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The Effect of Nondiagnostic Information on Internal Auditor Skepticism: Capturing the Dilution Effect

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Abstract

Internal auditors assigned to assess internal controls over financial reporting incorporate irrelevant information into their judgment, showing decreased skepticism when irrelevant information contradicts preconceived stereotypes of management, known as the dilution effect and attributed to the representativeness heuristic. Irrelevant information consistent with preconceived stereotypes does not decrease skepticism. In this experiment practicing internal auditors are provided an irrelevant description of the Chief Information Officer portrayed as either gregarious or introverted then subsequently receive relevant internal controls information. When the Chief Information Officer is described as gregarious, counter to common stereotypes, internal auditors assess risk as less likely to occur compared to when the Chief Information Officer is described as introverted or when no personality information is provided. This study controls for individual differences in trait skepticism, perception of information relevance, and CIO warmth finding that the effect of irrelevant information on skeptical judgment is stable regardless of internal auditor experience, gender, and presence of a professional certification. These findings provide insight into how internal auditors incorporate information into a risk decision indicating that irrelevant information has a significant role in skeptical judgment.

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Abstract

Internal auditors assigned to assess internal controls over financial reporting incorporate irrelevant information into their judgment, showing decreased skepticism when irrelevant information contradicts preconceived stereotypes of management, known as the dilution effect and attributed to the representativeness heuristic. Irrelevant information consistent with preconceived stereotypes does not decrease skepticism. In this experiment practicing internal auditors are provided an irrelevant description of the Chief Information Officer portrayed as either gregarious or introverted then subsequently receive relevant internal controls information. When the Chief Information Officer is described as gregarious, counter to common stereotypes, internal auditors assess risk as less likely to occur compared to when the Chief Information Officer is described as introverted or when no personality information is provided. This study controls for individual differences in trait skepticism, perception of information relevance, and CIO warmth finding that the effect of irrelevant information on skeptical judgment is stable regardless of internal auditor experience, gender, and presence of a professional certification. These findings provide insight into how internal auditors incorporate information into a risk decision indicating that irrelevant information has a significant role in skeptical judgment.

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Chapter 1: Introduction

Regulators and auditing standards emphasize the importance of external auditor skepticism, with potential professional and governmental sanctions motivating firms to ensure sound judgment (PCAOB, 2002, 2012). Considering these pressures, behavioral accounting scholars have developed several competing theoretical models of professional skepticism (Nelson, 2009; Hurtt, Brown-Liburd, Earley, & Krishnamoorthy, 2013; Nolder & Kadous, 2018) which foundationally agree that skepticism consists of innate and situational components affecting dimensions of judgment and action. One stream of skeptical judgment research studies how nondiagnostic (i.e., irrelevant) information impacts external auditor skeptical judgment, a construct borrowed from cognitive psychology's dilution effect (Nisbett, Zukier, & Lemley, 1981). The overarching conclusion of this research indicates that external auditors exhibit diminished skeptical judgment in the presence of nondiagnostic information.

This dissertation expands upon scholarly work in external auditor skepticism and the dilution effect to study the underlying mechanisms by which nondiagnostic information affects skeptical judgment in internal auditors. I propose that nondiagnostic information impacts judgment through multiple cognitive paths, but only representativeness (Nisbett et al., 1981) conforms to cognitive psychology's working definition of the dilution effect. This study narrows the application of the dilution effect in accounting research to regain consistency with cognitive psychology, providing

empirical support for this revised definition, Uniquely, I perform this study in the context of an internal, rather than an external audit-supporting scholarly calls for further research on this group.

Cognitive psychology has long observed that an experimental subject's judgment becomes less extreme in the simultaneous presence of relevant and irrelevant information, an effect they term "dilution" and attribute to the representativeness heuristic – a cognitive shortcut used to predict the likelihood of an event based on stereotypical perceptions of the involved actors (Kahneman & Tversky, 1972, 1973; Tversky 1977; Tversky & Kahneman, 1974). Classic dilution effect experiments focused on college student judgments regarding a wide range of titillating if not triggering topics such as pain tolerance by major (Nisbett, et al., 1981), war game strategies (Streufert, 1973), likelihood to commit assault (Peters & Rothbart, 2000), predictions of student GPA (Zukier, 1982), or the origin of ice cream cones (Sanborn, Noguchi, Trip, & Stewart, 2020).

Nisbett, et al. (1981) attributed earlier work on nondiagnostic information to the representativeness heuristic (Kahneman & Tversky, 1972, 1973; Tversky 1977; Tversky & Kahneman, 1974)- branding their work as the dilution effect. Subsequent cognitive psychologists follow this tradition and define dilution as a function of representativeness, scoping out potentially confounding pathways such as information overload, distraction, or confusion (i.e., Sanborn et al., 2020). While the boundaries of dilution were never formally articulated, contemporary usage of the dilution effect in cognitive psychology literature is effectively synonymous with representativeness.

Behavioral accounting research also examines judgment in the presence of nondiagnostic information in the context of external auditor skepticism, however, compared to the cognitive psychologists, accounting scholars adopt a more inclusive definition of the dilution effect. In behavioral accounting studies, nonnormative judgments in the presence of irrelevant information are typically labeled as dilution, regardless of whether the underlying cognitive mechanism is representativeness or something else (i.e., Wolfe, Mauldin, & Diaz, 2009). This is a significant deviation from the cognitive psychology literature that potentially reduces construct validity and experimental reliability by introducing a limitless host of confounding alternative constructs to explain auditor judgment in the presence of nondiagnostic information such as auditor confusion (Wolfe, et al., 2009) and emotional affect (Bhattacharjee & Moreno, 2002).

This paper in part reunites behavioral accounting's use of the dilution effect with its cognitive psychology progenitor by clarifying the construct boundaries in order to more clearly understand the mechanism by which nondiagnostic information effects judgment. With a unique focus on internal audit skeptical judgment, I argue that the relatively narrow classical definition of the dilution effect as a function of representativeness is empirically verifiable and should remain distinct from other confounding cognitive mechanisms. While nondiagnostic information may impact internal auditor skeptical judgment through mechanisms other than representativeness (classical dilution), broadly defining the dilution effect to include multiple cognitive phenomena confounds the dilution construct, rendering the term colloquial rather than experimentally useful. An overly broad definition of the dilution effect precludes

scholarly identification of interacting variables- a subject's judgement in the presence of nondiagnostic information may be due to multiple interesting interactions, however if judgment is attributed to a generically termed dilution effect, scholars lose the opportunity to discover these interactions. Adopting cognitive psychology's precise taxonomy allows space for more insightful theoretical and empirical accounting research.

This study is motivated by scholarly calls for additional insight into the internal audit profession (Bame-Aldred, Brandon, Messier, Rittenberg, & Stefaniak, 2013; DeFond & Zhang, 2014; Roussy & Peron, 2018) as well as scholarly calls to better define skepticism in the context of auditor judgment (Hurtt, 2010; Nolder, 2012; Nolder & Kadous, 2018). While both internal and external auditors are expected to maintain skepticism throughout their engagements (PCAOB, 2012; IASB 2018; IIA 2019a, 2019b), innate biases may unconsciously impair skeptical judgment. Understanding these mechanisms may assist the internal audit profession in designing mitigating countermeasures. Nondiagnostic information is particularly interesting as apparently benign nondiagnostic information is ubiquitous throughout collegial conversations, yet cognitive psychology studies indicate it has a dilutive effect on judgment (Nisbett, et al., 1981).

Previous studies have called for additional research on internal auditors due in part to the emerging visibility of internal auditing along with anecdotal accounts that internal auditors are unique from public accountants (Bame-Aldred, et al., 2013; DeFond & Zhang, 2014; Roussy & Peron, 2018). Roussy and Peron (2018) state that internal audit populations are poorly understood and that as a group they struggle with maintaining skeptical judgment due to a built-in closeness with their management client.

Internal audit research often laments that contemporary accounting research fails to fully account for the broad scope of internal auditor responsibilities (Behrend & Eulerich, 2019). The Institute of Internal Auditors (IIA) defines internal auditing as an assurance and consulting practice with a focus on governance, risk management, and operational improvements (IIA, 2017a), a distinct role from financial statement auditors focused on financial statement quality and related financial controls. Internal auditors, unlike their external counterparts, are not required to possess accounting knowledge, obtain a license or professional certification, or work under the supervision of a Certified Public Accountant (CPA) (IIA, 2022). While the IIA offers a professional certification known as the Certified Internal Auditor (CIA), the CIA is not a state-sanctioned license or a professional requirement. Compared to the rigorous regulatory standards of external auditors (PCAOB 2002), a mere 87% of internal auditors are even members of their professional organization- the Institute of Internal Auditors (IIA)- and only half of internal auditors hold either a CIA or a CPA (Calvin, 2021). These disparities in professional qualification between internal and external auditors lend credence to scholarly suggestions that internal audit populations may be distinct from external counterparts (Bame-Aldred et al., 2013).

While there are strong arguments that internal and external auditors are distinct populations, a similarly compelling counterargument can be made. Many of the internal auditing professional standards (IIA, 2017a) are similar to public accounting standards, requiring for example, objectivity and due diligence (PCAOB 2002). A significant number of internal auditors do have CPAs or have previously worked in public accounting, and public accounting firms such as KPMG and Deloitte offer internal

auditing services, further blurring the distinction (Baatwah, Omer, & Aljaaidi, 2020). Despite potential similarities and differences between the internal and external auditor, I was unable to find an empirical study exploring whether the internal and external auditors respond distinctively in a behavioral experiment.

