The Effects of Cognitive Control Information Processing on Auditors' Planning Decisions

By

Kimberly R. Walker

A dissertation submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

(Business)

at the
UNIVERSITY OF WISCONSIN-MADISON

2020

Date of final oral examination: 7/15/2020

The dissertation is approved by the following members of the Final Oral Committee:
Karla Zehms, Professor, Accounting
Dereck Barr-Pulliam, Assistant Professor, Accounting
Marcus Brauer, Professor, Psychology
Helen Brown-Liburd, Associate Professor, Accounting
Emily Griffith, Associate Professor, Accounting
Brian Mayhew, Professor, Accounting

DEDICATION

This dissertation is dedicated to my younger self.

A system of education is not one thing, nor does it have a single definite object, nor is it a mere matter of schools. Education is that whole system of human training within and without the school house walls, which molds and develops men.
-W.E.B. Du Bois

ACKNOWLEDGEMENTS

I thank my dissertation committee members for their guidance and helpful comments. My dissertation chair is Professor Karla Zehms (Johnstone). The other committee members are: Assistant Professor Dereck Barr-Pulliam, Professor Markus Brauer, Associate Professor Helen Brown-Liburd, Assistant Professor Emily Griffith, and Professor Brian Mayhew. I thank the participating auditors from two large accounting firms for their generous time and effort. I thank participants of the research workshop at the University of Wisconsin-Madison, Virginia Polytechnic Institute and State University, Clemson University, as well as participants of the 2019 PhD Project Accounting Doctoral Student Association meeting for their valuable feedback and suggestions. I gratefully acknowledge financial support from the Wisconsin School of Business. Lastly, I thank Ashley Dundon, Hayley Everett Catie Hohnstein, and Peter Muench for their research assistance.

TABLE OF CONTENTS

ABSTRACT

This study explores how cognitive control information processing affects auditors' judgment when making planning decisions. Audit planning directs the audit process and helps auditors assess and respond to the risk of material misstatement. Despite the importance of audit planning, the Public Company Accounting Oversight Board (PCAOB) inspection reports consistently note audit deficiencies related to assessing and responding to the risk of material misstatement (e.g., PCAOB 2017a). A possible root cause of auditors' inability to assess and respond to risk effectively is information overload. I examine whether goal-directed information processing, a cognitive control information processing approach, and cognitive flexibility improve auditors' planning decisions. The goal-directed information processing approach to information processing is useful in an audit planning setting, because it reduces cognitive interference by directing auditors to focus on a goal to govern the flow of information. Cognitive flexibility describes individuals' ability to adapt processing strategies to environmental conditions. Specifically, I examine whether and, if so, to what extent experience improves the effect of goal-directed information processing on auditors' planning decisions. I also examine the interactive effects of experience and cognitive flexibility on auditors' planning decisions. I find that less-experienced auditors who use goal-directed information processing make more accurate risk assessments compared to more experienced auditors. The results also suggest that cognitive flexibility is a valuable characteristic for auditors in practice. Accordingly, I find that less experienced auditors with a high level of cognitive flexibility make more accurate risk assessments compared to more-experienced auditors with a high level of cognitive flexibility. I also find that auditors with a high level of cognitive flexibility appropriately modify planned audit procedures to detect fraud risk for the receivables standard audit program.

INTRODUCTION

My research focuses on cognitive control interventions to improve auditors' judgments and decision making when making audit planning decisions. Specifically, I focus on auditor risk assessments and adjustments to planned audit procedures. Audit planning is a complex task because it requires auditors to consider idiosyncratic client risk and tailor their planned audit procedures to an acceptable level of audit risk (Knechel, Krishnan, Mikhail, and Shefchik 2013; Allen Hermanson, Kozloski, and Ramsay 2006). The audit planning process includes procedures to help auditors gain an understanding of the client business and strategy to assess client risk

To add to the difficulty associated to audit planning, auditors are responsible for evaluating an increased amount of client data and risk due to the increased availability of data from advanced technologies. Additionally, auditors must use this information to identify business risks facing their clients and assess the risk of material misstatement arising from these risks to design audit procedures to appropriately respond to the risk of material misstatements.

Prior research has attempted to identify root causes to explain why audit planning continues to be a difficult process for auditors. For example, prior research has explored whether risk assessment inputs such as management reports (e.g., Newman, Patterson, and Smith 2001), auditors' cognitive processes when performing planning procedures (e.g., Piercey 2011), and external factors such as audit fees and audit partner pressure (e.g, Houston 1999 and Bierstaker and Wright 2001) contributes to the difficulty that auditors' have in performing risk assessments. Generally, the results from these studies suggest that auditors use heuristic or take mental shortcuts while completing risk assessments. The results also suggest that external factors such as time pressures, audit fees and partner pressures influence auditor judgment during audit planning.

The upward trend and increased demand for businesses to increase their usage of data analytics tools have transformed the way auditors perform audits. Consistent with the trend, businesses are developing a more data-oriented culture and adjusting their business strategies to emphasize data and analytics. With that said, the amount of client data that auditors have to collect and evaluate to understand client operations is increasing. As such, the manner in which auditors cognitively process this increased amount of information has to evolve to improve audit judgments' effectiveness and efficiency during audit planning and to facilitate high audit quality.

In my experimental study, I manipulate auditors' cognitive processes to investigate if engaging in a cognitive control information processing improves auditor judgment when making planning decisions. I also measure auditors' current level of cognitive control through a measurement called cognitive flexibility. Cognitive flexibility describes individuals' ability to adapt processing strategies to environmental conditions. I posit that goal directed information processing is required for auditors to devote the appropriate, sufficient amount of mental resources to manage the increased amount of client data involved in audit planning. Cognitive control is a construct that refers to how individuals process information that allows adaptive behaviors and mental flexibility based on a goal, task, or other external interventions. This type of information processing inhibits automatic responses and mental shortcuts by influencing how individuals receive and process incoming information and prioritize information based on a goal.

Cognitive control processes include a board range of information processing. In this dissertation, I focus on goal directed information processing and cognitive flexibility. Prior audit studies have found that auditors' who use strategic reasoning in a fraud setting improve their judgements by effectively modifying their standard audit procedures (e.g., Hoffman, Zimbelman 2009; Wilks and Zimbelman 2004). The strategic reasoning experimental prompts directs auditors to focus their cognitive processes on how the client may be concealing a fraud from the auditor, suggesting that modifying auditors' cognitive process is an effective approach to improving judgments during audit planning. Drawing from goal-directed information processing theory and cognitive flexibility, I predict that a auditors who engage in goal-directed information processing strategy will make more accurate risk assessments and modify planned audit procedures to detect risk of material misstatement compared to auditors who do not use a strategy. I also predict that auditors with a higher level of cognitive flexibility will make risk assessments of greater accuracy and appropriately modify audit programming compared to auditors with lower levels of cognitive flexibility. I find that experience plays a significant role in my findings. I find that less experienced auditors with a high level of cognitive flexibility make more accurate risk assessments compared to more experienced auditors with a high level of cognitive flexibility. I also find that auditors with a high level of cognitive flexibility appropriately modify planned audit procedures to detect fraud risk for the receivables standard audit program, not for the revenue and revenue and receivables

This study and my research steam, in general, inform audit researchers, regulators, and practitioners about the influence of technology on auditor behavior. Specifically, I interested in exploring the behavioral implications derived from auditor's increased usage of audit technologies and exploring how individual characteristic influence's how auditors' interact with technologies. Understanding the underlying mechanisms that contribute to auditors' engagement in optimal cognitive processing will help audit firms improve audit quality by training auditors on how to direct attention when performing audit planning tasks. Furthermore, understanding individual auditor characteristics can help audit firms assign personnel to engagements and audit tasks, as well as the development of training.

The remainder of my dissertation includes a literature review, my experimental study, other analyses, and a conclusion. The literature review explores prior risk assessment literature through the lens of cognitive load theory. Specifically, I provide insight into why prior literature has not effectively improved the effectiveness and accuracy of risk assessments. Within the literature review, I also explore whether the newly revised international risk assessment standards, ISA 315, will be effective in improving the audit risk assessment process. Cognitive load theory and cognitive control are complementary theories I explore in this dissertation. Both theories focus on individuals ability to direct his/her attention while completing complex tasks. Cognitive load focuses on the amount of working memory individuals use when performing such tasks. Cognitive control theories focus on interventions to help individuals' modify how information is received and processed to support optimal decision making.

Next, I describe my experiment testing the influence of goal-directed information processes on auditor judgments in the audit planning setting presented in working paper format. I follow with a discussion of other analyses I performed, which have not been incorporated into the working paper but shed additional insights on my findings. Finally, I conclude and discuss directions for future research.

LITERATURE REVIEW

I. Introduction

The risk assessment process continues to be of great concern for regulators and researchers because of its task complexity and its pervasive effect on other areas of the audit and audit quality. The risk assessment process has dramatically changed over the last ten years. This change can be attributed to updates and revisions in professional standards (i.e., Statement of Auditing Standards No. 134, 136, and 137) and increased availability of data, along with the introduction of powerful, innovative audit technologies (Walker and Liburd-Brown 2019 and Austin et al. 2018). Despite a large amount of research focused on auditors' risk assessment, PCAOB inspection reports provide evidence that auditors continue to have difficulty assessing and responding to risk (PCAOB 2015, 2016, 2017, 2018). Keeping this in mind, I synthesize and analyze results from risk assessment studies to gain an in depth understanding as to whether the current studies have contributed to improving auditors risk assessments in practice and to identify gaps in the literature where more research is needed to identify root causes that explain why auditors continue to have difficulty with audit planning tasks. This synthesis also provides insight into why the current risk assessment literature has not contributed to significant improvements in the risk assessment process (Carcello 2005).

I propose that academics and audit regulators can use the cognitive load theory (Sweller 1988) as a framework to understand why auditors continue to have difficulty assessing risk and to identify research methods to examine unexplored variables to improve auditors' risk assessments. CLT is an instructional design theory that focuses on how individuals cognitively process complex information and instructional methods that help individuals process new information. The cognitive load theory (CLT) is "concerned with the natural complexity of information that must be understood and material that must be learned unencumbered by instructional issues such as how the information is presented or what activities individuals should engage to maximize learning" (Sweller 2010). As mentioned above, over the last five years, the PCAOB has identified recurring audit deficiencies related to assessing risk. The deficiencies find that auditors do not apply adequate due professional care in areas of significant risks and do not select appropriate controls for testing that address the specific risk of material misstatements, suggesting that auditors do not perform risk assessments according to professional auditing standards. This paper aims to use cognitive load theory to identify why auditors fail to follow professional auditing standards when completing risk assessments.

The CLT framework also provides instructional design guidelines that may help audit firms revise audit methodologies and other audit support techniques. The International Audit and Assurance Standards Board (IAASB) recently approved major changes to ISA 315 in September 2019. The changes will be effective for audits of financial statements for periods beginning on or after December 2021. The effects of the revisions require all firms to revise their approach to risk assessments. I also use the cognitive load theory to assess the potential effectiveness of the newly revised international risk assessment auditing standards.

The CLT framework also provides instructional design guidelines that may help audit firms revise audit methodologies and other audit support techniques. The International Audit and Assurance Standards Board (IAASB) recently approved significant changes to ISA 315 (Identifying and Assessing the Risk of Material Misstatement) in September 2019. The changes will be effective for audits of financial statements for periods beginning on or after December 2021. The effects of the revisions require all firms to revise their approach to risk assessments. I also use the cognitive load theory to assess the potential effectiveness of the newly revised international risk assessment auditing standards.

The cognitive load theory posits that individuals cannot effectively engage in complex cognition for extended periods because their working memory only stores a limited amount of information at one time. Cognitive load theory differentiates cognitive load into three types: *intrinsic*, *extraneous*, and *germane*. Intrinsic cognitive load represents the inherent complexity or difficulty associated with specific tasks. Intrinsic cognitive load is measured by the number of elements that interact with each other in the working memory that have to be processed simultaneously. An element is a piece or a single bit of information. It is important to note that it is difficult to alter an individuals' intrinsic cognitive load because the inherent complexity associated with material content cannot easily change. Even though the complexity of material content is less likely to change, the individual can manage how information is received and organized in the working memory by the task structure, the individuals' prior knowledge regarding the material, and aptitude, as well as the capacity for learning.

Extraneous cognitive load is the type of load created by how information is presented to and individual, and germane cognitive load refers to the mental resources devoted to learning material and transferring information from working memory to long term memory (Debue and van de Leemput 2014). According to CLT, the extraneous cognitive load must be reduced when the intrinsic load is high to achieve optimal material comprehension, which in turn influences judgment. When element interactivity is high due to intrinsic cognitive load, reducing the element interactivity due to extraneous cognitive load is critical for optimal decision making.

If the intrinsic cognitive load is high and extraneous low, the germane cognitive load will be high because the individual must devote a more significant proportion of working memory resources to interpreting the essential material content. If the extraneous cognitive load is increased, germane cognitive load is reduced, resulting in reduced learning because the individual is using working memory resources to deal with the extraneous elements imposed by the instructional procedure rather than the essential, intrinsic material (Sweller 2010; Sweller, and Chandler 1994). Taken together, to achieve optimal judgment and decision making, the individual must manage all three load types based on the formulation above in a manner that results in effective judgments and decision making.

Applied to the audit setting, CLT suggests that how complex information is processed and presented affects auditors' risk assessment judgments and decisions depending on auditor characteristics and task structure. CLT also suggests that intrinsic and extraneous cognitive load independently and interactively affect auditors' judgments and planning outcomes. Based on a sample of risk assessment studies, I show how the CLT framework can extend the risk assessment body of research by identifying gaps in the research stream consistent with the formulation presented above. The CLT framework also introduces experimental interventions that academics can explore to improve the risk assessment process.

The results from the existing stream of risk assessment studies are currently disparate and do not provide a collective and concentrated solution to improve the audit planning process for practice. The results suggest that external factors such as audit partner characteristics (Bedard and Johnstone 2010), corporate governance (Cohen, Krishnamoorthy, and Wright 2007), client characteristics (Marinis, Fukukawa and Mock 2011) and other environmental factors independently influences how auditors perform audit planning procedures. According to the CLT framework, the results do not consider how other variables such as auditor characteristics and task structure moderate theses effects on auditor judgment. Furthermore, as suggested by the CLT, to keep working memory al levels below capacity, intrinsic, extraneous, and germane cognitive load levels should be managed in a formulaic way to achieve individual decision-making goals.

Based on the CLT framework interpretations, I infer that the current risk assessment research has not contributed to significant improvements in practice because the majority of the research focuses on aspects that do not affect or improve how auditors process large amounts of information to perform risk assessments and other planning tasks effectively. According to the CLT theory, to effectively help auditors manage a large amount of information, the information must be presented to the individual that reflects how the individual cognitively processes information. The current research has not adequately addressed the root causes that explain why auditors continue to have difficulty assessing risk. In my current sample of studies, the majority of the studies manipulate various extrinsic and intrinsic factors that influence auditors' judgments. I argue that these extrinsic and intrinsic factors are idiosyncratic and cannot provide consistent, sufficient ways to improve auditors' risk assessments.

To carry out the purpose of this paper, I briefly describe the auditing planning process with an emphasis on the risk assessment process and the components of cognitive load theory and how it can explain auditors' difficulty in assessing risk. Next, I apply cognitive load theory to prior research findings that focus on auditors' risk assessments to create a framework that explains factors affecting auditors' risk assessment performance. This framework also includes a description of how auditing instruction (i.e., auditing standards) influences auditor judgment and performance and provides potential research questions. Finally, I explore how all of the components of cognitive load jointly affect auditors' judgment and directions for future research.

II. Risk Assessment Background

The audit planning process includes procedures to help auditors gain an understanding of the client business, including the client's control environment, and strategy to assess client risk. During audit planning, auditors must identify and assess the risk of material misstatement and design risk-based audit procedures that govern the collection of sufficient and appropriate audit evidence (PCAOB 2010a and 2010b). These activities affect audit quality (Knechel et al. 2013). Activities that auditors perform to assess risk include, but are not limited to, is performing audit tasks such as analytical procedures, inquiring with the client about business operations, and collecting client industry data and other client specific environmental factors.

The audit planning process can be difficult for auditors for a number of reasons. First, it requires them to consider idiosyncratic client risk and tailor their planned audit procedures to an acceptable level of audit risk (Knechel et al. 2013; Allen et al. 2006). Second, the planning processes involved a large amount of task and judgement variation. Failure to perform audit planning procedures; including assessing risk and tailoring planned audit procedures can lead to audit failure (e.g., Wilks and Zimbelman 2004; Low 2004).

Lastly, the planning processes is inherently complex because of the multiple sources of information that auditors have to collect and evaluate. The upward trend and increased demand for businesses to increase their usage of data analytics tools has transformed the way auditors perform audits. Consistent with the trend, businesses are developing a culture that is more data-oriented and adjusting their business strategies to emphasis data and analytics. With that said, the amount of client data that auditors have to collect and evaluate to gain an understanding of client operations is increasing. As such, the manner and method in which auditors cognitively process this increased amount of information has to be identified and categorized in a collective framework to help academics and regulators to improve the effectiveness and efficiency of audit judgments during audit planning and to facilitate high audit quality.

III. Cognitive Load Theory

The underlying assumption of cognitive load theory (CLT) is that individuals have limited processing capacity in their working memory (Sweller 1988). Working memory is limited, which reduces the amount of information that can move to long term memory (i.e., permanent knowledge storage). After an individual initially processes information, all incoming information is either discarded or is transferred to long term memory. The information transferred to long term memory is sorted into schemas (i.e., categories) based on existing information. When incoming information does not fit into a pre-existing schema, then the working memory will create a new schema or modify existing schemas. To improve this process of retaining new information to improve decision making, an individual must be able to integrate new information with existing knowledge.

Cognitive load is influenced by the number of elements interacting with each other (often referred to as element interactivity) in the working memory that an individual has to process simultaneously. An element is a piece of information. The greater amount of information that an individual has to processes at one time, the less likely the individual will retain this information for more extended periods. CLT focusses on methods to optimize working memory space by managing how information is transferred from working memory to long term memory through how information is presented.

Cognitive load is comprised of three types: germane, extraneous, and intrinsic; together, they make up an individuals' *total cognitive load.* CLT posit that together and independently, the three types of cognitive load influence individuals' judgements and decision making. It is essential to manage the three components of cognitive load to ensure that an individual's total cognitive load stays within its working memory limits when completing tasks. Individuals are capable of making optimal decisions and judgment when total cognitive load (intrinsic, extraneous, and germane) is within an individual's working memory capacity. According to CLT, the extraneous cognitive load must be reduced when the intrinsic load is high to achieve optimal material comprehension, which in turn influences judgment. When element interactivity is high due to intrinsic cognitive load, reducing the element interactivity due to extraneous cognitive load is critical for optimal decision making. If the intrinsic cognitive load is high and extraneous low, the germane cognitive load will be high because the individual must devote a more significant proportion of working memory resources to interpreting the essential material content. If the extraneous cognitive load is increased, germane cognitive load is reduced, resulting in reduced learning because the individual is using working memory resources to deal with the extraneous elements imposed by the instructional procedure rather than the essential, intrinsic material (Sweller 2010; Sweller, and Chandler 1994).

Applied to the risk assessment setting, varying cognitive load levels have varying effects on auditor judgments when performing risk assessments and other planning tasks[1]. For example,

[1] Intrinsic and extraneous cognitive load can be measured on a continuum from low to high based on the level of element interactivity associated with the material that needs to be learned. Generally, the risk assessment process is an activity that requires high levels of element interactivity because auditors have to consider information from multiple sources to complete auditing tasks and because completing risk assessments cannot be accurately learned independent of other information. Give the scope of this review, it is assumed that performing risk assessment related activities is medium to high intrinsic cognitive load because it is hard to disentangle which activity or bits of information is the driver that influences risk assessment judgments. In auditing, the client environment, management characteristics, and internal audit methodologies are the main drivers that influence risk assessment judgements.

the intrinsic cognitive load describes the inherent difficulty involved with assessing risk. According to CLT, information is complicated and complex because of the level of interactive elements associated with the material. Information with high interactive elements will be more complex than material with lower levels of interactive elements, suggesting that varying levels of intrinsic cognitive load affect auditors' judgments and decisions, which can fall on a continuum from low to high. Lower levels of intrinsic cognitive load have minimal effect on auditors' judgment, whereas higher levels of intrinsic cognitive load have more significant effects on auditors' judgment.

Extraneous cognitive is the type of cognitive load that describes how the information presented to auditors when completing risk assessments affects judgments and decisions. Little is known about what causes the extraneous cognitive load. However, extant research provides evidence that similar to intrinsic cognitive load, element interactivity is a major source of working memory load and influences judgment and decision making (Sweller 1988). Taken together, the level of extraneous cognitive load can influence how intrinsic cognitive load affects individuals' judgments and decisions. The manner in which information is presented to auditors during audit planning comes in many formats. For example, auditors receive information in various presentation formats and styles, such as information from the client such as client reports, information from internal sources such as audit work papers and other audit methodology resources, and information from external resources such as auditing standards. Taken together, task structure, auditor characteristics, and what needs to be learned moderates the effects of intrinsic and extraneous cognitive load on auditor judgment.

Other factors, such as task structure and individual characteristic, influence the effects of intrinsic cognitive load on risk assessment judgements. Thus, these moderating variables have differing effects on judgments.

Lastly, germane cognitive load can also be defined by element interactivity, but the manner in which element interactive influences judgment differs from the intrinsic and extraneous cognitive load. Intrinsic and extraneous cognitive load is determined by a combination of material and individual characteristics with emphasis on material characteristics because element interactivity is the primary driver that determines the cognitive load level (i.e., high or low cognitive load levels). In contrast to the emphasis by the intrinsic and extraneous cognitive load on the characteristics of the material, germane cognitive load is concerned only with learner characteristics. Germane cognitive load refers to the working memory resources that the learner devotes to dealing with the intrinsic cognitive load associated with the information. Applied to the risk assessment setting, germane cognitive load is independent of the information presented. The auditor has no control over germane cognitive load, suggesting that personal characteristics such as motivation and self-regulation moderates germane cognitive load on auditor judgment.

Figure 1 depicts how total cognitive load (intrinsic, extraneous and germane) variables influences auditors' judgments and decisions. Task structure and individual characteristics influences the effects of intrinsic cognitive load and extraneous cognitive load (independently) on auditor judgment. Auditors who experience low intrinsic cognitive load are not as influenced by task structure and individual characteristics as those auditors that experience high intrinsic cognitive load. Further the interactive effect of intrinsic and extraneous cognitive load influences auditor judgement. Thus, the cognitive load factors indirectly and in some cases, directly, influences auditors' judgement and decisions. Germane cognitive load is independent of intrinsic and extraneous cognitive load and is the only one out of the three cognitive loads that is only affected by individual auditors' characteristics.

INSERT FIGURE 1

IV. Literature Review Methodology

To reveal how the cognitive load theory can be a useful approach to interpret audit planning research studies to provide insight into why current research has not contributed to significant improvements. I synthesize studies from the audit risk model; specifically, the audit risk assessment. I limit my sample to studies published between 2000 and 2018 in Journal of Accounting Research, Contemporary Accounting Research, The Accounting Review, Accounting, Organizations and Society; Auditing: A Journal of Practice & Theory, Behavioral Research in Accounting, and Managerial Accounting Journal. I only include studies that focus on the audit risk model as part of the risk assessment process. I do not include fraud-related studies. I include studies that manipulate external factors and internal factors that influence how auditors perform audit planning tasks as the independent variables and measure auditors' risk assessment accuracy and appropriateness to detect the risk of material misstatement.

To review the studies using the CLT, I first note and categorize the independent variables based on the three types of cognitive load (intrinsic, extraneous, and germane). Next, for each cognitive load type, I develop an interpretation of whether the study contributed to the improvement of the risk assessment process or other planning-related tasks. These interpretations focus on how the independent variables affect and cause variation in auditors' performance when completing risk assessments. Some of the studies explore risk assessment and risk response. Based on this review's scope, I only focus on studies whose primary goal is to measure variation in auditors' risk assessment based on the independent variables. However, if the research study explores auditors' risk assessment and risk response, I include the syntheses' study. The proper identification of the risk is necessary when selecting appropriate control designing subsequent substantive testing. Lastly, I discuss the implications of my interpretations of potential future research studies. I focus on intervention on how future researchers can explore to improve the planning processes. See figure 2 and 2A for a graphical outline of the literature review.

INSERT FIGURE 2 and 2A

V. Synthesis of the Risk Assessment Literature

Cognitive Load Theory - Intrinsic

As discussed above, intrinsic cognitive load is concerned with the inherent complexity of the risk assessment process. Accordingly, element interactivity is one of the primary reasons why information is inherently complex. As outlined in the PCAOB auditing standards, it can be reasonably inferred that performing a risk assessment is complex. The auditors' decision-making process during planning involve a variety of choices; some choices are simple and straight forward, while the majority of choices are complex and require a multi-step approach to making decisions, suggesting the possibility of multiple outcomes for a given set of criteria. The challenge related to the decision-making process for audit planning is that the multiple outcomes are within reasonable parameters that the auditor may deem as acceptable solutions. The primary goal of this section is not to debate whether the risk assessments process is complex. In this section I focus on external factors such as client and audit methodology characteristics that contributes to auditors making less than optimal risk assessment decisions.

Client Characteristics

Client Environment

The client environment is important to consider in the discussion of the risk assessments process because the consideration of client information is the primary information source that auditors consider when making client risk assessments. Any information about the client is important in determining the likelihood the risk of material misstatement, including management integrity and evaluating the tone at the top (i.e., internal control environment). Auditors evaluate information about the client relevant to the evaluation of the likelihood of financial statement misstatements and the effectiveness of the internal control over financial reporting. These factors include risk assessment inputs, such as management reports, external (environmental) factors, and client characteristics, such as client location and type.

During audit planning, the auditors' goal is to reduce overall audit risk to an acceptable level. To do that, they must independently assess each risk component's level, as outlined in the audit risk model (AR = IR x CR x DR). According to the audit risk model, auditors should assess inherent risk independently from control risk assessments and detection risk. Several studies explore how auditors use the audit risk model to assess risk. Based on these studies' results, auditors do not independently assess inherent risk from control risk suggesting that inherent risk ratings have pervasive effects throughout audit planning (Wright and Bedard 2000). Further, the results indicate auditors erroneously assume some level of control risk when assessing inherent risk and do not assess risk as outlined in the auditing standards (i.e., Miller, Cipriano, Ramsay 2012; Messier and Austen 2000).

Kizirian, Mayhew, and Sneathen (2005) explore how auditors' assessment of management influences auditor's assessment of the risk of material misstatement. Consistent with other studies (e.g., Beaulieu 2001), the authors find that auditors adjust to their management integrity assessment by obtaining evidence when management integrity is low. Similarly, Newman, Patterson, and Smith (2001) explore the interaction between auditors and fraudulent clients by exploring how reports from a fraudulent client affect the assessment of the risk of material misstatement. Lastly, Glover, Jiambalvo, and Kennedy (2000) find that auditors are more likely to revise preliminary audit plans when there is minimal corroboration from management to explain account fluctuation, and when the incentive for management to commit fraud is present. The findings suggest that auditors' prior beliefs and interactions about management influence subsequent actions.

As described by CLT, because auditors experience high intrinsic cognitive load, they will exercise impaired judgments when completing risk assessments, especially when extraneous cognitive load is high as well. Based on these studies' results, I infer that auditors create mental shortcuts or heuristics by relying on management input and reports or erroneously assessing audit risk when making risk assessments because the level of element interactivity is high. Even though the results confirm that auditors have difficulty assessing risk, future researchers can explore interventions to help auditors manage intrinsic cognitive load. For example, intrinsic cognitive load can only be decreased by altering the foundational task or changing knowledge levels (Sweller 1988). Therefore, future researchers can explore interventions that modify risk assessment primary tasks or modify the order in which auditors perform the risk assessment tasks to reflects auditors' cognitive processing.

