

# FAR Working Papers

## Thinking Outside of the Box: Engaging Auditors' Innovation Mindset to Improve Auditors' Fraud Actions in a Data-Analytic Environment

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Project Number: 2019B02

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**March 2023**

We appreciate the helpful feedback provided by Ashley Austin, Ann Backof, Joe Brazel, Ryan Guggenmos, Jackie Hammersley, Miranda Hugie, Tamara Lambert, Robin Litjens, Cardin Masselink, Jen Winchel, Harm Schütt and workshop participants at Tilburg University, the University of Virginia, the 2020 Norwegian School of Economics (NHH) Digital Audit Symposium and the 2021 Association for Certified Fraud Examiners (ACFE) Research Institute (ARI). We thank the Foundation for Auditing Research (FAR) for their grant 2019B02. The views expressed in this document are those of the authors and not necessarily those of the FAR. Tina Carpenter and Margaret Christ are also thankful for financial support provided by the ARI and Terry-Sanford research grants. Finally, we are grateful to the accounting firms who provided auditor participants for our study.

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## **Thinking Outside of the Box: Engaging Auditors' Innovation Mindset to Improve Auditors' Fraud Actions in a Data-Analytic Environment**

### **ABSTRACT**

Data analytics can help auditors effectively respond to the risk of material misstatement due to fraud. However, harnessing this potential may require auditors to adopt an innovation mindset as urged by firms and regulators. Innovation is defined as creativity in action. Building on the creativity literature, we develop an innovation mindset designed to improve auditors' ability to generate effective fraud audit procedures when interpreting data analytic output. Further, with the advent of data analytics, auditors are asked to provide value-added, client insights, in addition to their primary goal of obtaining high audit quality. We predict that incorporating this secondary goal may strengthen the innovation mindset effect by enhancing auditors' cognitive flexibility. We experimentally demonstrate that the innovation mindset significantly improves auditors' development of effective fraud procedures. Moreover, this effect is amplified when auditors generate client insights, as this intervening goal boosts creativity and cognitive flexibility, further enhancing auditors' decision-making quality.

**Keywords:** innovation mindset; fraud detection; auditor judgment; goals; creativity; cognitive flexibility

## I. INTRODUCTION

Findings from recent PCAOB inspections suggest that significant audit deficiencies related to fraud detection are on the rise (PCAOB 2022a). This issue was highlighted in a recent speech by Paul Munter, Chief Accountant of the Securities and Exchange Commission (SEC), “PCAOB inspections consistently identify areas of concern involving auditors’ application of due professional care and professional skepticism when considering fraud or where the audit response to fraud risks and red flags was insufficient.” (SEC 2022, p. 2). Data analytics used during the financial statement audit offers powerful opportunities to address these shortcomings as they can reveal unusual patterns in data that could point to misstatements including fraudulent activity (Trentmann 2017). However, to effectively interpret data analytics output, both regulators and audit firms contend that auditors need to engage an *innovation mindset*, which is characterized by an ability to harness creativity to solve problems and display flexibility in thinking (CAQ 2018). Indeed, each of the Big Four audit firms now refer to an innovation mindset as a key trait for their professionals especially in today’s data analytic environment and are making significant investments to encourage auditors’ innovation mindsets (EY 2020; KPMG 2021; Deloitte 2022; PwC 2022). We draw on the psychology literature on creativity to examine whether prompting an innovation mindset improves auditors’ fraud actions, (i.e., generation of effective audit procedures likely to detect a seeded fraud) by enhancing flexibility in thinking, thus enhancing audit quality in a data analytic environment.

Performing a high-quality audit is one of auditors’ primary goals. However, as auditors increasingly use data analytics, they are also asked to identify and deliver value-added insights to the client because data analytics provide a more granular view into clients’ operations (PwC 2018; Austin, Carpenter, Christ, and Nielson 2021), introducing a new goal. In their interview study,

Austin et al. (2021) find evidence of this trend occurring now far more than in the past, as described by a Big Four partner:

“We see [providing client insights] as a way to provide more value-added advice to our clients. Imagine being able to walk into a CFO’s office and say to them, ‘as a result of our audit of sales we have learned something about how you sell, where you sell, the volume of transactions, when those transactions happen, which part of business generates those transactions’ ... [things] that they may or may not have had insight into. It lets us show the client some things they otherwise may not have known about their sales.” (p. 40)

While clients are eager to receive these business insights, regulators express concern about potential unintended consequences, as they view providing insights as a consulting-type activity that may reduce audit quality (Austin et al. 2021). Indeed, in a public speech one regulator warns that auditors may focus their use of data analytics in improving client operations and processes as opposed to improving audit quality (Harris 2017). Importantly, providing client insights adds a new goal into auditors’ already crowded set of goals, and there appears to be concern that this new goal may diminish audit quality.

Accounting literature shows that managing multiple goals can diminish one’s effectiveness of maximizing the successful outcome of a single goal (Kachelmeier, Reichert, and Williamson 2008; Christ, Emmett, Tayler, and Wood 2016; Ricci 2022), consistent with regulators’ concerns. However, we contend that effectiveness might not be diminished if the additional goal(s) engage creative thinking (e.g., using data analytics to provide client insights). In fact, when individuals shift between tasks or goals, it can help “switch on” creativity (Lu, Akinola, and Mason 2017) by increasing their cognitive flexibility, i.e., the use of different cognitive categories (De Dreu, Baas, and Nijstad 2008). In turn, increased cognitive flexibility associated with creativity can help individuals better manage different goals (Salvato and Rerup 2018). Thus, in a context where creativity is useful and encouraged, the focus on more than one goal may boost creativity, cognitive flexibility, and effective and appropriate goal management. We develop theory to predict that when

auditors are prompted with an innovation mindset, asking them to generate client insights may *benefit* the primary goal of audit quality as this new goal could serve as an incubator for cognitive flexibility (James 1995; Lu et al. 2017). The cognitive flexibility fostered by the client insights goal ultimately spills over to improve auditor performance in effective fraud procedure identification, which is critical for overall audit quality.

We test our hypotheses with a 2 x 2 between-participants experiment with 96 experienced senior-level auditors in the Netherlands from Big-Four and medium-sized international firms. Participants used financial information and data analytic output to perform a simulated audit task. The case is adapted from Asare and Wright (2004) and Hammersley, Johnstone, and Kadous (2011) and includes a seeded fraud based on a real fraud from an SEC Accounting and Auditing Enforcement Release (AAER) (SEC 1998). We updated this case with data analytics to reflect current audit practice. Participants assumed the role of an audit senior responsible for finalizing the audit program for the hypothetical audit engagement. We manipulated two independent variables: innovation mindset (primed vs. not) and goals (audit quality and client insights vs. audit quality only). Innovation is defined as creativity in action (Anderson, Potocnik, and Zhou 2014). Amabile (1988, p. 126) defines organizational innovation as “the successful *implementation* of creative ideas within an organization.” Thus, to develop the innovation mindset manipulation we adapted Guggenmos’ (2020) innovation culture manipulation and drew on the creativity literature in psychology (e.g., Sassenberg, Moskowitz, Fetterman, and Kessler 2017). All participants received email communication from the firm CEO about the audit firm’s philosophy, but we primed innovation mindset by manipulating the philosophy itself to reflect an innovation mindset versus a more neutral mindset. We also manipulated auditors’ goals via email communication from the audit manager. We manipulated the email content to include a focus on an audit quality goal

alone or an audit quality goal plus a client insights goal. Our main dependent measure is auditors' fraud actions, i.e., audit procedures effectively aimed at detecting the seeded fraud.

Consistent with our predictions, we find an ordinal interaction such that when auditors are in an innovation mindset and are given the additional goal of providing client insights, their creativity is amplified and they identify even more effective audit procedures aimed at detecting fraud. Also, using a process model, we find that cognitive flexibility<sup>1</sup> is the underlying mechanism that mediates the relationship. Thus, we show evidence consistent with theory that the combination of an innovation mindset and a goal of providing client insights increases auditors' cognitive flexibility, helping them identify more effective audit procedures and thereby enhancing audit quality.