Social science experiments are often criticized for weak construct validity as the potential presence of multiple, invisible, confounding factors may interfere with the construct of interest (Asay, Guggenmos, Kadous, Koonce, & Libby, 2021; Luft & Shields, 2003). Experiments on the dilution effect are no exception, as the introduction of nondiagnostic information may interfere with decision-making through multiple pathways other than the representativeness heuristic. For example, the introduction of nondiagnostic information can make a target more (less) relatable or likeable and the subject may change their assessment of the target based on an emotional reaction (Bhattacharjee & Moreno, 2002).

I conduct a 3 × 1 experiment with 157 internal auditors manipulating information diagnosticity (distinctive nondiagnostic, common nondiagnostic, and a control condition) to assess whether an internal auditor's skeptical judgment diminishes in the presence of the dilution effect. I measure participants' trait skepticism using the Hurtt (2010) professional skepticism scale to determine whether skeptical judgment in the presence of nondiagnostic information is explained by trait differences. Participants self-rate their perceptions of CIO warmth and the importance of relevant information. The experimental variables are summarized in Table 1 below.

Table 1.1: Experimental Variables

Independent Variable	Control Variable	Dependent Variable
Information Diagnosticity (Control, Distinct, Common)	Trait Skepticism Information Importance Warmth	Skeptical Judgment

In developing the representativeness heuristic, Gati and Tversky (1984) identify characteristics of information that is either stereotype confirming (common) or stereotype contradicting (distinctive). This terminology was later adopted within dilution effect research so that distinctive information is predicted to dilute judgment while common is expected to increase judgment extremeness (Nisbett et al., 1981). I manipulate information diagnosticity (common or distinct) by including information related to sixteen previously validated and commonly held management stereotypes (Gonzalez, Ashworth, & McKee, 2019). These stereotypes were further validated as distinctive or common in a series of experimental pre-tests. I also include a control condition where no additional nondiagnostic information is added to the experiment.

Internal auditor participants are instructed to assume the role of an audit supervisor performing an internal control over financial reporting (ICFR) risk assessment in an information technology (IT) setting. An ICFR engagement in an IT setting increases experimental realism as the IIA (2020a) reports that internal audit departments increasingly incorporate cybersecurity and ICFR engagements into their audit plans. Participants receive written background information on the client and company that includes the nondiagnostic information treatment. Those randomly assigned to the

distinctive nondiagnostic information treatment are provided with information about the Chief Information Officer (CIO) that contradicts previously determined stereotypes of a typical CEO, while the common nondiagnostic information treatment receives information about the CIO that supports common stereotypes. Control treatments do not receive additional nondiagnostic information.

Participants are subsequently directed towards an interview between a junior auditor and a CIO. Attention and manipulation checks are paced at appropriate intervals. Upon completion of this experiment participants assess internal control risk, complete the Hurtt (2010) professional skepticism scale to assess trait skepticism, and answer a series of demographic questions. Participants further answer a series of case specific questions designed to assess whether the manipulation unintentionally introduced confounding factors, the relevance of diagnostic and nondiagnostic information, and social identification with the CIO.

The results of my study show that when controlling for internal auditor trait skepticism, distinctive nondiagnostic information decreases (dilutes) internal auditor skeptical judgment while common nondiagnostic information does not significantly affect skeptical judgment when compared to a control condition. My results are consistent with behavioral psychology predictions that the representativeness function of dilution is only activated by stereotype contradicting nondiagnostic information. While prior behavioral accounting studies (i.e., Hackenbrack, 1992) predicted that common nondiagnostic information would not dilute external auditor judgment, the results of their empirical work instead showed a weak dilution effect. My results are more consistent with cognitive psychology theory compared to prior behavioral accounting studies

because my experimental design isolates the stereotype reinforcing/contradicting features of representativeness thereby greatly reducing opportunities for confounding variables to alter results.

My dissertation provides several contributions to the scholarly literature and the professional practice. I contribute to the application of theory by clarifying and redefining the dilution effect to align the behavioral accountant's usage with cognitive psychology. Limiting the dilution effect to the representativeness heuristic allows for further study into how other conditions such as social identification or information overload interact with dilution to affect judgment. Narrowing of the construct should improve the consistency of experimental results by aligning behavioral accounting studies with cognitive psychology theory and practice while preventing the unintentional introduction of confounding variables. Aligning behavioral accounting's usage of the dilution effect with cognitive psychology paves the way for future research on other mechanisms by which nondiagnostic information may impact skeptical judgment.

This remainder of this dissertation is organized as follows. Chapter two surveys the relevant literature and theories while concluding with my hypotheses. Chapter three describes the methodology, while chapter four presents the results. The final chapter concludes with a discussion of its implications as well as avenues for future research. The content of my experiment is in the appendix.

Chapter 2: Literature Review

The Classical Dilution Effect – An Overview and Brief History

Cognitive psychology scholars have long established the presence of nondiagnostic/irrelevant information alters judgment by smoothing predictions – judgments are less extreme, and raters express less confidence in judgment accuracy compared to when only diagnostic information is available (Hodge, 1954; Hodge & Reed, 1971; Montague, 1965; Streufert, 1973; Well, 1971). Nisbett et al. (1981) studied how the representativeness heuristic (Kahneman & Tversky, 1972, 1973; Tversky, 1977; Tversky & Kahneman, 1974) drove nondiagnostic information to moderate judgment, coining the dilution effect. Subsequently, cognitive psychology research treats the dilution effect as a function of representativeness (i.e., Sanborn, et al., 2020) with studies focusing on Kahneman & Tversky's (1972, 1973) feature matching process described in the paragraphs below. I subsequently refer to cognitive psychology's representativeness-based theories on the dilution effect as the "classical" dilution effect or simply classic dilution to distinguish it from broader uses of the term.

At the heart of cognitive psychology's use of the classic dilution effect is the representativeness heuristic (Kahneman & Tversky, 1972, 1973; Tversky, 1977), which predicts a model of stereotype incongruence where a subject unconsciously attempts to match characteristics of a target with preconceived characteristics of a behavior of interest. Colloquially stated, a decisionmaker tries to match the available information

about the person with a specific behavior based on generalized stereotypes. For example, Zukier (1982) examines whether predictions about a target's university grade point average will be more extreme when provided nondiagnostic information about physical traits such as "target is average height" as well as diagnostic information about study habits and intelligence. Participants receiving both diagnostic and nondiagnostic information tend to match the average phenotypical features of the target (height) with stereotypical perceptions of university performance, ultimately predicting that students of average height get average grades (Zukier, 1982). In the absence of the nondiagnostic information, grade point average predictions were either very high or very low as subjects based their predictions on diagnostic information. When additional nondiagnostic information was included, the additional context allowed subjects to fill in the gaps with less extreme assumptions – GPA predictions moderated to an average (Zukier, 1982).

Kahneman and Tversky (1973) agree that representativeness is a necessary evolutionary process facilitating decision-making in the absence of comprehensive information. When key information is missing, decision makers cognitively fill in the gaps and make judgments based on information availability and stereotypes (Kahneman & Tversky, 1973). Representativeness is problematic (leading to nonnormative decisions) when limited available information leads to stereotype exaggerations. Interestingly, the classic dilution effect research in cognitive psychology finds that less extreme judgment may lead to more objectively accurate (normative) judgments (Sanborn, et al., 2020) suggesting that dilution is not universally problematic but may in fact be desirable.

Tversky (1977) proposes that information (diagnostic or nondiagnostic) can have a reinforcing (common) or contradicting (distinctive) effect on the feature matching

process predicted by representativeness, changing the goodness of fit between available information and the model stereotype. If available information about a target is consistent with the action being judged (they match), known as common information, an experimental subject will rate the likelihood of the target engaging in an action as more likely than probability (or evidence) would predict – common information is stereotype reinforcing (Tversky, 1977). In contrast, when available information is inconsistent with the action being judged (a mismatch), known as distinctive information, experimental subjects rate a likelihood of the target engaging in an action as less likely – distinctive information is stereotype challenging (Tversky, 1977).

While distinctive and common information may be either diagnostic or nondiagnostic, Nisbett et al.'s (1981) work on the classic dilution effect proposes that common or distinctive elements of nondiagnostic information can alter judgment extremity due to a cognitive feature matching process that either dilutes or magnifies judgment. Peters and Rothbart (2000) apply this work to the classic dilution effect to predict that common nondiagnostic information – consistent with a stereotype model – matches the target's characteristics with preconceived stereotypes and should not dilute judgment, while distinctive nondiagnostic information offers features that contradict preconceived stereotypes, increasing dilution. The Peters and Rothbart (2000) results are consistent with this feature matching process, however their experimental results find that common nondiagnostic information simply weakens dilution rather than strengthens the extremity of the predictions.

Importantly, classical dilution effect manipulations in cognitive psychology are designed to add additional nondiagnostic information to an existing scenario containing a

baseline level of diagnostic and nondiagnostic information, tacitly recognizing that typical interactions are riddled with complex information containing a range of diagnosticity (i.e., Nisbett et al., 1981; Peters & Rothbart, 2000). Predictions rely on how this incremental addition of nondiagnostic information changes the goodness of fit in the subject's feature matching process beyond what was established in a baseline case (i.e., Nisbett et al., 1981; Peters & Rothbart, 2000). Adding nondiagnostic information to an established baseline allows studies to incorporate elements of realism despite the potential interaction between diagnostic and nondiagnostic information (Well, 1971). Afterall, robust human interaction inherently contains information of mixed diagnosticity (Peters & Rothbart, 2000).