Corporate Governance

The role of the audit committee (AC) dramatically increased after the passage of the Sarbanes Oxley Act of 2002 (SOX). The enactment of SOX requires audit committees to be directly responsible for the oversight of the engagement of the company's independent auditor. Other roles the audit committee is responsible for are monitoring the quality of the financial reporting process and ensuring the company is meeting strategic and operational goals. Given the expanded role of the AC, it is surprising that there are only few studies that explore the effects of AC on auditor risk assessments.

Cohen et al. (2007) explore the impact of the role the board -agency and resource dependence roles- on audit planning decisions. Agency role describes a board that places greater emphases and attention on monitoring management whereas the resource dependency role describes a board that actively assisting in setting the corporate strategy and access to external resources. The finding suggest that inherent risk assessments were not affected by the roles, but control risk assessments were higher when the board played a weak agency or resource dependency role. The audit program planning variable were also affected by the roles of the board. The participants plan a lower extent of auditing testing when the board played a stronger agency and resource dependence role.

Along the same lines, fewer studies explore the association between corporate environmental responsibility (CSR) and audit risk. Overall, the results indicate that auditors do not perceive a significant relationship between a client's corporate environmental responsibility and audit risk. Based on survey data, the study finds that auditors with a positive perception of the client's corporate responsibility, do not identify an association between corporate responsibility and audit risk. However, if the auditor has a negative perception of the client's environment, the auditor will include corporate responsibility in their risk assessment. A hand full of studies explore the effect of corporate governance structure on the assessment of the risk of material misstatement. Cohen and Hanno (2000) and Cohen, Krishnamoorthy, and Wright (2007) explore the effect of corporate governance and the role of the board on audit planning decisions, respectively. The findings from these two studies suggest that corporate governance plays a role in audit planning. For example, Cohen and Hanno (2000) find that corporate governance influences auditors' assessment of the business risk associated with accepting a new client.

Despite findings indicating the importance of the audit committee to the risk assessment process, there is a fruitful area of research that still remains. For example, future research can explore how corporate governance variables can improve auditors' risk assessments, specifically within controls testing. Testing controls is critical to an audit as it is used to support the audit firm's opinion of the effectiveness of ICFR in an integrated audit and to modify the nature, timing, and extent of substantive testing in financial statement and integrated audits. Previous PCAOB inspection findings state that auditors do not select controls for testing that address the specific risks of material misstatement and do not obtain a sufficient understanding of whether the control addressed the assessed risk of material misstatement.

External Factors

External factors describe the surroundings or conditions in which the auditor makes risk assessment decisions. External factors, such as the audit engagement team characteristics and audit partner pressures, play a role in how auditors assess audit risk, and modify audit programs. Despite these factors, auditors are responsible for applying due professional care in all areas of the audit. In other words, auditors should not be influenced by these factors when assessing the risk of material misstatement. As discussed earlier, the planning process is inherently complex; thus, it is essential to understand how external factors influence auditor judgment to help regulators and audit firms identify intervention and approaches to improve planning decisions.

Prior research examines the effect of the audit partner pressure (Bierstaker and Wright 2001) and audit partner tenure (Bedard and Johnstone 2010) on planning decisions. The results suggest that audit partner pressure has a negative effect on risk assessment accuracy. Interestingly, newly rotated audit partners invest more effort when performing planning procedures compared to longer-tenured partners, suggesting newly rotated audit partners dedicated additional resources, including audit staff, to understand client risks. Consistent with the effect of partner pressure, Houston (1999) finds a negative association between audit fee pressure and audit planning decisions.

Martinis, Fukukawa, and Mock (2011) find that client type affects how auditors make risk assessments. Based on a sample of audit workpapers, the results suggest that country differences impact client risk and subsequent audit planning decisions. Notwithstanding, the study does not account for systematic differences caused by the country. However, this effect is mitigated because, presumably, the same auditing standards are applied to all clients across the sample, suggesting that the same audit approach is applied differently depending on the client characteristics.

Overall, what we learned from this stream of research is that external factors such as client and audit characteristics influence how auditors perform risk assessments. Given that auditors will face various factors as they audit different clients and work with different engagement personnel, it is important to identify methods that auditors can consistently apply throughout the audit process. To date, research has generally examined how different factors, such as audit pressures and audit fees, affect auditors' risk assessment. However, according to CLT, future research needs to explore how auditor characteristics, such as audit experience and motivation, aid auditors when they experience high element interactivity. Below is a summary of the research questions.

Potential Research Questions – Intrinsic Cognitive Load

1. What methods can auditors use when performing risk assessments that decreases intrinsic cognitive load to improve risk assessment performance?

2. How does audit technology affect element interactivity?

3. Are there other auditor characteristics, besides auditor experience, that influences auditors ability to process high element interactivity material.

Cognitive Load Theory - Extraneous

As discussed above, extraneous cognitive is the type of cognitive load that describes how the information presented to auditors when completing risk assessments affects judgments and decisions. Cognitive load theory is primarily concerned with techniques designed to reduce individuals' extraneous cognitive load (Sweller 2003 and 2004). Nonoptimal instructional procedures are referred to as imposing an extraneous cognitive load. Within the auditing setting, various forms of extraneous cognitive load affect auditor judgments. For example, extraneous cognitive load is imposed by how workpapers are used by auditors and designed to complete risk assessments (Bonner, Majors, and Ritter 2018); how auditors use decision aids to complete risk assessments (Bedard and Graham 2002); regulatory documentation requirements (Piercey 2011), and how auditing standards are written.

For example, Bonner et al. 2018 find that auditors that use prepopulated workpaper, compared to blank work papers, make less accurate risk assessments because they are more likely to rely on last year's assessments. Bedard and Graham (2000) find that auditors who use negatively oriented decision aids identify more relevant risk factors compared to auditors who use positively oriented decision aids. Interestingly, Piercey (2011) finds that the manner in which risk assessment is performed (qualitative vs. quantitative) influences risk assessment judgment. The author also explores the interactive effects of documentation requirements on risk assessment types. The interactive effects suggest that auditors make less accurate risk assessment when using qualitative methods when documenting their rationale for the assessment compared to auditors who use quantitative risk assessment.

In the earlier years, the risk assessment literature focused on the effects of different risk types on auditor judgments. The majority of this research focuses on the effects of business risk and other operational benchmark measurements on auditors' risk assessments by using the strategic systems audit approach as the main experimental task. The strategic risk assessment approach focuses on the organization's overall business processes, where the auditor focuses on how the client creates value and then identifies and documents strategic business risks that threaten the business model. KPMG designed and implemented a risk-based strategic system auditing approach called Business Measurement Process (BMP). This approach was the inspiration for subsequent research (Bell et al. 1997). Generally, these studies find that strategic based risk assessment approaches lead to more accurate risk assessment compared to other approaches or the absence of using an approach because the auditors who use the strategic risk assessments create more complete mental models and/or problem representations of the client (Knechel, Salterio, and Kochetova-Kozloski (2010); Schultz, Bierstaker, and O'Donnell (2010).

On the other hand, O'Donnell and Schultz (2005) find that strategic risk assessment can distract auditors by influencing their subsequent judgments. When auditors focus on the holistic views of a client's business risk, the auditors are less sensitive to account fluctuations that signal higher risk that auditors should devote attention to. The authors contribute the findings from the study to the psychology phenomenal called the halo effect. These findings demonstrate how increased levels of element interactivity influence auditors from making optimal decisions. The auditors are not able to incorporate additional risk specific information into their working memory presumably because of intrinsic overload.

In summary, this line of research provides evidence on how auditors process information during planning. This line of research results is essential to the profession as the audit process begins to shift from the traditional audit approach to incorporating innovative technologies into the audit process. As a result, auditors will have increased information and audit evidence to consider and utilize during audit planning (Vasarhelyi and Halper 1991; Issa 2013; Vasarhelyi, Kogan, and Tuttle 2015; Moffitt and Vasarhelyi 2013). Appropriate methods and interventions to help auditors focus on the relevant risk factors while maintaining a level of due care should be further investigated. Keeping in mind the effects of intrinsic cognitive load on planning judgements, future research should explore experimental interventions that explore ways to decrease the extraneous cognitive load in setting where the intrinsic load is high by manipulating how information is presented to auditors. According to CLT, what constitutes extraneous cognitive load depends on what needs to be learned. Therefore, future research can manipulate learning goals and the interactive effects of learning goals and decision aids on risk assessment judgments. Lastly there is little research that focuses on how the presentation of auditing standards impact extraneous cognitive load. The presentation of information in auditing standards has the potential influence how auditors interpret information presenting in the auditing standards and how auditors apply this information when performing risk assessments. Refer to section VI for further discussion about the impact of auditing standards. Below is a summary of the research questions.

Potential Research Questions – Extraneous Cognitive Load

1. What methods can auditors use when performing risk assessments to decrease extraneous cognitive load to improve risk assessment performance?

2. Do the presentation of auditing standard increase element interactivity, which in turn increases extraneous cognitive load?

3. How can manipulating auditors' learning goals influence the impact of extraneous cognitive load on learning?

Germane Cognitive Load

Germane load (GL) refers to the mental resources devoted to acquiring and information and transferring his information into long-term memory. Thus, germane cognitive load is only concerned with individual characteristics. Applied to the risk assessment setting, germane cognitive load is independent of the information presented and the auditor has not control over germane cognitive load; suggesting that personal characteristics such as motivation moderates germane cognitive load on auditor judgement. In this section, I discuss papers that focus on the cognitive processes auditors follow when making risk assessment and the auditor characteristics such as auditor expertise that influences auditors' risk assessment performance.

Vandervelde, Tubbs, Schepanski, and Messier (2009) discover that auditors create an "effective modified risk weighting" when assessing the risk of material misstatement. Auditors reduce their *effective modified risk weighting* by the risk factor(s) possessing the lowest perceived risk and increase their *effective modified risk weighting* by the risk factor(s) possessing the highest perceived risk. With these weightings, auditors then strike a balance among all the risk factors evaluated in creating a risk assessment. This cognitive process is consistent with the strategic risk assessment approach introduced by Bell, Marrs, Solomon, and Thomas (1997).

Auditors develop their effective modified risk weightings by starting with a broad view of the client and its operations. The auditors then narrow their focus by identifying business processes and operations with high risk. During this process, the auditor will begin to reduce or increase weights to their effective modified risk weighting. The findings confirm the complexity associated with completing risk assessments. Auditors start the risk assessment process with a broad view of how risk affects the client environment. Subsequently, the auditors begin to identify and add pieces of information (also known as elements) related to the task of assess risk to their working memory to complete the risk assessment.

The manner in which information is processed during risk assessments is entirely dependent on individual characteristics. A natural extension of this discussion is that element interactivity is dependent on learner's expertise and prior knowledge. Intrinsic cognitive load through element interactivity is derived by an interaction between the nature of the material being learned and the expertise of the learners (Sweller, Van Merrienboer, and Paas 1998). It is likely that an individual with particular level of expertise will be able to solve problems with a large number of interacting elements because experts have preestablished schema to match with new information. For this reason, it is not surprising that experts have superior capability to solve complex problems. However, CLT find that experience does not always result in superior judgement and decisions. Recent CLT studies demonstrate that designs and techniques that are effective with low-knowledge individuals can lose their effectiveness and even have negative consequences for more experience individuals (Kalyuga et al. 2003; Kalyuga 2005). The reversal in the relative effectiveness of instructional methods as individual knowledge domain changes has been referred to as expertise reversal effect. CLT studies contribute the expertise reversal effect to characteristics of individuals'' cognitive architecture.

A large body of research explores the effects of knowledge and experience on auditor judgments. Specific to the audit planning setting, several studies explore how auditor knowledge influences auditor planning judgments. For example, Low (2004), Wright and Wright (1997), and Brazel and Agoglia (2007) demonstrate that auditor expertise influences auditors' risk assessment accuracy. Specifically, the studies find that auditors with skill sets that match the audit task perform accurate risk assessments and appropriately adjust audit procedures. More relevant to this review is the experiment completed by Bonner, Majors, and Ritter (2018). The authors explore how auditor characteristics, such as professional identity, self-control, and prior experience with prepopulated workpapers, affect auditor planning judgments.

In summary, consistent with the CLT, the findings suggest that auditor characteristics, such as experience, influence how auditors perform risk assessment tasks. These findings are not surprising because auditors with more experience have the appropriate knowledge schema needed to transfer knowledge from working memory to long term memory which results in superior decision making. Despite that the majority of research focuses on the effect of audit experience or knowledge expertise and auditor judgments, there are research opportunities to explore the effects of other personal characteristics such as motivation, emotional IQ, analytical skills on judgments and decision making. Given the diversity in skill, culture, and backgrounds in engagement teams, it is important to understand how these different characteristics impact auditor judgments. Lastly, there are different sub-tasks auditors are required to complete when performing risk assessments. Future research should explore the required skillsets auditors need to perform planning subtasks and subsequently determine if audit judgments improve when auditor skillsets matched with audit tasks.

Potential Research Questions – Germane Cognitive Load

1. What methods can auditors use when performing risk assessments to increase germane cognitive load to improve risk assessment performance?
2. What personal characteristics impact auditors' risk assessment judgments?
3. What situations does experience benefit auditors and hinder auditors when making risk assessment decisions?

VI. Assessment of International Risk Assessment Standards

The International Auditing and Assurance Standards Board (IASSB) recently revised ISA 315, Identifying and Assessing the Risks of Material Misstatement, standard in 2019 to include more robust procedures for auditors to follow when completing risk assessments. The revised standard intended purpose is to clarify and enhance requirements and the application of material and to enforce the consistent application of the standard to support the auditor's risk assessment process. The standard has been written and organized to reduce auditor bias when collecting evidence and improve understandability by reducing complexity with enhancements and clarifications (IASSB 2019). ISA 315 (Revised 2019) will be effective for financial statement audits for periods beginning on or after 15 December 2021.

In this section of the paper, I draw from the cognitive load theory, to analyze the newly revised international risk assessment standards to identify and investigate unintended consequences associated with the new standards on auditor judgment. My analysis identifies areas that are consistent with the suggested instructional design, as defined by the CLT. I rely on the extraneous and germane components of cognitive load to assess the newly revised international risk assessment professional standards' potential effectiveness. Extraneous cognitive load focuses on how information is presented, and germane cognitive load solely focuses on characteristics of the individual that is aids in knowledge acquisition. I explore extraneous and germane components together because both can be altered by instructional interventions (Sweller 2010). If the instructional design is organized to allow working memory resources to manage the element interactivity material that imposes a high intrinsic cognitive load, then germane cognitive load and judgments will be maximized. Thus, instructional designers need to consider the level of element interactivity in materials and align the instructional design with it. I focus on how information in the proposed auditing standard is consistent with cognitive load theory to improve auditors' risk assessment performance.[2].

The purpose of auditing standards is to provide auditors with systematic guidelines on how to conduct audits on companies' financial records (PCAOB 2001). Auditing standards are the foundation of the audit process because auditors rely on them to guide their efforts when planning and performing audit tasks. The role of auditing standards is essential for keeping audit services relevant (e.g., Barton 2005), meeting the evolving demands of stakeholders, and improving overall audit quality (e.g., Dye 1993; Knechel 2013). More importantly, audit standards are designed to restrict professional auditors' activities and behavior, which, in turn, affects auditors' judgment and decision-making when performing audit tasks (Dye 1993; Willekens Steele, and Miltz 1996; Willekens and Simunic 2007; Hay, Knechel, and Wong 2006) [3].

[3] It is essential to understand the changes to the revised international standards because the ISA 315 standards could be a strong signal of future changes to the PCAOB audit planning standards. More importantly, the PCAOB can learn from any unintended consequences derived from the newly revised standards and mimic auditing directives that improve auditors' performance. The last significant revisions to the PCAOB planning standards were in 2010. Given the increased attention to the risk assessment standards, it is likely that the PCAOB board will consider revising the standards to align with auditor judgment and changing technological environments. It is not uncommon for the PCAOB standards board to use feedback outlined in the ASB exposure drafts to inform potential changes. For example, in 2018, the PCAOB adopted auditing standard, *Auditing Accounting Estimates, Including Fair Value Measurements* and amendments to other PCAOB auditing standards. The amendment includes a section that compares PCAOB auditing standards to other standard setters, suggesting that the PCAOB values feedback from the international standards.

As discussed earlier in the paper, if instruction is not designed to reduce extraneous cognitive load or increase germane cognitive load, extraneous and germane cognitive load can have adverse effects on individual judgments. Auditing standards do not consider the cognitive load imposed by complex audit tasks, such as audit planning and the additional load that is imposed by complex and confusing auditing standards. Therefore, it is important to reduce auditors' extraneous cognitive load while increasing auditors' germane cognitive load through the design and organization of auditing standards so auditors can focus the majority of their cognitive efforts on assessing and responding to the risk of material misstatements. In this section, I explore the effectiveness of the newly revised auditing standards. Specifically, I explore how the organization and verbiage used in the auditing standard effects judgments

Cognitive load theory provides a framework that promotes optimal decision making and judgments through the presentation of information (Sweller, Merrienboer, and Paas 1998). The theory asserts that individuals will achieve optimal decision making when the structure of information matches the individuals' cognitive schema and information processing. To achieve the auditing standards' objectives and goals, auditors must fully understand the directives within the standards. This will only happen when the auditing standards are written and organized in a manner that coincides with auditors' cognitive processing. Therefore, it is appropriate to assess the revised international risk assessment standards through the cognitive load theory lens.

The proposed framework outlines instructional methods that decreases extraneous cognitive load for individuals and describes methods that increase germane cognitive load by managing how information enters into and processed the working memory. In some instances there may be overlap between the two methods. For example, some of the methods used to reduce extraneous cognitive load may also increase germane cognitive load. I compare the strategies as outlined in the CLT framework to the newly revised risk assessment standards to determine the effectiveness of the standards.

As outlined in the framework, the three strategies that increase germane cognitive by maximizing the amount of information an individual can process in working memory and store in long term memory is as follows: (1) *identification of component skills and required knowledge*, (2) *management of automatic and controlled processing*, and (3) *redirect attention for schema acquisition and knowledge transfer*. The first strategy, the identification of component skills and required knowledge, states that instructional design should be organized based on the skills and the usage frequency of the skill to complete the desired task. Generally, the tasks requiring less complex cognition (less frequent) should be presented earlier than tasks requiring more complex cognition (more frequent). The second strategy, management of automatic and controlled processing, states that instruction should be organized based on how information is processed. Lastly, the final strategy, redirect attention for schema acquisition and knowledge transfer, states that instruction should direct an individual's attention to information or examples that facilitate knowledge acquisition. The second phase in the framework identifies instructional methods, such as worked-out exampled and nonspecific goal method, that decreases extraneous cognitive. See Figure 3 and 4 for the risk assessment auditing standards framework.

INSERT FIGURE 3 and 4

Methods to Increase Germane Cognitive Load

As discussed earlier, germane cognitive load is concerned with how individuals allocate mental recourses to acquiring and cementing knowledge in long-term memory (Ayres 2006). It also measures the number of resources directly involved in learning, rather than following instructions (Paas, Renkl, and Sweller 2003). In this section, I focus on three strategies that promote ways to facilitate learning and improves auditor judgments during the risk assessment process.

Strategy One: Identification of component skills and required knowledge

One strategy to increase germane cognitive load is to break down complex tasks into component skills and required knowledge (e.g., Pass and Merrienboer 1994; Pollock, Chandler, and Sweller 2002). Component skills are subskills that form part of the whole skill that needs to be learned to complete a task. For example, a component skill for solving a complex algebra problem is technical math skills, analyzing problems, and formulating possible solutions. Generally, complex tasks consist of recurrent and nonrecurrent component skills. Recurrent component skills are skills that are performed similarly, across diverse tasks. For example, an audit test that does not require significant judgment such as counting physical inventory, is a recurrent skill in audit practice because the completion of the task does not vary significantly across engagements. Alternatively, nonrecurrent component skills vary considerably over diverse tasks. Tasks that require a more significant number of nonrecurrent components skills are typically more complex and impose higher intrinsic cognitive load.

The revised auditing standards attempt to increase germane cognitive load in two ways: 1) inclusion of a new objective and 2) inclusion of key term definitions. This strategy increases germane cognitive load because it directs the auditors' attention to component skills and knowledge that the auditor will need to appropriately complete risk assessments before introducing further instruction. This strategy permits optimal learning and improved judgements because it imposes relatively light cognitive load in a way that performance of the main task, in this case, risk assessment performance, is not influenced by cognitive capacity limits (Paas and

Merrienboer 1994) Further, the identification of these skills and knowledge promote fast development of automatic processing for recurrent component skills.

First, the revised standards' objective highlights *how* the auditor should identify and assess the risks of material misstatement. The standard states," the auditor is to identify and assess the risks of material misstatement… *at the financial statement and assertion levels*.." Upon reading the standard, the auditor is immediately aware that they will need to understand the association between the risk of material misstatement at the financial statement assertion level. The clarity and introduction of the standard objectives create new knowledge schema that allows auditors to interpret new information as presented during audit planning. This is a significant change from the PCAOB standards that states, "The objective of the standard highlights that the auditor should identify and assess the risks of material misstatement." The manner in which this information is presented does not allow auditors to identify the skills needed to effectively complete future tasks and hinders the formation of appropriate knowledge for future applications.

ISA 315 also includes key term definitions at the beginning of the standard (Paragraphs 1-18) that are not present in the PCAOB standards. The definitions include the following terms: assertions, business risk, controls, and general information technology. The presentation of the definitions confirms the component skills that auditors will need to understand the standard. The definitions also address difficulties that auditors had in the past when applying standards. For example, ISA 330 refers to assessments of risk as "significant," but a firm's methodology may define risk as high or higher. Therefore, variation in approaches is likely, which can affect auditors' judgments and inconsistent application of the auditing standards.

Another change made to the ISA 315 is the introduction of five new inherent risk factors and a revised definition of significant risk. The inclusion of the inherent risk factors helps the auditor identify the appropriate events or conditions that affect inherent risks while limiting the number of plausible outcomes that may impair auditor judgment. Inherent risk is the "characteristics of events or conditions that affect susceptibility to misstatement of a financial statement assertion before consideration of controls." The newly revised ISA 315 standards include the consideration of inherent risk factors to assist the auditor in focusing on events or conditions that affect an assertion to misstatement due to error or fraud, which facilitates a more focused identification of risks of material misstatement. The standard includes the following risk factors for auditors to consider complexity, subjectivity, uncertainty, change, and susceptibility to misstatement due to management bias or fraud.

According to the CLT framework, the referenced changes made to the revised auditing standards identify skills and knowledge that auditors will need to complete risk assessments, which will promote the development of automated processing. Although the revised standards identify the technical knowledge needed to perform risk assessments, there is an opportunity for future research to identify and measure other auditor characteristics useful for auditors to have when completing a risk assessment. Along the same lines, future research can examine whether identifying these auditor characteristics for auditors' impact risk assessment performance and judgments. In conclusion, it is important to automate recurrent skills so individuals can devote mental resources to more cognitively demanding aspects of the task. (Fisk and Gallini 1989; Myers and Fisk 1987). Without automation, the performance of a recently completed task may be negatively affected. Schema automation is described in the next section

Strategy Two: Automatic and control processing

A recent trend in auditing research is the exploration of auditors' mindsets (e.g., Griffith, Hammersley, Kadous, and Young 2015). Mindsets are the set of judgment criteria and cognitive processes and procedures that produce a disposition or readiness to respond in a particular manner. Similarly, cognitive load research focuses on how two modes of information processing can decrease cognitive load: automated processing and control processing (e.g., Shiffrin and Schneider 1977). The critical distinction between automatic and controlled processing pertains to the attentional requirements between the two processing modes. Controlled processing is slow, serial, and effortful. It typically occurs in new and inconsistent processing tasks. Automatic processing, on the other hand, occurs without requiring active or conscious control or attention. It is fast, parallel, and effortless; it typically occurs in well-practiced consistent tasks.

Automatic processing is important because it allows an individual to process a more considerable amount of information by bypassing working memory for nonconscious processing. Automatic processing occurs after practice and multiple times of exposure. With sufficient practice and exposure, a task can be completed with minimal conscious effort. For example, most adults can drive their car home on a routine route without consciously processing every street name and building they pass on the way home. The process of driving home becomes automated with multiple trips to and from home. Generally, prior research finds evidence supporting the notion that automation helps with problem-solving (e.g., Kotovsky, Hayes, and Simon 1985).

According to Van Merriënboer et al. (1992) and Sweller (1988), the instructional design should aim to the fast development of automatic processing. Therefore, tasks should be outlined in the auditing standards to decrease the cognitive load by the automation of recurrent component skills. ISA 315 attempts to automate auditors' component skills by defining terms that require a substantial amount of judgment, which may cause extreme variation in terms of how audit teams interpret the requirement. For example, the new auditing standards has created a robust process to help auditors identify and assess inherent risk. The newly revised standards introduce five new inherent risk factors to assist auditors when making risk assessments: subjectivity, complexity, uncertainty, change, and susceptibility to misstatement due to management bias or fraud (Par. 12).

Similarly, the new risk assessment auditing standard clarifies the definition of significant risk and significant classes of account. Because of the variation of audit firm methodology, client environment, and individual auditor characteristics, both auditors and regulators report problems in determining what constitutes a "significant" risk and a "high-risk area." Further, the use of qualitative terms such as "significant" used to describe categories of risk creates ambiguity on how these terms should be applied when assessing risk. As auditors continue to use the auditing standards (i.e., increase exposure to the standards), assessing inherent risk will involve less variation, which will decrease cognitive effort. During automatic processing, performance is believed to be relatively effortless, insensitive to working memory capacity limits.

Consistent with the CLT, the revised auditing standards identify and break down the required knowledge auditors need to know to perform a risk assessment effectively. Representing the complex task in relevant component skills and knowledge is an effective approach that is appropriate for reducing auditors' cognitive load. Breaking down the complex task into component skills also helps the auditor develop automatic processing when encountering these component skills during the risk assessment process.

Rule automation is a term that describes the transition from controlled to automatic processing. One important factor that needs to be emphasized is that rule automation is a function of practice; that is, less effort is required when a task is more extensively practiced, and rule automation can be a lengthy process. The timing it takes for rule automation to occur is an important factor for audit firms to consider as they assign personnel to audit engagements and design training for auditors. To increase auditors' exposure and practice to key terms and definitions, audit firms should consider incorporating frequent training in which auditors can practice and learn key definitions.

Strategy Three: Re-direct attention to schema acquisition and knowledge transfer

The third instructional design that decreases germane cognitive load is redirecting attention to schema acquisition and knowledge transfer. This strategy aims to make controlled processing of non-recurrent components more efficient by providing instructional tactics that support the development of rich knowledge. Strategy three is similar to strategy two; however, the main difference is that strategy three focuses on non-recurrent component skill, whereas strategy two focuses on recurrent component skills.

Knowledge schema is an important factor in the knowledge transfer process. Although schemas are stored in long-term memory, in order to construct them, information must be processed in working memory. The information must be extracted and manipulated in working memory before being stored in long term memory. An individuals' cognitive system can store unlimited amounts of information in long-term memory; knowledge acquired after years of practice is stored in long term memory (e.g., Ericsson and Charness 1994). Therefore information stored in long term memory is extensive and contains complex interactions. As a result, working memory is not capable of processing complex information stored in long term memory.