Our study makes several contributions to the literature and practice by examining the intersection of several timely and important topics that are top of mind for researchers, standard setters, audit firms and regulators: engaging an innovation mindset, adopting a goal to identify client insights, utilizing and interpreting data analytics, and enhancing fraud actions. First, regulators, academics and practitioners call for research to understand auditor behavior in a data analytics environment and the conditions under which auditors can improve the quality of their judgments, including those related to fraud (Trompeter, Carpenter, Desai, Jones, and Riley 2013; Alles 2015; Perols, Bowen, Zimmerman, and Samba 2017; IAASB 2018, 2022; Austin et al. 2021; ASB 2022; PCAOB 2022c). This study answers these calls as we examine the joint effects of two new trends for auditors, utilizing an innovation mindset and providing client insights while working in a data analytic environment to respond to the risk of fraud. Indeed, the risk of fraud is

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<sup>1</sup> Cognitive flexibility is a measure of creative performance and a cognitive process. Researchers suggest that individuals must think flexibly to be creative (Smith and Blankenship 1991; Smith, Ward, and Shumacher 1993). We argue cognitive flexibility is one of the underlying mechanisms driving creativity.

on the rise and top of mind for standard setters (CAQ 2020b, IAASB 2022; PCAOB 2022a, 2022b, 2022c) who continue to note that auditors fail to respond to fraud risks with effective procedures (e.g., PCAOB 2018, 2019, 2020, 2022a; SEC 2019, 2022; Brazel, Carpenter, Gimbar, Jenkins and Jones 2023). Our results provide good news as we find that engaging auditors' innovation mindset in a data analytic environment improves their ability to identify effective fraud audit procedures. Thus, we provide novel insights that create a bridge between the fraud and data analytic literatures.

Second, we find that when auditors are given the explicit goal of identifying client business insights while their innovation mindset is engaged, the combined effect of mindset and goal further enhances auditors' ability to identify effective audit procedures. Our theory suggests this combined effect emerges because cognitive flexibility encourages a positive spillover of the creative client insight generation to the auditors' interpretation of data analytics. These results contribute to the accounting literatures on goal conflict (e.g., Kachelmeier et al. 2008; Christ et al. 2016; Ricci 2022) and auditor mindsets (e.g., Griffith, Hammerlsey, Kadous, and Young 2015; Backof, Carpenter, and Thayer 2018; Bauer, Hillison, Peecher, and Pomeroy 2020; Brewster, Johanns, Peecher, and Solomon 2021; Blum and Hatfield 2022; Cao, Duh, Tan, and Xu 2022). Further, we introduce a theory-based innovation mindset that boosts auditors' creativity, allowing them to identify effective fraud procedures when needed, particularly when asked to provide client insights, and find that cognitive flexibility is the process that underlies these performance improvements. Thus, we answer calls for research to provide cognitive process evidence that is derived from underlying theory and informed by prior research (Plumlee, Rixom, and Rosman 2015; Asay, Guggenmos, Kadous, Koonce, and Libby 2022).

Third, we contribute to practice and standard setting. The Center for Audit Quality (CAQ) suggests that auditors adapt an innovation mindset to effectively interpret data analytic output and

to generate creative solutions to problems (CAQ 2018). Accordingly, Big Four audit firms are investing significantly in data analytics and now include an innovation mindset as a key trait for their professionals (EY 2018, 2020; KPMG 2021; Deloitte 2022; PwC 2022). We provide evidence that a simple innovation mindset based on creativity theory can improve auditors' interpretation of data analytics, as well as their fraud actions, thus improving audit quality.

## **II. BACKGROUND AND HYPOTHESES DEVELOPMENT**

### **Auditors' Consideration of Fraud on the Audit**

Fraudulent financial reporting can have catastrophic consequences (Asare and Wright 2004; Beasley, Carcello, Hermanson, and Neal 2010; CAQ 2020a, 2020b; PCAOB 2020; SEC 2020, 2022; ACFE 2022; Dyck et al. 2023). Auditors are required to plan and perform an audit to obtain reasonable assurance that the financial statements are free of material misstatement due to error or fraud (IAASB ISA 240; PCAOB AS 2401.13). Auditing standards emphasize the importance of auditors' "questioning mind," when considering fraud (PCAOB AS 2401.52) and require auditors to identify fraud schemes that present risks of material misstatement, assess these risks, and respond with planned audit procedures that effectively address these fraud risks (AS 2301.12-15; IAASB ISA 240; PCAOB AS 2110.52-53).

Auditing research generally finds that auditors assess fraud risks reasonably well (e.g., Zimbelman 1997; Asare and Wright 2004; Carpenter 2007; Hoffman and Zimbelman 2009; Trotman, Simnett, and Khalifa 2009) but struggle to respond with effective audit procedures that would effectively detect fraud (e.g., Zimbelman 1997; Asare and Wright 2004; Hoffman and Zimbelman 2009; Hammersley 2011; Hammersley et al. 2011; Trompeter et al. 2013; Hamilton 2016; Austin 2023; Brazel et al. 2023). This problem is reflected in practice as PCAOB inspections

note auditors' failure to effectively respond to fraud (PCAOB 2019, 2020, 2022a; SEC 2019; IAASB 2022; SEC 2022).

Detecting fraud is a complex judgment task as auditors must examine and synthesize significant amounts of data to identify trends and patterns indicative of fraud (Hammersley 2006; Trompeter et al. 2013; Nolder and Kadous 2018; Griffith, Kadous, and Young 2021). If auditors fail to recognize a pattern or trend in the data suggesting a possible fraud, their ability to design effective fraud procedures diminishes (Hammersley et al. 2011, Asare and Wright 2004). Thus, it is critical that auditors improve their ability to recognize fraud patterns in the data, so they can design effective procedures targeting a specific fraud scheme (Hammersley et al. 2011).

Since fraud is difficult to detect (Carpenter and Austin 2014; Hamilton and Smith 2019), auditors often need to go beyond routine procedures to adequately address fraud risks, and recent data analytic developments may offer powerful opportunities in this regard. Indeed, armed with large data sets that can be summarized and visualized using data analytics, auditors may be better poised to address and respond to fraud risks. Further, data analytics can highlight areas of higher risk allowing for more focused testing (e.g., Alles 2015; Schneider, Dai, Janvrin, Ajayi, and Raschke 2015; Perols et al. 2017; IAASB 2018). However, though data analytics has the potential to tell a powerful, data-driven story, if the user lacks the necessary mindset to effectively interpret that story, the power of data analytics could be lost. As discussed, next, we propose that an innovation mindset may help auditors to effectively utilize this promising technology.

### **Prompting an Innovation Mindset**

Even with data analytics, auditors are still likely to struggle with generating effective audit procedures in response to heightened fraud risk without an appropriate mindset as auditors continue to fail to respond to fraud with appropriate audit procedures in practice (CAQ 2020a;

2020b; IAASB 2022; PCAOB 2022). While the CAQ refers to multiple mindsets (i.e., analytic, global and growth), they emphasize the importance of an innovation mindset, where one “has the ability to generate creative or novel solutions to problems” (CAQ 2018, p. 1). Thus, the innovation mindset is the focus of our study as we seek to improve auditors’ creation of effective fraud procedures (CAQ 2018). Similar to the CAQ, audit firms also emphasize the importance of engaging an innovation mindset, especially in today’s technology-driven audit environment (EY 2018, 2020; KPMG 2021; Deloitte 2022; PwC 2022). They contend that even auditors with the requisite technical and analytical competencies may fail to interpret or use data analytic outputs effectively unless they engage an innovation mindset which allows them to “think outside the box.”

### ***Innovation and creativity***

While the term ‘innovation mindset’ comes out of practice, there is a rich academic literature on the notions of innovation and creativity which we draw on in this study. Amabile (1988, p. 126) distinguishes between organizational innovation and creativity. She defines creativity as the “*production* of novel ideas and useful ideas by an individual or small group,” and organizational innovation as “the successful *implementation* of creative ideas within an organization.” In other words, innovation can be defined as creativity in action (e.g., Anderson et al. 2014).