A few scholars have addressed some obvious holes in dilution effect theories, but this work is either outdated or rare enough that further inquiry is prudent. Well (1971), for example found that participants were able to recall both diagnostic and nondiagnostic information post experiment, effectively ruling out information overload as a cause of dilution. This experiment was to my knowledge never replicated, and outside of cognitive psychology information overload is still occasionally proposed as a possible mechanism particularly in a big data context (i.e., Brown-Liburd, Issa & Lombardi, 2015). This dissertation acknowledges that information overload likely exists, but my theoretical model regards it as separate from dilution. Second, Tetlock, Lerner, and Boettger (1996) find that both decision accountability and warning subjects that the experiment contains nondiagnostic information may reverse the dilution effect. Warning subjects that nondiagnostic information may be present accounts for suppositions that experimental subjects normatively expect case information to be relevant. Unfortunately, subsequent

scholars failed to replicate these findings in both cognitive psychology (Slugoski & Wilson, 1998) and behavioral accounting (Glover, 1997) leaving this an open question.

A final note on the cognitive psychology experiments; participants traditionally are asked to classify the relevance of diagnostic and nondiagnostic information used through the experiment in an ex-post inquiry, and consistently do so accurately (i.e., Nisbett et al., 1981; Peters & Rothbart, 2000). This self-identifying exercise rules out explanations that subjects misclassified nondiagnostic information as diagnostic as offered by behavioral accounting studies such as Wolfe, et al. (2009).

Behavioral accounting scholars have similarly explored the dilution effect in the context of how nondiagnostic information affects external auditor skeptical judgment (Brown-Liburd, et al., 2015; Hackenbrack, 1992), however, their usage of the term "dilution effect" has drifted from conventions established by cognitive psychology to include mechanisms beyond representativeness such as information overload (Brown-Liburd, et al., 2015), affect (Bhattacharjee & Moreno, 2002), justification (Hoffman & Patton, 1997), and confusion (Wolfe, et al., 2009). While behavioral accounting's definitional drift from cognitive psychology may seem a matter of semantics, their broad use of the dilution effect comes at the cost of understanding potentially divergent pathways by which nondiagnostic information affects decisions. In short, a narrower definition of dilution improves prediction potential. The behavioral accounting work is summarized in the following section.

The Dilution Effect in Accounting Literature

The dilution effect is a pertinent theory within behavioral accounting as professional standards and regulatory bodies (PCAOB, 2002, 2012) require external

auditors to exhibit skeptical judgment, and an audit (external or internal) typically requires complex interactions with a management partner where conversational norms dictate a constant exchange of relevant and irrelevant information (Hoffman & Patton, 1997). Studies consider comparatively lower risk ratings (Eutsler, Norris, & Trompeter, 2018), or a reduced likelihood of an event occurring (Glover, 1997) as a proxy for reduced skeptical judgment, typically attributed to the dilution effect in the presence of nondiagnostic information (Hoffman & Patton, 1997). Consistent with cognitive psychology, behavioral accounting research finds that the dilution effect is present with external auditor populations- auditors are considered less skeptical when nondiagnostic information is introduced. A summary of this literature follows.

Hackenbrack (1992) based his research on Nisbett et al.'s (1981) representativeness-based framework finding external auditors were susceptible to biases and judgment errors. Consistent with the representativeness literature, Hackenbrack (1992) categorizes information as consisting of common features (consistent with a perceived stereotype), distinctive features (contradicts a perceived stereotype), or neutral (neither common nor distinctive), finding that the salience, rather than the type of nondiagnostic information, predicts the strength of the dilution effect. In the Hackenbrack (1992) study, both distinctive and common nondiagnostic information led to external auditor dilution, inconsistent with representativeness theory predicting that common nondiagnostic information would polarize, not moderate judgment. In hindsight, this study was an early indication that some other mechanism apart from dilution, in this case salience, acted on nondiagnostic information. Salience has face validity as a reasonable person would expect front of mind information to heavily influence judgment.

Hackenbrack (1992) did not control for salience when examining common or distinct nondiagnostic information allowing for the possibility that representativeness and salience were simultaneous actors. Later work in cognitive psychology by Peters and Rothbart (2000) experimentally found that common nondiagnostic information may reverse the dilution effect, a finding consistent with representativeness and somewhat contrary to Hackenbrack (1992).

Glover (1997) performs a partial replication of Hackenbrack (1992) to determine whether external auditor time pressure or accountability impact the dilution effect. While Glover (1997), and later Hoffman & Patton (1997) find that accountability has little effect on dilution, prior studies found that accountability increases dilution (Tetlock et al., 1996), indicating that this is not settled science, or at least a more complex understanding of accountability is necessary. Glover does, however, find that time pressure reduces dilution (auditors are more skeptical) proposing that time pressure pushes auditors towards faster heuristic processing leading to more extreme judgments. Without time pressure, auditors showed less extreme (more diluted/less skeptical) judgment as they employed a slower deliberative decision-making progress allowing for dilutive pressures (Glover, 1997). Glover (1997), however, did not examine the interaction between heuristic/deliberative thought processing and representativeness.

Hoffman and Patton (1997) also examined whether holding external auditors accountable for their decisions moderates the dilution effect, motivating their study by emphasizing the pervasiveness of irrelevant information throughout a typical financial audit engagement. Accountability was expected to make auditors more conservative (more dilutive) in their risk judgments. While accountability did not seem to impact

dilution – all treatments showed the same amount of dilution- accountable auditors focused on the defensibility of their opinions to their superiors which may have affected the results (Hoffman & Patton, 1997).

Shelton (1999) finds that more experienced external auditors, partners, and mangers are less impacted by the dilution effect than less experienced senior auditors due to the development of more detailed knowledge structures that overcome fallacies from the representativeness heuristic (Kahneman & Tversky, 1972).

More recent studies in behavioral accounting drift from the representativeness heuristic to explain how nondiagnostic information affects external auditor skeptical judgment. Bhattacharjee and Moreno (2002) assessed whether nondiagnostic information that generates an auditors' negative emotional reaction to a client (affective state) would lead to more extreme risk judgments, a reversal of the dilution effect. Bhattacharjee and Moreno (2002) primed auditor participants with a nondiagnostic warning that the client was "quite arrogant" or "unpleasant to work with" prior to completing an inventory obsolescence assessment where the client had no indication of problems. Participants primed towards negative affect rated the risk of inventory obsolescence higher, although more experienced auditors were less impacted by the nondiagnostic information, consistent with Shelton (1999).

Wolfe et al. (2009) employ the dilution effect to explain why management's concessions over an IT control failure leads to diminished external auditor blame than denials. Wolfe et al. (2009) assert that the presence of technology related information is nondiagnostic when an IT control has failed due to human error. The Wolfe et al. (2009) study deviates from other dilution studies in that participants fail to perceive this

information as non-diagnostic and report preferring management's diluted explanation, calling into question whether the dilution effect adequately explains their experimental results.

Finally, in a discussion paper, Brown-Liburd, et al. (2015) propose that big data will be dilutive to auditor judgment by prompting information overload, particularly when auditors are unfamiliar with the data structure and analytic techniques. While proposing information overload as a mechanism for dilution is reminiscent of an early debate between Hodge (1954), Montague (1965), and Well (1971) who ultimately concluded that overload was not a major factor in dilution, the sheer size of modern datasets today compared to the early 1970s justifies a closer look at information overload as a critical mechanism.

A summary of dilution effect literature has been condensed and abbreviated into Table 2 below.

Table 2.1: Summary of Dilution Effect Studies

Study	**Discipline and Explanatory Theory**	**Sample, Dependent Variables and Independent Variables**	**Major Findings**
The influence of irrelevant information on speeded classification tasks (Well, 1971)	Cognitive Psychology Study Competing responses and cognitive overload	**Sample** Eight females and seven males hired through the University of Oregon Employment Service. All less than 30 years old. **Independent Variables** Multidimensional shapes (dots, lines)	Early work exploring how participants gate irrelevant information. Cognitive overload does not fully explain disruptive effects of irrelevant information on decision making.

		Dependent Variable Accuracy of shape classification.	
Effects of information relevance on decision making in complex environments (Streufert, 1973)	Cognitive Psychology Study Information overload (complexity theory) distinct from information relevance	**Sample** 24 male undergraduate students from a psychology course **Independent Variables** Preprogrammed statements relevant (irrelevant) to decisions in a simulated game **Dependent Variables** Number of decisions (simple decision-making) and integrative quality of decision-making (complex decision-making) during a simulated game	Controlled for information load, establishing that information irrelevance has an independent effect on decision-making, but only when decisions were complex.
The dilution effect: Nondiagnostic information weakens the implications of diagnostic information (Nisbett, Zukier, & Lemley, 1981)	Cognitive Psychology Study Representativeness heuristic First to use term "Dilution Effect"	**Sample** 108 University of Michigan students enrolled in an introductory psychology course **Dependent Variable** Predicted electric shock tolerance Predicted movie preference	Subjects provided a combination of nondiagnostic and diagnostic information subsequently make less extreme (diluted) predictions compared to when only diagnostic information is provided. Proposes that judgments are impaired because subjects use the

		Independent Variable Diagnostic information: Major (science, humanities, engineering) Nondiagnostic information: Biographical information (i.e., hometown, mother's occupation). Salience: (video or written) **<u>Subsequent Study</u>** **Sample** 48 graduate students in social work **Dependent Variable** Likelihood social work client is a child abuser **Independent Variable** Diagnostic information: Financial pressure and extreme debts Nondiagnostic information: Occupation, IQ score, birthplace Counter diagnostic information: Number of close friends	representativeness heuristic (Kahneman and Tversky, 1973) to make similarity judgments comparing available subject information with their preconceived stereotype. Salience had a dilutive effect in videotaped condition in diagnostic information only treatment. Nondiagnostic information weakens the implications of social stereotypes. Dilution may lead to normative judgment. Stereotypes are more powerful when the subjects are abstract vs individuated.