The effective instructional design should facilitate knowledge transfer and develop a rich knowledge base that redirects attention to aspects of the task that facilitates schema acquisition (Paas and Van Merriënboer 1994). A schema is a cognitive structure developed through experience with one or more problems. It enables the problem solvers to recognize problems as belonging to a particular category requiring a particular operation to reach the desired solution (Van Merriënboer and Paas 1990). Thus, an instructional design that requires individuals to engage in complex reasoning using new information (i.e., information not stored in long term memory) will be ineffective.

The new auditing standards reflect effective instructional design by providing client scalability options for auditors to use based on the complexity of the auditee and introducing the inherent risk spectrum. The scalability options keep the principles-based requirements focused on what needs to be done and using separate headings in the application material to illustrate scaling up for more complex situations and scaling down for less complex situations. The inherent risk spectrum categorizes inherent risk factors on a continuum from lower to higher, based on the likelihood and magnitude of a possible misstatement when assessing risk of material misstatement.

The scalability option and inherent spectrum allow the auditor to categorize and match problems to solutions for clients with similar complexity. The organization of information helps auditors create a knowledge schema in their long-term memory that can subsequently be applied as auditors perform subsequent planning tasks.

Instructional Methods to Decrease Extraneous Load

The next section focuses on instructional methods that decrease the extraneous cognitive load. As discussed earlier, the extraneous cognitive load focuses on the cognitive load imposed by instructional design. I analyze the instructional tactics outlined in the new risk assessment auditing standard. I focus on the following two instructional tactics: (1) worked out examples and (2) nonspecific goal method.

Method One: Worked out example

A worked-out example is a written-out example with a well-structured solution that provides an ideal example for the individual of the problem or task under consideration. A worked-out example can also summarize and re-state the main points of an abstract concept and emphasis general principles of the underlying problem or task (Paas and Van Merriënboer 1994). Accordingly, worked-out examples can be used as a schema roadmap for new solutions and foster schema acquisition. Therefore worked-out examples are an effective way to transfer knowledge schema because it prevents the individual from engaging in ineffective or weak problem-solving methods by redirecting his/her attention. (Sweller 1988, 1999).

Worked-out examples also decrease individuals' cognitive load by diverting attention to more relevant aspects of the task aspects that prompts schema acquisition. Prior empirical research provides evidence that worked-out examples do not have to be identical to the task or problem the individual is attempting to solve to promote schema acquisition (Jelsma, van Merrienboer, and Bijlstra 1990). In some instances, it may be more useful for individuals to identify critical features from worked-out examples to apply to the task to what the individual is trying to solve (Anderson, Boyle, Corbett, and Lewis 1990).

ISA 315 incorporates approximately 15 interpretations and/or examples for auditors to use when applying the standard. See an example of one of the interpretation/examples below.

"The auditor may use a spreadsheet to perform a comparison of actual recorded amounts to budgeted amounts, or may perform a more advanced procedure by extracting data from the entity's information system, and further analyzing this data using visualization techniques to

identify classes of transactions, account balances or disclosures for which further specific risk assessment procedures may be warranted."

The above example provides the auditor with details on how to perform analytical procedures with data analytics or other automated tools. The example emphasis the general principle the auditor should extract, which is to perform an analytical procedure; the auditor must compare actual amounts to budget amounts. The example then provides detailed examples of how the auditor can extract data from the client

Despite a large number of evidence that provides evidence that worked-out examples are beneficial for transferring knowledge or constructing schema, it is essential to keep in mind that learning will only occur under certain circumstances. For example, worked-out examples requiring individuals to integrate different sources of information will likely not be useful because they create a high extraneous cognitive load (Sweller, Chandler, Tierney, and Cooper, 1990). Further, worked-out examples that include redundant information does not allow individuals to construct knowledge schema for future learning. Future research can explore the

Method Two: Non-specific goal method

Another method to decrease cognitive load is the non-specific goal method. A non-specific problem is one in which the goal is not described or obvious. Prior research finds that problems that do not include a specific goal reduces cognitive load by creating schema acquisition compared to traditional problem-solving methods such as means-end analysis. (e.g., Sweller 1988). A means-ends analysis is a problem-solving strategy where the individuals solves a problem by primarily focusing on the obstacles and subtasks between the initial problem and the goal state.

This instructional design is based on the assumption that solving a wide range of goal-specific problems is an effective way for novices to understand instruction. Interestingly, research shows that this goal hierarchy instructional approach also increases the cognitive load for novices. Prior research provides evidence that non-specific goal problems redirect individuals' attention from weak problem-solving strategies that impose a heavy cognitive load (i.e., means-end strategy) to a strategy in which individuals work forward from information provided.

The existing PCAOB auditing standards have over 20 instances where the standards state a goal or objective for the auditor to complete. The common language in the PCAOB standard includes "…the auditor *should* obtain an understanding…" The language suggests that the auditors have the desired end goal. Consistent with the cognitive load theory, it is likely that an auditor faced with a standard that outlines a goal will unlikely construct a schema to generate a solution and is likely to use weaker problem-solving methods, such as means-ends analysis. It is important to point out that individuals can effectively solve problems with a means-ends analysis. However, this method uses a considerable amount of working memory capacity and does not construct a knowledge schema appropriate for the problem solver that lessens the cognitive load.

The ISA 315 has removed such language. The standards are written in factual statements instructing the auditor on how to perform a task. For example, current PCAOB standard describes how auditors should identify significant risk by stating the instruction in a goal specific directive, "…Evaluate whether the identified risks relate pervasively to the financial statements as a whole and potentially affect many assertions". This statement highlights that the goal for identifying significant risk is that the risk should affect more than one financial statement assertion. This statement, and many more like this, does not help the auditor identify the appropriate schema needed to achieve the goal of identifying significant risk. Contrary, the ISA standards remove the goal specificity from the standard. For example, the ISA 315 standard state, "…The auditor shall identify the risks of material misstatement and determine whether they exist at: (a) The financial statement level or(b) The assertion level for classes of transactions, account balances and disclosures." The standard also provides additional detail on how to assess risk at the noted assertion levels.

Lastly, the schema developed by auditors may not always be sufficient for performing risk assessments. Auditing research provides evidence that PCAOB inspection findings affect auditors' judgments and subsequent task performance. Negative feedback, such as identifying recurring deficiencies, as outlined in PCOAB inspection reports, may create inaccurate knowledge schema. Consequently, as auditors perform risk assessments and subsequent audit planning tasks, they will rely on inaccurate knowledge schema, resulting in subpar planning judgments. Taken together, future research should consider the unintentional consequences associated with designing standards to facilitate schema acquisition.

Other Consideration - Auditor Expertise

A critical factor that auditing standards should consider is how auditor expertise and prior audit experience affects the understanding and application of auditing standards. There is already an extensive body of audit research that explores the differential effects of experience (experts versus novice) on task performance, suggesting that novices' task performance is inferior to experts' performance. Consistent with previous research findings, novices have a limited amount of information stored in working memory and long-term memory, compared to experts. Therefore, the interactive effects of performing complex tasks and a high extraneous cognitive load imposed by ineffective instructional design create a high cognitive load for novice auditors (Sweller 1988).

Based on the above logic, there are numerous research opportunities to explore the effects of auditing standard design on auditors' cognitive load. Future auditing standards should consider experimental interventions to improve novices' risk assessment performance to counteract the adverse effects of a high cognitive load on novice auditors. The intervention should consider novices and experts' cognitive processes when completing planning auditing tasks and explore how those cognitive processes interact with extraneous cognitive loads imposed by auditing standards. Future research can also explore methods to measure the extraneous cognitive load imposed by auditing standards and how they differ based on auditor characteristics.

Cognitive load represents the effect that performing a particular task imposes on the learner's cognitive system (e.g., Yeshkati, 1988). Nevertheless, prior research has not identified a consistent way to measure cognitive load because of its multidimensional characteristics (Tulga and Sheridan 1980). Commonly used audit proxies associated with cognitive load is "effort" and "task complexity." Future research should explore whether and how accurately existing audit proxies measure cognitive load or unexplored proxies that provide greater insight into an individual's cognitive load. An ideal cognitive load measurement can disentangle information about auditors' cognitive processes that may not be reflected in performance and isolate auditors' mental effort from task demands and other external factors. In a perfect world, an appropriate cognitive load proxy measures the marginal effect of task demands on auditors' cognitive load. Other avenues researchers can explore to capture cognitive loads are psychophysiological indices and psychology indices. Researchers must understand the impact that extraneous cognitive load has on auditor judgment, suggesting that standard setters and researchers can gain insight into the root causes of negative inspection findings and audit quality.

Potential Research Questions – Auditing Standards

1. What are some unintended consequences associated with organizing standards to reflect auditors' information processes?

2. Are ineffective problem-solving strategies imposed by the manner in which auditing standard are organized?

3. What is the extent that PCOAB negative inspection findings influence auditors' interpretations of auditing standards? And subsequent judgements?

VII. Conclusion

Despite the importance of assessing and responding to the risk of material misstatement, the PCAOB consistently find that auditors continue to have difficulty completing planning tasks. Prior research has attempted to identify root causes to explain why audit planning continues to be a difficult process. Prior research has explored whether risk assessment inputs such as management reports (e.g., Newman, Patterson, and Smith 2001), auditors' cognitive processes when performing planning procedures (e.g., Piercey 2011), and external factors such as audit fees and audit partner pressure (e.g, Houston 1999 and Bierstaker and Wright 2001) contributes to the difficulty that auditors' have in performing risk assessments.

In this study, I collectively view the risk assessment literature to identify root causes and solutions to improve the risk assessment process. Academic research indicates that auditors are aware of the difficulty associated with performing risk assessments and attempt to adjust behaviors and try different approach to improve judgments; however, the PCAOB have consistently note that these efforts are not working in practice. My research indicates several possible explanations as to why auditors continue to have difficulty assessing risk.

One reason is individual auditor characteristics. Individual auditor characteristics, besides experience, may influence the ability of an auditor to recognize high risk situations where additional work or investigation is required. Given that task structure and individual knowledge are moderating factors that influence intrinsic and extraneous cognitive load, future research needs to consider the need for audit practice to incorporate adaptative learning environment.

Lastly, I analyze the newly revised auditing standards through the lens of cognitive load theory. Overall, my findings suggest that the new auditing standards are designed to improve auditor judgments and risk assessment performance. The new instructional designs such as defining key definition, updating the verbiage, and directing auditors' attention to develop schema are effective instructional tactics to help auditors as they complete risk assessments. However, academics and regulators should accept the benefits derived from the CLT instructional design with caution as the increased instructions and design can also have adverse effects on auditor judgements. In sum, the CLT framework has the potential to improve auditor risk assessment judgements, assess and understand collective research findings, and identify potential research opportunities for academics, and regulators.

EXPERIMENTAL STUDY

I. Introduction

During audit planning, auditors must identify and assess the risk of material misstatement and design risk-based audit procedures that govern the collection of sufficient and appropriate audit evidence (PCAOB 2010a and 2010b). These activities affect audit quality (Knechel et al. 2013). The audit planning process can be difficult for auditors, because it requires them to consider idiosyncratic client risk and tailor their planned audit procedures to an acceptable level of audit risk (Knechel et al. 2013; Allen et al. 2006). Failure to tailor planned audit procedures can lead to audit failure (e.g., Wilks and Zimbelman 2004; Low 2004). Despite the importance of audit planning, the PCAOB inspection reports consistently note audit deficiencies related to inappropriate assessment of and response to the risk of material misstatement (e.g., PCAOB 2017a). The purpose of my study is to examine whether cognitive control information processing helps auditors overcome information overload when making planning decisions.

I examine whether "goal-directed information processing", a type of cognitive control information processing approach improves auditors' judgments and decision-making during audit planning. Specifically, I focus on whether goal-directed information processing and cognitive flexibility independently improve auditors' risk assessment and modification of planned audit procedures to obtain an acceptable level of audit risk. I also examine whether and, if so, to what extent experience improves the effect of goal-directed information processing and cognitive flexibility on auditors' planning decisions.

A possible root cause of auditors' inability to assess and respond to risk effectively is information overload. When performing audit planning, auditors need to consider a large amount of information about the client's environment, such as the industry in which the client operates and the client's competitors, the client's day-to-day operations, and financial-reporting processes. These tasks involve processing large amounts of information to evaluate audit risk and tailor audit procedures. Information overload occurs when the supply of information exceeds the individual's information processing capacity (Simon and Newell 1971). Information overload affects how auditors understand client information and can contribute to ineffective audit planning decisions (Alon and Dwyer 2010). Individuals experience the effects of information overload because they have limited resources for self-regulation. Self-regulation involves an individual's efforts to exert cognitive control over cognitive processes, inferences or decision processes (Baumeister and Newman 1994; Avila 2001).

Cognitive control describes the process by which goals influence individual cognitive processes, behaviors and, decision making. Cognitive control is useful in a situation of information overload because it helps individuals override habits, impulses, and distractions by making decisions consistent with a goal. Prior studies have examined auditors' cognitive processes associated with performing audit planning procedures (Hoffman and Zimbelman 2009; Fukukawa and Mock 2011; Bauer, Hillison, Peecher, and Pomeroy 2019). The results from these studies suggest that altering auditors' cognitive processes can improve audit decisions.

Goal-directed information processing is a cognitive approach by which individuals exert control over their behaviors and cognitive processes. This type of information processing facilitates the flow of information (Wyer and Srull 2015). Executive functions (EF) are a set of three cognitive processes (working memory, inhibitory control, and cognitive flexibility) individuals need to be able to exert cognitive control over their behavior. In this study, I focus on cognitive flexibility and working memory.[4] Cognitive flexibility refers to an individual's ability

[4] In this study, I do not directly measure or examine inhibitory control. Inhibitory control describes mechanisms and the ability to limit the influence of unwanted actions and thoughts. I indirectly explore auditors' inhibitory control through the goal directed

to quickly reconfigure processing strategies when switching between different tasks in a new environment or new stimuli (e.g., Spiro, Coulson, Feltovich and Anderson 1988; Diamond 2013: Dane 2010). Goal-directed information processing manipulates how information is received and processed in an individuals' working memory.

Goal-directed information processing will likely help auditors exert control over their cognitive processing when making planning decisions. I examine whether auditor experience moderates the effect of goal-directed information processing on auditors' ability to assess and respond to risk. Prior research finds a positive relationship between expertise and cognitive control, because experts have complex domain knowledge that helps them make effective decisions and judgments (e.g., Dane 2010, Bonner 1990; Fredrick and Libby 1986). Accordingly, research examining audit planning and fraud risk assessment finds that domain task experience is positively correlated with the accuracy of the auditors' internal control evaluation (Nanni 1984) and that auditors with domain-specific experience are more effective at detecting a seeded error compared to auditors without domain-specific experience (Bedard and Wright 1994). Lastly, Hammersley (2006) find that auditors specializing in a particular industry recognize and interpret patterns within client data compared to auditors who do not specialize in a particular industry. Despite the benefits of experience, as individuals acquire expertise, they tend to become inflexible and experience "fixation" with respect to information within their domain and thus will be less likely to engage in cognitive control information processing. These results imply that experience will likely play a role in how effective goal-directed information processing will be in auditors' planning decisions.

---

information processing intervention. Accordingly, auditors who use goal directed information processing during audit planning should be able to exercise some level of inhibitory control by selecting appropriate behavior that is consistent with completing their goals. My primary focus is to explore how to manage auditors' cognitive processes in an information overload setting. I am not interested in limiting any aspect of auditors' cognitive processes.

Next, I examine the interactive effects of cognitive flexibility and auditor experience on auditors' ability to assess and respond to risk. Individuals with a high level of cognitive flexibility have a heightened awareness of alternative solutions in their environment and should be more willing to investigate those alternatives (Martin and Rubin 1995). Accordingly, auditors with a high level of cognitive flexibility are more likely to be aware of alternatives that could explain account inconsistencies noted during audit planning (Martin and Rubin 1995). I expect that experience will affect auditors' level of cognitive flexibility. Prior research shows that diversified experiences increase an individual's level of cognitive flexibility (Ritter et al. 2012). Therefore, as an auditor acquires more experience, it is likely that the additional experiences will be diverse, thus increasing the auditor's cognitive flexibility. Similarly, there are negative consequences associated with cognitive control and experience. Thus, these results demonstrate that audit experience will affect an individual's level of cognitive flexibility, either positively or negatively.

To test my predictions, I conducted an experiment with 74 audit seniors from a single international accounting firm. I performed a 3x2 ANOVA analysis to examine whether goal-directed information processing improves auditor judgment and to examine whether and, if so, to what extent experience improves the effect of goal-directed information processing on audit planning judgments. The dependent variable is auditors' risk-assessment accuracy and the ability to tailor the planned audit program to detect risk for both analyses. I manipulate the goal-directed information processing independent variable at three levels (Balance Control Strategy vs. Highlight Control Strategy), and I include a control condition. I measure the second independent variable, experience, as self-reported months of experience as a professional external auditor. I then categorize participants' experience as either less experienced or more experienced according to whether it is below or above the median, respectively. I perform a 2x2 ANOVA analysis to explore the effects of cognitive flexibility on planning decisions and to examine whether and, if so, to what extent experience improves auditors' level of cognitive flexibility when making planning decisions.[5] I measure the first independent variable, cognitive flexibility, using the Martin and Rubin (1995) validated cognitive flexibility scale. I separate participants into low and high cognitive flexibility according to whether they score below or above the median, respectively. I also measure the second variable, experience, by according to whether the reported experience is below or above the median, respectively.

Participants planned an engagement for a new, hypothetical audit client, Precision, Inc. The client is a publicly traded manufacturing company that sells laboratory medical instruments for blood testing to third-party retailers and end users. The case contains a seeded channel-stuffing fraud.[6] Precision has experienced a significant decline in sales of its primary product. To address the declining sales, Precision's management launched a marketing program to encourage its third-party retailers to purchase a large quantity of products at a discount. Precision typically records revenue when products are shipped to customers. However, management fraudulently inflated sales by recording revenue when items were shipped to the third-party retailers. Further, Precision stored products for third-party retailers lacking space and extended credit terms to its third-party retailers unable to repay loans within the payback period. All participants received client background information such as comparative financial statements, financial ratios, industry

[5] I do not explore the interactive effects of goal-directed information processing and cognitive flexibility on audit planning decisions. Goal-directed information processing is a cognitive approach individuals can use to exert control over their behaviors and cognitive processes. Goal-directed information processing modifies an individual's cognitive processes based on feedback from multiple behavioral responses called executive functions (Johnson, Chang and Lord 2006). These behavioral responses include attentional control, cognitive inhibition, working memory, and cognitive flexibility (Diamond 2013). In this setting, cognitive flexibility is a confounding variable because it is hard to distinguish which aforementioned behavioral response interacts with goal-directed information processing to improve planning decisions. Thus, I explore the effects of cognitive flexibility and goal-directed information processing on audit planning decisions independently. Refer to Figure 5 for an illustration of the relationship between cognitive control, executive functions and goal-directed information processing.

[6] The case is adapted from Hammersley, Johnstone, and Kadous (2011).

background, and the client-control environment that the auditor could use to make planning decisions. Next, participants assessed inherent, detection, control, and fraud risk. Finally, based on the risk assessments, the participants determined how to modify a set of standard revenue procedures.

INSERT FIGURE 5

The results of the experiment are consistent with my predictions. I find that experience influences the effect of the goal-directed information processing on auditors' risk assessment accuracy, suggesting that less-experienced auditors need help controlling their cognitive processing when performing planning activities. I also find that the auditors' level of cognitive flexibility is influenced by audit experience, which in turn affects the accuracy of their risk assessments.[7] Less-experienced auditors with high cognitive flexibility make more accurate risk assessments compared to the more experienced auditors with high cognitive flexibility, suggesting that cognitive flexibility is a valuable characteristic for less-experienced auditors. Generally, experience enhances cognitive flexibility (Ritter et al. 2012). Interestingly, in the audit planning setting, a high level of experience diminishes the effect of cognitive flexibility, suggesting that more-experienced auditors are less likely to update their conclusions with alternative solutions when they receive a large amount of information during audit planning. This diminishing effect likely occurs because auditors' learned experiences can cause them to become fixated on how they performed audit planning tasks during previous audit engagements and therefore inhibit their ability to generate new solutions (Dane 2010). I also find that cognitive flexibility influences

[7] I assembled a panel of highly experienced auditors to define benchmarks for auditors' risk ratings and proposed modifications to planned audit procedures. I used the benchmarks to assess risk assessment accuracy.

auditors' likelihood to select the appropriate planned procedures for a receivables standard audit program to detect fraud risk.

These results contribute to the auditing literature in important ways. First, I introduce a cognitive control mechanism (i.e., goal-directed information processing) that directs auditors' cognitive processing in a high-information-load environment. Second, I introduce an alternative way by which accounting researchers can operationalize audit experience. In general, prior research has examined experience by auditor rank (i.e., managers versus senior auditors). Consistent with the explanation that less-experienced auditors are performing more complex tasks (Austin, Carpenter, Christ, and Neilson 2019; Walker and Brown-Liburd 2019: PwC 2015), the experience level of auditors performing planning tasks can range anywhere from two years of experience (i.e., less experienced) to 4 to 5 years of experience (i.e., more experienced). Thus, how prior research has traditionally measured experience does not capture the variation in experience of auditors performing the studied audit tasks. Therefore, the smaller range of experience measures increases external validity and provides evidence of the marginal effects experience has on auditors' judgments.

Lastly, my results highlight how marginal differences in experience influence how auditors cognitively approach tasks and problems within the audit planning setting. These findings suggest that less-experienced auditors can benefit from adjusting their cognitive processing when performing planning tasks. Further, my results highlight a drawback experience can have on an auditor. Presumably, experience inhibits auditors' ability to identify alternative solutions when making decisions in a high-information-load setting. These results could provide audit firms with an additional attribute (i.e., cognitive flexibility) by which to determine how successful an auditor will be at assessing and responding to risk. The identification and measurement of this characteristic could influence the assignment of personnel to engagements and audit tasks, as well as the development of training.

first to explore how cognitive control can help auditors improve audit planning decisions.

II. Theory and Predictions

Goal Pursuit in Audit Planning

Goal pursuit theory asserts that goals constitute the focal point(s) around which human behavior and cognitive processing are organized, suggesting that goals govern how individuals think and behave (Fishbach and Ferguson 2007). Audit planning is a series of systematic rational procedures that achieve a collective goal—assessing and responding to the risk of material misstatement. Goal pursuit is the process by which individuals formulate wishes related to the desired outcome (Gollwitzer and Brandstatter 1997). Accordingly, goal pursuit influences human behavior and action as well as individuals' assessments and evaluations.

The PCAOB auditing standards provide a theoretical roadmap an auditor should follow during audit planning. Consistent with goal pursuit theory, auditors' interpretation of client information influences how auditors apply audit standards, which, in turn, plays a significant role in improving the effectiveness of auditors' assessments and responses to risk. An auditor could erroneously misinterpret or miss critical information about the client's environment. This error could consequently impact the process (i.e., the PCAOB auditing standards) that the auditor should follow. For example, an auditor could misinterpret or miss information about a client's complex lease agreements leading the auditor, in turn, to not follow appropriate auditing standard(s), such as consulting a leasing specialist, and, therefore, making an inaccurate risk assessment. The auditor's goal pursuit is impacted from the auditor's attention having been diverted to the wrong standards or sections. Thus, goal pursuit affects auditors' behaviors and cognitive processing when making planning decisions and audit quality.

Goal-Directed Information Processing Theory

Consistent with an information overload setting, dysfunctional consequences, such as ineffective decision-making, result from individuals having too much information. Thus, I adapt Wyer and Srull's (2015) goal-directed information processing model to an audit setting to examine how the pursuit of multiple goals in a high-information load environment improves auditors' planning decisions.[8] It is important to explore how goals affect the auditors' planning judgments and decisions, because auditors are responsible for completing more than one task to achieve the ultimate goal of planning the audit (Hammersley and Ricci 2019; Austin, Hammersley, and Ricci 2019; Griffith, Kadous, and Young 2016). Given the nature of audit planning, it is unrealistic to assume that auditors process evidence and complete one task at a time.

The goal-directed information processing model describes how individuals process information during audit planning (see Figure 6). The process begins with the receipt of external information. For example, the auditor receives information about the client's background, including information about the industry in which the client operates and the client's competitors. Upon receipt of the information, the auditor enters the comprehension stage where the auditor interprets the new information based on a goal objective. The auditor then combines information from the comprehension stage with existing information stored in the auditor's

[8] A goal can also be referred to as a task set. An audit task is a specific activity the auditor needs to perform within a specified period to achieve an audit objective or adhere to an audit plan, whereas a goal is the cognitive representation of the desired endpoint that impacts an individual's evaluations and behaviors (e.g., Locke and Latham 1990; Sorrentino and Higgins 1986). Multiple audit tasks create an audit goal. See Figure 8 for a description of the task sets I use in this study.

working memory. After processing, information is stored in the "work space." The work space is a "sometimes" temporary repository of information where information is recalled by the auditor to make a decision. Information is stored indefinitely in the work space as long as it is relevant to a processing objective. It is important to note that long term memory plays a role in information processing.

INSERT FIGURE 6

Long term memory is a permanent repository that stores information that has, at one time or another, been processed by the individual. Information is retrieved from long term memory to aid individuals when processing information based on a cognitive goal or objective, also known as a goal schema. Another way to describe a goal schema is a set of instructions that guide the individuals in attaining the cognitive goal at hand. An individuals' long-term memory may contain more than one goal schema at a time. However, its capacity is limited. Therefore, as additional objectives and the procedures for attaining them enter the unit, others may be displaced and consequently cease to affect any current information processing activity. Long term memory retrieval is also affected by experience level. Individuals with greater relevant experience will more likely have greater amount of information related to the goal schema stored in long term memory. Further, these individuals will be more likely to recall information related to those concepts interpret in previous experiences when using goal directed information processing.

The social psychology literature describes the pursuit of multiple goals as multiple-goal attainment. Consequently, individuals will seek goal attainment that is multi-final, meaning that during the goal pursuit, the individual will search for attainment that satisfies as many goals as possible (Kruglanski et al. 2002). Because of individuals' limited ability to self-regulate (Baumeister and Newman 1994), several behavioral implications occur as they attempt to pursue multiple goals (Fishbach and Ferguson 2007). Generally, when processing multiple goals, individuals will search longer for satisfying means to reach attainment and end up choosing compromise options that are less effective at or even inappropriate for satisfying each goal independently (Simonson 1989). On the other hand, an individual may reject the search for multi-finality and focus on only one goal out of many (Fishback, Dhar, and Zhang 2006). Lastly, an individual may erroneously view the attainment of one goal as the attainment of multiple goals (Fishbach and Ferguson 2007).

Individuals use a variety of information processing strategies to limit the amount of information they permit to enter their decision making (Jacoby 1984). Further, as suggested by the self-regulation theory and prior research, auditors likely cannot self-regulate behaviors when faced with a large amount of information that is used to pursue multiple goals during audit planning. I explore two alternatives (i.e., goal-directed information processing strategies) in which individuals can engage in cognitive control information processing to organize large amounts of information to make effective audit planning decisions. These strategies may help auditors combat the negative consequences that result from information overload by enhancing cognitive control when making audit planning decisions. The proposed strategies adjust auditors' underlying cognitive information processing by directing them to focus on specific planning goals. Ultimately, these cognitive control information processing alternatives will likely improve auditors' ability to make more accurate risk assessments and appropriately tailor audit procedures to obtain an acceptable level of audit risk.