Creative ideation allows individuals to problem-solve, remain flexible, and cope with opportunities, technology and changes that are part of decision-making (Mumford and Gustafson 1988; Flach 1990; De Dreu et al. 2008; Nijstad, De Dreu, Rietzschel, and Baas 2010; Runco 2010). Psychology research often operationalizes creativity with measures of fluency, originality, and flexibility. Fluency is a measure of creative production of ideas and is typically captured by the number of non-redundant ideas, solutions or insights (De Dreu et al. 2008). Originality is the

uncommonness of ideas being generated (Amabile 1983). Flexibility is the use and consideration of different cognitive categories and perspectives (De Dreu et al. 2008) and is associated with more ideas overall, with increased fluency (Nijstad, Stroebe, and Lodewjckx 2003), and with originality (Murray, Sujan, Hirt, and Sujan 1990). Research in psychology suggests that cognitive flexibility is needed for individuals to be creative and as such is thought of as both a measure of creative performance and a cognitive process (Smith and Blankenship 1991; Smith et al. 1993). As flexibility is a cognitive process and can be argued to subsume the other elements of fluency and originality, we focus on cognitive flexibility, and predict that auditors' creative generation of effective fraud audit procedures will benefit from enhanced cognitive flexibility.

Huerta and Jensen (2017) argue that creativity could be a key factor in whether users effectively interpret and thus appropriately harness the capabilities of data analytics. More specifically, we predict that prompting creativity is particularly crucial to the quality of fraud-related audit actions in a data analytic environment, because it may cause a disruption to auditors' normal "routine" of following standard and/or prior year procedures. As this creative disruption to their audit routine promotes more flexibility, it will allow auditors to consider cues more effectively during completion of their audit work. However, creativity is not a typical skill for most accountants (Bryant, Stone, and Weir 2011; Herron and Cornell 2021), and auditors may not display the creativity necessary to effectively use and interpret data analytics for fraud detection (Austin et al. 2021).

The auditing profession acknowledges auditors' limitation in creativity and calls for auditors to adopt an innovation mindset in practice (CAQ 2018; EY 2020; KPMG 2021; Deloitte 2022; PwC 2022). Brown-Liburd, Issa, and Lombardi (2015) warn that data analytics tools have the potential to overload users with information, and psychology theory suggests that information

overload can stifle creativity (Shalley 1991). Thus, the level of creativity that may be necessary for effective utilization of data analytics could be stifled by both the accountants' lack of creativity and the increased quantity of information provided by data analytics. This makes the encouragement of the innovation mindset even more important because it may mitigate against these two creativity suppressors.

### ***Prompting mindsets***

We draw on literature in psychology (e.g., Amabile 1988; Sassenberg and Moskowitz 2005; De Dreu et al. 2008; Liu, Jiang, Shalley, Keem, and Zhou 2016; Sassenberg et al. 2017) and management accounting research on innovation culture and creativity (e.g., Kachelmeier et al. 2008; Kachelmeier and Williamson 2010; Guggenmos 2020) to examine the effect of prompting an innovation mindset to improve auditors' fraud actions in this new data analytic environment.

Mindsets can be defined as broad cognitive configurations that drive the why and how of goal pursuit and have spillovers beyond a singular task (Gollwitzer and Keller 2020). Research has examined how prompting auditors' mindsets affects their audit approaches. For example, Kang, Piercey, and Trotman (2020) find that auditors often engage in a "defensive auditing" mindset and may be hesitant to incorporate more innovative audit procedures in their work even though such procedures may improve risk assessment. Bauer et al. (2020) suggest that auditors who approach planning as an advisor (with a more deliberative mindset), versus a decider (with a more implemental mindset), make more effective changes to prior year audit plans. Further, Brewster et al. (2021) find a wise-thinking disposition, characterized by thinking openly and reflectively, can be beneficial to auditors examining fraud. Building on this research, Blum and Hatfield (2022) find that auditors primed with deliberative mindsets exhibit higher skeptical judgments than those with an implemental mindset. Interestingly, however, an implemental

mindset resulted in higher skeptical actions as compared to a deliberative mindset, suggesting that different mindsets may influence different components of professional skepticism. This further highlights the importance of understanding how mindsets impact auditor effectiveness.

Cao et al. (2022) examine a growth mindset, which is the perspective that human ability can grow with effort as opposed to being fixed. They find that auditors with a growth mindset utilize data analytics more in conditions of high inspection risk. The innovation mindset discussed herein is related to the growth mindset discussed in Cao et al. (2022), as a growth mindset should also promote an openness to change. However, the innovation mindset is distinctly different as it is rooted in the psychology literature on creativity and idea generation rather than in level of effort like the growth mindset. Accordingly, examining the influence of an innovation mindset is important as we seek to improve auditors' creative generation of effective fraud audit procedures.

Collectively, this research suggests that mindsets are important in how effective data analytics are for auditors in addressing fraud. Although certain mindsets are seen as an inherent tendency or trait (Bauer et al. 2020; Brewster et al. 2021), we argue that prompting a state of creativity through an innovation mindset could encourage the type of open-minded and reflective thinking needed to effectively utilize and interpret data analytics in examining fraud.

### ***Prompting creativity through an innovation mindset***

We expect that encouraging an innovation mindset while auditors complete core audit tasks, such as planning appropriate audit procedures, will increase their creativity and enhance their execution of these core tasks. Prompted by an innovation mindset, creativity can aid auditors by encouraging more cognitive flexibility in their thinking. As previously described, this can help disrupt auditors' normal routine of following standard and/or prior year procedures, promoting flexibility that will allow auditors to consider cues in the data analytic environment more

effectively. Thus, we expect that engaging auditors' innovation mindset has the potential to improve their ability to effectively interpret audit evidence and hence improve their identification of effective audit procedures. This leads to the following hypothesis:

**H1:** Prompting auditors' innovation mindset will increase their effectiveness in identifying audit procedures that aid in detecting fraud.

### **Auditors' Goals**

As predicted in H1, we expect that auditor's fraud actions will generally improve when they engage an innovation mindset. However, unless they are given a creative task there may be limits to how much the innovation mindset benefits them (Puccio and Cabra 2010). As a result, auditors' ability to be creative likely benefits from introducing an additional, more creative task or goal that allows them to apply an innovation mindset more explicitly. As such, we examine the effect of adding a more unstructured task to an auditor's expected workload. An unstructured task should allow for a strengthened activation of an innovation mindset because it creates more freedom for the auditor to think outside of their standard procedures. One such task is providing value-added client insights.

Due to the increasing amount and type of data available, clients' demands on the auditor to provide value-added insights have recently grown (PwC 2018; Austin et al. 2021). For example, audits enhanced by data analytics typically include detailed transaction data, including dimensions such as preparer, source, detailed timing, approvals, and transaction paths (Brown-Liburd and Vasarhelyi 2015). This expanded level of detail allows auditors unique insight into clients' business. As one Big Four audit partner described in Austin et al. (2021, p. 1913), insights gleaned through data analytics provide "a way to provide more value-added advice to our clients" by sharing knowledge about the client's business, the client "might not otherwise have been privy to."

The task to provide client insights adds an additional goal to an auditors' already crowded set of goals, which includes performing a high-quality audit, avoiding litigation risk, completing audits within the budgeted amount of time, providing client service, and reaching conclusions that agree with their supervisors' preferences, among others (Griffith, Hammersley, Kadous, and Young 2015). Regulators raise concerns about whether the goal of providing client insights may cause independence concerns and diminish audit quality (e.g., PCAOB 2021).

In theory, introducing a secondary goal (providing client insights) could cause goal conflict and adversely affect auditors' performance on their primary goal (providing high audit quality). Psychology research defines a goal as an internal representation of a desired state not yet obtained (Austin and Vancouver 1996). People set a wide range of goals throughout their lives and vary these goals in complexity, topic area and duration. As a result, people experience goals concurrently, so these goals compete for the same resources. Researchers label this as "goal conflict" and find that it results in decreased goal-related performance because it shifts cognitive resources from goal realization of a single goal to self-regulation amongst several goals (Shah and Kruglanski 2002; Kehr 2003).

Prior management accounting studies also find that an individual's performance towards a primary goal decreases with the introduction of a secondary goal (e.g., Kachelmeier et al. 2008; Christ et al. 2016). However, more recently, Ricci (2022) finds that performance can increase or decrease depending on how the individual perceives their goals. Specifically, he finds the way auditors perceive performance and think of their goals as either commitment framing (i.e., how much they care about a goal), or progress framing (i.e., the degree to which they are accomplishing a goal) matters to audit quality such that commitment framing of a client service goal impairs the quality of auditors' judgment while progress framing does not impair their performance.