The dilution effect: The role of correlation and the dispersion of predictor variables in the use of nondiagnostic information (Zukier, 1982)	Cognitive Psychology Study Representativeness heuristic	**Sample** 39 introductory psychology students **Independent Variables** Nondiagnostic information: Describing targets as average Diagnostic information: Control condition **Dependent Variables** Predictions about grade point averages of target students.	GPA predictions regressed to the mean GPA of all students in the presence of nondiagnostic information.
Accountability: A social magnifier of the dilution effect (Tetlock & Boettger, 1989)	Cognitive Psychology Study Representativeness heuristic	**Sample** 160 undergraduate students **Independent Variables** Diagnostic Information: Number of hours per week students study (high or low) Nondiagnostic Information: Unrelated to GPA (widely regarded as being honest, plays tennis, etc.) **Dependent Variables** Predicted GPA & Confidence in prediction	Accountability made decisionmakers more sensitive to nondiagnostic information as accountable subjects attempted to incorporate a wider range of available information in their decisions.

Implications of seemingly irrelevant evidence in audit judgment (Hackenbrack, 1992)	Behavioral Accounting Study Representativeness heuristic	**Sample** 39 external auditors **Independent Variables** Favorable nondiagnostic evidence: Client is willing to prepare schedules Unfavorable nondiagnostic evidence: Transactions are recorded effectively but not efficiently Neutral nondiagnostic evidence: Generic organization chart **Dependent Variables** Fraud risk ratings	The impact of nondiagnostic evidence on external auditors is related to the ability of the evidence to hold the auditor's attention. Non-neutral nondiagnostic information has higher salience in the auditor's mind and increases dilution.
The influence of time pressure and accountability on auditors' processing of nondiagnostic information (Glover, 1997)	Behavioral Accounting Representativeness heuristic and time pressure	**Sample** 156 external auditors from big 6 firms with 24 months average experience **Independent Variables** Nondiagnostic evidence: Permanent file workpapers, partial results of other audit procedures, other client information Diagnostic evidence: Characteristics that indicate either high	Time pressure reduces the dilution effect while accountability has no impact.

		or low likelihood of AR misstatement. Time pressure: Instructed that they have a limited amount of time to complete assessment. Accountability: Instructed to write names on paper and that some will be selected to explain answers **Dependent Variables** Risk Assessment ratings of likelihood accounts receivable balances are misstated.	
Accountability, the dilution effect, and conservatism in auditors' fraud judgments (Hoffman & Patton, 1997)	Behavioral Accounting Study Defensibility of judgment to superior	**Sample** 44 large firm external auditors with a mean 3.2 years' experience. **Independent Variable** Accountability: Likelihood responses will be reviewed or questioned Diagnostic/Nondiagnostic information: Cues deemed by experts to be relevant or irrelevant to fraud risk.	Replicate Glover (1997) findings: time pressure reduces dilution in an external audit setting, but accountability leads to more conservative risk assessments. Counter to predictions in behavioral psychology, accountability does not exacerbate the dilution effect in an external audit setting, likely due to supervisor pressure. While accountability does not exacerbate

		Dependent Variable Fraud risk judgment	dilution, dilution is still present.
Contribution of conversational skills to the production of judgment errors (Slugoski & Wilson, 1998)	Cognitive Psychology Study Biased social judgments and heuristics including representativeness.	**Sample** 32 female introductory psychology students **Independent Variables** Diagnostic Information: Studies 31 hours per week Nondiagnostic Information: Visits grandparents monthly, goes to sleep at midnight, etc. **Dependent Variables** Predicted GPA	Social conventions and norms account for why subjects attempt to incorporate nondiagnostic information into decision-making in an experimental setting. Participants normatively expect to use all information provided in an experimental setting.
The effect of experience on the use of irrelevant evidence in auditor judgment (Shelton, 1999)	Behavioral Accounting Study Representativeness heuristic	**Sample** 56 partners of large public accounting firms (experienced) 31 audit seniors at large public accounting firms (inexperienced) **Independent Variables** Information about the client that was deemed by a panel to be irrelevant (i.e., the chief internal auditor retired).	In the context of a going concern decision, irrelevant information does not dilute the judgment of public accounting audit partners or managers, but it does dilute the judgment of external audit seniors. Experience mitigates the dilutive effect of irrelevant information on judgment.

		Dependent Variables Going concern risk assessment	
Typicality can create, eliminate, and reverse the dilution effect (Peters & Rothbart, 2000)	Cognitive Psychology Study Representativeness heuristic	**Sample** 67 undergraduate students from an introductory psychology course. **Independent Variables** Experiment 1: 46 items (likes to work on his tan) that describe fraternity member Experiment 2: Describing fraternity members with various levels of nondiagnostic information from experiment 1 **Dependent Variables** Experiment 1: Rated typicality and diagnostic of traits that may describe a fraternity member and number of books read Experiment 2: Predicted number of books fraternity member would read in a year	Builds on Nisbett et al (1981) to propose a model where the dilution effect works by altering the goodness of fit between the target and decision. Nondiagnostic information reduces this goodness of fit between person and decision category. Increasing nondiagnostic information may reduce, increase, or not change the amount of dilution depending on the typicality of the nondiagnostic information. Increasing the amount of nondiagnostic information that is atypical of the target/behavior increases dilution, while increasing typical or neutral nondiagnostic information will decrease or not change dilution levels.

The impact of affective information on the professional judgments of more experienced and less experienced auditors (Bhattacharjee & Moreno, 2002)	Behavioral Accounting Study Affective reaction	**Sample** 84 external auditors from public accounting firms (staff through partners) **Independent Variables** Negative affect: Information about client arrogance or negative attitudes. **Dependent Variables** Inventory obsolescence risk judgment	Risk judgments were higher when less experienced external auditors were exposed to negative affective information (opposite of dilution). Effect was not observed with more experienced auditors indicating that external auditor experience counteracts judgment biases.
Judgment and decision-making research in auditing: A task, person, and interpersonal interaction perspective (Nelson & Tan 2005)	Behavioral Accounting Review: Ignores theoretical work on representativeness while suggesting future research to investigate why this effect occurs.	*Decision-making literature review, a portion of which includes the dilution effect.*	Suggests three paths for future research: tie studies to relevant context such as auditing, identify ways to reduce dilution, and provide evidence explaining why dilution occurs.
Concede or deny: Do management persuasion tactics affect auditor evaluation of internal control deviations? (Wolfe, et al., 2009)	Behavioral Accounting: Human/computer interaction fallacy	**Sample** 106 external audit seniors **Independent Variables** Persuasion tactic (concede or deny) Type of control deviation (IT or manual)	Management concessions lead to auditors assessing IT control deficiencies less severely than denials, particularly when management provides a technological explanation for a manual control failure (in this study considered dilutive).

		Dependent Variables Severity assessment of internal control deficiency Management blame	
Behavioral implications of big data's impact on audit judgment and decision making and future research directions (Brown-Liburd, et al., 2015)	Behavioral Accounting: Information overload	*Decision-making literature review, a portion of which includes the dilution effect.*	Suggest future research examines how big data can overwhelm external auditor decision-making.
A dilution effect without dilution: When missing evidence, not non-diagnostic evidence, is judged inaccurately (Sanborn, et al., 2020)	Cognitive Psychology Study: Representativeness heuristic	**Sample** 114 participants recruited from Amazon's MTURK. **Independent Variables** Shapes of ice cream cones and ice cream shops **Dependent Variables** Determine probability that an ice cream cone came from a particular shop.	Rather than nondiagnostic information causing dilution, participants inaccurately interpret diagnostic information in the absence of nondiagnostic information by filling in the gaps with bias. The introduction of nondiagnostic information into a decision lead to empirically more accurate decisions than diagnostic information alone.

To summarize the main takeaways of the above table, there is wide consensus across cognitive psychology and behavioral accounting that nondiagnostic information reduces judgement (Hackenbrack, 1992; Nisbett et al., 1981; Slugoski & Wilson, 1998; Peters & Rothbart, 2000). In an external auditing context, time pressure (Glover, 1997; Hoffman & Patton, 1997) and work experience (Shelton, 1999; Bhattacharjee & Moreno, 2002) are shown to decrease dilution while auditor accountability increases dilution (Tetlock & Boettger, 1989). While convincing work in cognitive psychology attributes this dilution to a stereotype confirming/contradicting goodness of fit based on the representativeness heuristic (Kahneman & Tversky, 1972, 1973), behavioral accounting scholars continue to call for evidence explaining why dilution occurs (Brown-Liburd et al., 2015; Nelson & Tan 2009). Representativeness theory predicts that stereotype contradicting distinctive nondiagnostic information dilutes judgment while stereotype confirming common nondiagnostic information eliminates or even reverses dilution (Nisbett et al., 1981; Peters & Rothbart, 2000), however contrary to this theory experimental results show that common nondiagnostic information produces a weak dilutive effect (Hackenbrack, 1992; Peters & Rothbart, 2000).