Cognitive Control Strategies

Highlight Control Strategy

The highlight control strategy is one in which an individual prioritizes one goal over the other goals in a sequence during a multi-goal pursuit. Accordingly, the pursuit of a prioritized goal enhances the individual's commitment to that prioritized goal and motivates the individual to pursue complementary goals within that sequence to realize goal attainment (e.g., Aronson 1997; Locke and Latham 1990).[9] As such, the individuals will increase their motivation to make similar, complementary actions toward other goals in the sequence during goal pursuit (Fishbach, Dhar, and Zhang 2006).

Balance Control Strategy

The balance control strategy describes when individuals simultaneously focus on multiple goals rather than focusing on one goal over time. An individual who engages in this strategy will interpret that the achievement toward an initial goal, such as evaluating the client environment, indicates progress toward other planning goals (Carver and Scheier 1998; Power 1973). Under these circumstances, the individual will relax efforts toward the initial goal and begin to attend to congruent goals. In this setting, the auditor perceives that progress toward each planning goal—no matter the form that progress takes—will achieve attainment of the ultimate goal, which is to assess and respond to the risk of material misstatement. Cognitively, the auditors will focus the same level of effort to attend to all planning goals.

This leads to my first prediction. Since both strategies are intended to help auditors exert cognitive control over their cognitive processing in a high-information-load environment, I posit that auditors who use either one will make more accurate risk assessments and appropriately

[9] In this study, goal attainment is the auditors' ultimate planning goal, which is to make accurate risk assessments and to tailor planned audit programs to detect the risk of material misstatement. In this study, I focus on the required audit tasks, as outlined in the PCAOB auditing standards, that auditors need to complete to reach goal attainment.

adjust planned audit procedures to respond to fraud risk better than auditors who do not use a strategy.

H1a: Auditors who use a goal-directed information processing strategy will make more accurate risk assessments compared to auditors who do not use a strategy.

H1b: Auditors who use a goal-directed information processing strategy will appropriately adjust planned audit procedures to detect the risk of material misstatement compared to auditors who do not use a strategy.

Cognitive Flexibility Theory

Cognitive flexibility refers to an individual's ability to quickly reconfigure processing strategies when switching between different tasks in a new environment (e.g., Spiro et al. 1988). For example, cognitive flexibility occurs when an individual quickly shifts focus from color when sorting dirty clothes to shape and size when searching for a sock in a pile of freshly laundered clothes. Cognitive flexibility also describes how individuals update their beliefs and strategies as task demands change in an environment (Krems 1995). Cognitive flexibility is associated with behavioral activation and is widely recognized as a function of cognitive control (Diamond 2013)[10].

Cognitive flexibility is increasing in importance, given the digital age of multitasking and the increased availability of data (Diamond, 2013). The digital age presents individuals with a greater amount of information to choose from when faced with a new environment or setting. Individuals with high cognitive flexibility exhibit three characteristics (Martin and Rubin 1995). First, they are aware of choices and alternatives when experiencing a new environment. Second, they are not only aware of alternatives but also understand that there is more than one alternative or more than one correct behavioral response. Lastly, individuals with high cognitive flexibility

[10] Cognitive control allows information processing and behavior to adapt from moment to moment depending on a processing goal (Diamond 2013).

are confident in their ability to exert control over their motivation and behavior when shifting cognitive processes in a new environment.

I predict that cognitive flexibility can improve auditors' planning decisions. For example, auditors with high cognitive flexibility will be more likely to consider alternative solutions and interpretations of client information when evaluating financial statement accounts and the client environment. This consideration helps the auditor choose an appropriate representation or solution to make accurate risk assessments and to match risk factors to the appropriate risk response. This discussion leads to the following hypotheses:

H2a: Auditors with a high level of cognitive flexibility will make risk assessments of greater accuracy than those made by auditors with a low level of cognitive flexibility.

H2b: Auditors with a high level of cognitive flexibility will appropriately adjust planned audit procedures to detect the risk of material misstatement, while auditors with a low level of cognitive flexibility will not.

Auditor Experience

An extensive audit literature shows that experience affects judgments in various audit settings (e.g., Bonner 1990; and Frederick and Heiman-Hoffman 1994; Fredrick and Libby 1986). Prior research finds a positive relationship between expertise and cognitive control, because experts have complex domain knowledge that helps them make effective decisions and judgments (Dane 2010, Bonner 1990; Fredrick and Libby 1986). Accordingly, research examining audit planning and fraud-risk assessment finds that domain task experience is positively correlated with the accuracy of the auditors' internal control evaluation (Nanni 1984), and auditors with domain-specific experience are more effective at detecting a seeded error than are auditors without domain-specific experience (Bedard and Wright 1994). Lastly, Hammersley (2006) found that auditors specializing in the industry in which the client operates recognize and interpret patterns within client data that auditors lacking such specialization cannot. Despite the benefits of experience, as individuals acquire expertise, they tend to become inflexible, experiencing fixation with respect to information within their domain, and thus will be less likely to engage in cognitive control information processing

These findings suggest that as auditors advance in their careers, increased levels of professionally relevant task knowledge improve their audit planning judgments (Gissel and Johnstone 2017). However, as described by Hammersley (2011), experience depends on the specific situations encountered during an audit engagement. Because of the infrequent nature of fraud occurring during a financial statement audit, practice provides little opportunity for learning directly from experience (Hammersley et al 2011)[11]. Therefore, simply knowing the number of years of experience an auditor has is not enough for researchers to know the types of fraud the auditor has experienced and whether the auditor's experience is relevant to the fraud the researchers are examining. This leads to the following non-directional hypotheses:

H3a: Auditor experience will influence how auditors assess the risk of material misstatement when making planning decisions.

H3b: Auditor experience will influence how auditors adjust planned audit procedures to respond to fraud risk when making planning decisions.

Interactive Effects: Audit Experience, Cognitive Flexibility, and Goal-Directed Information Processing

Next, I examine the interactive effects of cognitive flexibility and auditor experience on auditors' ability to assess and respond to risk. Consistent with cognitive flexibility theory, more-experienced auditors should be aware of alternatives that could explain inconsistencies noted during audit planning, because prior experience should help them develop and refine their independent expectations (Martin and Rubin 1995). Further, prior research shows that diversified experiences positively increase an individual's level of cognitive flexibility (Ritter et al. 2012).

[11] Hammersley et al (2011) report that less than 25% of their study participants had direct knowledge or prior experience with financial statement fraud.

Therefore, as an auditor acquires more experience, it is likely that the auditor's experience will become more diverse, thus increasing the level of cognitive flexibility.

Despite the benefits of experience, there are negative consequences associated with cognitive flexibility. As individuals acquire expertise, they tend to become inflexible and experience fixation with respect to information within their domains and thus will be less likely to engage in cognitive control information processing. Relatedly, while inexperienced auditors could lack task-specific knowledge, they may be more willing to be flexible and appreciate having to adapt to new situations. For example, Abdolmohammadi and Wright (1987) found a negative relationship between audit experience and the likelihood of proposing an audit adjustment or qualified opinion. One possible explanation for this finding is that less-experienced auditors possess a higher level of confidence in their ability to perform the audit task, leading them to propose more adjustments. This finding could also mean that less-experienced auditors lack knowledge of how to accurately apply auditing standards. Thurs, less-experience auditors will erroneously propose adjustments or issue a qualified opinion. This leads to the following non-directional hypothesis:

H4a: The interaction between auditor experience and cognitive flexibility will influence auditors' ability and likelihood to assess and respond to the risk of material misstatement when making planning decisions.

On the other hand, according to Wyer and Srull's (2015) information processing model, individuals with more experience will have considerably more information stored in their work space and long-term memory. Auditors use information stored in their work space to make planning decisions. Because individuals with more experience will likely process more information in their work space, they will have a higher likelihood of information recall (Wyer and Srull 2015). Keeping in mind the results from Hammersley (2001), because of the infrequent nature of fraud, it is unclear how fraud experience influences auditors' decisions. Based on the above logic, I posit that experience will influence the effectiveness of goal-directed information processing control strategies, with the following hypothesis:

H4b: The interaction of auditor experience and the goal-directed information processing strategy will influence auditors' ability and likelihood to assess and respond to the risk of material misstatement when making planning decisions.

III. Research Design and Methodology

I conduct an experiment using 74 audit seniors. Participants represent a single international audit firm.[12] I investigate the effects of cognitive control information processing using two analyses. With the first, I explore whether cognitive control information processing measured by goal-directed information strategies improves planning judgments. I compare the mean risk-assessment rating of auditors who used goal-directed information processing to the mean risk-assessment rating of auditors who did not use goal-directed information processing (i.e., participants in the control condition) to measure the effectiveness of the goal-directed information processing strategies. I conduct a 3x2 analysis in which I measure three goal-directed information processing strategies: balance control strategy, highlight control strategy, and the control condition.[13] With this analysis, I explore the effects of the goal-directed information processing strategies on planning decisions and examine whether and, if so, to what extent experience improves auditors planning decisions. Second, I explore the effects of

[12] At the time that this was working draft was written, I had only analyzed 74 participants. I received an additional 128 responses by attending audit training for a second large accounting firm. I have combined those responses with the responses referenced in this version of the manuscript. The results from the combined responses are in Appendix A.

[13] The results of the 3x2 between subjects ANOVA test where the cognitive control strategies (highlight strategy, balance strategy, and control group) and experience (less experienced and more experienced) were the independent variables and participants' mean fraud risk assessment was the dependent variable did not yield an significant results In this analyses, I conduct a 2x2 to explore whether experience and cognitive flexibility separately improve the effect of goal-directed information processing on planning judgments. I combine participants who used one of the two goal-directed control strategies into one independent variable. The second independent variable represents the participants who did not use any control strategies to make planning decisions.

cognitive flexibility on planning decisions and examine whether and, if so, to what extent experience improves auditors' level of cognitive flexibility when making auditors planning decisions.

I adapt the experimental materials used by Hammersley et al. (2011) to my setting. The experiment includes five phases. In the first, auditors complete the cognitive flexibility scale. In the second, participants read background information on a hypothetical audit client. Participants assumed the role of an audit senior responsible for planning an engagement for a new hypothetical audit client, Precision. The client is a publicly traded manufacturing company that sells laboratory medical instruments for blood testing to third-party retailers and end users. Following Hammersley et al (2011), the case contains a seeded channel-stuffing fraud motivated by a significant decline in sales of the company's primary product. To address the declining sales, management launched a marketing program to encourage its third-party retailers to purchase a large quantity of products at a discount. Precision typically records revenue when products are shipped to customers; however, management fraudulently inflated sales by recording revenue when products were shipped to the third-party retailers. All participants receive the client's background information, including comparative financial statements, financial ratios, industry background, and the client's control environment, which the auditor can use to make planning decisions. Next, participants assess inherent, detection, control, and fraud risk. Based on the audit risk assessment, the auditors determine how to modify a set of standard audit programs. Lastly, participants complete a post-experimental questionnaire.

Independent Variables

Goal-Directed Information Processing Strategy Manipulations

I manipulate goal-directed information processing strategies at three levels: balance control strategy, highlight control strategy, and a control condition. Before reading background information about the client, the participants received further direction from the audit manager on how and where to focus their time as they complete the audit planning procedures. Consistent with the balance control theoretical strategy, the audit manager directs the participating auditors to focus their time equally on each of the four audit planning goals. I provide details outlining these four goals. According to the highlight control strategy, the audit manager directs participating auditors to prioritize their time on one of the four planning goals. Participants in the control condition receive no direction about how to focus their time as they complete the audit planning procedures, though they still receive the four goals.

Creation of the Experimental Planning Goals

I use data from the PCAOB auditing standard 9, "Audit Planning and Risk Assessment," to identify all required planning tasks (PCAOB 2010b). I use thematic analysis to group the audit tasks by broader themes or patterns outlined within the audit planning standards. [14] I continue this iterative thematic analysis of grouping and identifying patterns until the themes did not have any shared meaning or overlap around a central concept. From this iterative process, I identify the following three out of four goals used in the experimental case:

1. Identify client risk factors relating to the environment and/or business strategy;
2. Assess audit risk (i.e., inherent, control, and detection risk); and
3. Adjust planned audit procedures to appropriately respond to risk.

Next, I review the PCAOB deficiency reports to identify any planning tasks auditors are performing that are not reflected in the auditing standards. The PCAOB deficiency reports do not specify how auditors are using technology during planning but provide evidence that auditors are

[14] A thematic analysis is a research methodology that focuses on examining themes or patterns of meaning within data or a data source (e.g., Daly, Kellehear and Gliksman 1997). The themes are operationalized as patterns of shared meaning across data sets or by a central idea, which is important in understanding the relevancy of the research question or objective.

considering the use of technology and outputs from technology when assessing risk. Based on the information outlined in the PCAOB deficiency reports, I identify the last audit planning goal:

4. Consider how audit technology can be used to assess risk.

I create the percentages that directed the participants' time for the highlight control strategy from information outlined in 2015, 2016, and 2017 PCAOB inspection reports (PCAOB 2015; PCAOB 2016; PCAOB 2017a) A recurring theme in these reports is a failure to assess and respond to risks of material misstatements. For example, all the reports state that auditors did not consider appropriate client-specific information that corresponded to certain assertations in the financial statements when assessing and responding to risk. Additionally, the inspection reports state that auditors do not obtain sufficient understanding of the revenue-recognition process.

INSERT FIGURE 7

Each report highlights deficiencies related to the auditors' response to risk; presumably, auditors do not spend adequate time and effort on their risk response (i.e., adjusting planned procedures) in practice. Based on these findings and tenets of the highlight strategy approach, I develop percentages for directing participants' time. Specifically, in the highlight goal condition, I direct participants to place half (50%) of their focus on the audit goal, "adjusting planned audit procedures to appropriately respond to risk."[15]

Audit Experience

15 The remaining weights in the highlight control strategy are calculated based on the auditor's ability to perform the remaining audit planning goals, as outlined in the PCAOB inspection reports. In the highlight control condition, I direct auditors to focus less time on audit planning goals that auditors traditionally perform with few reported deficiencies. Based on PCAOB findings, auditors generally make accurate risk assessments, suggesting that auditors gain an adequate understanding of the client environment in practice. Therefore, I assign a weight of 25% to the audit goal, "assess audit and fraud risk," and assign 15% to the audit goal, "identify client risk factors." Lastly, given the lack of auditing standard that addresses how the auditor should use technology in the audit, I assign the least weight (10%) to the audit goal, "considering how audit technology can be used to assess risk." See Figure 7 for a description of the experimental conditions and the assigned weights.

I measure audit experience as participants' self-reported total number of months working as a professional external auditor. I create a categorical variable to indicate whether a participant's responses are below or above the median, attributing values of low or high experience, respectively. Generally, prior research has operationalized experience by auditor rank (Knapp and Knapp 200) (i.e., managers versus senior auditors). Consistent with the explanation that less-experienced auditors are performing more complex tasks, presumably the experience level of auditors performing decision planning can range anywhere from two years of experience (i.e., less experienced) to 4 to 5 years of experience. Thus, the way prior research has traditionally measured experience does not capture the variation in experience of auditors performing these audit tasks. Because senior auditors typically initiate and perform the more complex audit planning tasks, I focus on variation within rather than across ranks (Hammersley et al 2011).[16]

Cognitive Flexibility

I measure rather than manipulate cognitive flexibility for three reasons. First, three factors comprise the cognitive flexibility construct: (a) the awareness that in any given situation there are options and alternatives available; (b) the willingness to be flexible and adapt to a situation; and (c) confidence in their ability to exert control over their motivation and behavior when shifting cognitive processes (Martin and Rubin 1995). Research is silent as to which construct—or combination of constructs—influences participants' behaviors more when performing an experimental task. Consequently, I measure cognitive flexibility using a validated

16 Prior literature has expressed concerns regarding the construct validity of the "experience" variable. For example, some studies provide evidence that domain-specific experience, such as in fraud or IT, affects auditors' assessments of the likelihood of material errors and improves their effectiveness (e.g., Bedard and Wright 1994, Hammersley 2004). However, the frequency at which general auditors experience fraud is very low. As a result, little is known about the types of fraud auditors have experienced and whether that experience is relevant to the frauds examined in the research (Hammersley 2011). Therefore, general audit experience is a suitable construct for my setting.

scale (Martin and Rubin 1995). Second, by definition, cognitive flexibility describes a personal characteristic that is both trait-specific (i.e., inherent and stable characteristics of an individual) and state-specific (i.e., adaptive skills that can change over time and by situation). These competing factors could lead to significant variation among auditors. However, this combination also illuminates difficulty in sufficiently manipulating cognitive flexibility. Consistent with the theory, cognitive flexibility is at least in part adaptive, which suggests it can be improved.

Dependent Variables

Expert Panel

The primary dependent variables focus on the accuracy of auditors' planning judgments and decisions. I assemble a panel of highly experienced auditors to define benchmarks for auditors' risk ratings and propose modifications to planned audit procedures, both of which are discussed next. The expert panel includes three auditors (one partner, one senior manager, and one manager) with an average of 12.2 years of audit experience. Participants are responsible for leading or managing the audit practice in their respective offices or lines of business in the audit firm. Members rank the audit test objectives for each standard audit program and recommend a testing procedure for the testing objective they rank the highest.

Assessing Fraud Risk

Participants assess inherent, control detection, and fraud risk for the revenue cycle on an 11-point Likert-type scale ranging from 0 (low risk) and 10 (high risk). I determine participants' accuracy based on whether the participant rated fraud or inherent risk as high, which demonstrates the participant attended to the channel-stuffing fraud embedded in the case. I divide participants' risk ratings into low, medium, and high, with a rating for fraud or inherent risk at or above 7 considered to be high. This approach is consistent with a ranking within the top third. I then compare each participant's rating to those of the expert panel. Where ratings match, I considered the participant's rating to be "accurate."

Responding to Risk—Modification to Audit Programs

The second dependent variable I measure examines how participants modify a standard audit-revenue cycle-planned program. The standard audit revenue cycle planned program includes three standard audit test procedures that comprise the revenue cycle: (1) sales, (2) sales and receivables, and (3) receivables. Each standard audit test procedure contains five testing objectives auditors can focus on to detect the risk of material misstatement. Participants rank the five testing objectives in order of importance (where 1 is most important, and 5 is least important) according to what they would focus on when responding to Precision's risk of material misstatement. For the testing objective they rank the highest, the participant explains the ranking and describes the nature, timing, and extent of the audit procedure(s) they would use to test the objective. The author and a research assistant, who is blind to the experimental conditions and predictions, codes the descriptions of audit procedures. To evaluate participants' program modification, I measure the degree to which the participant's program rankings coincide with the expert panel's benchmark.[17] The expert panel identifies an appropriate program modification for each of the three standard audit test procedures within the revenue cycle.

IV. Results

Effects of Goal-Directed Information Processing Strategies on Risk Assessment Accuracy

I first examine whether goal-directed information processing improves auditors' fraud risk assessments. I conduct a 3x1 between-subjects ANOVA where the participants' mean fraud risk

[17] To develop the benchmark, I fist provide the expert panel with the case background and tell them about the channel-stuffing fraud to ensure their responses are the best for fraud detection. I collect a response from each panelist. Next, I combine and review all the responses to identify any significant outliers. For any one response that was not consistent with those of the other two panel members, I follow up with the panelist and review supplement documentation, such as fraud textbooks, to confirm the most accurate response.

rating is the dependent variable, and the balance strategy, highlight strategy, and control condition are the independent variables. The results (not tabulated) from the ANOVA are not significant, suggesting that goal-directed information processing strategies individually do not affect auditors' when making risk assessments. I also perform a serious of two-tailed t-tests to determine if the participants' mean fraud and inherent risk rating were significantly different by each condition [18]. The results from these test did not yield any significant results. Thus, I do not find evidence to show that the goal directed information processing strategies independently influence auditors' risk assessments. My results do not support H1a. Refer to Table 1 for the participants' descriptive statistics. Refer to Table 2 for the mean inherent and fraud risk ratings for each participant by each goal directed information processing strategy.

INSERT TABLE 1

INSERT TABLE 2

Effects of Cognitive Flexibility on Risk Assessment Accuracy

Next, I examine whether cognitive flexibility influences auditor's ability to accurately assess inherent risk and fraud risk. The results from the univariate analysis (not tabulated) with the participant's fraud risk assessment as the dependent variable and cognitive flexibility as independent variable reveal that cognitive flexibility plays a significant role in assessing fraud risk ($F=8.12$; $p=.006$). I do not find a significant association between cognitive flexibility and inherent risk or a significant association between cognitive flexibility and the other risk ratings (i.e., detection risk and control risk). The participants' mean fraud score increased from 6.00 to 7.36 as the level of cognitive flexibility decreased. These results suggest that cognitive flexibility

[18] For each two-tailed t-test, I compared the means of the participants' risk scores across strategy conditions. I performed this testing, instead of a planned contrast analysis, to determine if one out of the two goal-directed information strategies were more effective at helping auditors assess risk.

influences auditors' behaviors when making fraud risk assessments but not inherent risk assessments. The remaining analysis in this paper focuses on participants' mean fraud risk assessments. While I find a significant association, interestingly, I do not find evidence that shows auditors with high cognitive flexibility will assess risk higher compared to auditors with low cognitive flexibility. Participants with high (low) cognitive flexibility assess inherent risk at 6.76 (6.81) and fraud risk at 6.00 (7.39) respectively. I find partial support for H2a. I find that cognitive flexibility influences auditors' risk assessment but not in the direction I predicted. Refer to Table 3 for the participants' mean inherent and fraud risk ratings by cognitive flexibility.

INSERT TABLE 3

Effects of Audit Experience on Risk Assessment Accuracy

I examine whether audit experience influences auditors' inherent risk and fraud risk assessments. I perform a series of two-tailed t-tests to determine if the participants' mean fraud and inherent risk rating were significantly different by experience. The results from these tests do not yield any significant results. The results suggest that in this setting, experience does not influence auditors' planning decision, thus providing no support for H3a. This finding indicates that domain-specific knowledge (i.e., a fraud specialist) opposed to general knowledge may be useful in helping auditors in planning to assess risk. Refer to Table 4 for the participants' mean fraud and inherent risk ratings by audit experience.

INSERT TABLE 4

Effects of Experience and Cognitive Flexibility on Risk Assessment Accuracy

With further analysis, I explore if experience interacts with cognitive flexibility when auditors assess fraud risk. Consistent with the cognitive flexibility theoretical constructs and the auditor experience literature, I expect that cognitive flexibility will have a differential effect on participants' mean fraud risk assessments when the participants' audit experience varies. The results from the ANCOVA with the participant's fraud risk assessment as the dependent variable, the participants' self-assessment of exerted effort when making the fraud risk assessment as a covariate and cognitive flexibility and experience as independent variables reveal a significant interaction ($F = 6.23$, $p = 0.013$, Table 5), thus partially supporting H4a.[19] I include the audit effort variable as a covariate because audit effort is correlated with the dependent variable, the participants' mean fraud risk rating ($p=0.03$; not tabulated). Further prior audit archival (e.g., Davidson and Gist 1996) and experimental research (e.g., Mock and Wright 1993), find an association between audit effort and performance. I do not find significant main effects of cognitive flexibility and audit experience on the participants' mean fraud risk rating. The results suggest that more experienced auditors, with high cognitive flexibility, either identify fewer alternatives in their Work Space or are less confident to act on the alternatives they identified in their work space. Therefore, is likely that high levels of cognitive flexibility tend to distract more experienced auditors compared to less experienced auditors from making accurate risk assessments.

INSERT TABLE 5

INSERT FIGURE 9

[19] I find that the interactive effect of experience and cognitive flexibility improves the accuracy of auditors' fraud risk assessment but does not improve auditors' ability to modify planned audit programs.

Effects of Experience and the Cognitive Control Strategies on Risk Assessment Accuracy

I perform further analysis to determine whether experience influences the effect of the goal-directed information processing has on participants' mean fraud risk scores. The ANCOVA results with the participants' mean fraud risk assessment as the dependent variable and the goal-directed information strategies and auditor experience as independent variables reveal a significant interaction (F=3.96, p=.05, Table 6), thus finding partial support for H4b[20]. The results suggest that less experienced auditors benefit from goal-directed information strategies compared to more experienced auditors. For example, more experienced auditors assess fraud risk approximately 12.6% units lower compared to the less experienced auditors who received the control strategy. Overall, I find that the cognitive control strategies help less experienced auditors exert control by self-regulating their cognitive processing when performing audit planning tasks in a high information load environment. My results provide strong evidence that the cognitive intervention, goal-directed information processing, will help less experienced auditor self-regulate to lessen the adverse effects of information overload in the audit planning setting.

INSERT TABLE 6

INSERT FIGURE 10

Effects on Audit Response

I examine if goal-directed information processing strategies (H1b), cognitive flexibility (H2b), and experience (H3b) independently affect auditor's ability to adjust planned audit procedures accurately. I run a probit regression model where the independent variable is the goal-

[20] I combine participants who use one of the two goal-directed control strategies into one condition. The second condition represents the participants who did not use any control strategies to make planning decisions.

directed information strategies, cognitive flexibility, and experience on the three standard audit programs. The probit model measures the likelihood that the auditor will focus on the appropriate testing objective that identifies fraud. Using the ranking information from the expert panel that identifies the appropriate testing objective that is effective to detect the fraud in the case, I noted the top two rankings of each expert panelist. The expert panel was consistent with their ranking for the standard audit programs. For each standard audit program, I created dummy variables, 0 and 1, to measure whether the participant identifies the appropriate audit program. Participants who identified at a minimum one of the top two ranked testing objective as defined by the expert panel was categorized as 1, where all else is 0. I measure each participating auditors' average months of experience and his/her cognitive flexibility score as part of this analysis.

I find that cognitive flexibility (B=1.39, SE=.650, p=0.05) influences how auditors modify the receivables standard audit program (Not Tabulated). For example, auditors with a high level of cognitive flexible are more likely to identify the appropriate testing objective for audit programs related to accounts receivables. I did not find a significant association between goal directed information processing strategies and the modification of any of the standard audit programs (H1b). I do not find a significant association between experience and the modification of any of the standard audit programs (H3b). Lastly, I don't find a significant interaction of experience and cognitive flexibility (H4a) on program modification nor a significant interaction of experience and goal-directed information processing strategies on program modification (H4b). Thus, the results show partial support that cognitive flexibility influences how auditors adjust planned audit programs, thus finding partial support for H2b.

V. Conclusion

Auditing standards require auditors to assess and respond to the risk of material misstatement. In this study, I examine the effects of goal-directed information system processing, experience, and cognitive flexibility on auditor's ability to assess and respond to risk during audit planning procedures. Mainly, I consider how goal-directed information processing helps auditors reduce the adverse effects from information overload My findings suggest that less experienced auditors can benefit from engaging in goal-directed information processing compared to more experienced auditors when performing planning tasks. Interestingly, I find that cognitive flexibility is a characteristic that primarily helps less experienced auditors compared to more experienced auditors. I also find that auditors, who scored high on the cognitive flexibility scale, are more likely to identify the appropriate planning procedures to detect fraud.

This study has multiple implications for future research. First, future research can explore if goal-directed information processing can benefit auditors in a different audit setting where auditors experience high information overload or have to perform multiple tasks to achieve an audit objective. For example, future research can explore if this intervention will work for auditors in a high judgment setting, such as auditing complex estimates. With additional theoretical considerations, future research can explore the boundaries conditions and auditor characteristics in which the current study findings hold. Second, prior research empirically finds an association between cognitive flexibility and creativity. Further, creativity is a valuable trait that the PCAOB has focused on as a way to improve audit quality (PCAOB 2017b). Interestingly, I did not find evidence that cognitive flexibility benefits experienced auditors. Future research can determine if creativity will be a useful trait for auditors to have as auditors begin to incorporate emerging technologies in the audit process (Journal of Accountancy 2017).