This mixed evidence would suggest that introducing a goal to provide client insights could either improve or diminish audit quality. Further, while prior management accounting research examines contexts where the goals compete directly for the same cognitive resources, an auditor may be able to find insights during audit procedures that have implications for the audit and the client. As a result, these two goals are not mutually exclusive and thus not necessarily competing for resources. As such, it is an empirical question whether this additional goal of providing client insights as a “byproduct” of the data analytic enabled audit environment (Austin et al. 2021) would adversely impact audit quality as it is not inherently in conflict with the goal to maintain high audit quality.

Auditors may take an approach to “keep their eyes peeled” during the audit in case they discover insights that may interest the client. Unlike other situations in which auditors face directly conflicting goals and must choose between two tasks or decide whether to perform a task, the potential conflict between providing value-added insights to clients and maintaining audit quality exists within a single task and therefore does not require the auditor to choose between tasks because progress on one can lead to progress on the other. For example, during revenue planning procedures the auditor can discover an insight that is helpful to the client and also to the audit. In addition, the act alone of discovering client insights likely results in the auditor learning information that may increase their understanding of the client, which is crucial for audit quality. Thus, asking auditors to provide client insights adds a new goal, but in a way that may not be detrimental to audit quality. Rather it adds an additional focus that connects to, and may even benefit, the primary goal of providing a high quality audit.

## The Enhancing Effect of Goals on Creativity

As discussed, the main impact of being asked to provide client insights in addition to the primary goal of providing high audit quality on the effectiveness of auditors' fraud actions is unclear. However, there are several theoretical reasons to expect that the addition of another goal might further enhance the impact of the innovation mindset on the generation of fraud-related audit procedures—an ordinal interaction effect.

First, research in psychology suggests that having participants engage in an intervening activity boosts creativity, especially when the intervening task is more cognitively demanding (Segal 2004). We argue that in the audit context, where auditors are thinking of effective audit procedures to address fraud risks, incorporating the new goal to provide client insights as an intervening task will be cognitively demanding. This is because it requires both interpreting data analytic outputs and employing some level of cognitive flexibility to come up with client insights, which are both outside of an auditor's typical skillset (Bryant et al. 2011; Herron and Cornell 2021). Accordingly, this new goal of generating client insights may act as an incubator for creativity when the appropriate innovation mindset is employed.

Second, studies in psychology have shown that creativity and innovation are enhanced when experts switch between tasks and goals (Tardif and Sternberg 1988; James, Chen, and Goldberg 1992; James 1995). This would suggest that the effects of an innovation mindset may be more effective when an auditor experiences some level of switching between goals (James et al. 1992; James 1995).<sup>2</sup> Similarly, task-switching has been shown to aid in “switching on” creativity (Lu et al. 2017).

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<sup>2</sup> James et al. (1992) find that this is only the case when the intervening goal is one that is socially or instrumentally linked to the task in the expert's area of expertise. In the auditing context, we expect that a goal to provide client insights is socially linked to auditor's expertise as auditing is a client service profession, and also is instrumentally linked as it is a goal within the auditor's course of performing normal audit procedures (in this case, interpreting data analytics).

Third, the creativity literature emphasizes the importance of cognitive flexibility when conceptualizing creativity (De Dreu et al. 2008). Cognitive flexibility is defined by Nijstad et al. (2010) as “the ease with which people can switch to a different approach or consider a different perspective” (p. 42). We argue that the combination of encouraging auditors to be creative through an innovation mindset and asking them to consider an additional client-insights goal will improve their cognitive flexibility, leading to the generation of more effective audit procedures, and resulting in improved audit quality overall.

Indeed, prior research finds that increased (cognitive) flexibility is necessary to adequately accommodate more than one goal (Salvato and Rerup 2018). However, auditing firms generally dictate the nature, timing, and extent of testing in an audit, thus creating a rigid routine that is likely to inhibit cognitive flexibility. We expect that encouraging auditors, who do not normally engage in high levels of creativity, to engage an innovation mindset (i.e., be creative) could cause a disruption to their normal “routine” of following standard and/or prior year procedures. This creative disruption to the audit routine is likely to promote more cognitive flexibility when engaging an innovation mindset. Then, giving auditors a (somewhat) less structured goal to identify value-added client insights, will further enhance auditors’ cognitive flexibility as it will allow auditors to consider more than one goal during completion of their audit work, giving them a more explicit application for cognitive flexibility. We formally predict this relationship in H2a:

**H2a:** The positive effect of prompting an auditors’ innovation mindset on the provision of effective audit procedures that aid in detecting fraud will be greater when they are also asked to provide client insights compared to when they are not.

Importantly, prior research does not suggest that simply having multiple goals improves creativity, but when combined with an environment that stimulates creativity, more than one goal can further enhance the creativity employed during a task because of the enhanced cognitive flexibility. Thus, we do not expect that adding a new goal to provide client insights alone, i.e.,

without engaging their innovation mindset, will increase task performance as the auditor is not encouraged to be innovative or deviate from their rigid routine. Instead, we expect that the creative and cognitively challenging task of providing client insights amplifies the benefits of the innovation mindset such that the combination of the additional goal with the innovation mindset will result in enhanced creative output.<sup>3</sup> This leads to our ordinal interaction hypothesis:

**H2b:** Asking auditors to provide client insights will increase the effectiveness in identifying audit procedures that aid in detecting fraud when an innovation mindset prompt is present, but not when it is absent.

We summarize the predicted effects of both H2a and H2b in Figure 1.

### **The Underlying Mechanism: Cognitive Flexibility**

Cognitive flexibility is a cognitive process that research suggests may be necessary to enable individuals' creativity (Smith and Blankenship 1991; Smith et al. 1993). Thus, we predict cognitive flexibility to be the mechanism that underlies auditors' improved fraud actions and therefore mediates the interactive effect of an innovation mindset coupled with an additional goal to provide client insights. This leads to the following hypothesis:

**H3:** Cognitive flexibility will mediate the interaction effect of prompting an innovation mindset and goals on the auditors' effectiveness in providing audit procedures that aid in detecting fraud.

## **III. RESEARCH METHOD**

### **Participants**

Ninety-eight auditors from the Netherlands, with an average of 4.67 years of audit experience, completed the study. We exclude two participants who experienced technical difficulties or did not understand the language used in the case. In total, 96 auditors are included

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<sup>3</sup> Although we do not predict that the effect of this secondary goal without the innovation mindset will degrade auditors' performance, quotes from Austin et al. (2021) suggest that regulators are concerned that seeking client insights might decrease audit quality, in part, because auditors may be distracted by this secondary goal.

in our analysis. 76 percent (24 percent) of participants worked for Big Four (non-Big Four) firms. Thirty percent of the participants are females. Ninety-four percent of participants had experience auditing revenue. Participants reported utilizing data analytics during audit engagements an average of six times.

We conducted our experiment using an online task. The Foundation for Auditing Research (FAR) provided access to participants through live sessions online and firm-distributed links. We also recruited participants through personal networks.<sup>4</sup>

### **Experimental Design**

To test our predictions, we conducted a 2 x 2 between-participants experiment in which participants used traditional audit evidence and data analytic output to perform a simulated audit task. Participants were randomly assigned to treatment conditions. The task is an adaptation of the fraud case from Asare and Wright (2004) and Hammersley et al. (2011) based on an actual SEC AAER (SEC 1998), and we updated the case to include data analytic output and dashboards creating a data-analytic environment for all participants. We manipulated two independent variables: *Innovation Mindset* (mindset vs. no mindset) and *Goals* (i.e., audit quality and client insights vs. audit quality only). Participants were asked to assume the role of an audit senior responsible for finalizing the audit program for a hypothetical audit engagement (Precision Inc.). Participants first read an email from the CEO of their audit firm (Bean, LLC), which described the philosophy of the firm and included the mindset manipulation. Then, they viewed an email from their audit manager that included the goal manipulation. Next, participants received background information about the scenario, the client, and the engagement.

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<sup>4</sup> Prior to conducting the experiment, we obtained approval from the relevant institutional review boards. We also conducted a pilot study and incorporated feedback provided by several partners in practice who reviewed our experimental materials for realism and relevance of the task for participants.