Conventions of the Classical Dilution Effect

Construct validity is a pervasive challenge in the behavioral sciences as operationalized variables potentially capture a wide range of difficult to measure, invisible, subjective social constructions beyond what a researcher intends to measure (Clark & Watson, 1995; Luft & Shields, 2003; Asay, et al., 2021). This intersection of social constructions, limited by the human imagination, may lead to misinterpretation of experimental results (Luft & Shields, 2003). To limit the invalidating effect unidentified

variables potentially have on experimental results, scholars suggest an array of steps that colloquially deconstruct as: clearly define variables and confirm results through multiple experiments (Clark & Watson, 1995; Luft & Shields, 2003; Asay, et al., 2021).

To define the classic dilution effect, I invoke the ground rules practiced by the cognitive psychologists (i.e., Nisbett et al., 1981) who relied on the construct of representativeness by Kahneman and Tversky (1972, 1973). Classic dilution effect studies share common elements of design that in my opinion should be preserved. These elements are summarized in Table 3 and described below.

Table 2.2: Rules of Classic Dilution Effect Studies

1. Participants recognize nondiagnostic information.
2. Nondiagnostic information is added to a baseline scenario.
3. Dilution theory is based on the feature matching process of the representativeness heuristic.
4. Participants make a judgment about the probability of an outcome.

1. Recognition of Nondiagnostic Information

Foremost, rather than rely on an objective standard or researcher assumption, either participants or independent parties in classic dilution effect experiments correctly identify nondiagnostic and diagnostic information during a pre-examination (ie., Nisbett et al., 1981; Tetlock et al., 1996). Participant acknowledgment rules out the possibility of information misinterpretation or trickery as proposed by later scholars (i.e., Wolfe et al., 2009). Despite recognizing information as irrelevant to a judgment, participants nonetheless alter their judgments.

2. Additive Nondiagnostic Information

Recognizing the complexity of human interactions, nondiagnostic information is added to a baseline scenario that inherently contains cues of mixed diagnosticity (i.e., Well, 1971). This design tacitly acknowledges that the dilution effect incrementally moderates judgment beyond the baseline noise embedded in an interaction as typical interactions contain a mixture of diagnostic and nondiagnostic information. Adding nondiagnostic information to an existing scenario measures the incremental impact of additional nondiagnostic information while controlling for confounding factors introduced in other areas of the experiment such as when providing background information. In behavioral accounting, Hackenbrack (1992) provides an example of the additive nondiagnostic information feature, providing "several pages" of nondiagnostic information to participants beyond the control condition.

3. Feature Matching Process of Representativeness

The classic dilution effect at its core is a study of the representativeness heuristic which exploits embedded stereotypes about a person and an action where subjects subconsciously conduct a feature matching process to determine whether information about a target is consistent with the action (Kahneman & Tversky, 1972, 1973; Tversky, 1977; Tversky & Kahneman, 1974). Congruent information (common) between the person and action, theoretically, enhances judgment extremity – participants rate the target as more likely to engage in the action, while incongruent (distinctive) information diminishes, or dilutes, judgment extremity -participants rate the target as less likely to engage in the action (Kahneman & Tversky, 1972, 1973; Tversky 1977; Tversky & Kahneman, 1974). Classical dilution studies rely on representativeness, particularly the

feature matching principle, to predict behavior (i.e., Peters & Rothbart, 2000). Behavioral accounting studies have more recently drifted from the classical use of the dilution effect (representativeness), potentially confounding the construct by introducing additional mechanisms such as emotional affect (Bhattacharjee & Moreno, 2002). To their credit, some scholars are careful to avoid using cognitive psychology's dilution effect terminology (Carlisle & Jenkins, 2021), but more commonly the dilution effect risks becoming a blanket term describing impaired judgment in the presence of nondiagnostic information irrespective of the cause, at least in behavioral accounting (i.e., Nelson & Tan, 2005).

4. Judgment Decisions

The final common element of classic dilution, participants make a judgment, is arguably noncontroversial as studies consistently maintain this convention. It does however warrant a three-sentence explanation if for no other reason than posterity. Classical dilution studies involve a participant making a judgment about the potential for a target to engage in an action (i.e., Nisbet et al., 1981; Well, 1971). In a behavioral accounting context, dilution studies similarly assess an individual or company's potential fraud risk (Hackenbrack, 1992), control deficiency (Wolfe et al., 2009), or other practice related judgment.

Going forward, maintaining the above four conventions of dilution research align the behavioral accountant's usage of the dilution effect with cognitive psychology. Narrowing the dilution effect to a single cognitive mechanism allows for experimental parsimony, allowing for meaningful scholarly inquiry and construct clarity. Focusing on a narrow definition of the dilution effect, however, does not indicate that nondiagnostic

information may not affect judgment through additional pathways. On the contrary, it segregates these pathways allowing for more precise scholarly inquiry.

Applying the conventions of classical dilution research as outlined above, previous studies in behavioral accounting (i.e., Hackleback, 1992) provide evidence that an auditor's skeptical judgment dilutes when nondiagnostic information is incorporated into an experimental case scenario, consistent with experiments conducted in cognitive psychology (i.e., Nisbett, et al., 1981). While Hackenbrack (1992) conforms closely to the representativeness framework, more contemporary scholars such as Wolfe et al. (2009) deviate from this framework to introduce alternative pathways by which judgment may be impaired in the presence of nondiagnostic information. While acknowledging that these alternative pathways likely exist, segregating these pathways, rather than lumping them under the common term "dilution effect" allows researchers to better understand how auditor judgment is driven in a complex environment and develop predictions that benefit the practice.

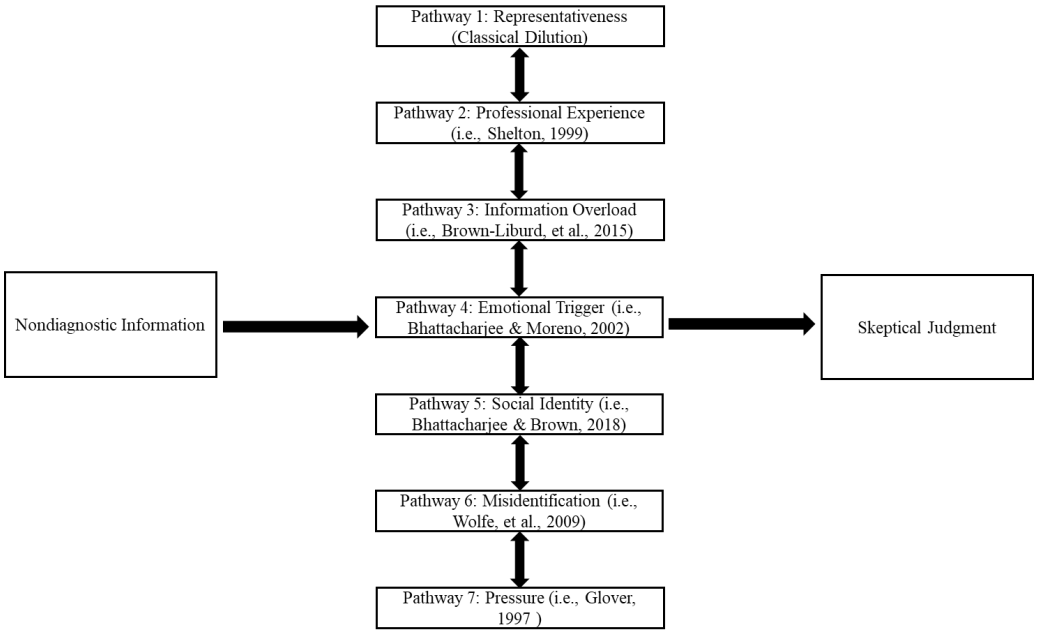
Theoretical Model of Dilution

I previously made a case for researchers to segregate the classical dilution effect (representativeness) from other pathways that affect skeptical judgment. Refocusing on behavioral accounting literature where skeptical judgment is an operational proxy for dilution (i.e., Shelton, 1999), I have identified several additional pathways by which nondiagnostic information is shown to affect external auditor skeptical judgment. Figure 2 graphically displays these pathways, all of which I expect will interact. The first pathway, classical dilution, has been previously described above and is the focus of this

dissertation. Below I provide a very brief description of the remaining pathways identified in the literature.

Professional experience (Pathway 2) as well as professional identification have been shown to increase skeptical judgment through expanded knowledge structures (Shelton, 1999) and reduced in-group identification with the client (Bamber & Iyer, 2007). More experienced external auditors, audit supervisors and partners, licensed CPA's, and those with high firm involvement consistently show more skeptical judgment in the presence of nondiagnostic information, although industry specialist external auditors are less skeptical than non-specialists, attributed to confirmation bias (Grenier, 2017).

Figure 2.1: Multiple Pathway Model of Nondiagnostic Information



Early cognitive psychology work on nondiagnostic information ruled out information overload (Pathway 3) as a cause of judgment moderation in the presence of nondiagnostic information (Well, 1971) although behavioral accounting's interest in

information overload has increased in in the context of big data (Brown-Liburd et al., 2015). Hackenbrack (1992) mentioned information salience as a driver of auditor skeptical judgment, which for parsimony my proposed model classifies as information overload. Similarly, Pathway 6, misidentification (Wolfe, et al., 2009) of nondiagnostic information as diagnostic is ruled out by classical dilution effect research design where participants correctly identify nondiagnostic information (Nisbett et al., 1981), however it is reasonable and obvious that confused auditors would exhibit nonnormative or at least suboptimal judgments.