Third, cognitive flexibility has a substantial impact on less experienced auditor judgments and decisions, but the mechanism as to how cognitive flexibility or the interaction of cognitive flexibility and experience works to impact audit judgment is not well defined or explored in this study. It is also possible that other variables not captured in this study interact with cognitive flexibly to impact auditor judgment and decisions. If future research can identify the mechanism that explains the effect, audit firms can design training and create audit decision aids or modify the audit methodology to enable individuals with more experience to fully benefit from cognitive flexibility. Finally, I only explore and manipulate the cognitive processes that auditors use to assess and respond to risk. I did not examine the underlying factors that influenced the auditors' behaviors and impacted judgments when engaging in goal-directed information processing.

In summary, my study contributes to audit research and practice. First, I provide insight into a characteristic that has not been explored in the audit literature. Cognitive flexibility is a valuable characteristic that will help auditors as they navigate audit processes and tasks that involved multiple steps in high information overload environments. My observation that less experienced auditors tend to have a higher level of cognitive flexibility compared to more experienced auditors validates the need for more experienced auditors to attend training that focuses on enhances creativity. My findings that less experienced auditors benefit from goal-directed information processing demonstrates the importance of guiding less experienced auditors when making planning decisions and the importance of audit firms to consider individual attributes when assigning audit personnel to audit engagements.

Analyses with Full Sample

In this section, I perform the same statistical analysis as performed in the working paper using my full sample. The full sample consists of observations from auditors from one Big4 and one NonBig 4 international public accounting firm located in the Midwest. I conduct the experiment with 188 auditors. The analysis and results consist of 146 usable responses. (78% of the auditors passed the manipulation checks). Below are the results, along with the updated tables and analysis.

UPDATED RESULTS – FULL SAMPLE

H1a. Effects of Goal-Directed Information Processing Strategies on Risk Assessment Accuracy

I conduct a 3x1 between-subjects ANOVA where the participants' mean fraud risk rating is the dependent variable, and the balance strategy, highlight strategy, and control condition are the independent variables. I also perform a serious of two-tailed t-tests to determine if the participants' mean fraud risk assessments were significantly different by each condition.

Findings: The results from the ANOVA are not significant, suggesting that goal-directed information processing strategies independently do not affect auditors' risk assessments.

H2a. Effects of Cognitive Flexibility on Risk Assessment Accuracy

I perform a series of two-tailed t-tests to determine if the participating auditors' mean fraud and inherent risk rating are significantly different by both levels of cognitive flexibility (i.e., lower levels versus higher levels of cognitive flexibility).

Findings: The results from the two-tailed tests do not reveal any significant results, suggesting that cognitive flexibility does not affect auditors' when making risk assessments.

H3a. Effects of Audit Experience on Risk Assessment Accuracy

I perform a series of two-tailed t-tests to determine if the participant auditors' mean fraud and inherent risk rating were significantly different by levels of audit experience (i.e., more experienced and less experienced auditors).

Findings: The results from the two-tailed tests do not reveal significant results, suggesting that audit experience does not affect auditors' when making risk assessments.

H4a. Effects of Experience and Cognitive Flexibility on Risk Assessment Accuracy

I perform a 2x2 between subjects ANOVA where the participating auditors' mean fraud risk rating is the dependent variable and experience and cognitive flexibility are the independent variables.

Findings: The results from the ANCOVA with the participant's fraud risk assessment as the dependent variable, the participants' self-assessment of exerted effort when making the fraud risk assessment as a covariate and cognitive flexibility and experience as independent variables reveal a significant interaction ($F = 6.30$, $p = 0.013$). I do not find significant main effects of cognitive flexibility and audit experience on the participants' mean fraud risk rating. The results reveal that more experienced auditors, with high cognitive flexibility have lower risk assessment ratings compared to less experienced auditors with higher cognitive flexibility. The results suggest that more experienced auditors either identify fewer alternatives in their Work Space or are less confident to act on the alternatives they identified in their work space when performing risk assessments. Therefore, is likely that high levels of cognitive flexibility tend to distract more experienced auditors.

H4b. Effects of Experience and the Cognitive Control Strategies on Risk Assessment Accuracy

I perform a 2x2 between subjects ANOVA where the participants mean fraud risk rating is the dependent variable and experience and the goal-directed information strategies are the independent variables and the participants' self-assessment of exerted effort when making the fraud risk assessment is a covariant.

Findings:_The results from the ANCOVA with the participant's fraud risk assessment as the dependent variable, the participants' self-assessment of exerted effort when making the fraud risk assessment as a covariate and cognitive flexibility and experience as independent variables do not reveal significant results.

I also perform a 2x2 between-subjects ANOVA where the participants mean fraud risk rating is the dependent variable and experience and the balance and highlight cognitive control strategies are the independent variables. I also include experience variables and the participants' self-assessment of exerted effort when making the fraud risk assessment as covariates. In this analysis, I only include participants assigned to the highlight and balance cognitive control strategies. I do not find a significant interaction between experience and cognitive control strategies. However, I do find that the main effect of the control strategies is significant. The results suggest that auditors assigned to the balance cognitive control condition rate fraud risk an average of 1.3 points higher than auditors assigned to the highlight condition.

The theoretical construct underlying the cognitive control strategies describes how individuals should direct their attention to optimize how individuals self-regulate (i.e., control) their thoughts and behaviors when performing tasks. In my experimental setting, I instruct the participants assigned to the balance condition to focus 25% of their attention on the risk assessment. Unlike the balance condition, participating auditors assigned to the highlight condition are instructed to focus 15% of their attention on the risk assessment. Given the results, creating goals for auditors that directs their attention to focus on specific tasks is beneficial.

Effects on Audit Response

H1b, H2b, H3b, H4a/b. I run a probit regression model where the independent variable is the goal-directed information strategies, cognitive flexibility, and experience on the three standard audit programs. The probit model measures the likelihood that the auditor will focus on the appropriate testing objective that identifies fraud. I noted the top two rankings of each expert panelist. The expert panel was consistent with their ranking for the standard audit programs. For each standard audit program, I created dummy variables, 0 and 1, to measure whether the participant identifies the appropriate audit program. Participants who identified at a minimum one of the top two ranked testing objective as defined by the expert panel was categorized as 1, where all else is 0. I measure each participating auditors' average months of experience and his/her cognitive flexibility score as part of this analysis.

Finding: **H1b:** I find a significant association between goal directed information processing strategies and the modification of the sales and receivables standard audit programs to detect fraud (B=-1.22, SE=.58, p=.036). For example, auditors who use one of the goal-directed information processing are less likely to select the appropriate audit programs that detects fraud.

H2b: I find a significant association between cognitive flexibility and the modification of the receivables standard audit programs to detect fraud (B=1.05, SE=.40, p=0.009). For example, auditors with higher levels of cognitive flexibility are more likely to modify the receivables standard audit program to detect fraud.

H3b: I find a significant association between audit experience and the modification of the receivables standard audit programs to detect fraud (B=1.00, SE=.401, p=.013). For example, auditors with higher levels of experience are more likely to modify the receivables standard audit program to detect fraud.

H4a: I find a significant association between the interaction of audit experience and cognitive flexibility on the modification of the receivables standard audit programs to detect fraud (B=1.26, SE=.410, p=.002). For example, more experienced auditors with higher levels of cognitive flexibility are more likely to appropriately modify the receivables standard audit program to detect risk compared to auditors with lower levels of cognitive flexibility with higher levels of experience.

H4b: I find a significant association between the interaction of audit experience and cognitive control strategies on the modification of the sales and receivables standard audit programs to detect fraud (B= -.837, SE= .43 p=.05). For example, auditors with fewer years of experience that use a cognitive control strategy are more likely to modify the appropriate sales and receivable audit program to detect fraud.

CONCLUDING REMARKS (UPDATED WITH FULL SAMPLE)

Interestingly, my results change when I included the full population into my data analysis. The results in the working draft consist entirely of participants from the Big4 firm. Thus, the full sample includes auditors from the original sample (participants from Big4) and auditors from a NonBig 4 firm.

Consistent with the results from the working draft, the results from the 3x1ANOVA testing where the cognitive control strategies are the independent variables and the auditors' fraud risk assessments is the dependent variable reveals that cognitive control strategies do not influence the accuracy of auditors' risk assessments. Consistent with the main effects result in the working draft, I find that audit experience does not influence auditors' inherent risk and fraud risk assessments. Not consistent with results in the working draft, I find that cognitive flexibility does not influence auditor's risk assessments. With respect to the interactive results, consistent with the working paper results, I find that more experienced auditors, with high cognitive flexibility, make less accurate risk assessments than less experienced auditors with high cognitive flexibility. Surprisingly, I find the same interactive effect when inherent risk is the dependent variable. I did not find a significant interactive effect of experience and cognitive control strategies on auditors' fraud risk assessments.

However, the current analysis does not capture the accuracy of the auditor's risk assessments. To capture the auditors' risk assessments' accuracy, I measure how close the auditors' risk assessment is to the expert panel's assessment. I run a probit regression model where the independent variable is the goal-directed information strategies, and the dependent variable is the auditors' risk assessment accuracy. I use the expert panel's risk assessments (inherent, control, detection, and fraud risk) as a benchmark to assess the accuracy of the participating auditors' assessments. I calculate the average rating for each risk type among the highly experienced auditors that comprise the expert panel. For each risk assessment (inherent, control, detection, and fraud), I created dummy variables, 0 and 1, to measure the auditors' risk assessments' accuracy. Participating auditors whose assessment rating is within a three-rank range is categorized as 1, where all else is 0. For example, the expert panel's average risk assessment for fraud risk is 8. Participating auditors' that ranked their fraud risk assessment as 7, 8, or 9 is categorized as 1; all other rankings are 0.

See the results for the above analysis in this section of the dissertation. Keeping in mind the logic from above, I also run a probit regression analysis to determine if audit experience and cognitive flexibility influence auditors' likelihood of making accurate risk assessments. I also examine the interactive effects of cognitive flexibility and experience and the interactive effects of experience and cognitive control strategies on the auditors' risk assessments' accuracy.

With respect to how auditors respond to risk, I find significant results associated with auditors' risk response. In the working draft, the significant results reveal that auditors with higher cognitive flexibility are more likely to modify the receivables audit program to detect fraud. The analysis that includes the full sample reinforces that the cognitive control strategies are more helpful for less experienced auditors than more experienced auditors when identifying audit program to detect fraud. Consistent with the working paper results, I find that

auditors, who scored high on the cognitive flexibility scale, are more likely to identify the appropriate planning procedures to detect fraud. Unlike the results associated with the risk assessment accuracy,

I find that experience influences how auditors respond to risk and that auditors with higher levels of cognitive flexibility with more experience are more likely to modify the receivable audit program to detect fraud. These findings suggest that different skillsets and levels of experience are needed to assess risk assessments compared to responding to the risk of material misstatement. For example, audit firms and future research should further explore and identify the skillsets and experience required to assess risk and respond to risk independently. Identifying these skill sets can help audit firms design training and create audit decision aids or modify the audit methodology to enable individuals with more experience to perform specific audit tasks such as risk response procedures.

Updated Tables with Full Sample

TABLE 1: Participant Descriptives (Full Sample =147)

	n	Mean	Median	Min	Max	SD
CPAs	53%					
Experience (in months)	146	34.46	36	6	90	17.76
Cognitive Flexibility Score (Composite Score)	146	5.08	4.92	3.58	6.58	.69

TABLE 2: Test of hypothesis 1a (Full Sample)

Effects of Goal-Directed Information Processing on Risk Assessment

Panel A: The participants' mean Inherent ant and Fraud Assessment

	Inherent Risk	Fraud Risk
Balance Control Strategy	7.43 n=46 (2.21)	6.43 n=46 (2.97)
Control Condition	7.16 n=38 (2.53)	6.37 n=38 (2.63)
Highlight Control Strategy	7.04 n=45 (1.68)	6.87 n=45 (2.14)
Combined	7.22 n=129 (2.14)	6.57 n=129 (2.60)

Table 2 reports the result of the H1a test. *Goal-directed information processing* strategy is manipulated at three levels: Balance Control Strategy, Highlight Control Strategy, and the Control Condition.

TABLE 3: Test of hypothesis 2a (Full Sample)

Effects of Cognitive Flexibility on Risk Assessment

Panel A: The participants' mean Inherent and Fraud Risk Assessment

	Inherent Risk	Fraud Risk
High Cognitive Flexibility	7.14 n=69	6.58 n=60
Low Cognitive Flexibility	7.30 n=60	6.55 n=69
Combined	7.22 n=129	6.57 n=129

Table 3 reports the results of the H2a test. *Cognitive Flexibility* is a dichotomous variable categorized as 'Low Cognitive Flexibility' when the participant score is lower than the median and 'High Cognitive Flexibility' when the participant score is greater than the median.

TABLE 4: Test of hypothesis 3a (Full Sample)

Effects of Experience on Risk Assessment

Panel A: The participants' mean Inherent and Fraud Risk Assessment

	Inherent Risk	Fraud Risk
More Experienced	7.25 n=69	6.48 n=60
Less Experienced	7.19 n=33	6.64 n=69
Combined	7.22 n=129	6.57 n=129

Table 4 reports the results of the H3a test. *Experience* is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median.

TABLE 5: Test of hypothesis 4a (Full Sample)

Effects of Experience and Cognitive Flexibility on Risk Assessment

Panel A: ANCOVA of the Participants Fraud Risk Assessment

Source	F-Value	p
Cognitive Flexibility	0.09	0.77
Experience	0.02	0.88
Cognitive Flexibility * Experience	6.31	0.046*
Fraud Risk Assessment Effort	7.35	0.004

Panel B: Mean Fraud Risk Assessment (standard deviation)

Experience:	Cognitive Flexibility: Low Cognitive Flexibility	Cognitive Flexibility: High Cognitive Flexibility	
Less Experienced	6.17 (2.62) n=42	7.37 (2.34) n=27	6.64 (2.56) n=69
More Experienced	7.44 (2.36) n=18	6.07 (2.68) n=42	6.48 (2.64) n=60
	6.55 (2.59) n=60	6.58 (2.61) n=69	

Cognitive Flexibility is a dichotomous variable categorized as 'Low Cognitive Flexibility' when the participant score is lower than the median and 'High Cognitive Flexibility' when the participant score is greater than the median. Experience is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median. *Mean Fraud Risk Assessment* is the participants'' mean fraud risk rating measured on a 0 to 10 Likert Scale with 0 representing 'no fraud risk' and 10 representing 'high fraud risk'.

TABLE 6: Test of hypothesis 4b (Full Sample)

Effects of Experience and Cognitive Control Strategies on Risk Assessment

Panel A: ANCOVA of the Participants Fraud Risk Assessment

Source	**F-Value**	**p**
Cognitive Control Strategy	0.00	0.98
Experience	0.10	0.75
Cognitive Control Strategy * Experience	0.00	0.98
Fraud Risk Assessment Effort	19.68	0.00

Panel B: Mean Fraud Risk Assessment (standard deviation)

	Cognitive Control Strategy		
Experience:	Absent	Present	
Less Experienced	6.35 (2.49) n=23	6.78 (2.62) n=46	6.64 (2.57) n=69
More Experienced	6.40 (2.95) n=15	6.48 (2.59) n=44	6.46 (2.61) n=59
	6.37 (2.63) n=38	6.63 (2.59) n=69	

Cognitive Control Strategy is a dichotomous variable categorized as 'Absent' if the participant did not used a goal-directed information control strategy and 'Present' if the participant used one of the goal-directed information control strategies. Experience is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median. *Mean Fraud Risk Assessment* is the participants'' mean fraud risk rating measured on a 0 to 10 Likert Scale with 0 representing 'no fraud risk' and 10 representing 'high fraud risk'.

Additional Analyses– Logit Models

Logit Models for Risk Assessment Accuracy

I run a probit regression model where the independent variable is the goal-directed information strategies, and the dependent variable is the auditors' risk assessment accuracy. I use the expert panel's risk assessments (inherent, control, detection, and fraud risk) as a benchmark to assess the accuracy of the participating auditors' assessments. I calculate the average rating for each risk type among the highly experienced auditors that comprise the expert panel. For each risk assessment (inherent, control, detection, and fraud), I created dummy variables, 0 and 1, to measure the accuracy of the auditors' risk assessments. Participating auditors whose risk assessment is within a three-rank range is categorized as 1, where all else is 0. For example, the expert panel's average risk assessment for fraud risk is 8. Participating auditors' that ranked their fraud risk assessment as 7, 8, or 9 is categorized as 1; all other rankings are 0.

I do not find any significant results where the independent variable is the goal-directed information strategies and the dependent variable is the auditors' fraud and inherent risk assessment accuracy, suggesting that the cognitive control strategies do not influence risk assessment accuracy (H1a). I also do not find evidence that cognitive flexibility directly influences risk assessment accuracy (H2a). I also do not find significant results when the independent variable is experience and the dependent variable is fraud risk assessment accuracy. (H3a); however, I do find significant results when the dependent variable is the auditors' inherent risk assessment accuracy (B=1.12, SE=.37, p=.002). These results suggest that accurate risk assessments require task specific knowledge, compared to general knowledge.

With respect to the interactive results, I find that more experienced auditors with higher cognitive flexibility are less likely to make accurate fraud risk assessments (B=-.98, SE=.43, p=.02). These results reinforce the notion that cognitive flexibility is more beneficial for less experienced auditors when making fraud risk assessments (H4a). I also find that more experienced auditors with higher cognitive flexibility are more likely to make accurate inherent risk assessments (B=1.16, SE=.39, p=.003). This finding is interesting because I find that the opposite level of cognitive flexibility (lower levels) is required for more experienced auditors to modify audit program to detect fraud appropriately. This finding provides further evidence that different skills and experience levels are needed to perform the variety of planning tasks involved in audit planning. For example, more experienced auditors need higher cognitive flexibility to make accurate risk assessments, whereas more experienced auditors need lower cognitive flexibility to appropriately modify audit programs.

Lastly, when inherent risk assessment accuracy is the dependent variable and the interactive variables audit experience and cognitive control strategies variable are the independent variables, the interaction variable results reveal significant results (B=1.61, SE=.91, p=.003). The findings suggest that more experienced auditors who use the cognitive control strategies are more likely to make more accurate inherent risk assessments.

Additional Analyses– BigN Differences

Differences between Big4 and NonBig4

A large number of auditing research has explored quality and performance differences between BigN and NonBigN audit firms. The consensus from the research stream concludes that BigN auditors provide higher quality audits than NonBigN auditors. The majority of this research uses archival data (e.g., DeFond , Erkens, and Zhang 2017; Lawrence, Minutti-Meza and Zhang 2011), or explore other factors that affect audit quality such as audit partner characteristics (e.g., Gul, Wu, and Yang 2013), auditor specialization (e.g., Francis, Reichelt, and Wang 2005), and audit firm office size (e.g., Francis and Yu 2009).

In this section, I experimentally explore whether BigN differences found in previous research generalizes to the audit planning setting specifically with audit planning tasks. Despite the differences in audit methodology, BigN and NonBig N auditors should exercise the same amount of professional due care and exercise a high level of professional skepticism when making auditing decisions.

I run a probit regression model where the independent variable is audit firm; auditors from a NonBig4 audit firm is coded as 0, and auditors from a Big4 audit firm is coded as 1. The dependent variable is the auditors' risk assessment accuracy. I use the expert panel's risk assessments (inherent, control, detection, and fraud risk) as a benchmark to assess the accuracy of the participating auditors' assessments. I calculate the average rating for each risk type among the highly experienced auditors that comprise the expert panel. For each risk assessment (inherent, control, detection, and fraud), I created dummy variables, 0 and 1, to measure the auditors' risk assessments' accuracy. Participating auditors whose risk assessment is within a three-rank range is categorized as 1, where all else is 0. For example, the expert panel's average risk assessment for fraud risk is 8. Participating auditors' that ranked their fraud risk assessment as 7, 8, or 9 is categorized as 1; all other rankings are 0.

I find significant results when the independent variable is audit firm and the dependent variable is inherent risk assessment accuracy (B=1.02, SE=.39, p=.009), suggesting that Big4 auditors are more likely to make more accurate inherent risk assessments. I do not find a significant results when fraud risk assessment accuracy is the dependent variable.

I find significant results when the independent variable is the interaction of cognitive flexibility and firm with the dependent variable is the fraud risk assessment accuracy (B= -.958, SE=.49, p=.05), suggesting that auditors with higher cognitive flexibility from Big4 firms are less likely to make accurate fraud risk assessments.

I find significant results when the independent variable is the interaction of experience and firm with the dependent variable is fraud risk assessment accuracy (B= -.96, SE=.48, p=.05), suggesting that more experienced auditors from Big4 firms are less likely to make accurate fraud risk assessments.

I find significant results when the independent variable is the interaction of cognitive control strategies and firm and the dependent variable is the modification of the receivables audit program (B=1.26, SE=.43, p=.004), suggesting that auditors from Big4 firm using a cognitive control strategy are more likely to modify the receivables program to detect fraud compared to auditors from a NonBig 4 firm.

I also find significant results when the independent variable is the interaction of cognitive flexibility and firm and the dependent variable is the modification of the receivables audit program (B=.916, SE=.399, p=.022), suggesting that high cognitive flexibility auditors from

Big4 firms are more likely to modify the receivables program to detect fraud compared to auditors from a nonBig4 firm.

Overall, the results indicate a systematic difference between auditor risk assessment judgments and performance between Big4 and NonBig4 auditors. I need to collect additional data observations to confirm the validity and generalizability of the results. My sample has limited variation by experience level. For example, most of the auditors (85%) from the Big 4 firm have experience levels higher than 33 months (senior associated). To validate the above findings, I will need to collect additional data from Big4 firms with lower levels of experience.

CONCLUSION

My study of how cognitive control strategies influence auditor judgments and decisions within the audit planning setting contributes to our understanding of how individual auditor characteristics, such as auditors' cognitive processes and audit experience, influences auditors' performance. In this study, I examine the effects of goal-directed information system processing, experience, and cognitive flexibility on auditor's ability to assess and respond to risk during audit planning procedures. I also introduce a valuable auditor characteristic to the auditing literature, cognitive flexibility. My findings suggest that less experienced auditors can benefit from engaging in goal-directed information processing compared to more experienced auditors when performing planning tasks. I also find that cognitive flexibility is a characteristic that helps less experienced auditors compared to more experienced auditors.

Interestingly, my findings identify implications associated with audit experience that has not yet been explored in auditing research. Generally, prior research concludes that more experienced auditors make superior decisions and better judgments compared to less experienced auditors. In my study, I find that in some instances, less experienced auditors make better decisions compared to less experienced auditors. This phenomenon is referred to as expertise reversal. Expertise reversal refers to the effectiveness of instructional techniques and task on learners with differing levels of prior knowledge, suggesting that instructional design (such as audit methodology and workpaper designs) need to be adjusted as auditors' acquire more knowledge in a specific domain. Future research can explore learner adaptive interventions that counteract the adverse effects of expertise reversal.

I also analyze and synthesize the risk assessment literature and evaluate the revised risk assessment standards through the lens of cognitive load theory. Through the analysis, I find that the primary root cause that explains why auditors continue to have difficulty assessing and responding to risk is because auditors experience cognitive overload when performing such tasks. Auditors experience cognitive overload not only from the inherent complexity associated with performing audit task, but also from the cognitive load imposed by audit methodologies (including audit workpapers), and auditing standards that auditors rely on for guidance to perform such tasks. My findings suggest that audit firms should consider designing audit training and other decision aids that reflect auditors' cognitive processing when performing such audit planning related tasks. According to the cognitive load theory, individual characteristics also influence how cognitive load impacts judgments. Future research can identify other characteristics that potentially influence auditors' judgments when performing planning procedures.

References

Abdolmohammadi, M., and A. Wright. 1987. An examination of the effects of experience and task complexity on audit judgments. *The Accounting Review* 62 (1): 1-13.

Allen, R. D., D. R. Hermanson, T. M. Kozloski, and R. J. Ramsay. 2006. Auditor risk assessment: insights from the academic literature. *Accounting Horizons* 20 (2): 157-177.

Alon, A., and P. Dwyer. 2010. The impact of groups and decision aid reliance on fraud risk assessment. *Management Research Review* 33 (1): 240-256.

American Institute of Certified Public Accountants (AICPA). 2019. *Auditor Reporting and Amendments, Including Amendments Addressing Disclosures in the Audit of Financial Statements*. Statement on Auditing Standards No. 134. New York: AICPA.

American Institute of Certified Public Accountants (AICPA). 2019. *Omnibus Statement on Auditing Standards*. Statement on Auditing Standards No. 135. New York: AICPA.

American Institute of Certified Public Accountants (AICPA). 2019. *The Auditor's Responsibilities Relating to Other Information Included in Annual Reports*. Statement on Auditing Standards No. 137. New York: AICPA.

Aronson, E. 1997. The theory of cognitive dissonance: The evolution and vicissitudes of an idea. In *The message of social psychology: Perspectives on mind in society*, edited by C. McGarty and S. A. Haslam, 20–35. Cambridge, MA: Blackwell.

Anderson, J. R., C. F. Boyle, A. Corbett, and M. Lewis. 1990 Cognitive modeling and intelligent tutoring. *Artificial Intelligence* 42 (1): 7–49.

Austin, A., T. Carpenter, M. Christ, and C. Neilson. The data analytics transformation: Evidence from auditors, CFOs, and standard-setters. Working Paper. University of Georgia.

Austin, A. T., J. S. Hammersley, M. A. Ricci. 2019. *Improving auditors' consideration of evidence contradicting management's estimate assumptions*, forthcoming.

Avila, C. 2001. Distinguishing BIS-mediated and BAS-mediated disinhibition mechanisms: A comparison of disinhibition models of Gray (1981, 1987) and of Patterson and Newman (1993). *Journal of Personality and Social Psychology* 80 (1): 311–324.

Ayres P. 2006. Using subjective measures to detect variations of intrinsic cognitive load within problems. *Learning and Instruction* 16 (5): 389–400.

Barton, J. 2005. Who cares about auditor reputation? *Contemporary Accounting Research* 22 (3): 549–586.

Bauer, T., S. M. Hillison, M. E. Peecher, and B. Pomeroy. 2019. *Revising Audit Plans to Address Fraud Risk: A Case of "Do as I Advise, Not as I Do"?* Working paper, University of Waterloo, Virginia Tech University, University of Illinois.

Baumeister, R. F., and L. S. Newman. 1994. Self-Regulation of cognitive inference and decision processes. *Personality and Social Psychology Bulletin* 20 (1): 3-19.

Bedard, J. C., and L. E. Graham. 2002. The effects of decision aid orientation on risk factor identification and audit test planning. *Auditing: A Journal of Practice & Theory* 21 (2): 39–56.

Bedard, J. C., and K. M. Johnstone. 2010. Audit Partner Tenure and Audit Planning and Pricing. *Auditing: A Journal of Practice & Theory* 29 (2): 45–70.

Bedard, J., and A. M. Wright. 1994. The functionality of decision heuristics: Reliance on prior audit adjustments in evidential planning. *Behavioral Research in Accountin*g 6 (Suppl): 62–89.

Bonner, S. E. 1990. Experience Effects in Auditing: The Role of Task-Specific Knowledge. *The Accounting Review* 65 (1): 72-92.

Bonner, S. T. Majors, and S. Ritter. 2018. Prepopulating audit workpapers with prior year assessments: default option effects on risk rating accuracy. *Journal of Accounting Research* 56 (5): 1453-1481.

Brazel, J. F. and C. P. Agoglia. 2007. An examination of auditor planning judgements in a complex accounting information system environment. *Contemporary Accounting Research* 24 (4): 1059-1083.