The case materials included client background, industry analysis, assessment of management, planned materiality, and assessment of the control environment. Participants were also given an overview of the Revenue cycle and discussion of roll-forward tests and changes since prior year. The only major change from prior year and interim was the introduction of a new marketing strategy that increased revenue significantly at year-end. This marketing strategy was the basis of the seeded fraud in the case.<sup>5</sup> The participants were provided with the unaudited financial statements of the current year as well as the audited financial statements from the prior year. Consistent with practice, we set our study in the context of a data-analytics enabled audit. Importantly, all participants were given (non-interactive) data-analytics dashboards which allowed further insight into trends regarding revenue, shipping, and accounts receivable. Data analytics also provided insight into industry trends regarding key ratios. After viewing the case materials, participants were asked to design an audit program for this client. The main dependent measure is the quality of proposed audit procedures to detect the seeded fraud. We also collected risk assessments, manipulation checks, process measures, and demographic questions.

### **Independent Variables**

We manipulated Innovation Mindset at two levels: *Mindset* and *No Mindset*. We developed our innovation mindset manipulation based on psychology research on creativity (Sassenberg et al. 2017) and the company innovation culture manipulation from Guggenmos (2020).<sup>6</sup> All participants received a message from their audit firm’s CEO about their firm’s philosophy (“Think BEAN!”). In the *Mindset* condition the acronym “BEAN” stands for “Be creative, Embrace risk-

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<sup>5</sup> The marketing strategy was described in detail in the case and featured fraud indicators including management incentives, increased credit limits, and pushing inventory on distributors that did not have the facilities to hold the inventory.

<sup>6</sup> In Guggenmos (2020), participants were exposed to either a more or less innovative company culture based on the words chosen to represent the letters B, E, A, N in the “Think Bean!” slogan. We adapted the “Think Bean!” slogan to fit the auditing context.

taking, Applaud innovation, and Need to educate and collaborate.” In the *No Mindset* condition, it stands for “Be focused and excel, Embrace efficiency and effectiveness, Applaud competence, and Need to educate and communicate.” Full text of the manipulation is provided in the Appendix.

Note that indication of the company’s philosophy is used as a prompt for engaging a certain mindset (innovation mindset versus no mindset), as an individual is likely to adopt the mindset encouraged by management. After learning their firm’s philosophy, participants were asked to “List three ways you can embrace the “Think Bean!” mindset on the job. The purpose of this was to strengthen and reinforce the manipulation. This technique is similar to that used in psychology research on mindsets where participants list experiences associated with the primed mindsets (e.g., Sassenberg and Moskowitz 2005) and is intended to strengthen mindset manipulations. Similar to Guggenmos (2020), and consistent with audit practice, participants are reminded of the firm philosophy once during the experiment to “mirror the pervasive nature of a strong corporate culture” (p. 2329).

Goals were manipulated by either asking participants to focus both on audit quality and provide additional client insights (*Insights*) or only to focus on audit quality (*No Insights*). Before reviewing case details, participants in the insights condition were told that their audit manager had asked them to keep their eyes out for business insights to share with the client, while participants in the control condition were not instructed specifically to search for these insights. Both conditions emphasize the importance of performing a high-quality audit. Participants in both conditions were eventually asked to provide client insights; thus, the difference between conditions is whether they knew about the additional goal beforehand.

## Dependent Variables

After receiving the manipulations and reviewing all available case materials, participants were asked several questions regarding their own observations and appropriate audit procedures to perform based on their observations. As discussed above, the case contained seeded fraud indicators related to management overstatement of revenue. Participants learned of a large increase in year-end revenue related to a new marketing strategy that encouraged distributors to purchase more products on credit that would be housed at the client's premises until distributors had room. In addition, there were clear management incentives to meet earnings targets.

Our main dependent variable, *Effective Audit Procedures*, is the quality of auditors' planned procedures, measured as the number of suggested procedures that would enable detection of the seeded fraud as reflected and documented in the real SEC AAER upon which our case is based (SEC 1998). This variable captures participants' ability to incorporate fraud indicators into their design of effective procedures.

Two researchers who were blind to the participants' conditions coded audit procedures based on quantity and quality. Quantity reflects the number of idea units generated by an audit participant after removing redundancies. To assess the quality of suggested audit procedures, the researchers largely leveraged the coding from Hammersley et al. (2011) in which an expert panel reviewed the risk factors and procedures identified by auditor participants to validate the quality of procedures in relation to detecting the seeded fraud in the case that we adapted from their study. Procedures deemed to be of quality in the Hammersley et al. (2011) study were also coded as quality in our study. However, because our case materials included data analytic dashboards which could increase or change the types of procedures performed, the coders used their judgement to determine if any procedures not included in the Hammersley et al. (2011) study were of high

quality with respect to identifying the seeded fraud. The coders also agreed that all high-quality procedures included in Hammersley et al. (2011) were still of high quality in this study.<sup>7</sup>

We also measured the quality of the business insights identified by participants (*Quality Insights*) using auditors' written responses. Importantly, all participants were asked to list business insights, not just those in conditions where they were explicitly asked to do so ahead of time by their manager. The same researchers, blind to participants' conditions, coded these insights using a predetermined coding rubric. Insights were counted when they were clear, novel, and insightful for the client (not just basic audit information). Initial intercoder agreement was 93.6% for all score categories, with a Cohen's Kappa measure of 0.845 ( $p < 0.001$ ), which is considered 'almost perfect agreement' (Landis and Koch 1977). Finally, the coders met and reconciled all coding differences. Once coding was complete, we engaged a panel of senior audit experts provided by the FAR to validate the coding of client insights, further confirming the coding scores.<sup>8</sup>

### ***Mediating Variable***

Psychology studies define *Cognitive Flexibility* as the ease with which one switches between different tasks or categories (Nijstad et al. 2010). We develop a composite measure of the number of *Effective Audit Procedures* and the number of *Quality Insights* identified by each participant. This measure is intended to capture the extent to which a participant can switch categories between audit procedures and business insights and therefore represents their cognitive flexibility. To calculate *Cognitive Flexibility*, we compared the scores for the two main goals that we examine in this study: effective audit procedures and client insights. We determined how many

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<sup>7</sup> If a participant listed a complete audit procedure, it was coded '1' for quantity. However, if the procedure did not address the seeded frauds, the response was coded '0' for quality.

<sup>8</sup> A panel of seven senior audit experts ranging from senior manager to partner reviewed the participants' responses and our coding. The experts indicated whether they agreed with the coding of each insight as quality vs. non-quality and explained their answers. Overall, five of the seven experts had over 80% agreement with our initial coding. We examined whether there were any items for which the majority of experts disagreed with the original coding and updated our coding accordingly.

of the individual high-quality ideas in the audit procedures category were matched with a high-quality idea in the client insights category. Every quality procedure that corresponds to a quality client insight demonstrates that the individual was able to entertain both goals at the same time and thus indicates cognitive flexibility between the goals.<sup>9</sup>

## IV. RESULTS

### Manipulation Checks

To measure the effectiveness of our innovation mindset manipulation, we ask participants to “Think back to the “Think Bean!” philosophy at your audit firm, Bean LLC,” and indicate on a 100-point Likert scale the extent to which the philosophy focused on innovation. On average, auditors in the *Mindset* condition indicated a significantly greater focus on innovation than those in the *No Mindset* condition (68.34 v. 54.40,  $F = 12.32$ ,  $p < 0.001$ , untabulated). To measure the effectiveness of our goal manipulation, we ask participants to “Think back to when you began your audit,” and indicate on a 100-point Likert scale the extent to which “your manager, John Reynolds, asked you to focus on additional insights about the client’s business.” On average, auditors in the *Insights* goal condition indicated a significantly greater focus on client insights than those in the *No Insights* goal condition (66.16 v. 49.48,  $F = 16.63$ ,  $p < 0.001$ , untabulated). Thus, we have evidence that our manipulations of innovation mindset and goals are effective.