Two socio-emotional constructs are identified as factors in nonnormative skeptical judgment in the presence of nondiagnostic information. External auditors with strong social ties (Pathway 5) to the client show less skepticism, particularly as the client relationship extends over time (Bhattacharjee & Brown, 2018). On the other hand, external auditors experiencing a negative affect (Pathway 4) towards management (i.e., anger, mistrust) show increased skepticism when the negative affect is nondiagnostic (Bhattacharjee & Moreno, 2002). These two studies can be grouped to propose that external auditors who experience positive affect (social identification) are more lenient, while angry external auditors are less lenient regardless of the diagnosticity of information.

My model is useful to future auditing researchers interested in exploring interactions between the different pathways. For example, Hackenbrack, (1992) found that salience of information (Pathway 3) amplifies nonnormative judgments in the presence of nondiagnostic information. Bhattacharjee and Moreno (2002) similarly find that negative affective information leads to nonnormative judgments in the presence of

nondiagnostic information. It makes intuitive sense that information salience and negative affect would interact such that higher salience information leads to a stronger affect and less normative judgments. Although this is beyond the scope of my dissertation, this and similar questions can be addressed using my model. These opportunities would not be as easily accessible under a conceptual framework where all judgment in the presence of nondiagnostic information is referred to as the dilution effect.

Hackenbrack Revisited

Classical dilution research in both cognitive psychology (i.e., Nisbett et al., 1981) and behavioral accounting (i.e., Hackenbrack, 1992) consistently shows the presence of distinctive nondiagnostic information dilutes judgment over a control condition, consistent with the theoretical framework of representativeness (Kahneman & Tversky, 1972, 1973; Tversky 1977; Tversky & Kahneman, 1974). My initial hypothesis proposes that distinctive nondiagnostic information will continue to dilute in the context of the internal auditor's judgment. Common nondiagnostic information's effect on skeptical judgment is not, however settled science and may be framed by two competing results from Peters and Rothbart (2000) and Hackenbrack (1992). Peters and Rothbart (2000) found in a cognitive psychology context that common nondiagnostic information does not dilute judgment, consistent with representativeness theory (Kahneman & Tversky, 1972, 1973; Tversky 1977; Tversky & Kahneman, 1974). Hackenbrack (1992) finds more nuanced results in behavioral accounting as described below.

The Hackenbrack (1992) experiment finds that instead of making judgments more extreme, common nondiagnostic information had a small dilutive effect, contrary to representativeness theory. Common nondiagnostic information in the Hackenbrack

(1992) experiment diluted less than distinctive diagnostic information, but it still diluted. Hackenbrack (1992) explains the dilutive effect of common diagnostic information by suggesting but not examining that information salience independently moderates judgment.

The Hackenbrack (1992) experimental design required subjects to examine "several pages" of nondiagnostic information and was reasonable to propose that information salience varied across conditions, however the volume of nondiagnostic information provided likely introduced unmeasured, confounding information. A more concise experiment minimizes salience differences between experimental conditions and reduces the potential impact of salience overall – a smaller volume of dilutive information allows for relevant information to stand out.

The dilution effect is based on Kahneman and Tversky's (1972, 1973) theory of representativeness which predicts that individuals undergo a cognitive feature matching process where the judger relies on preconceived notions of a target's characteristics versus potential actions. In cases where the judger's stereotype of the target and potential action match, referred to as common information, the characteristic/action dynamic is mutually reinforcing, and the judger rates the action as more likely to be performed by the target. When there is a mismatch between the target's characteristics versus potential actions, known as distinctive information, the characteristic/action dynamic is contradictory, and the judger rates the action as less likely to be performed by the target. In the case of the dilution effect, the information about the target (common or distinctive) is considered by the judger to be unrelated to the decision (nondiagnostic), yet despite this irrelevance, this information still either supports (common) or challenges

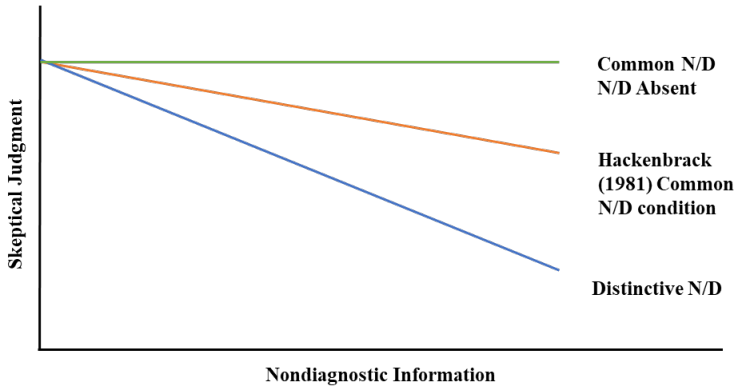
(distinctive) the stereotype. Therefore, if representativeness is the cause of the dilution effect, then compared to a control condition the presence of distinctive nondiagnostic information will reduce skeptical judgment while common nondiagnostic information will not dilute and may in fact increase skepticism.

H1a: Consistent with the representativeness theory of the dilution effect, internal auditors will exhibit **decreased** skepticism when distinctive nondiagnostic information is introduced compared to a control condition.

H1b: Consistent with the representativeness theory of the dilution effect, internal auditors will exhibit **increased** skepticism when common nondiagnostic information is introduced compared to a control condition.

Figure 1 provides a visual representation of the first hypothesis and is designed to improve understandability of the dilution concept. This figure clarifies that decreased skepticism is akin to increased dilution and distinguishes my predictions from the Hackenbrack (1992) study.

Figure 2.2: Dilution Model Operationalized



Professional Skepticism

Skepticism, the dependent variable used throughout this dissertation, is a loosely defined construct in scholarly communities with robust debate over whether skepticism refers to neutrality or presumptive doubt mindsets as well as whether skepticism is a stable personality trait or a fluid state of being (Hurtt, 2010; Nolder, 2012; Nolder & Kadous, 2018). Practitioners and accounting regulatory bodies are more likely to invoke skepticism as an ex-post consequence of an audit problem – the external auditors failed to detect an accounting issue; therefore, they did not exercise sufficient skepticism (Nelson, 2009). Despite a somewhat reactive approach to skepticism, regulatory bodies express useful common definitional elements of skepticism with the PCAOB (2012) and IASB (2018) adopting language such as a "questioning mindset," "alertness" and "critical assessment of evidence." Regulatory and professional bodies also agree that skepticism is required when performing "every aspect of auditing" (PCAOB, 2012; IASB 2018; IIA 2019a, 2019b) and the PCAOB (2012) cautions external auditors to be particularly skeptical when applying judgment. Pertinent to my research, scholarly literature considers an external auditor's judgment to be more skeptical when rating an activity as riskier, controls as less effective or management as less reliable compared to a control condition (Glover & Prawitt, 2014; Nelson, 2009; Nolder & Kadous, 2018).

United States regulators have expressed concerns with the external auditor's professional skepticism (PCAOB, 2012). The International Accounting Standards Board (IASB) (2018) similarly ties professional skepticism to financial audit quality. The PCAOB's Staff Audit Practice Alert #10 (2012) cautions auditors to consistently exercise skepticism, particularly in complex areas that require management judgment. While

issued as a reminder to maintain professional skepticism, the PCAOB (2012) was critical of public auditors for placing an "inappropriate level of confidence or trust in management," warning against pressures that may lead to impaired skepticism such as the need to maintain a long-term relationship with management, avoid conflict, provide favorable opinions under tight deadlines, satisfy management, control costs, or cross sell. While common, these pressures are attributed to auditors' tendency to favor management's interests over the public interest (PCAOB, 2012).

Hurtt (2010) deconstructs skepticism into a combination of stable personality traits and temporary situational states, developing a novel scale to measure trait skepticism. State skepticism is synonymous with an external auditor's situational judgment (Hurtt, 2010) and is typically measured as a dependent variable (i.e., Brown & Millar, 2020). Trait skepticism is considered a comparatively less volatile innate personality trait (Hurtt, 2010). While skeptical judgment (state) may be situationally high or low and impacted by an array of factors, the judger's innate propensity to be skeptical (trait) is little changed over time (Hurtt, 2010).

The Hurtt professional skepticism scale (Hurtt, 2010) draws on interdisciplinary research in psychology and philosophy to model trait skepticism as an element of six characteristics: "a questioning mind, suspension of judgment, a search for knowledge, interpersonal understanding, self-esteem, and autonomy" with the last two characteristics attributed to skeptical behavior rather than mindset. Scores on the Hurtt (2010) scale are aggregated across these characteristics with high scores indicating high trait skepticism. Hurtt (2010) allows researchers to evaluate the innate level of skepticism in a subject or

group to study, among other things, whether highly skeptical external auditors consistently make highly skeptical judgments.

Empirical research has examined factors influencing professional skepticism using internal and external auditors as subjects. Prior studies have found that an auditor's close relationship with management diminishes skeptical judgment with auditors requesting less evidence when management is friendly or likeable (Barr-Pulliam, Nkansa, & Walker, 2017; Bhattacharjee & Moreno, 2002; Bhattacharjee, Moreno, & Riley, 2012; Chung, Cohen, & Monroe, 2008; Eutsler et al., 2018; Robertson, 2010; Schafer & Schafer, 2019). Notably, repeated auditor/client interactions are also shown to enhance social bonds, leading to less skeptical auditor judgments (Bowlin, Hobson, & Piercy, 2015; Hatfield, Jackson, & Vandervelde 2011).

Prior drafts of this dissertation provided a detailed summary of skepticism literature in behavioral accounting. These studies have been condensed and summarized in Table 4 below.