Carcello, J. V. 2005. Discussion of audit research after Sarbanes-Oxley. *Auditing: A Journal of Practice & Theory* 24 (Suppl): 31– 40.

Carver, C. S., and M. F. Scheier. 1998. On the self-regulation of behavior. New York, NY: Cambridge University Press.

Christ, M. 1993. Evidence on the nature of audit planning problem representations: An examination of auditor free recalls. *The Accounting Review* 68 (2): 304-322.

Cohen, J. R. and D. M. Hanno. 2000 Auditors' consideration of corporate governance and management control philosophy in preplanning and planning judgments. *AUDITING: A Journal of Practice* 19 (2): 133–146.

Cohen, J. R., G. Krishnamoorthy, and A. M. Wright. 2007. The impact of roles of the board on auditors' risk assessments and program planning decisions. *Auditing: A Journal of Practice & Theory* 26 (1): 91–112.

Daly, J., A. Kellehear, and M. Gliksman. 1997. The public health researcher: A methodological approach. Melbourne, Australia: Oxford University Press.

Dane, E. 2010. Reconsidering the trade-off between expertise and flexibility: A cognitive entrenchment perspective. *Academy of Management* 35 (4): 579-603.

Debue, N., and C. van de Leemput. 2014. What does germane load mean? An empirical contribution to the cognitive load theory. *Frontiers in Psychology* 5 (1099): 1-12.

DeFond, M., D. H. Erkens, and J. Zhang. 2017. Do Client Characteristics Really Drive the Big N Audit Quality Effect? New Evidence from Propensity Score Matching. Management Science. 63 (11): 3628-3649.

De Martinis, M., H. Fukukawa, and T. J. Mock. 2011. Exploring the role of country and client type on the auditor's client risk assessments and audit planning decisions. *Managerial Auditing Journal* 26 (7): 543-65

Diamond, A. 2013. Executive functions. *Annual Review of Psychology* 64 (1): 135–168.

Dye, R. A. 1993. Auditing standards, legal liability, and auditor wealth. *Journal of Political Economy* 101 (5): 887–914.

Fisk, A. D., and J. K. Gallini. 1989. Training consistent components of tasks: Developing an instructional system based on automatic/controlled processing principles. *Human Factors* 31 (4): 453-463.

Fishbach, A. and M. J. Ferguson. 2007. The Goal Construct in Social Psychology. In *Social Psychology: Handbook of Basic Principles,* edited by A. W. Kruglanski and E. T. Higgins, 490-515. New York, NY: Guilford Publications.

Fishbach, A., R. Dhar, and Y. Zhang. 2006. Subgoals as substitutes or complements: The role of goal accessibility. *Journal of Personality and Social Psychology* 91 (2): 232–242.

Francis J, K. Reichelt, and D. Wang. 2005. The pricing of national and city-specific reputations for industry expertise in the U.S. audit market. The Accounting Review 80 (1): 113-136.

Frederick, D. M., and V. B. Heiman-Hoffman. 1994. The Structure of Auditors’ Knowledge of Financial Statement Errors. *Auditing: A Journal of Practice & Theory* 13 (1): 1–21

Frederick, D. M., and R. Libby. 1986. Expertise and auditors' judgments of conjunctive events. *Journal of Accounting Research* 24 (2): 270- 290.

Fukukawa, H. and T. J. Mock. 2011. Audit risk assessment using belief versus probability. *Auditing: A Journal of Practice & Theory* 30 (1): 75-99.

Glover, M. S., J. Jiambalvo, and J. Kennedy J. 2000. Analytical Procedures and Audit-Planning Decisions. *AUDITING: A Journal of Practice & Theory* 19 (2): 27-45.

Gollwitzer, P. M., and V. Brandstätter. 1997. Implementation intentions and effective goal pursuit. *Journal of Personality and Social Psychology* 73 (1): 186–199.

Griffith, E. E., K. Kadous, and D. Young. 2016. How insights from the "New" JDM research can improve auditor judgment: Fundamental research questions and methodological advice. *AUDITING: A Journal of Practice & Theory* 35 (2): 1-22.

Griffith, E.E., J. S. Hammersley, and K. Kadous, and D. Young. 2015., Auditor Mindsets and Audits of Complex Estimates. *Journal of Accounting Research* 53 (1): 49-77.

Gissel, J. L. and K. M. Johnstone. 2017. Information Sharing during Auditors' Fraud Brainstorming: Effects of Psychological Safety and Auditor Knowledge. *Auditing: A Journal of Practice & Theory* 36 (2): 87-110.

Gul F, Wu D, Z. Yang. 2013. Do individual auditors affect audit quality? Evidence from archival data. The Accounting Review 88 (6): 1993-2023.

Hammersley, J. S. 2006. Pattern identification and industry-specialist auditors. The Accounting Review 81 (2): 309-336.

Hammersley, J. S. 2011. A Review and Model of Auditor Judgments in Fraud-Related Planning Tasks. *Auditing: A Journal of Practice & Theory* 30 (4): *101-128,*

Hammersley, J. S., K. M. Johnstone, and K. Kadous. 2011. How Do Audit Seniors Respond to Heightened Fraud Risk?. *Auditing: A Journal of Practice & Theory* 30 (3): 81-101.

Hammersley, J. S., M. A. Ricci. 2019. *Using Audit Programs to Improve Auditor Evidence Collection*. Working Paper, University of Georgia and University of Florida.

Hay, D., W. R. Knechel, and N. Wong. 2006. Audit fees: A meta-analysis of the effect of supply and demand attributes. *Contemporary Accounting Research* 23 (1): 141–191.

Hoffman, V. B., and M. F. Zimbelman. 2009. Do strategic reasoning and brainstorming help auditors change their standard audit procedures in response to fraud risk?. *The Accounting Review* (84) 3: 811-837.

International Auditing and Assurance Standards Board (IASSB). 2019. ISA 315, , Identifying and Assessing the Risks of Material Misstatement. Exposure Draft. https://www.ifac.org/system/files/publications/files/Proposed-ISA-315-Revised-Explanatory-Memorandum.pdf

Jacob, J. 1984. Perspectives on information overload. *Journal of Consumer Research* 10 (4): 432-435.

Jelsma, O., J. J. G .Van Merriënboer, and J. Bijlstra. 1990. The ADAPT design model: Towards instructional control of transfer. *Instruction Science* 19 (2): 89-120.

Johnson, R. E., C. Chang, R. G. Lord. 2006. Moving from cognition to behavior: What the research says. *Psychological Bulletin* 132 (3): 381-415.

Journal of Accountancy. 2017. Rethinking the audit. https://www.journalofaccountancy.com/issues/2017/apr/rethinking-the-audit.html.

Kizirian, T. G., B. W. Mayhew, D. L. Sneathen. 2005. The impact of management integrity on audit planning and evidence. *AUDITING: A Journal of Practice* 24 (2): 49–67.

Knechel, R. D. 2013. Do Auditing Standards Matter? *Current Issues in Auditing* 7 (2): 1-16.

Knechel, W. R., G. V. Krishnan, R. Mikhail, L. B. Shefchik, and U. K. Velury. 2013. Audit Quality: Insights from the Academic Literature. AUDITING: A Journal of Practice & Theory 32 (Supplement 1): 385-421.

Krems, J. 1995. Cognitive Flexibility and complex problem solving. In Complex Problem Solving: The European Perspective, edited by P. Frensch and J. Funke, 201-216. Lawrence Erlbaum Associates.

Kruglanski, A. W., S. Y. James, A. Fishbach, R. Friedman, W. Y. Chun, D. Sleeth-Keppler. 2002. A theory of goal systems. *Advances in Experimental Social Psychology* 34 (1): 331-378.

Lawrence A, M. Minutti-Meza, P. Zhang .2011. Can Big 4 versus Non-Big 4 differences in audit-quality proxies be attributed to client characteristics? The Accounting Review 86 (1): 259-286.

Locke, E. A., and G. P. Latham. 1990. A theory of goal setting & task performance. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Low, K. 2004. The effects of industry specialization on audit risk assessments and audit planning decisions. *The Accounting Review* 79 (1): 201-219.

Martin, M. M., and R. B. Rubin. 1995. A new measure of cognitive flexibility. *Psychological Reports* 76 (2): 623 – 626.

Mauraven, M., and R. F. Baumeister. 2000. Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin*. 126 (2): 247–259.

Messier, W. F., and L. A. Austen. 2000. Inherent risk and control risk assessments: Evidence on the effect of pervasive and specific risk factors. *AUDITING: A Journal of Practice & Theory* 19 (2): 119–131.

Miller, T.C., Cipriano, M. and R. J. Ramsay. 2012. Do auditors assess inherent risk as if there are no controls? *Managerial Auditing Journal* 27 (5): 448-461.

Mindak, M. and W. Heltzer. 2011. Corporate environmental responsibility and audit risk. *Managerial Auditing Journal* 26 (8): 697-733.

Mock, T. J., and H. Fukukawa. 2016. Auditors' risk assessments: The effects of elicitation approach and assertion framing. *Behavioral Research in Accounting* 28 (2): 75–84

Myers, G. L., and Fisk, A. D. (1987). Application of automatic and controlled processing theory to industrial task training: The value of consistent component training. *Human Factors* 29 (3): 255-268.

Moeckel, C. 1990. The effect of experience on auditors' memory errors. *Journal of Accounting Research* 28 (2): 368-387.

Nanni, A. J. 1984. An exploration of the mediating effects of auditor experience and position in internal accounting control evaluation. *Accounting, Organizations and Society* 9 (2): 149-163.

Newman, D., E. Patterson, and R. Smith. 2001. The influence of potentially fraudulent reports on audit risk assessment and planning. *The Accounting Review* 76 (1): 59-80.

O'Donnell, E., and J. J. Schultz. 2005. The halo effect in business risk audits: Can strategic risk assessment bias auditor judgment about accounting details? *The Accounting Review* 80 (3): 921-939.

O'Donnell, E., and J. J. Schultz Jr. 2003. The influence of business-process-focused audit support software on analytical procedures judgments. AUDITING: A Journal of Practice & Theory 22 (2): 265-279.

Paas, F. G. W. C., and J. J. Van Merriënboer. 1994.. Variability of worked examples and transfer of geometrical problem-solving skill: A cognitive-load approach. *Journal of Educational Psychology* 86: 122-133.

Paas, F., A. Renkl, and J. Sweller. 2003. Cognitive load theory and instructional design: Recent developments. *Educational Psychologist* 38 (1):1-4.

Piercey, D. M. 2011. Documentation Requirements and Quantified versus Qualitative Audit Risk Assessments. *Auditing: A Journal of Practice & Theory* 30 (4): 223–248.

Pollock, E., and P. Chandler, and J. Sweller. 2002. Assimilating complex information. *Learning and Instruction* 12 (1): 61-86.

Powers, W. T. 1973. Behavior: The control of perception. Oxford, UK: Aldine.

Public Company Accounting Oversight Board (PCAOB) 2001. Responsibilities and Functions of the Independent Auditor. Auditing Standard No.1001. Washington, D.C.: PCAOB.

---------- (PCAOB). 2010a. Audit Risk. Auditing Standard No.8 Washington, D.C.: PCAOB.

--------- (PCAOB). 2010b. Audit Planning and Risk Assessment. Auditing Standard No.9 Washington, D.C.: PCAOB.

---------(PCAOB). 2015. Staff Inspection Brief. Preview of Observation from 2015 Inspection of Auditors of Issuers. https://pcaobus.org/News/Releases/Pages/staff-inspection-brief-2015-issuer-inspections.aspx.

---------(PCAOB). 2016. Staff Inspection Brief. Preview of Observation from 2016 Inspection of Auditors of Issuers. https://pcaobus.org/Inspections/Documents/inspection-brief-2017-4-issuer-results.pdf.

----------(PCAOB). 2017a. Staff Inspection Brief. Preview of Observation from 2017 Inspection of Auditors of Issuers. https://pcaobus.org/Inspections/Documents/inspection-brief-2017-3-issuer-scope.pdf.

--------- (PCAOB). 2017b. Evolution and Innovation to Meet Emerging Risks and Challenges. https://pcaobus.org/News/Speech/Pages/Franzel-statement-PCAOB-AAA-4-20-17.aspx

---------(PCAOB). 2018. Staff Inspection Brief. Preview of Observation from 2018 Inspection of Auditors of Issuers. https://pcaobus.org/Inspections/Documents/Staff-Preview-2018-Inspection-Observations.pdf.

PricewaterhouseCoopers (PwC). 2015. The evolution of auditors – How skillsets are changing. https://www.pwc.com/us/en/cfodirect/publications/point-of-view/evolution-of-auditor-skills-technology-accounting.html

Reigeluth, C. M.1983. Instructional design: What is it and why is it? In Reigeluth, C. M. (ed.), Instructional Design Theory and Models, Erlbaum Associated, Hillsdale, NJ: 3-36.

Ritter, S. M., R. I. Damian, D. K. Simonton, R. B. van Baaren, M. Strick, J. Derks, and A. Dijksterhuis. 2012. Diversifying experiences enhance cognitive flexibility. *Journal of Experimental Social Psychology* 48 (1): 961-964.

Robert, R.W., S. E. Salterio, and N. Kochetova-Kozloski. 2010. The effect of benchmarked performance measures and strategic analysis on auditors' risk assessments and mental models. *Accounting, Organizations and Society* 35(3): 316-333.

Roloff, M. E., and C. R. Berger. 1982. Social cognition and communication: An introduction. In *Social cognition and communication*, edited by Roloff, M. E., and C. R. Berger, 9-32. Beverly Hills, CA: Sage.

Schultz J. J., J. L. Bierstaker, and E. O'Donnell. 2010.Integrating business risk into auditor judgment about the risk of material misstatement: The influence of a strategic-systems-audit approach. *Accounting, Organizations and Society* 35 (2): 238-251.

Simon, H. A., and A. Newell. 1971. A. Human problem solving: The state of the theory in 1970. *American Psychologist* 26 (1): 145-159.

Simunic, D. A. 1980. The pricing of audit services: Theory and evidence. *Journal of Accounting Research* 18 (1): 161– 190.

Simonson, I. 1989. Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research* 16 (2): 158–174.

Sorrentino, R. M., and E. T. Higgins. 1986. Handbook of motivation and cognition: Foundations of social behavior. New York, NY: Guilford Press.

Spiro, R. J., R. L. Coulson, P. J. Feltovich, and D. K. Anderson. 1988. Cognitive flexibility theory: Advanced knowledge acquisition in ill-structured domains. Technical Report No. 441: Office of Naval Research,

Sprinkle, G. B., and R. M. Tubbs. 1998. The Effects of audit risk and information importance on auditor memory during working paper review. *The Accounting Review* 73 (4): 475-502.

Sternberg, R. J., and T. Ben-Zeev. 2001. Complex cognition: The psychology of human thought. Oxford University Press.

Sweller, J. 1988. Cognitive load during problem solving: Effects on learning. *Cognitive Science* 12 (2): 257–285.

Sweller, J., J. Van Merrienboer, and F. Paas.1998. Cognitive architecture and instructional design. *Educational Psychology Review* 10 (3): 251-296.

Sweller, J., and Chandler, P. 1994. Why some material is difficult to learn. *Cognition and Instruction* 12 (3): 185–233.

Sweller, J. 1999 Instructional Design in Technical Areas. Melbourne, Australia: ACER Press.

Sweller J. 2010. Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review* 22 (1): 123–138.

Vandervelde, S. D., R. M. Tubbs, A. Schepanski, and W. F. Messier Jr. 2009. Experimental tests of a descriptive theory of combined auditee risk assessment. *Auditing: A Journal of Practice & Theory* 28 (2): 145–169.

Walker, K., and H. Brown-Liburd. 2019. The Emergence of Data Analytics in Auditing: Perspectives from Internal and External Auditors through the Lens of Institutional Theory. Working Paper. University of Wisconsin-Madison.

Wilks, T. J., and M. F. Zimbelman. 2004. Decomposition of fraud-risk assessments and auditors' sensitivity to fraud cues. *Contemporary Accounting Research* 21 (3): 719-745

Wright, A., and J. C. Bedard. 2000. Decision Processes in Audit Evidential Planning: A Multistage Investigation. AUDITING: A Journal of Practice 19 (1): 123–143

Wyer, R. S., and T. K. Srull. 2015. Memory and cognition in its social context. New York, NY: Psychology Press.

Figures

FIGURE 1: Factors affecting auditors' risk assessment judgments

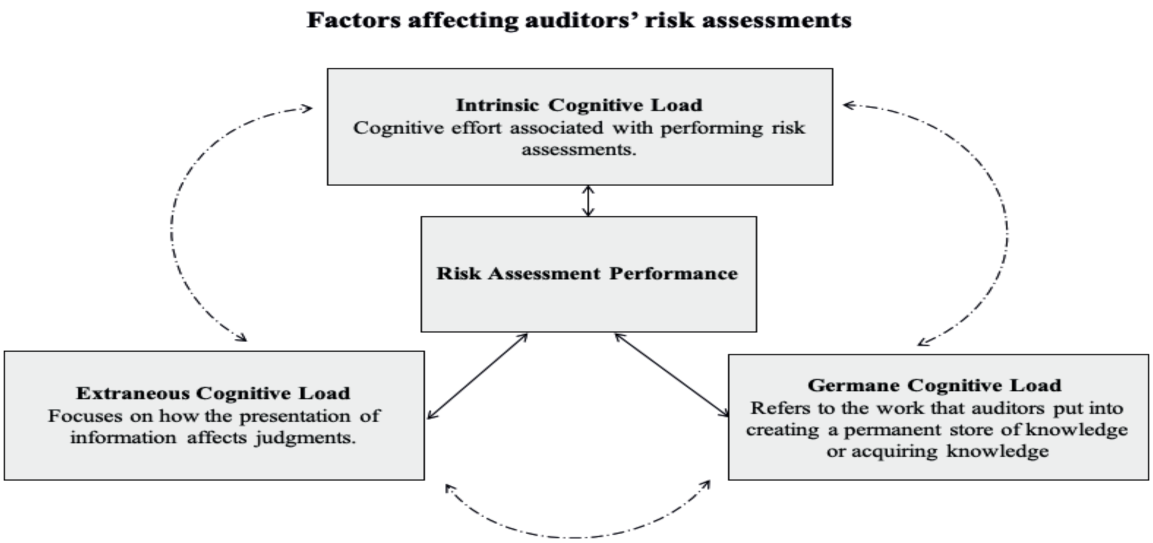


FIGURE 2: Cognitive Load Framework (Theoretical)

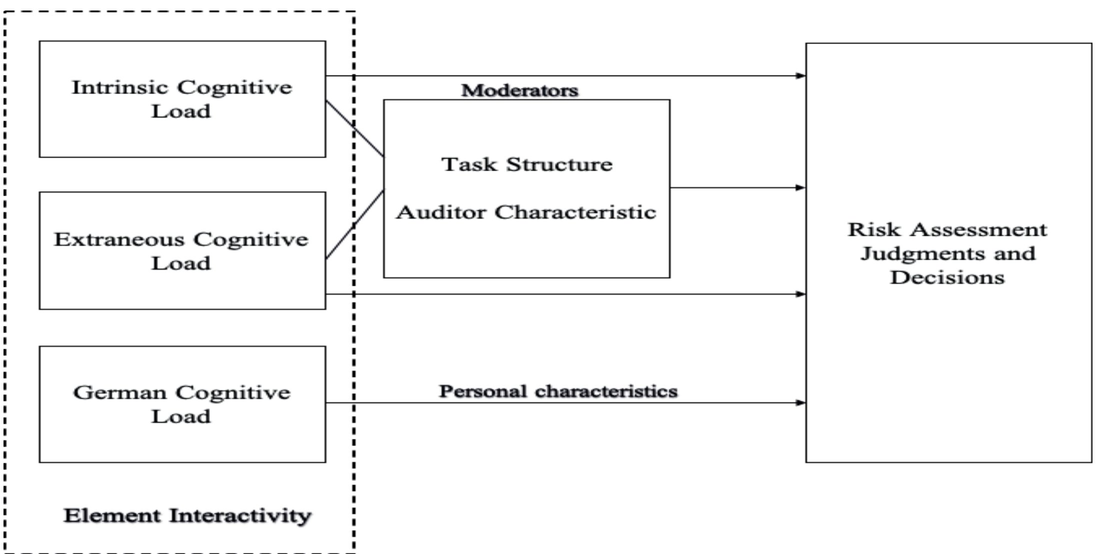


FIGURE 2A: Cognitive Load Theory Framework

PCAOB Inspection Finding		
Auditors should apply due professional care in areas of significant risks, including the risk of fraud by performing sufficient risk assessment procedures to identify the risks of material misstatement and to design procedures responsive to the assessed risks		
Intrinsic	**Extraneous**	**Germane**
Inherent complexity of the task	*Presentation of information*	*Individual cognitive processes*
• Client Characteristics ○ Client Environment ○ Management integrity ○ Corporate governance/Audit Committees ○ Location and Industry • Externa Factors ○ Audit Reports ○ Audit Methodology ○ Audit Personnel	• Strategic Risk Assessments ○ Business Risk Assessments • Technology Software • Decision Aids • Audit Workpapers	• Heuristics ○ Framing ○ Evidence • Information Processing Order • Auditor Characteristics

FIGURE 3: Risk Assessment Standard Framework

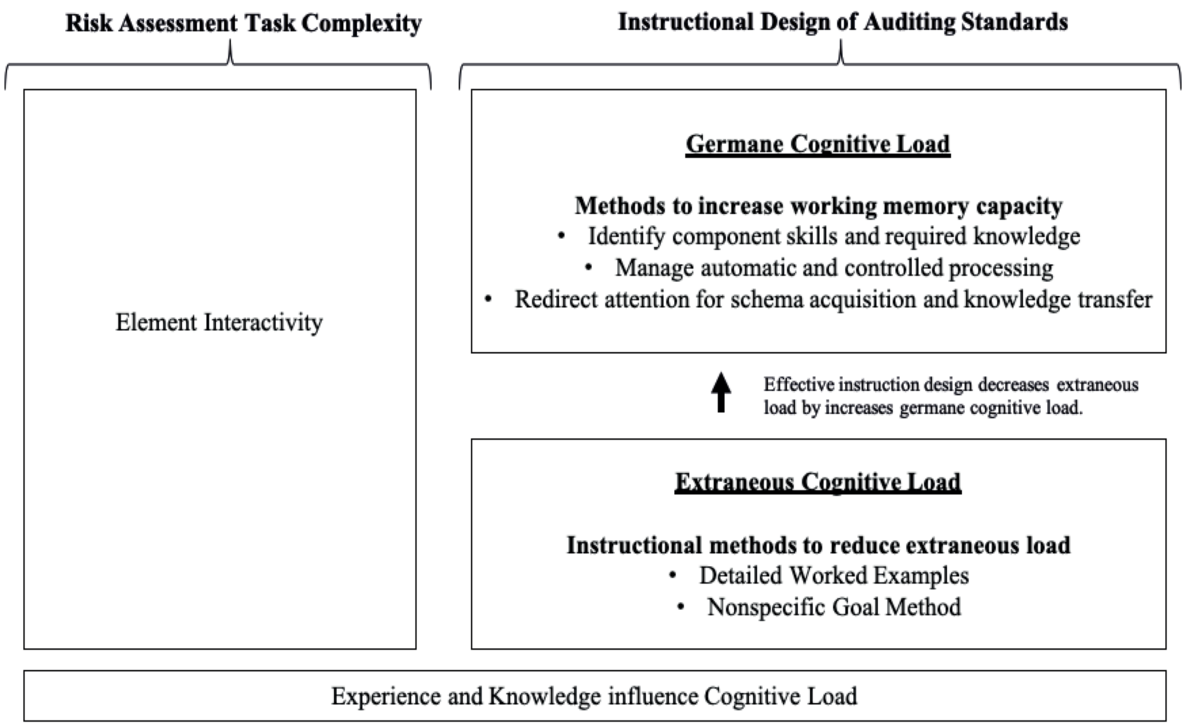


FIGURE 4: Risk Assessment Standard Framework

The objective of the standard highlights that the auditor should identify and assess the risks of material misstatement. Key term definitions are not present at the beginning of the standard. Limited references of information technology "IT" in the standard. Only includes three references to IT.	**Component skills and required knowledge**	The objective of the standard highlights *how* the auditor should identify and assess the risks of material misstatement. The standard states that auditors should assess risk at the financial statement and assertion levels Key terms and definitions are presented at the beginning of the standard. (Par 1-18) In-depth inclusion about how information technology should be considered in the standard.
Auditors have to use judgment (additional working memory) or rely on audit firm methodology to assess client inherent risk.	**Automatic and Controlled Processing**	Introduction of new inherent risk factors to aid in risk assessment (Par 208-214) Introduction of the "spectrum of risk" that measures the higher end of which lie significant risks
No detailed examples in the appendices Example from Standard: "Whether management's philosophy and operating style promote *effective internal control over financial reporting*…"(the standard does not define effective.	**Schema acquisition, knowledge transfer, and redirect attention**	Introduction of the "spectrum of risk" that measures the higher end of which lie significant risks
Other Considerations: - Consideration of Experience		

FIGURE 5: Relationship between Cognitive Control, Cognitive Flexibility, and Goal-Directed Information Processing