### Tests of Hypotheses

We report the cell means for our variables in Table 1, and the respective hypotheses tests in Table 2 (H1), Table 3 (H2), and Figure 2 (H3). Hypothesis 1 predicts that prompting an auditors’

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<sup>9</sup> Effectively, this score is the lower value of either the quality procedure or quality insights score. For example, if an individual lists five quality procedures and two quality insights, they would receive a score of ‘2’ as they have two thoughts in each goal that has a counterpart in the other goal. If an individual lists two quality procedures and two quality insights, they will similarly receive a score of ‘2’ for cognitive flexibility. This score is not intended to value the number of either insights or procedures alone; rather it is intended to capture the ability to entertain both goals simultaneously.

innovation mindset will increase their effectiveness in identifying audit procedures that aid in detecting fraud. Our dependent variable is a count of our coded quality audit procedures variable, *Effective Audit Procedures*. As shown in Table 1 and Table 2, auditors in the *Mindset* condition document a significantly greater number of effective audit procedures than those in the *No Mindset* condition (4.48 vs. 2.33,  $F=14.577$ ,  $p < 0.001$ ). Thus, H1 is supported as we find that engaging an innovation mindset increases auditors' creation of effective audit procedures designed to target the seeded fraud.<sup>10</sup>

Hypothesis 2a predicts that when auditors are asked to provide business insights to clients during the audit, it will amplify the effect of the innovation mindset. Hypothesis 2b predicts a positive effect of the client insight goal when auditors have been prompted to engage an innovation mindset but no effect when they have not been prompted to engage an innovation mindset. Combined, our theory predicts an ordinal interaction with a specific pattern of cell means.<sup>11</sup>

We report the results of our statistical tests of H2a and H2b in Table 3. Panel A presents the overall ANOVA results and Panel B presents simple effects. We use custom contrast coding to test for the predicted pattern of results (shown in Figure 1, Panel A). We follow Guggenmos, Piercey, and Agoglia (2018) and derive contrasts weightings based on a priori theory [-2, -2, 1, 3] to reflect the main effect predicted in H1 and the ordinal interaction predicted in H2a and H2b. Statistical results of these planned contrast tests and an evaluation of the contrast residual ( $q^2$ ) are reported in Table 3, Panel C. In Table 3, Panel C, we test the predicted ordinal interaction and report that contrast is significant ( $F = 15.474$ ,  $p < 0.001$ , two-tailed). Further, the between-cells

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<sup>10</sup> For consistency with prior literature, we also examine the effect of innovation mindset on the auditors' ability to identify fraud risk factors. Untabulated results reveal a directional effect that is close to significant (2.71 vs 2.15,  $F=2.665$ ,  $p=0.106$ ).

<sup>11</sup> For consistency with prior literature, we also examine the interactive effect of an innovation mindset and goals on auditors' ability to generate quality fraud risk factors (untabulated). Using the same contrast weights as in our test of H2, we find a significant contrast ( $F=2.90$ ,  $p=0.092$ , two tailed) with an insignificant between-cells residual variance ( $F=0.09$ ,  $p=0.910$ ) and the contrast variance ( $q^2$ ) is 0.05, meaning that only approximately five percent of the variance is not explained by the predicted contrast.

residual variance is not significant ( $F = 0.572$   $p = 0.566$ , two tailed) and the contrast variance ( $q^2$ ) is 0.064, meaning that only approximately six percent of the variance is not explained by the predicted contrast. We also assess the visual fit by comparing the plotted means in Figure 1, Panel B, to the predicted pattern in Figure 1 Panel A, and confirm visually that the pattern of results matches the prediction.

Both H2a and H2b are supported. The evidence suggests that the joint effect of an innovation mindset and client insights goal leads to the greatest number of effective audit procedures being identified that appropriately target the seeded fraud compared to an innovation mindset alone, client insights goals alone, or when neither an innovation mindset nor a client insights goal is prompted.

H3 predicts that the mechanism through which the innovation mindset and client insights goal improves the quality of audit procedures identified by auditors is cognitive flexibility. That is, when auditors have a client insight goal and audit quality goal, engaging the innovation mindset will allow them to switch their focus back and forth among those goals more readily, resulting in improved cognition and audit actions.

We test H3 using a moderated mediation model (Hayes 2018), which is depicted in Figure 2. Specifically, we use PROCESS Model 8 wherein we use our *Cognitive Flexibility* measure as the mediator. As predicted, the results of our theoretical model demonstrate that the interaction of Innovation Mindset and Goals improves auditors' ability to identify effective fraud audit procedures by enhancing their cognitive flexibility (90% CI, Lower Limit: 0.210, Upper Limit: 3.491).<sup>12</sup> Thus, H3 is supported.

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<sup>12</sup> Following Hayes (2018), PROCESS models are statistically significant when a 90% confidence interval (CI) does not contain 0.

## **Supplemental Analysis**

### ***The Effect of an Innovation Mindset and Goals on Identification of Client Insights***

While the primary focus of our study is on the attainment of audit quality by means of identifying effective audit procedures aiding in fraud detection, we also examine how prompting an innovation mindset can help auditors to accommodate their additional goal and therefore perform better when producing client insights, as a byproduct of the current data-analytics enabled audit environment. Interviews from Austin et al. (2021), revealed that client insights are valued by both auditors and clients. Further, identifying client insights may not only act as a client service tool but could also result in auditors learning more about their clients. Though finding insights should not become the auditor's main goal, there is value in understanding factors that influence their detection. Means shown in Table 1 panel C, suggest that tasking auditors with finding business insights at the start of the audit results in auditors generating a greater number of insights. Further, the number of insights generated is the highest when auditors are both tasked with finding insights and encouraged to engage an innovation mindset. Untabulated planned comparisons reveal significant differences between the control condition (i.e., no innovation mindset and no client insights) and when both a mindset and insights goal is present ( $t=-3.992, p < 0.001$ ), between an insights goal only and both a mindset and insights goal is present ( $t=-3.768, p < 0.001$ ), and between mindset only and when both a mindset and insights goal is present ( $t=-3.379, p = 0.001$ ).

### ***Auditors' Use of Data Analytic Output***

As we have described, current auditing practices include using, interpreting, and reviewing data analytic output. All auditor participants received the same data analytic dashboards as part of the audit evidence during the experiment. After concluding the main portions of the experiment, participants were asked to describe "the extent to which you relied on the data analytics provided"

on an 11-point Likert scale. Untabulated results reveal that the use of the data analytics is greater when auditors are asked to identify client business insights at the beginning of the audit ( $F=2.351$ ,  $p=.06$  one tailed), suggesting an additional benefit of providing client insights is more reliance on data analytic output.

## V. CONCLUSION

Data analytics and emerging technologies are transforming the auditing and financial reporting landscape, and it is now more important than ever that auditors develop the appropriate mindsets to fully embrace these powerful tools that can reveal suspicious patterns in the data that may be indicative of misstatement or fraud. Regulators and standard setters are exploring ways to revise audit standards to address both data analytics and fraud detection (IAASB 2022, PCAOB 2022c) because auditors continue to struggle with fraud detection (PCAOB 2018, 2019, 2020, 2022a; IAASB 2022). Audit practitioners warn that auditors must engage the proper mindset to interpret the data analytics in practice (e.g., CAQ 2018). The CAQ suggests that auditors adopt an innovation mindset, one that allows thinking flexibly, effectively interpreting data analytics and finding creative problem solutions (CAQ 2018), and Big Four audit firms also encourage their professionals to have an innovation mindset (EY 2020; KPMG 2021; Deloitte 2022; PwC 2022).

Drawing on psychology theory on creativity, we develop an innovation mindset intervention that we predict and find produces the kind of cognitive flexibility that auditors need while conducting a data analytics-enabled audit to effectively identify audit procedures that enhance auditors' detection of fraud, ultimately improving audit quality. Specifically, we find that auditors who are prompted with an innovation mindset document a significantly greater number of effective audit procedures (those targeted at the seeded fraud) than those auditors who were not prompted with an innovation mindset. Further, we find that when auditors are provided both an

innovation mindset and an additional goal of providing client insights, that the additional client insights goal serves as a creativity incubator as auditors' cognitive flexibility is enhanced. This amplifies their ability to identify both more effective fraud audit procedures and more client business insights. Thus, we document an additional benefit of the emerging practice of identifying client insights during the audit. This is a fruitful area for future research.

Our study makes three primary contributions to the literature and practice at the intersection of several important and emerging areas for research and practice: developing innovation mindsets, balancing goals, effective interpretation of data analytics and enhancing fraud and skeptical actions. First, by examining the joint effect of asking auditors to provide client insights and engaging their innovative mindset while using data analytics, we answer the calls for research that provides a deeper understanding of auditors' judgments and actions when they use and interpret data analytics (Alles 2015; Schneider et al. 2015; IAASB 2018; Austin et al. 2021).

