feel overwhelmed by the quantity of information provided to you in the audit task?



8. I am confident about the conclusion reached.



For each of the following statements below select “1” if you strongly disagree and “7” if you strongly agree:

While working on this case, I frequently questioned things that I saw or read	1 2 3 4 5 6 7
While working on this case, I had a tendency to reject statements unless I had proof that they were true.	1 2 3 4 5 6 7
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I find Excel easy to use	1 2 3 4 5 6 7
Use of new technology enhances my task effectiveness	1 2 3 4 5 6 7
I find new technology useful	1 2 3 4 5 6 7

Your gender is? Male _____ Female _____

What is your age? _____ years

What is your year in school? (check one)

Freshman _____ Sophomore _____ Junior _____

Senior _____ Other _____

How many accounting classes have you completed? _____

Which accounting classes have you completed?

Please provide any comments you have about this study in the space below.

Thank you for your participation!