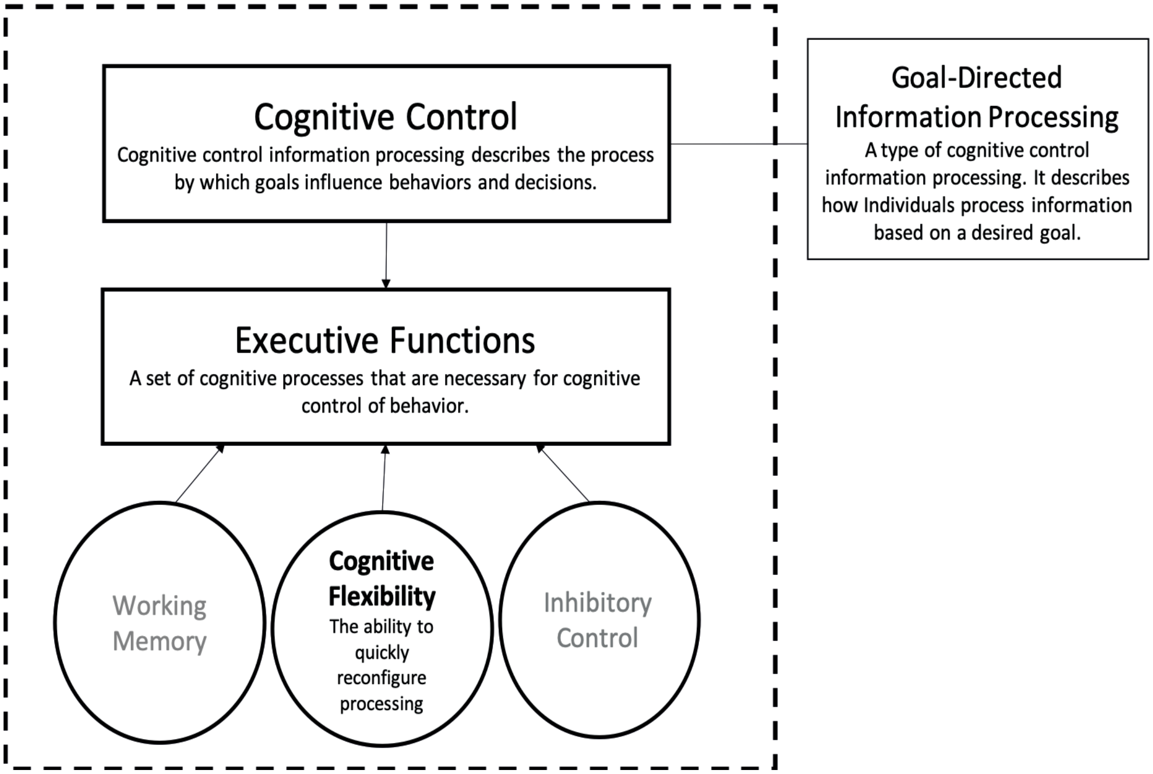


FIGURE 6: Goal-Directed Information Processing Model

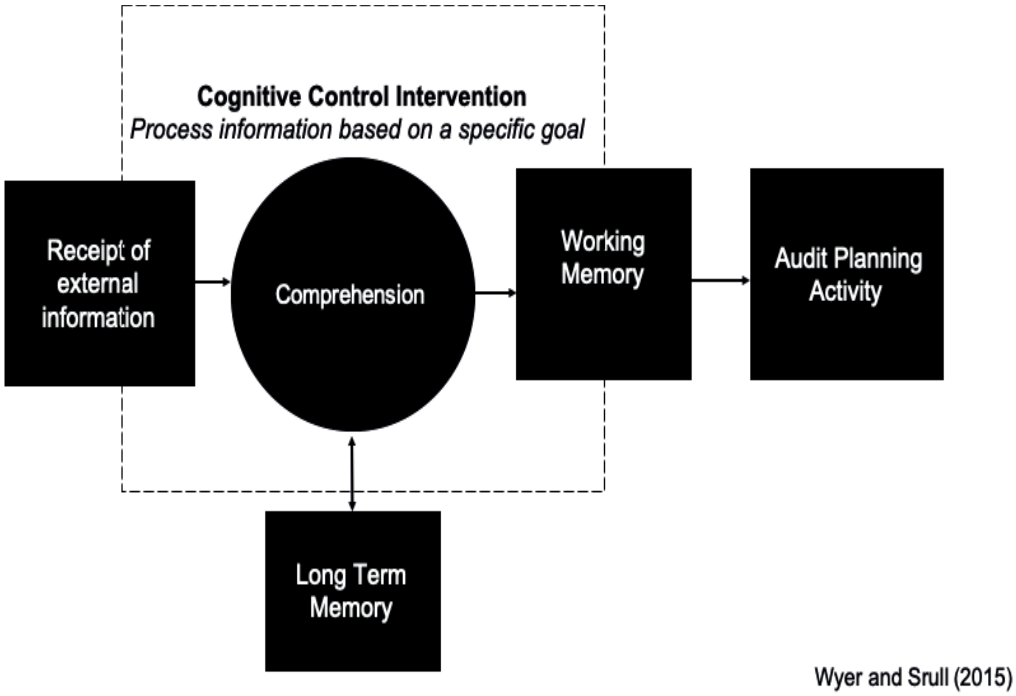


FIGURE 7: Description of Experimental Manipulations

Experimental Manipulations			
Balance Strategy	**Highlight Strategy**	**Control Group**	**Audit Planning Goal**
25%	15%	N/A	Identify client risk factors relating to the environment and/or the business strategy
25%	25%	N/A	Assess inherent risk, control risk, detection risk and fraud risk for the revenue cycle
25%	50%	N/A	Adjust planned audit procedures to appropriately respond to risk
25%	10%	N/A	Consider how audit technology can be used to assess risk

FIGURE 8: Relationship between Audit Goal and Audit Tasks

Relationship between Audit Goals and Audit Tasks

Audit goal (Task Set)	**Identify client risk factors relating to the environment and/or the business strategy**	**Assess audit risk (i.e., inherent, control and detection risk);**	**Consider how audit technology can be used to assess risk**	**Adjust planned audit procedures to appropriately respond to risk**
Individual audit tasks	The auditor should gain and evaluate information about the client, such as: • Internal control environment. • Matters affecting the client industry, matters affecting company's business and relative complexity of the client. • Control deficiencies previously communicated to the audit committee or management.	The auditor should evaluate the client environment to assess the following risks: • Inherent risk. • Control risk. • Detection risk. • Fraud risk. The auditor considers the planned nature, timing, and extent of the risk assessment procedures.	The auditor should determine the following: • Whether specialized skill or knowledge is needed to perform planning procedures. • Evaluate how the client's technological environment affect audit evidence • Consider whether the auditor has the appropriate skill set to evaluate technological evidence.	The auditor should establish the overall audit strategy for the engagement and developing an audit plan. The audit plan should include: • The planned nature, timing, and extent of tests of controls and substantive procedures. • Other planned audit procedures required to be performed so that the engagement complies with PCAOB standards.

FIGURE 9: Graph of the Effects of Experience and Cognitive Flexibility on Risk Assessment

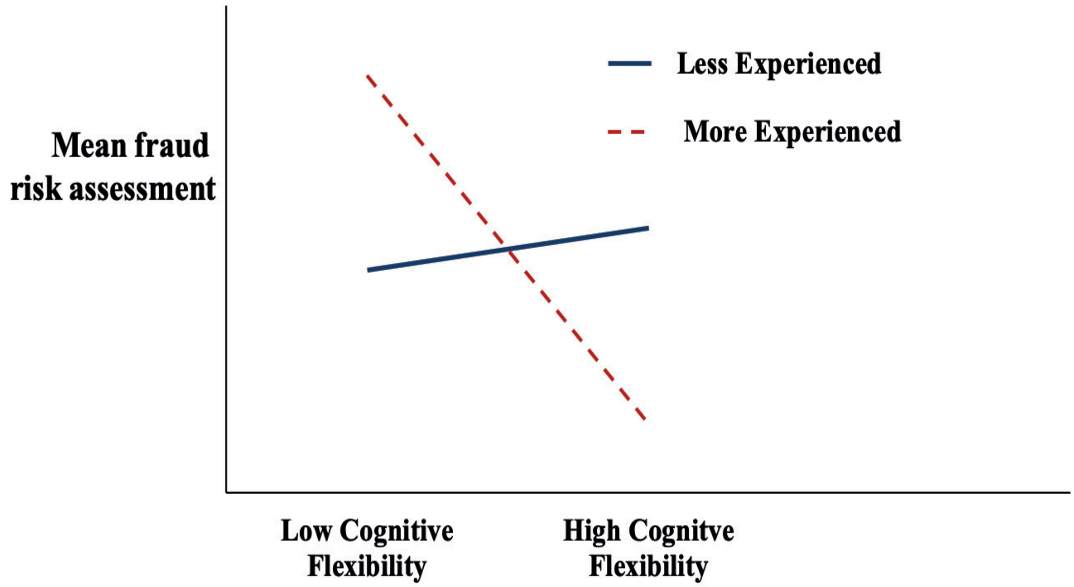
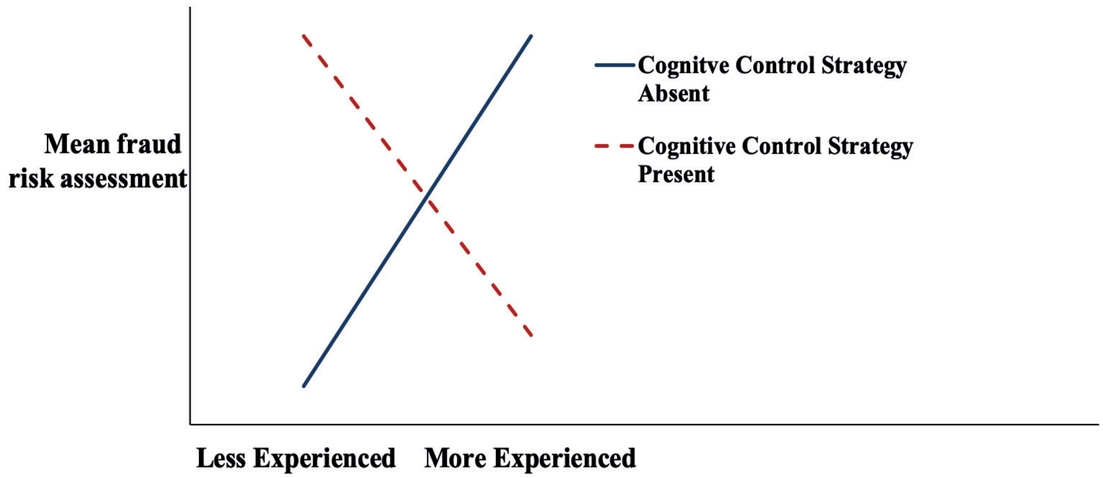


FIGURE 10: Graph of the Effects of Experience and Goal Directed Information Processing on Risk Assessment



Tables

TABLE 1: Participant Descriptives

	n	Mean	Median	Min	Max	SD
CPAs	66%					
Experience (in months)	74	51	48	32	108	12.84
Cognitive Flexibility Score (Composite Score)	74	7.70	5.75	4	6.58	.57

TABLE 2: Test of hypothesis 1a

Effects of Goal-Directed Information Processing on Risk Assessment

Panel A: The participants' mean Inherent ant and Fraud Assessment

	Inherent Risk	Fraud Risk
Balance Control Strategy	6.76 n=25	6.12 n=25
Control Condition	6.38 n=26	7.00 n=26
Highlight Control Strategy	7.26 n=23	7.04 n=24
Balance Strategy and Highlight	7.00 n=48	6.57 n=49
Combined	6.78 n=74	6.60 n=75

Table 2 reports the result of the H1a test. *Goal-directed information processing* strategy is manipulated at three levels: Balance Control Strategy, Highlight Control Strategy, and the Control Condition.

TABLE 3: Test of hypothesis 2a

Effects of Cognitive Flexibility on Risk Assessment

Panel A: The participants' mean Inherent and Fraud Risk Assessment

	Inherent Risk	Fraud Risk
High Cognitive Flexibility	6.76 n=42	6.00* n=42
Low Cognitive Flexibility	6.81 n=32	7.36* n=42
Combined	6.78 n=75	6.60 n=75

Table 3 reports the results of the H2a test. *Cognitive Flexibility* is a dichotomous variable categorized as 'Low Cognitive Flexibility' when the participant score is lower than the median and 'High Cognitive Flexibility' when the participant score is greater than the median.

TABLE 4: Test of hypothesis 3a

Effects of Experience on Risk Assessment

Panel A: The participants' mean Inherent and Fraud Risk Assessment

	Inherent Risk	Fraud Risk
More Experienced	6.68 n=41	6.51 n=41
Less Experienced	6.91 n=33	6.71 n=33
Combined	6.78 n=75	6.60 n=75

Table 4 reports the results of the H3a test. *Experience* is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median.

TABLE 5: Test of hypothesis 4a

Effects of Experience and Cognitive Flexibility on Risk Assessment

Panel A: ANCOVA of the Participants Fraud Risk Assessment

Source	F-Value	p
Cognitive Flexibility	0.75	0.55
Experience	0	1.00
Cognitive Flexibility * Experience	6.23	0.013
Fraud Risk Assessment Effort	10.18	0.002

Panel B: Mean Fraud Risk Assessment (standard deviation)

Cognitive Flexibility:

Experience:	Low Cognitive Flexibility	High Cognitive Flexibility	
Less Experienced	6.88 (1.96) n=17	6.53 (2.69) n=17	6.71 (2.33) n=34
More Experienced	7.88 (1.74) n=16	5.64 (2.77) n=25	6.51 (2.63) n=41
	7.36 (1.90) n=33	6.00 (2.74) n=42	

Cognitive Flexibility is a dichotomous variable categorized as 'Low Cognitive Flexibility' when the participant score is lower than the median and 'High Cognitive Flexibility' when the participant score is greater than the median. Experience is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median. Mean Fraud Risk Assessment is the participants'' mean fraud risk rating measured on a 0 to 10 Likert Scale with 0 representing 'no fraud risk' and 10 representing 'high fraud risk'.

TABLE 6: Test of hypothesis 4b

Effects of Experience and Cognitive Control Strategies on Risk Assessment

Panel A: ANCOVA of the Participants Fraud Risk Assessment

Source	**F-Value**	**p**
Cognitive Control Strategy	0.04	0.85
Experience	0.01	0.91
Cognitive Control Strategy* Experience	3.96	0.05
Fraud Risk Assessment Effort	15.19	0.00

Panel B: Mean Fraud Risk Assessment (standard deviation)

	Cognitive Control Strategy		
Audit Experience:	Absent	Present	
Less Experienced	6.14 (2.48) n=14	7.10 (2.20) n=20	6.71 (2.33) n=34
More Experienced	7.25 (2.70) n=12	6.21 (2.60) n=29	6.51 (2.64) n=41
	6.65 (2.60) n=26	6.57 (2.46) n=49	

Cognitive Control Strategy is a dichotomous variable categorized as 'Absent' if the participant did not used a goal-directed information control strategy and 'Present' if the participant used one of the goal-directed information control strategies. Experience is dichotomous variable categorized as 'Less Experienced' if the participant's number of months of experience is less than the median and 'More Experienced" if the participant's number of months of experience is greater than the median. *Mean Fraud Risk Assessment* is the participants'' mean fraud risk rating measured on a 0 to 10 Likert Scale with 0 representing 'no fraud risk' and 10 representing 'high fraud risk'.

Appendix A: Summary of Logit Results

Logit Models for Risk Assessment Accuracy

$$Risk\ Assessment\ Variables = B_0 + B_1\,IV + B_2 IV + B_3 IVxIV + B_4 Controls \quad + e$$

Hyp	Logit Equation	IV	Finding	Conclusion
H1a	$FRAUD\_ACC = B_0 + B_1\,\boldsymbol{CogCon} + e$ $INHER_{ACC} = B_0 + B_1\,\boldsymbol{CogCon} + e$	Cognitive Control	No Significant Results	The cognitive control strategies do not influence the likelihood that auditors will make accurate risk assessments.
H2a	$FRAUD\_ACC = B_0 + B_1\,\boldsymbol{CogFlex} + e$ $INHER\_ACC = B_0 + B_1\,\boldsymbol{CogFlex} + e$	Cognitive Flexibility	No Significant Results	Cognitive flexibility does not influence the likelihood of auditors making accurate risk assessments.
H3a	$FRAUD\_ACC = B_0 + B_1\,\boldsymbol{EXP} + e$	Audit Experience	No Significant Results	Audit Experience influences the likelihood that auditors will make accurate inherent risk assessments. This finding suggests two factors that may influence whether auditors

	$INHER_{ACC} = B_0 + B_1 \boldsymbol{EXP} * + e$		Statistical Results Variable: **EXP** B=1.12, SE=.37, p=.002	make accurate risk assessments. First, for auditors to detect fraud by making accurate fraud risk assessments, auditors need to acquire task-specific knowledge compared to general knowledge. On the other hand, the expert panel ranking for inherent and fraud risk is the same. It is reasonable to infer that auditors identified red flags presented in the case but did not contribute these red flags to fraud.
H4a	$FRAUD_{ACC} = B_0 + B_1 \boldsymbol{CogFlex\ \ x\ \ EXP} + e$	Cognitive Flexibility and Experience	Statistical Results Variable: **CogFlex x EXP** B= -.98, SE=.43, p=.02	Auditors with more experience and higher levels of cognitive flexibility are less likely to make accurate fraud assessments. This finding reinforces the notion that cognitive flexibility is more beneficial for less experienced auditors when making fraud risk assessments.
	$INHER\_ACC = B_0 + B_1 \boldsymbol{CogFlex\ \ x\, EXP} + e$		Statistical Results Variable: **CogFlex x EXP** B=1.16, SE=.39, p=.003.	I also find that more experienced auditors with higher levels of cognitive flexibility are more likely to make accurate inherent risk assessments. This finding is interesting because I find that the opposite level of cognitive flexibility (lower levels) is required for more experienced auditors to modify audit program to

				detect fraud appropriately. The results also provide the support that different skills and levels of knowledge are necessary to detect fraud.
H4b	$FRAUD\_ACC = B_0 + B_1 \boldsymbol{CogCon\ \ x\ EXP} + e$	Cognitive Control and Experience	No Significant Results,	The findings suggest that more experienced auditors who use cognitive control strategies are more likely to make more accurate inherent risk assessments.
	$INHER\_ACC = B_0 + B_1 \boldsymbol{CogCon\ \ x\ EXP} + e$		Statistical Results Variable: **CogFlex x EXP** B=1.61, SE=.91, p=.003	

Logit Models for Risk Response

$$Risk\ Response\ Variables = B_0 + B_1\,IV + B_2IV + B_3IVxIV + B_4Controls \quad + e$$

Hyp	Logit Equation	Variable of Interest	Finding	Conclusion
H1b	$SALES\_RECIEV = B_0 + B_1\,\boldsymbol{CogCon} + e$	**Cognitive Control**	Statistical Results Variable: $SALES\_RECIEV$ (B=-1.22, SE=.58, p=.036).	I find that auditors who use a cognitive control strategy is less likely to modify the receivables standard audit programs to detect fraud.
	$SALES = B_0 + B_1\,\boldsymbol{CogCon} + e$			
	$RECEIV = B_0 + B_1\,\boldsymbol{CogCon} + e$		No Significant Results	
H2b	$SALES\_RECIEV = B_0 + B_1\,\boldsymbol{CogCon} + e$	**Cognitive Flexibility**	No Significant Results	I find that auditors with high levels of cognitive flexibility are more likely to modify the receivables standard audit programs to detect fraud.
	$SALES = B_0 + B_1\,\boldsymbol{CogCon} + e$			

	$RECEIV = B_0 + B_1 \boldsymbol{CogCon} + e$		Statistical Results Variable: ***RECEIV*** B=1.05, SE=.40, p=.009	
H3b	$SALES\_RECIEV = B_0 + B_1 \boldsymbol{CogCon} + e$	**Audit Experience**	No Significant Results	I find auditors with higher levels of experience are more likely to modify the receivables standard audit program to detect fraud.
	$SALES = B_0 + B_1 \boldsymbol{CogCon} + e$			
	$RECEIV = B_0 + B_1 \boldsymbol{CogCon} + e$		Statistical Results Variable: **EXP** B=1.00, SE=.401, p=.013	
H4a	$SALES\_RECIEV = B_0 + B_1 \boldsymbol{COG\_FLEX\ \ x\ \ EXP} + e$	**Cognitive Flexibility and Experience**	No Significant Results	I find that more experienced auditors with high levels of cognitive flexibility are more likely to modify the receivables standard audit programs to detect fraud.
	$SALES = B_0 + B_1 \boldsymbol{COG\_FLEX\ \ x\ \ EXP} + e$			

	$RECIEV = B_0 + B_1\, \boldsymbol{COG\_FLEX\ \ x\ \ EXP} + e$		Statistical Results <u>Variable:</u> <u>**COG_FLEX*EXP**</u> B=1.26, SE=.410, p=.002	
H4b	$SALES\_RECIEV = B_0 + B_1\, \boldsymbol{COG\_CON\ \ x\ \ EXP} + e$	**Cognitive Control Strategies and Experience**	Statistical Results <u>Variable: **COG_CON*EXP**</u> B= -.84, SE=.43, p=.05	I find that more experience auditors with high levels of cognitive flexibility is less likely to modify the sales and receivables standard audit program to detect risk. The results imply that less experienced auditors with high levels of cognitive flexibility are more likely to modify the appropriate sales and receivable audit program to detect fraud.
	$SALES = B_0 + B_1\, \boldsymbol{COG\_CON\ \ x\ \ EXP} + e$		No Significant Results	
	$RECIEV = B_0 + B_1\, \boldsymbol{COG\_CON\ \ x\ \ EXP} + e$		No Significant Results	

Variable	Description
FRAUD_ACC	= 1 if the auditors' fraud risk assessment is equal, or one ranking above or one ranking below the fraud risk assessment of the expert panel, and 0 otherwise.
INHER_ACC	= 1 if the auditors' inherent risk assessment is equal, or one ranking above or one ranking below the inherent risk assessment of the expert panel, and 0 otherwise.
COG_FLEX	= 1 if the auditors' level of cognitive flexibility is higher than the median cognitive flexibility score, and 0 otherwise.
EXP	= 1 if the auditors experience level is greater than the median months of audit experience, and 0 otherwise.
COG_CON	= 1 if the auditor uses one of the control strategies to perform planning procedures, and 0 otherwise.
SALES_RECIEV	= 1 if the auditor identified at a minimum one of the top two ranked sales and receivables audit program testing objectives as defined by the expert panel, and 0 otherwise.
SALES	= 1 if the auditor identified at a minimum one of the top two ranked sales audit program testing objectives as defined by the expert panel, and 0 otherwise.
RECIEV	= 1 if the auditor identified at a minimum one of the top two ranked receivables audit program testing objectives as defined by the expert panel, and 0 otherwise.

Appendix B: Experimental Instrument

PART I

Before you start the study, answer the following questions. Several statements that people use to describe themselves are given below. 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. Use the following scale:

1	**2**	**3**	**4**	**5**	**6**	**7**
Strongly Disagree	Somewhat Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Somewhat Agree	Strongly Agree

1. I can communicate an idea in many different ways.	1	2	3	4	5	6	7
2. I avoid new and unusual situations.	1	2	3	4	5	6	7
3. I feel like I never get to make decisions.	1	2	3	4	5	6	7
4. I can find workable solutions to seemingly unsolvable problems.	1	2	3	4	5	6	7
5. I seldom have choices when deciding how to behave.	1	2	3	4	5	6	7
6. I am willing to work at creative solutions to problems.	1	2	3	4	5	6	7
7. In any given situation, I am able to act appropriately.	1	2	3	4	5	6	7
8. My behavior is a result of conscious decisions that I make.	1	2	3	4	5	6	7
9. I have many possible ways of behaving in any given situation.	1	2	3	4	5	6	7
10. I have difficulty using my knowledge on a given topic in real life situations.	1	2	3	4	5	6	7
11. I am willing to listen and consider alternatives for handling a problem	1	2	3	4	5	6	7
12. I have the self-confidence necessary to try different ways of behaving.	1	2	3	4	5	6	7

PART II

Assume that you have been assigned to perform a risk assessment and design an audit program for Precision Equipment, Inc. (Precision) for the year ended December 31, 2018.

Please read the following information, which includes descriptions of the company's business and industry, management, the control environment, and the revenue cycle, as well as selected ratios and summary financial statements.

As you read the case, keep in mind that your primary audit planning tasks are:

(1) to perform a risk assessment. A risk assessment involves identifying and appropriately assessing the risks of material misstatement, and

(2) to tailor audit programs as a basis for designing and implementing responses to the risks of material misstatement.

You can use a hand-held calculator or the calculator on your phone to complete any analysis.

[Goal-directed Strategy– Equal (Present) Condition]

To help with your audit planning tasks, the audit manager reminds you to complete it in accordance with PCAOB Accounting Standards (AS) 2101 and 2110. Further, the audit manager has assigned weights (i.e., percentages) to help guide your effort and time while completing the audit planning tasks.

Identify client risk factors relating to the environment and/or the business strategy	25%
Assess inherent risk, control risk, detection risk and fraud risk for the revenue cycle	25 %
Consider how audit technology can be used to assess risk	25 %
Adjust planned audit procedures to appropriately respond to risk	25 %

Before you begin, recall *any* activity that requires you to work toward a goal with **EQUAL** inputs to successfully complete that goal. For example, an individual that wants to achieve a healthier lifestyle may consider their diet, an exercise plan, and whether they want to hire a trainer equally in order to be successful. In the box below, write a description of the activity that you recall, along with a number of equally weighted goals.

[Goal-directed Strategy– Control]

To help with your audit planning tasks, the audit manager reminds you to complete it in accordance with PCAOB Accounting Standards (AS) 2101 and 2110.

Before you begin, recall a time when you created *any* goal and then achieved it. For example, an individual wants to achieve a healthier lifestyle (e.g., lose weight or exercise frequently) and then achieves that goal within the specified time frame. In the box below, write a description of the goal that you recall along with the details.

[Goal-directed Strategy– AUDIT RESPONSE focus Condition]

To help with your audit planning tasks, the audit manager reminds you to complete it in accordance with PCAOB Accounting Standards (AS) 2101 and 2110. Further, the audit manager has assigned weights (i.e., percentages) to help guide your effort and time while completing the audit planning tasks.

.

Adjust planned audit procedures to appropriately respond to risk	50 %
Identify client risk factors relating to the environment and/or the business strategy	25%
Assess inherent risk, control risk, detection risk and fraud risk for the revenue cycle	15 %
Consider how audit technology can be used to assess risk	10 %

Before you begin, recall *any* activity that requires you to work toward a goal with **UNEQUAL** inputs to successfully complete that goal with an emphasis on the planning of the goal. For example, an individual that wants to achieve a healthier lifestyle may place relatively minimal attention on understanding their current health indicators (e.g., medical diagnostics to assess potential problems), but may focus heavily on listening to the advice of their trainer and adhering to their exercise plan. In the box below, write a description of the activity that you recall, along with a number of unequally weighted goals.

Background Information

Client Background
Precision Inc, a manufacturer of medical laboratory equipment, is a publicly traded corporation. Precision employs about 20,000 people and maintains operations in nine countries outside the United States. The company develops, manufactures and markets laboratory medical instruments for human blood testing including blood analyzers, DNA kits, and blood sugar (glucose) testing kits.

Precision's principal customers are hospitals, physicians, nursing homes, and mass merchandisers. The company's products and services are marketed both through independent distribution channels and directly to end-users. The segments of the industry in which Precision does business continue to be characterized by significant competition between suppliers, both in the United States and abroad.

Since about 2010, the company has been undergoing substantial changes and faces major strategic challenges. The company's business historically had centered on hand-held instruments to perform blood testing, such as needles and pins. However, beginning around 2015, patch technologies gained popularity. The patches are equipped with a transdermal biosensor that reads blood analytes through the skin without drawing blood with a needle. In fact, sales of hand-held instruments industry-wide have fallen about 8% each year since 2015. Precision was a late entrant into the patch technology market and remains behind other industry leaders in converting its production and sales. Accordingly, the company is working to increase its sales in this critical and growing market segment. At the same time, the company seeks to maximize its hand-held instrument sales, which—while diminishing over time—continue to account for 70% of its revenues.

Prior and Current Years' Audits
This is your firm's first-time auditing Precision. During the client acceptance process, the firm learned that the previous audit firm has issued standard unqualified reports for the past 20 years in each of those years. The audit team has determined that there were no significant changes in any accounting or auditing standards that would affect this year's audit.

Industry Analysis
The medical blood testing products and devices category encompass more than 130,000 different items, ranging from needles to sophisticated blood analyzer machines. Standard and
Poors projects that the industry growth rate will slow in the coming years. Other industry characteristics are:
Decreasing growth rate of sales. Total dollar shipments of all medical blood testing products and devices are expected to increase only 5.4% to $40 billion in 2018, following increases of 8.2% and 12.9% in 2018 and 2017, respectively. The principal drivers of this slowdown include:
Cost containment pressures in primary markets.
Heightened scrutiny by the FDA in its approval of new products.
Controls imposed by managed care providers.
Rising premiums and political uncertainty related to the Affordable Care Act present another negative factor confronting the industry.

Stable or slightly declining stock share prices since 2014.

While the US remains the world's largest supplier of medical products by a wide margin, this dominance is slipping. It is expected that customers (independent distributors and hospitals) are likely to be big winners as manufacturers provide innovative and lucrative incentives to market their products in what is becoming a very competitive field.

Selected industry ratios are presented below:

	2018 (unaudited)	2017
Profit margin on sales	8.36%	8.42%
Current ratio	1.93	1.96
Inventory turnover	2.33	2.41
A/R turnover	5.92	6.45

ASSESSMENT OF MANAGEMENT, JUDGMENT OF MATERIALITY, AND THE CONTROL ENVIRONMENT

Management Top management is compensated through a base salary (50%), an earnings-based bonus plan (30%) and stock options (20%). As with most public companies in the industry, there is significant pressure for management to meet analysts' earnings forecasts. Management places great importance on achieving or exceeding sales and other financial forecasts. The company has met or exceeded sales goals for 12 consecutive quarters. The management team is well respected in the business community and turnover among top management has been infrequent.