Second, by examining the potential for conflicting goals that arise because of auditors' new opportunities to provide client insights with data analytics, we highlight that when combining these goals with an innovation mindset, auditors' actions can actually improve with this additional goal. This finding contributes to the accounting literature on goal conflict (e.g., Kachelmeier et al. 2008; Christ et al. 2016; Ricci 2022) as well as the recent literature on auditor mindsets (e.g., Bauer et al 2020; Kang et al. 2020; Brewster et al. 2021; Blum and Hatfield 2022; Cao et al. 2022). Further, by exploring cognitive flexibility as the mechanism for how this theory-based innovation mindset works to boost auditors' creativity and auditor performance, we respond to calls for research that draws on theory to test predictions and provide cognitive process evidence in the audit environment (Plumlee et al. 2015; Asay et al. 2022).

Third, we contribute to the ongoing discussion about how auditors might improve their professional skepticism and their response to fraud by regulators and academics (e.g., Nolder and Kadous 2018; PCAOB 2019; 2020; 2022; IAASB 2022; SEC 2022a, 2022b, 2022c) and add to the debate about the benefits and costs of audit firms providing “consulting-type” activities (PCAOB 2022c). We find that by engaging an innovation mindset and improving cognitive flexibility, auditors can and do identify significantly more high-quality audit procedures that are aimed at detecting the seeded fraud. In sum, our study contributes to academic research, practice, and regulation by providing insights into this new world of data analytics as we seek to better understand additional goals that auditors may face and the benefits of auditors’ innovation mindsets at managing these goals and improving cognitive flexibility, professional skepticism, and fraud detection.

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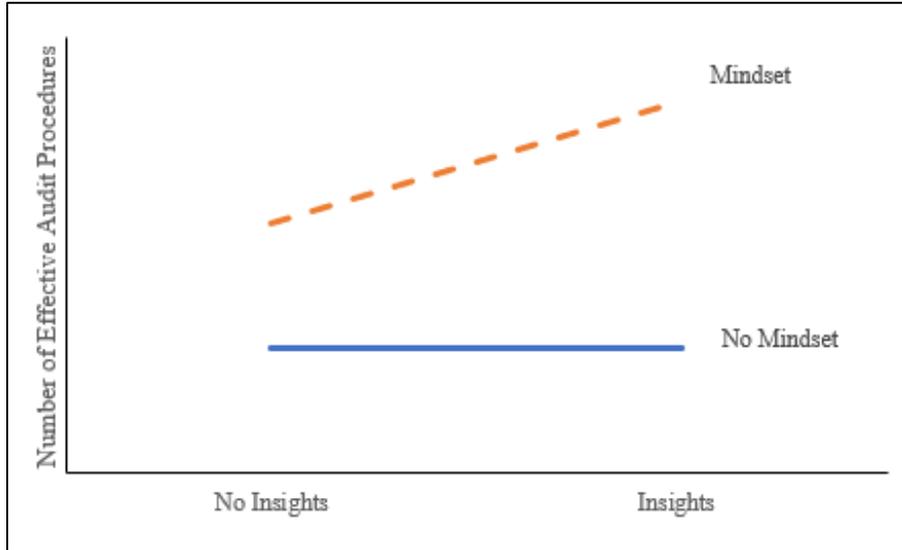
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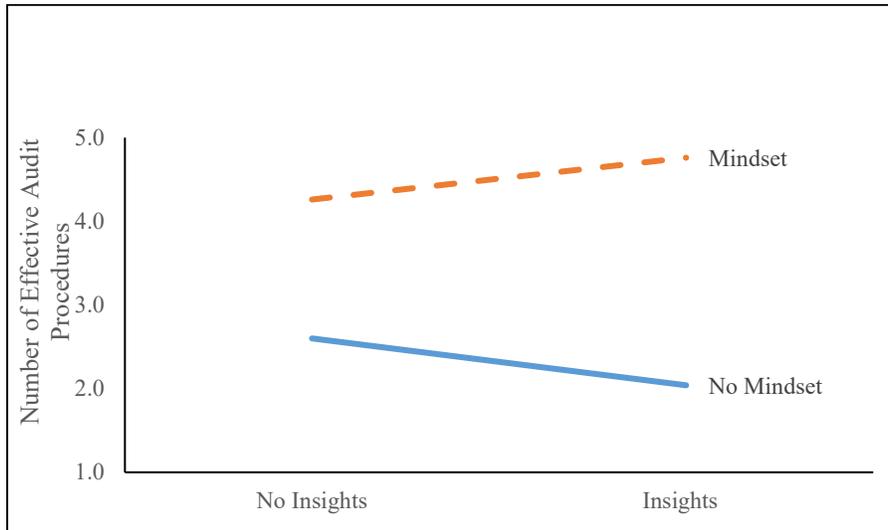
Figure 1

The effect of asking for client insights and priming an innovation mindset on identifying effective audit procedures (H2a and H2b)

Panel A: Predicted Results

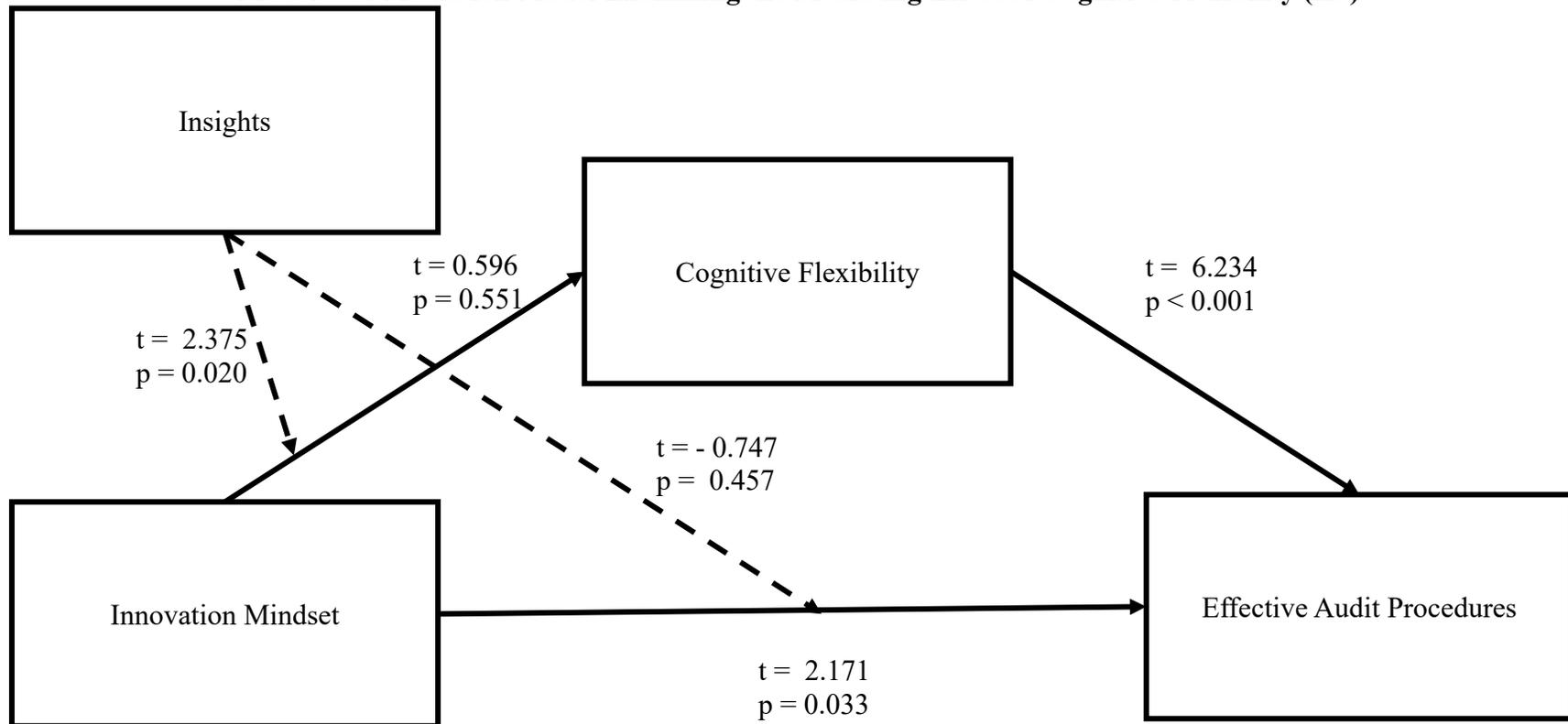


Panel B: Observed Results



Notes: Panel A presents a graph of the predicted mean count of effective fraud audit procedures identified by participants. Panel B presents the observed results. The dependent variable, *Effective Audit Procedures*, is a coded variable in which any audit procedures that would target the seeded frauds in the experiment would be counted. The independent variable *Mindset* is manipulated by presenting the participant with the firm’s philosophy that suggests a more (*MINDSET*) vs. less innovative culture (*NO MINDSET*). The independent variable, *Goals*, is manipulated based on whether participants were (*INSIGHTS*) or were not (*NO INSIGHTS*) asked to look for client insights at the beginning of the audit in addition to their audit quality goal.