Table 2.3: Summary of Skepticism Studies in Behavioral Accounting

Study	Sample, Dependent Variables and Independent Variables	Major Findings
The effect of professional skepticism on the fraud detection skills of internal auditors (Fullerton & Durtschi, 2004)	**Sample** 57 Florida internal auditors **Independent Variables** 8-hour training class **Dependent Variables** Identification of fraud signals	In a series of before and after training surveys (not an experiment), Internal auditors with high trait skepticism show improved ability to recognize fraud signals. Training however narrows the differences in fraud detection between the low and high skepticism groups.

A model and literature review of professional skepticism in auditing (Nelson, 2009)	*Literature review and theory.*	Proposes a model of skeptical judgment and action consisting of auditor incentives, traits, knowledge, experience, and training.
Development of a scale to measure professional skepticism (Hurtt, 2010)	*Theory and methodology*	Develops and validates a 30-item scale to measure individual trait skepticism in an external audit context. Six characteristics of professional skepticism: a questioning mind, suspension of judgment, search for knowledge, interpersonal understanding, self-esteem, and autonomy.
Research on auditor professional skepticism: Literature synthesis and opportunities for future research (Hurtt, Brown-Liburd, et al., 2013)	*Literature review and theory.*	Updates the Nelson (2009) professional skepticism model further distinguishing antecedents of skeptical judgment and skeptical action as consisting of auditor, evidence, client and external environment characteristics.
Enhancing auditor professional skepticism: The professional skepticism continuum (Glover & Prawitt, 2014)	*Theory and theoretical model*	Frames auditor skepticism as a continuum ranging from attitudes of complete trust, neutral, presumptive doubt, and complete doubt. The amount of evidence collected increases along the continuum away from complete trust. Items commonly discovered by external auditors such as indicators of fraud and error detection should influence where the auditor is on the continuum and how much evidence to collect. Focus is on

		appropriate skepticism rather than more skepticism.
The effects of auditor rotation, professional skepticism, and interactions with managers on audit quality (Bowlin, et al., 2015)	**Sample** 226 undergraduate students from a large university **Independent Variables** Financial reporting aggressiveness (conservative/aggressive) Rotation/no rotation **Dependent Variables** Audit effort (low/high) Management honesty/dishonesty	If external auditors frame their assessment of management representations as potential management dishonesty, then audit quality remains high in the absence of audit firm rotation. On the other hand, when audit firms rotate, framing assessments as potential management honesty comparatively improves auditor quality.
The outcome effect and professional skepticism (Brazel, Jackson, Schaefer, & Stewart, 2016)	**Sample** 96 external audit seniors from an international accounting firm **Independent Variables** Procedures discover/do not discover misstatement Consultation with supervisor: absent/minimal consultation/high consultation **Dependent Variables** Performance evaluation of a staff member	Audit supervisors evaluate skeptical behavior by the results of the audit, not by whether the decision-making process was sufficient. Auditors who uncover a misstatement are considered more skeptical than auditors exhibiting the same behavior who do not uncover the misstatement. Evaluations were negative when misstatements were uncovered regardless of whether the auditor consulted with the supervisor. This is known as the outcome effect or hindsight bias.

Encouraging professional skepticism in the industry specialization era (Grenier, 2017)	**Sample** 371 external auditors **Independent Variables** Specialization - auditors specializing in the insurance industry Prompting - partner emphasizes skepticism **Dependent Variables** Auditor assessment of fraud vs error	Specialist external auditors (deep familiarity with a certain industry or practice) are less skeptical than non-specialists because they are familiar with common explanations for unusual findings. Training however is more effective on specialists because non-specialists are skeptical in the absence of training.
The effect of partner communications of fraud likelihood and skeptical orientation on auditors' professional skepticism (Harding & Trotman, 2017)	**Sample** 88 Big 4 auditors **Independent Variables** Partner expression of fraud Auditor skeptical orientation **Dependent Variables** Perceived fraud risk Perceived evidence reliability	How an external audit partner communicates skepticism in a fraud brainstorming meetings impacts how skeptical the staff will be on the subsequent audit. Communicating that management feels there is a low likelihood of fraud reduces skepticism more than when the partner is silent or communicates their own view of fraud risk.
The impact of management alumni affiliation and persuasion tactics on auditors' internal control judgments (Bhattacharjee & Brown, 2018)	**Sample** 91 Big 4 audit seniors **Independent Variables** Alumni of firm (yes/no) Social validation (compare to peers) **Dependent Variables** Internal control evaluation	External auditors socially identify with clients who are alumni of their audit firm leading to reduced skeptical judgment. However, when a persuasion tactic (social validation) is used by a client who is a firm alumnus, the tactic backfires and external auditors exhibit increased skepticism. Auditors are better able to recognize the persuasion tactic when the client is a firm alumnus.

A live simulation-based investigation: Interactions with clients and their effect on audit judgment and professional skepticism (Eutsler, et al., 2018)	**Sample** 51 graduate accounting students **Independent Variables** Friendly/intimidating client **Dependent Variables** Judgment of a control deficiency Level of additional follow up needed	Social interactions with a controller reduce the external auditor's tendencies to identify questionable cash disbursements and recommend follow up. External auditors scoring low on trait skepticism have the most pronounced decrease in skeptical judgment when interviewing a friendly controller.
Grounding the professional skepticism construct in mindset and attitude theory: A way forward (Nolder & Kadous, 2018)	*Theory and methodology*	Expands on Nolder model using attitude to reframe skepticism as consisting of attitude (affective and social factors influencing beliefs) and a mindset (cognitive processing and critical thinking) components. Per their theory, variables measuring mindsets are related to cognitive processing, while variables measuring attitudes are related to judgments and responses. Individual traits (personality, knowledge, ability, motivation) and situations (culture, pressure, auditing standards, etc.) from prior models influence both mindsets and attitudes. Develops a series of measure for auditor mindsets and attitudes.

Why is trait skepticism not consistently reflected in state skepticism? An exploratory study into the role of aesthetic engagement (Khan & Harding, 2019)	**Sample** 87 undergraduate and post graduate auditing students from an Australian university **Independent Variables** Controller gender Aesthetics (present/absent/emphasized) **Dependent Variable** Aesthetic engagement Trait & state skepticism	Suggests that trait skepticism can be undermined leading to lower skeptical judgment (defined by the author as state skepticism) when the auditor is distracted by aesthetics such as a fashionable office.
Do rewards encourage professional skepticism? It depends (Brazel, Leiby, Schaefer, 2020)	**Sample** 112 external audit seniors from international accounting firms. **Independent Variables** Reward absent/present Red flag minor/moderate/severe **Dependent Variable** Skepticism: Additional procedures necessary (none/medium/high).	Rewarding an auditor's skeptical behavior when misstatements are not uncovered (costly skepticism) backfires (reduces subsequent skeptical behavior) when the reward is not perceived as credible. Consistent rewards for skeptical behavior on the other hand improve skepticism over time.
A matter of perspective: Mitigating the outcome effect in auditor performance evaluations (Brown & Millar, 2020)	**Sample** 117 auditors with an average of 2.1 years' experience **Independent Variables** Identification of material misstatement (identified/not identified) Perspective taking: Presence or absence of guidance **Dependent Variables** Evaluation of a staff member	Prompting auditor supervisors to take the perspective of the auditor appropriately increases performance ratings when skeptical behavior does not lead to the discovery of a misstatement. This mitigates the outcome effect on performance evaluation where judgment of auditor skeptical behavior is dependent on results, not logical process.

While trait skepticism is expected to be positively associated with external auditor skeptical judgment (Hurtt, 2010), this may not be universally true. Khan and Harding (2019) find that external auditors with high trait skepticism exhibit less skeptical judgment in the presence of engaging physical environments which they term aesthetic engagement. External auditors with high trait skepticism become distracted by aesthetics, such as high-end office furniture, and rate a going concern risk as less likely compared to auditors with lower trait skepticism (Khan & Harding, 2019). Khan and Harding (2019) attribute their findings to the dilution effect because they consider their independent variable, sensory stimulating aesthetic information, to be nondiagnostic. As previously lamented, this is a misuse of the dilution effect as, it violates the principles laid out in cognitive psychology research and this dissertation by ignoring representativeness. Further, aesthetic engagement may not be nondiagnostic to a going concern decision as expensive furniture may be an indicator of financial resources. Regardless of the purity of their constructs, Khan and Harding (2019) propose that auditors are cognitively affected by nondiagnostic information, and the classic dilution effect (representativeness) is not ruled out by their study.

Building on Khan and Harding's (2019) evidence that external auditors with high trait skepticism sometimes make less skeptical judgments, I designed an experiment to determine whether the dilution effect contributes to this counterintuitive observation. The dilution effect predicts that adding distinctive nondiagnostic information to a baseline case would lead to a person/action mismatch known to reduce skeptical judgment. When subjects possess high trait skepticism, they would innately attempt to incorporate nondiagnostic information to a higher degree than subjects with low trait skepticism. This

additional focus on nondiagnostic information would exaggerate the person/action discrepancy and dilute judgment to a greater extent. In the presence of common nondiagnostic information, however, high trait skepticism would magnify skeptical judgment as subjects focus on a feature matching process that reinforces ingrained stereotypes. I therefore incorporate trait skepticism as a control in my design.

Chapter 3: Method and Design

Experimental Overview

I examined my hypotheses through a 3×1 between-participants experiment manipulating the dilution effect using experienced internal auditors as subjects. Regardless of the treatment group, all participants receive identical initial materials consisting of instructions, a written overview of the company, excerpts from a PCAOB warning letter, and management's self-disclosure of a control failure.