Materiality. After reviewing last year's financial statements and the current year unaudited financial statements, materiality for planning purposes has been set at $8,000,000.

Control Environment. In general, the control system is reliable in recording routine transactions and the segregation of duties is adequate. The board of directors and the audit committee meet regularly. The president of the company maintains a high degree of control over management and over financial reporting.

OVERVIEW OF THE REVENUE CYCLE

Precision's products and services are marketed both through independent distribution channels and directly to end-users. Revenue is recognized when products are shipped to customers. Highlights of the revenue cycle follow.

Order Entry

- The majority of orders are received electronically through a secure web portal on Precision's website.

Orders received through a secure web portal

- Orders from pre-approved customers are processed immediately. The web portal has embedded application checks. For orders "flagged" by the system because information was not entered correctly, they are forwarded to a file clerk for further investigation.

Credit

- The system generates a total for the order and compares that total with the customer's outstanding accounts receivable balance and credit limit. If the total of the order plus outstanding amounts due would put the customer over the credit limit, the transaction is transmitted to the credit department for review.
- The company's normal payment terms have been similar to the industry, i.e., n/45 days.
- Bad debt estimates have also been close to the industry average.

Inventory

- The order-entry portal accesses the inventory file to determine whether the goods are on hand. If they are on hand, the system requests the quantity ordered, thus restricting the items from being shipped to another customer.
- The company prides itself on maintaining next-day shipment on 98% of its orders as part of its commitment to customer service.
- The invoice is not created or recorded until the shipping department acknowledges shipment of the order by entering the packing slip number into a terminal.
- Differences between the packing slip and actual orders are rare because shortages occur only when the perpetual inventory record is inaccurate, but any differences are immediately resolved by a supervisor.

Roll-Forward Tests

The only change since interim was the implementation of a marketing program in November in response to distributor incentives granted by key competitors. The marketing program increased revenue and net income by $84 million and $35.2 million, respectively. Discussions with key company personnel revealed that Precision felt it was necessary to take this action in response to market changes and competitor actions.

November Marketing Strategy

In late 2018, management decided that a reallocation of marketing responsibilities among its sales channels would offer the best means of meeting its strategic goals. The company's products, both hand-held instruments and patch technologies, had been sold to end-users primarily through two channels: directly, i.e., through a sales force of employees, and through authorized distributors, who purchased measurement products from the company for resale to end-users. Management believed that by giving the distributors primary sales responsibility for the traditional hand-held instrument segment of its product line, the company's direct sales force could devote increased resources and efforts to the sale of the patch technology products.

In November 2018, to further this strategy of shifting hand-held instrument sales responsibility to distributors, Precision launched a new marketing program under which all distributors were asked to purchase a minimum number of hand-held instruments. The minimum was based on the inventory of hand-held instruments (1.8 million units) divided by the pro-rata share of overall distributor sales. To encourage the distributors to participate, Precision offered end-user incentives (discussed below) to buy hand-held instruments from distributors. These incentives would help distributors resell the inventory they were purchasing from the promotion. Precision also offered several incentives, including profit-sharing opportunities, directly to distributors to encourage them to participate in the program

To further assist sales by the distributors, the program would provide them with access to large retail accounts, hospitals and physicians that had previously been serviced by Precision directly. Further, under the program, Precision would permit distributors to share in incremental profits resulting from expansion of Precision's share of the market.

Precision devised other initiatives to help boost sales of the hand-held instruments. Primary among these initiatives was the "Premier Patch" program, through which retailers who purchased hand-held instruments from the distributors earned frequent-flyer type points that could be used to obtain discounts on the patch technology units. This type of program was becoming more commonplace as industry growth slowed and distributors were being pursued by patch technology manufacturers.
As part of the promotion program, Precision required that each distributor sign a promissory note for program purchase amounts. Under the terms of the promissory note, all amounts owed to Precision, including the November program purchases, would have to be satisfied in full within six months. The note also required distributors to make payments on their November program balances calculated to coincide with expected product sell-through. After six months, the note required distributors to make a "balloon" payment for their remaining balances, which Precision estimated would be approximately 70% of the November program purchases.

On November 13, 2018, Precision held a meeting with its distributors to present them the program. The marketing initiative was largely successful with distributors signing up for large orders of hand-held instruments . About 70 percent of the distributors signed immediately with the rest being undecided. Follow-ups with the undecided distributors proved successful with only four not signing by year-end.

On December 10, 2018, the controller prepared a summary memorandum requesting credit limit increases for 11 distributors. The memorandum described the results of the November marketing strategy, the potential strategic benefits of the program, the intended reliance on promissory notes to secure the distributors' credit balances, and the payment history and status of the 11 distributors. Top management approved the requested credit limit increases based upon this summary memorandum.

Finally, several distributors indicated, during and after the November 13 meeting, that they did not have sufficient capacity to store additional products in their warehouses. As an accommodation to these distributors, Precision arranged to hire freight forwarders and warehouse facilities. At this point, management was quite pleased with the success of the marketing strategy.

RATIO ANALYSIS AND FINANCIAL STATEMENTS

Selected financial statement ratios are presented below, along with the unaudited consolidated financial statements for 2018 and the audited financial statements for 2017.

SELECTED RATIOS:	12/31/18 (unaudited)	12/31/17
Current ratio: current assets / current liabilities	2.23	2.20
Quick ratio: (current assets-inventory) / current liabilities	1.79	1.65
Debt to assets: total debt / total assets	59.20%	47.91%
Long term debt-to-equity: long-term debt / stockholders' equity	81.40%	39.96%
Inventory turnover: cost of sales / inventory	2.85	2.64
Days sales in inventory: 360 days / inventory turnover	126.32	136.30
A/R turnover: net sales / accounts receivable	4.35	5.85
Days sales in A/R: 360 days/ accounts receivable turnover	82.71	61.58
Total asset turnover: net sales / total assets	0.68	0.87
Gross margin: (net sales – cost of sales) / net sales	55.4%	54.4%
Profit margin on sales: net income/ net sales	9.10%	10.03%
Return on equity: net income / stockholders' equity	16.29%	16.76%

CONSOLIDATED STATEMENTS OF OPERATIONS FOR THE YEARS ENDED (IN THOUSAND OF DOLLARS EXCEPT PER SHARE DATA)

	12/31/18 (unaudited)	% of Net Sales	12/31/17 (audited)	% of Net Sales	% Change (Year over Year)
Net Sales	$1,914,318		$1,709,086		12.0
Cost and Expenses					
Cost of products sold	853,975	44.61	778,684	45.56	9.7
Selling, general, Administrative	725,608	37.90	606,889	35.51	19.6
Research and development	57,864	3.02	53,268	3.12	8.6
Total Expenses	1,637,447	85.54	1,438,841	84.19	13.8
Operating Earnings	276,871	14.46	270,245	15.81	2.4
Other (Income) Expense	13,561	0.71	13,700	0.80	-1.0
Earnings before income taxes	263,310	13.75	256,545	15.01	2.6
Provision for income taxes	89,118	4.66	85,125	4.98	4.7
Net Earnings	174,192	9.10	171,420	10.03	1.6
Retained Earnings at Beginning of Year	909,728		785,866		
Cash Dividends– Common Stock	52,266		47,558		9.9
Retained Earnings at Year End	1,031,654		909,728		
Earnings Per Common Share	$2.89		$2.84		1.9

CONSOLIDATED BALANCE SHEETS (IN THOUSANDS OF DOLLARS)

	12/31/18 (unaudited)	12/31/17 (audited)	% Change (Year over Year)
ASSETS			
Current Assets:			
Cash and cash equivalents	$546,036	$416,773	31.0
Accounts receivable - net	439,807	292,338	50.4
Inventories	299,662	294,825	1.6
Other current assets	233,844	167,779	39.4
Total Current Assets	1,519,349	1,171,715	29.7
Property, plant and equipment – net	541,061	503,922	7.4
Goodwill and other intangibles	456,944	217,791	109.8
Other assets	103,505	70,261	47.3
Total Assets	2,620,859	1,963,689	33.5
LIABILITIES AND SHAREHOLDERS' EQUITY			
Notes payable	222,642	198,197	12.3
Current portion of long-term debt	21,935	10,657	105.8
Accrued liabilities	366,646	286,160	28.1
Federal and foreign income taxes	70,168	37,100	89.1
Total Current Liabilities	681,391	532,114	28.0
Long-term debt	870,312	408,707	112.9
Total Liabilities	1,551,703	940,821	64.9
Common stock	24,154	24,150	0.0
Capital in excess of par value	88,101	89,088	-1.1
Retained earnings	1,031,654	909,728	13.4
Cumulative translation adjustment	8,915	63,465	-85.9
Treasury stock	(83,668)	(63,563)	31.6
Total Shareholders' Equity	1,069,156	1,022,868	4.5
Total Liabilities & Shareholders' Equity	2,620,859	1,963,689	33.5

PART III

Risk Assessment for the Revenue Cycle
As you know, auditing standards require various risk assessments in the planning phase of an engagement. Based on the preceding information, provide risk assessments for Precision's **revenue cycle** on the scales below.

1. **INHERENT RISK** is defined as the susceptibility of an assertion to a misstatement, due to error or fraud that could be material, individually or in combination with other misstatements, before considering the effectiveness of the related internal control structure (PCAOB AS 1101). Provide an assessment of the INHERENT RISK associated with the revenue cycle by indicating the appropriate number (between 0 to 10 as defined by the scale below) in the space provided. Circle **ONE** number.

0---------1---------2---------3---------4---------5---------6---------7---------8---------9---------10
Low Risk Moderate Risk High Risk

2. **CONTROL RISK** is defined as the risk that the client's controls will not prevent or detect material misstatements (PCAOB AS 1101). Provide an assessment of the CONTROL RISK associated with the revenue cycle by indicating the appropriate number (between 0 to 10 as defined by the scale below) in the space provided. Circle **ONE** number.

0---------1---------2---------3---------4---------5---------6---------7---------8---------9---------10
Low Risk Moderate Risk High Risk

3. **DETECTION RISK** is defined as is the risk that the procedures performed by the auditor will not detect a misstatement that exists and that could be material, individually or in combination with other misstatements (PCAOB AS 1101). Provide an assessment of the DETECTION RISK associated with the revenue cycle by indicating the appropriate number (between 0 to 10 as defined by the scale below) in the space provided. Circle **ONE** number.

0---------1---------2---------3---------4---------5---------6---------7---------8---------9---------10
Low Risk Moderate Risk High Risk

4. **FRAUD RISK** is defined as the risk that the client and its management will intentionally cause the financial statement to be materially misstated (PCAOB AS 2401). Provide an assessment of the FRAUD RISK associated with the revenue cycle of Precision by indicating the appropriate number (between 0 to 10 as defined by the scale below) in the space provided. Circle **ONE** number.

0---------1---------2---------3---------4---------5---------6---------7---------8---------9---------10
Low Risk Moderate Risk High Risk

PART IV

Audit Program for the Revenue Cycle

Rank in order of importance (1-5) the testing objectives you would focus on when responding to Precision's risk of material misstatement for each element of a standard audit program listed below. A ranking of "1" indicates you would place the highest focus. A ranking of "5" indicates you would place the lowest focus. Write N/A if you would place no focus at all (i.e., the objective is irrelevant). Write your ranking in the boxes below. Do not include a "tie" answer.

(A) Standard audit procedures – SALES AND RECEIVABLES

RANKING	TESTING OBJECTIVE
	OBJECTIVE 1. TEST PROPRIETY OF REVENUE RECOGNITION POLICIES AND PROCEDURES - SALES AND RECEIVABLES [Completeness, Existence]
	OBJECTIVE 2. TEST PRESENTATION OF SALES AND RECEIVABLES [Presentation]
	OBJECTIVE 3. TEST SALES AND RECEIVABLES JOURNAL ENTRIES RECORDED IN THE GENERAL LEDGER [Valuation, Existence, Completeness]
	OBJECTIVE 4. EVALUATE BUSINESS RATIONALE FOR SIGNIFICANT UNUSUAL SALES OR RECEIVABLES TRANSACTIONS [Existence, Valuation]
	OBJECTIVE 5. TEST PRESENTATION OF RELATED-PARTY SALES AND RECEIVABLES [Presentation]

For the testing objective you ranked #1 above related to SALES AND RECEIVABLES, explain your rationale for the ranking you chose, and then provide a detailed description about the nature, timing, and extent of audit procedure(s) you would perform to ensure that the testing objective is met.

Rationale for ranking:

Description of nature, timing, and extent:

(B) Standard audit procedures – SALES

RANKING	TESTING OBJECTIVE
	OBJECTIVE 1. TEST SALES BALANCES [Validity, Completeness, Existence]
	OBJECTIVE 2. TEST SALES RETURNS [Completeness, Existence]
	OBJECTIVE 3. TEST CUT-OFF OF SALES [Existence]
	OBJECTIVE 4. TEST CUT-OFF OF CREDIT MEMOS [Existence]
	OBJECTIVE 5. TEST FOREIGN CURRENCY SALES [Valuation]

For the testing objective you ranked #1 above related to SALES, explain your rationale for the ranking you chose, and then provide a detailed description about the nature, timing, and extent of audit procedure(s) you would perform to ensure that the testing objective is met.

Rationale for ranking:

Description of nature, timing, and extent:

(C) Standard audit procedures –RECEIVABLES

RANKING	TESTING OBJECTIVE
	OBJECTIVE 1. CONFIRM RECEIVABLES [Validity, Recording, Existence]
	OBJECTIVE 2. TEST THE ALLOWANCE FOR DOUBTFUL ACCOUNTS AND BAD DEBT EXPENSE [Valuation]
	OBJECTIVE 3. TEST ALLOWANCES FOR SALES RETURNS AND DISCOUNTS [Valuation]
	OBJECTIVE 4. TEST VALUATION OF FOREIGN CURRENCY RECEIVABLES [Valuation]
	OBJECTIVE 5 TEST FOR PROHIBITED LOANS TO EXECUTIVES [Presentation]

For the testing objective you ranked #1 above related to RECEIVABLES, explain your rationale for the ranking you chose, and then provide a detailed description about the nature, timing, and extent of audit procedure(s) you would perform to ensure that the testing objective is met.

Rationale for ranking:

Description of nature, timing, and extent:

Record the time you finish this part here: ____________________, and then continue.

PART V

Instructions: Please input or circle responses as requested. If you cannot provide an exact response, please provide as accurate of an approximation as possible.

Demographic Questions
Note: For questions 1 – 3, we are requesting this information based on your public accounting career. ***Please provide your best estimates.***

1. Are you a CPA? _________Yes _________No

2. What is your level of experience at your firm? Check only ONE.

Staff	Experienced Staff	Senior	Manager	Snr. Manager

3. Indicate the length of your audit experience _________Yrs _________Months

4. Indicate your primary industry expertise/specialization. Check only ONE.

Manufacturing	Financial Services	Technology	Health Care	Other

If other, please describe

Note: For questions 5 – 17, we are requesting specific information about the case and your previous experiences. ***Please* circle ONE number and provide your best estimate**

5. The audit manager in this case assigned you the following weights to help direct your effort and time when completing the risk assessment. Circle your answer below.
   a. The audit manager assigned equal weights (**25%**) to all of the planning tasks.
   b. The audit manager **did not** assign any weights to help direct my effort and time when completing the risk assessment.
   c. The audit manager assigned a **50%** weight of my time and effort to adjusting planned audit procedures to appropriately respond to risk.

6. How did your audit manager's instructions related to the risk weights affect how you completed the audit planning tasks?

7. In this case, rate the **level of effort** you placed on *evaluating **audit** risk (i.e., inherent, control, and detection risk).*

1	2	3	4	5	6	7	8	9	10	11
Low Effort										High Effort

8. In this case, rate the **level of effort** you placed on *evaluating **fraud** risk.*

1	2	3	4	5	6	7	8	9	10	11
Low Effort										High Effort

9. In this case, rate the **level of effort** you placed on ***adjusting planned audit procedures to appropriately respond to risk.***

1	2	3	4	5	6	7	8	9	10	11
Low Effort										High Effort

10. How **pleasant or unpleasant** was it for you to think about the primary tasks in this case?

1	2	3	4	5	6	7	8	9	10	11
Very Unpleasant										Very Pleasant

11. How **interesting** did you personally find the primary tasks in this case?

1	2	3	4	5	6	7	8	9	10	11
Very Dull/ Uninteresting										Very Interesting

12. How **easy or difficult** was it to make the risk assessments?

1	2	3	4	5	6	7	8	9	10	11
Very Easy										Very Difficult

13. How **easy or difficult** was it to make the audit program tailoring decisions?

1	2	3	4	5	6	7	8	9	10	11
Very Easy										Very Difficult

14. How much **knowledge** do you personally have with risk assessments?

1	2	3	4	5	6	7	8	9	10	11
Very Little Knowledge										Very Much Knowledge

15. How much **knowledge** do you personally have with audit program tailoring?

1	2	3	4	5	6	7	8	9	10	11
Very Little Knowledge										Very Much Knowledge

16. How much did the risk assessment task, in the case, call for or allow you to apply **creativity** in making your judgments?

1	2	3	4	5	6	7	8	9	10	11
Did Not Allow For Creativity										Strongly Allowed for Creativity

17. How much did the audit program tailoring task, in the case, call for or allow you to apply **creativity** in making your decisions?

1	2	3	4	5	6	7	8	9	10	11
Did Not Allow For Creativity										Strongly Encouraged Creativity

For the following questions, ***input a number or we will be unable to use your response. ***

18. What is the approximate number of times that you have performed a planning risk assessment in the last three years? ______________________

19. What is the approximate number of times you have detected a material misstatement ***due to error*** in the last three years?____________________

20. What is the approximate number of times you have detected a material misstatement ***due to fraud*** in the last three years? ____________________

21. **In practice**, what percentage of time do you spend doing the following activities when planning an audit? (please ensure that the total equals 100%)

Identifying client risk factors relating to the environment and/or the business strategy	
Assessing inherent risk, control risk, detection risk and fraud risk for the revenue cycle	
Considering how audit technology can be used to assess risk	
Adjusting planned audit procedures to appropriately respond to risk	
Total	100%

Appendix C: Risk Assessment Literature Studies

Title	Author(s) (Year)	Journal	Category	Research Question	Main Findings
Analytical Procedures and Audit Planning Decisions	Glover, Jiambalvo, and Kennedy (2000)	AJPT	**Intrinsic**	*How do auditors' revise preliminary audit plans after analytical procedures performed during interim testing reveal unexpected fluctuations?*	Auditors are more likely to increase planned testing where there is minimal corroboration of management explanation of the fluctuation and there is incentive for management to misrepresent the financial statements.
The Impact of Management Integrity on Audit Planning and Evidence	Kizirian, Mayhew, and Sneathen (2005)	AJPT	**Intrinsic**	*How do auditor-assessed management integrity influence auditor's assessments of risk of material misstatement, audit planning, and audit outcomes?*	Management integrity impacts the extent of testing and timing of evidence sought beyond what is suggested by the auditor's risk assessment and aids the auditor in discovering errors.
The Influence of Potentially Fraudulent Reports on Audit Risk Assessment and Planning	Newman, Patterson, and Smith (2001)	TAR	**Intrinsic**	*How do auditors assess the risk of fraudulent financial reporting and plan their audit where a possibly fraudulent auditee anticipates the assessment and planning process?*	The interaction between the auditor and auditee procedures that aid in assessing audit risk may not reduce that risk or result in more efficient audits.
Auditors' consideration of corporate governance and management control philosophy in preplanning and planning judgments	Cohen and Hanno (2000)	AJPT	**Intrinsic**	*What are the effects of corporate governance and management control on auditor planning judgments?*	Management control philosophy and governance structure affects auditors' assessment of the effectiveness of business risk.

141

Title	Author (Year)	Journal	Category	Research Question	Main Findings
The Halo Effect in Business Risk Audits: Can Strategic Risk Assessment Bias Auditor Judgment about Accounting Details?	O'Donnell and Schultz (2005)	TAR	**Extraneous**	*Does the holistic perspective that auditors acquire in making a strategic risk assessment influences the extent to which auditors adjust account-level risk assessments when they encounter changes in accounts that are inconsistent with information about client operations?*	Auditors using strategic risk assessments prior to evaluating more detailed performance measures (changes in account balances) will reduce their use of the diagnostic information. The finding suggest that the halo effect generated during strategic assessment influences subsequent judgment.
The Effect of Benchmarked Performance Measures and Strategic Analysis on Auditors' Risk Assessments and Mental Models	Knechel, Salterio, and Kochetova-Kozloski (2010)	AOS	**Extraneous**	*What are the joint effects of strategic analysis and benchmarking of performance measures on auditor judgment in assessing audit risk?*	Auditors who engage in strategic analysis have more balanced and accurate assessment of the risks across the business units being evaluated. The in-depth strategic analysis allows auditors to develop a more complete mental model of a client.
Integrating business risk into auditor judgment about the risk of material misstatement: The influence of a strategic-systems-audit approach	Schultz, Bierstaker, and O'Donnell (2010)	AOS	**Extraneous**	*How does the strategic-systems-audit (SSA) approach affect auditors' risk assessments?*	Only auditors trained to use SSA who analyzed information pro-vided in an SSA format effectively integrated business risk assessments with their assessment of the risk of material misstatement.

Title	Author (Year)	Journal	Category	Research Question	Main Findings
The Impact of Roles of the Board on Auditors' Risk Assessments and Program Planning Decisions	Cohen, Krishnamoorthy, and Wright (2007)	AJPT	**Intrinsic**	*How does the role of the audit committee impact auditors' risk assessments and program planning decisions?*	Inherent risk assessments were not affected by the roles, but control risk assessments were higher when the board played a weak agency or resource dependency role. The audit program planning variable were also affected by the roles of the board.
Exploring the role of country and client type on the auditor's client risk assessments and audit planning decisions	Martinis, Fukukawa, and Mock (2011)	MAJ	**Intrinsic**	*Does country and client type impact the auditor's client risk assessments, subsequent audit planning decisions and audit planning responsiveness to client risk assessments?*	Country and client type do have an impact on the auditor's client risk assessments and planned total audit hours, but they do not moderate audit planning responsiveness to client risk assessments.
Audit Partner Tenure and Audit Planning and Pricing	Bedard and Johnstone (2010)	AJPT	**Intrinsic**	*Is there an association between audit engagement partner tenure and audit planning and pricing?*	Audit planning effort increases for engagements following partner rotation, suggesting that new partners invest more effort when performing planning procedures compared to longer tenured partners.

Title	Author (Year)	Journal	Category	Research Question	Main Findings
Corporate environmental responsibility and audit risk	Mindak and Heltzer (2011)	MAJ	**Intrinsic**	*What is the relationship between auditors' perception of corporate environmental responsibility (CER) and audit risk?*	Auditors with a positive perception of the client's corporate responsibility, do not identify an association between corporate responsibility and audit risk. However, if the auditor has a negative perception of the client's environment, the auditor will include corporate responsibility in their risk assessment.
The Effects of Industry Specialization on Audit Risk Assessments and Audit-Planning Decisions	Low (2004)	TAR	**Germane**	*What is the effect of industry specialization on auditor's client risk assessment?*	Auditors' knowledge of the client's industry improves their audit risk assessments and the quality of their audit- planning decision.
An examination of auditor planning judgements in a complex accounting information system environment	Brazel and Agoglia (2007)	CAR	**Germane**	*What is the effect of computer assurance specialist (CAS) competence and auditor accounting information system (AIS) expertise on auditor planning judgements in a complex AIS environment?*	Auditor with high accounting information system (AIS) expertise assess higher risk in response to the risky ERP implementation than those with low expertise. Further, auditors with high AIS expertise effectively expanded the scope of substantive tests, particularly when there are CAS competence deficiencies.

Title	Author (Year)	Journal	Category	Research Question	Main Findings
Prepopulating Audit Workpapers with Prior Year Assessments: Default Option Effects on Risk Rating Accuracy	Bonner, Majors, and Ritter (2018)	TAR	**Germane** and **Extraneous**	*Are client risk assessments accuracy affected by the manner in which auditors access prior year risk assessments?*	Auditors with prepopulated (vs. blank) workpapers are less accurate for risks that have changed because they are more likely to stick with last year's assessments. Auditor characteristics reflecting a preference for accuracy reduce, but do not eliminate, the above negative effects associated with prepopulated workpapers.
The Effects of Decision Aid Orientation on Risk Factor Identification and Audit Test Planning	Bedard and Graham (2002)	AJPT	**Extraneous**	*Does decision aid orientation, positive or negative orientation, affect auditors' identification of risk factors and planning of audit tests?*	Auditors using the negative decision aid orientation identify more risk factors than do those using a positive orientation, for high-risk clients.
Decision Processes in Audit Evidential Planning: A Multistage Investigation	Wright and Bedard (2000)	AJPT	**Intrinsic**	*How does variation in inherent-risk factors affects auditors' decisions processes throughout audit planning?*	The client risk factors have pervasive effects throughout planning. The recognition of risk factors may help less experienced auditors to improve performance in the planning process.

Title	Author (Year)	Journal	Category	Research Question	Main Findings
Experimental tests of a descriptive theory of combined auditee risk assessment	Vandervelde, Tubbs, Schepanski, and Messier (2009)	AJPT	**Germane**	*What are auditors' cognitive processing when making auditee risk determinations during the planning of the audit of an account balance in a client's financial statement?*	Auditors create an "effective modified risk weighting" when assessing client risk. The auditors reduce their modified risk weighting by the risk factor possessing the lowest perceived risk and increase their modified risk weighting by the risk factor possessing the highest perceived risk. With these weightings, auditors then strike a balance among all the risk factors evaluated in reaching an assessment of combined auditee risk.
Documentation Requirements and Quantified Versus Qualitative Audit Risk Assessments	Piercey (2011)	AJPT	**Extraneous**	*What are the unintended consequences of the PCAOB -Auditing Standard No. 3 (AS3) documentation standard on auditors who have pressure to reach lenient, client-preferred risk assessments?*	Auditors assessing risk in qualitative terms respond to the AS3 documentation (adding documentation requirements) pressure by rationalizing their lenient assessments. The AS3 documentation requirement does not have this effect on quantified risk assessments.

Title	Author (Year)	Journal	Category	Research Question	Main Findings
Audit Risk Assessments Using Belief versus Probability Risk Assessments: The Effects of Elicitation Approach and Assertion Framing	Mock and Fukukawa (2011, 2016)	BRIA	**Germane**	*Are auditors' risk assessments influenced by the risk assessment approach and by assertion framing?*	Both risk assessment approach and assertion framing effects on the auditors' risk assessments are observed. More specifically, the risk measures that auditors choose to focus on, and the way assertions are framed impact planning decisions.
Do auditors assess inherent risk as if there are no controls?	Miller, Cipriano, Ramsay (2012)	MAJ	**Intrinsic**	*Do auditors assess inherent risk as if there are no controls?*	Auditors presume some level of expected control effectiveness when assessing IR; which is inconsistent with the definition of inherent risk defined in auditing standards. As a result, auditors tend to increase RMM (i.e., over audit) in response to internal control deficiencies.
Inherent Risk and Control Risk Assessments: Evidence on the Effect of Pervasive and Specific Risk Factors	Messier and Austen (2000)	AJPT	**Intrinsic**	*How do risk factors effect risk and control assessments of auditors?*	Auditors erroneously assess inherent and control risk when making risk assessments. Auditors' IR and CR assessments are inconsistent with the multiplicative formulation of the audit risk model.