**Figure 2**  
**Moderated Mediation Model Examining the Mediating Effect of Cognitive Flexibility (H3)**



**Indirect effect:**  
Lower Limit: 0.210, Upper Limit: 3.491

**Table 1: Cell Means**

**Panel A: Number of Effective Audit Procedures Identified Mean (SD) [n] Cell**

	<u>Innovation Mindset</u>		<b>Overall Row</b>
	<b>No Mindset</b>	<b>Mindset</b>	
<b>No Insights</b>	2.60 (3.29) [25] A	4.26 (3.06) [27] C	3.46 (3.25) [52]
<b>Insights</b>	2.04 (1.75) [23] B	4.76 (2.61) [21] D	3.34 (2.57) [44]
<b>Overall Column</b>	2.33 (2.65) [48]	4.48 (2.85) [48]	

**Panel B: Cognitive Flexibility (SD) [n] Cell**

	<u>Innovation Mindset</u>		<b>Overall Row</b>
	<b>No Mindset</b>	<b>Mindset</b>	
<b>No Insights</b>	0.56 (1.16) [25] A	0.74 (0.98) [27] C	0.65 (1.06) [52]
<b>Insights</b>	0.52 (1.08) [23] B	1.76 (1.15) [21] D	1.11 (1.26) [44]
<b>Overall Column</b>	0.54 (1.11)	1.20 (1.16)	

**Panel C: Number of Business Insights Identified Mean (SD) [n] Cell**

<b>Innovation Mindset</b>			
	<b>No Mindset</b>	<b>Mindset</b>	<b>Overall Row</b>
<b>No Insights</b>	0.56 (1.16) [25] A	0.78 (0.97) [27] C	0.67 (1.06) [52]
<b>Insights</b>	0.61 (1.12) [23] B	1.86 (1.15) [21] D	1.20 (1.29) [44]
<b>Overall Column</b>	0.58 (1.13) [48]	1.25 (1.18) [48]	

**Table 2: ANOVA Test of H1**

**H1:** Prompting an auditors' innovation mindset will increase their effectiveness in identifying audit procedures that aid in detecting fraud.

<b>Source of Variation</b>	<b>df</b>	<b>MS</b>	<b>F</b>	<b>Two-Tailed p-value</b>
Between Groups	1	110.510	14.577	< 0.001
Within Groups	94	7.581		

**Table 3: Tests of H2**

**H2a:** The positive effect of prompting an auditors' innovation mindset on the provision of effective audit procedures that aid in detecting fraud will be greater when they are also asked to provide client insights compared to when they are not asked to provide client insights.

**H2b:** Asking auditors to provide client insights will increase the effectiveness in identifying audit procedures that aid in detecting fraud when an innovation mindset prompt is present, but not when it is absent.

**Panel A: ANOVA Table**

<b>Source of Variation</b>	<b>df</b>	<b>MS</b>	<b>F</b>	<b>Two-Tailed p-value</b>
Insights	1	0.017	0.002	0.962
Mindset	1	113.981	14.854	< 0.001
Insights X Mindset	1	6.672	0.870	0.353
Error	92	2.91	7.673	

**Panel B: Simple Effects**

<b>Comparison</b>	<b>t-statistic</b>	<b>p-value</b>
Insights Only vs. Control	0.708	0.481
Mindset Only vs. Control	-2.198	0.031
Both vs. Control	-2.880	0.005
Insights Only vs. Mindset Only	-2.871	0.005
Insights Only vs. Both	-3.495	0.001
Mindset Only vs. Both	-0.861	0.392

**Panel C: Planned Contrasts**

<b>Source of Variation</b>	<b>F</b>	<b>p-value</b>
[-2, -2, 1, 3] Contrast for [A, B, C, D]	15.474	< 0.001
Residual between-cells variance	0.572	0.566
Contrast variance residual, $q^2$	$q^2 = 0.064$	

## Appendix

Auditors in the No Innovation Mindset Condition received the following communication from the CEO of the audit firm.

Aaron Bean is the CEO of the audit firm you work for, Bean, LLC. He has sent you the following email to describe the firm philosophy:

Hello!

At our audit firm, Bean, we pride ourselves on providing audits of the highest quality in an efficient and effective manner. We are grateful for having smart, capable employees like you on our team.

I'd like to share some of our information about our "Think BEAN!" philosophy here at the firm. We are very proud of this mindset and the ideals it encourages.

Think BEAN! is an acronym that stands for **Be Focused and Excel, Embrace Efficiency & Effectiveness, Applaud Competence, and Need to Educate & Communicate.**

### **BE Focused and Excel**

Employees are encouraged to be focused and excel at their jobs, which means having the freedom to work hard and act professionally. Often, the best work comes from auditors who are self-motivated, focused and allowed the freedom to work diligently. Take the time to work hard and you will excel.

### **EMBRACE Efficiency and Effectiveness**

The most successful audits are efficient and effective. This also means there may be challenges along the way. Bean embraces efficiency and effectiveness, as well as challenges and persistence to keep trying. This makes your job more successful and rewarding because you have time to do the most interesting and challenging work.

### **APPLAUD Competence**

At Bean, competence and hard work are recognized and applauded. Employees can take great satisfaction in knowing that competence ensures high audit quality, enhances our efficiency, and adds value. Competence makes Bean a better, more effective, and more successful place to work and we thank you for it!

### **Need to Educate & Communicate**

Management supports communication across our firm. When you have taken steps to improve your work, the next step is educate others. By educating and sharing your experiences with others, you will change our firm for the better!

Thank you,

Aaron Bean, CEO

Auditors in the Innovation Mindset Condition received the following communication from the CEO of the audit firm.

**Aaron Bean** is the CEO of the audit firm you work for, Bean, LLC. He has sent you the following email to describe the firm philosophy:

Hello!

At our audit firm, Bean, we pride ourselves on providing audits of the highest quality in an efficient and effective manner. We are grateful for having smart, capable employees like you on our team.

I'd like to share some of our information about our "Think BEAN!" philosophy here at the firm. We are very proud of this mindset and the ideals it encourages.

Think BEAN! is an acronym that stands for **Be Creative, Embrace Risk Taking, Applaud Innovation, and Need to Educate & Collaborate.**



**BE Creative**

Employees are encouraged to be creative and innovative, which means having the freedom to generate new ideas, take risks and think outside of the box. Often the best ideas come from auditors who see the big picture from multiple perspectives. Take the time to try new things – you might just have the next big idea!

**EMBRACE Risk Taking**

The most successful innovation encourages flexibility, agility and adaptability. This also means there may be failed ideas along the way. Bean embraces risk taking, learning from failed ideas and persistence to keep trying. This makes your job more enjoyable and rewarding because you have time to do the most interesting and challenging work.

**APPLAUD Innovation**

At Bean, creative and innovative ideas are recognized and applauded. Employees can take great satisfaction in knowing that their innovative ideas ensure high audit quality, enhance our efficiency, and add value. Innovation creates progress and makes Bean a better, more effective, and more enjoyable place to work and we thank you for it!

**NEEED to Educate & Collaborate**

Management supports collaborative idea flow across our firm. When you have developed innovative and creative ideas to improve our work, the next step is to educate others. By educating and sharing your ideas with others, you will change our firm for the better!

Thank you,

Aaron Bean, CEO