Participants were randomly assigned to one of three groups (control, common nondiagnostic, or distinctive nondiagnostic). Participants assigned to a nondiagnostic group receive irrelevant written information about the CIO either conforming to (common) or contradicting (distinctive) previously validated CIO personality stereotypes. Control group participants did not receive information about the CIO. Information about the CIO is the only difference across treatment groups.

All participants were subsequently directed to read an interview transcript between the senior internal auditor and the CIO, which was used in Wolfe, et al. (2009). Upon reviewing the interview, all participants performed an internal control over financial reporting (ICFR) assessment and responded to additional questions measuring trait skepticism, social identity, information relevance, and professional experience.

Finally, participants answered a series of demographic questions and were directed to an additional Qualtrics survey where they could provide contact information

for a drawing to win one of twenty $50 Amazon gift-cards. Twenty participants were randomly selected to receive these gift cards. To receive a gift card, participants were prompted to disclose identifiable information (an email). As such the gift card Qualtrics survey was administered separately from the experiment to promote participant anonymity.

Participants

Participants were recruited through several LinkedIn pages as previously done by Sangster & Henderson (2014): *The Institute of Internal Auditors Official Global* group page (171,365 members), the *Official ISACA* group page (63,870 members), the *Internal Audit & Risk Management Consultants* group page (120,822 members), and the *Denver IIA* group page (834 members). Additionally, I solicited participants through my personal LinkedIn page (810 contacts), and several members of these groups indicated they had proactively forwarded my survey to their professional networks. While the targeted groups have 357,701 combined members, these should not be interpreted as unique members as individuals typically belong to multiple groups. Upon viewing my recruitment materials, participants could access the experiment through a Qualtrics hyperlink.

Table 5 shows key demographic information about the participants. Four hundred forty-three individuals attempted the survey of which 157 completed and answered all manipulation and attention check questions as described in the subsequent section. Ultimately 64 participants comprised the control, 45 the common, and 48 the distinctive groups. Qualtrics metadata indicated that participants were English speakers. Ninety percent of participants held at least one certification: CIA (61%), CPA (38%), CMA

(20%), CISA (14%). On average participants were 39 years old, supervisors, and had 5.4 years of internal audit experience. Men slightly outnumbered women 53% versus 46% although one-way ANOVA tests show no significant response differences between genders or other demographic factors. While responses to the dependent variable did not significantly vary by gender if using a strict p=.05 threshold, they are close enough to this significance threshold for preliminary consideration as a control variable in this study ($F_{(1,156)} = 3.229$, p=.074).

Table 3.1: Participant Demographic Information

	Male	Female	Total
Participants	Count (%) 84 (53.5%)	Count (%) 73 (46.5%)	Count (%) 157 (100%)
Years of Experience	Mean (SD)	Mean (SD)	Mean (SD)
Internal Auditing	5.63(3.41)	5.12 (2.66)	5.39 (3.08)
IT Auditing	4.55 (2.98)	4.47 (2.58)	4.51 (2.79)
Public Accounting	2.44 (2.59)	2.99 (2.50)	2.69 (2.55)
Professional	6.25 (3.49)	5.48 (2.96)	5.89 (3.27)
Age	39.88 (9.38)	38.59 (8.56)	39.27 (9.00)
Certification	Count (%)	Count (%)	Count (%)
CIA	48 (57.0%)	47 (64.4%)	95 (60.1%)
CPA	30 (35.7%)	29 (39.7%)	59 (37.6%)
CMA	18 (21.4%)	14 (19.2%)	32 (20.4%)
CISA	11 (13.1%)	11 (15.1%)	22 (14.0%)
None	9 (10.7%)	7 (9.6%)	16 (10.2%)
Highest Audit Role	Count (%)	Count (%)	Count (%)
Staff/Senior	24 (28.6%)	24 (32.9%)	48 (30.6%)
Supervisor	25 (29.8%)	24 (32.9%	49 (31.2%)
Director	16 (19.0%)	12 (16.4%)	28 (17.8%)
Executive	17 (20.2%)	12 (16.4%)	29 (18.5%)
None	2 (2.4%)	1 (1.4%)	3 (1.9%)
	Mean (SD)	Mean (SD)	Mean (SD)
Assessed risk of misstatement (DV)	6.87 (1.47)	6.41 (1.78)	6.65 (1.633)

Procedure and Task

Participants are asked to assume the role of an internal audit supervisor for the publicly traded Pine Inc. and are assigned to assess management's ICFR related to

information technology security. Next, they view a four-sentence background of Pine Inc. which is from an abbreviated company overview of AT&T Corporation available on investor websites sites such as Google Finance. The background states that Pine Inc. is a telecommunications and media company founded in 1983 that operates in the US and Latin America. Pine Inc. is responsible for both media content and technology such as wireless telecommunications. This background information provides a baseline level of information that an internal auditor should know, enhancing experimental realism (Carlisle and Jenkins, 2021). Similar background information is included in experiments by Bhattacharjee and Brown (2018); Hackenbrack (1992); Shelton (1999); and Wolfe et al. (2009).

Next participants read an excerpt communication from the US Securities Exchange Commission (SEC) designed to warn companies of pervasive cyber-related scams targeting publicly traded companies, articulating that companies are responsible for instituting adequate internal controls to mitigate such scams. The SEC concludes with a vague threat of future enforcement actions against companies that fall victim to these scams. This warning should bring the risk of cyber-threats to the front of participants' minds by emphasizing the severity of these risks in the eyes of regulators. Other studies perform similar exercises directing auditors toward unexpected problems albeit with different tools such as a financial ratio analysis task (Carlisle & Jenkins, 2021; Bhattacharjee & Brown, 2018; Shelton, 1999; Wolfe et al., 2009), business cycle narratives (Bhattacharjee & Brown, 2018; Wolfe et al., 2009), and published PCAOB auditing standards (Bhattacharjee & Brown, 2018).

Regardless of the manipulation, participants are subsequently informed that Pine has experienced a recent system breach where 2,000 customer records were stolen, some of which contain valuable information. In addition, procurement card information was lost. Participants are finally told that they are about to view an interview with Taylor, the CIO.

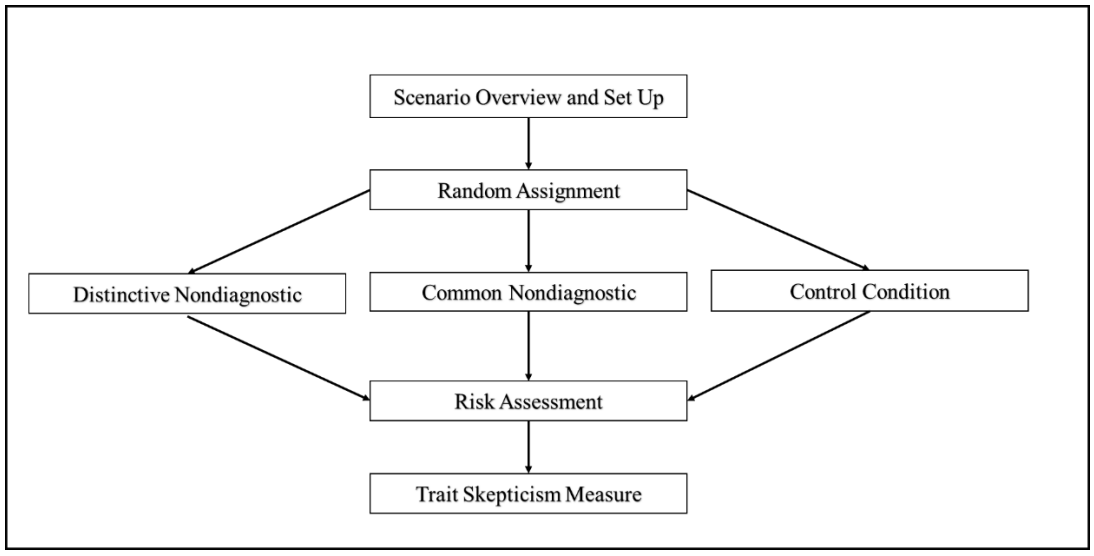
Participants assigned to an experimental manipulation are next provided a short paragraph that describes Taylor with either stereotype affirming (common) or contradicting (distinctive) information prior to viewing the interview. Control group participants do not receive such information and are directed to the interview. This single paragraph (or absence of) is the only difference between the three experimental treatments.

The interview was written by Wolfe et al. (2009) consisting of a dialog between Jordan the senior auditor and Taylor the CIO. The interview itself is uneventful as Taylor expresses willingness to cooperate with the auditor and readily admits to the systems breach. Taylor further states that the company was socially engineered, and procurement cards were fraudulently charged, but does not feel there is a material misstatement because the breach was detected in time. I intentionally chose gender ambiguous names throughout this experiment to prevent rater bias related to gender role stereotypes.

Immediately upon completing the interview participants evaluate the risk that an IT control failure will lead to materially misstated financials over the next year, consistent with Durkin, Jollineau, & Lyon (2021). Participants subsequently respond to additional questions designed to measure social identity, social presence, recognition of nondiagnostic information, client distinctiveness, trait skepticism, professional

experience, comfort with information systems audits, and other demographic information. Participants are finally directed to a second survey where they can register for a random gift card drawing. Twenty participants received a $50 gift card. Appendix 2 contains the experimental tool, while Figure 6 pictorially summarizes the experimental procedure.

Figure 3.1: Experimental Summary



Independent Variables

Participants assigned to a dilution effect treatment receive a written description of the CIO containing either *distinctive* or *common* nondiagnostic information, while those assigned to the control group do not receive nondiagnostic information about the CIO. For the *common nondiagnostic dilution* manipulation, participants are provided a paragraph of information about the CIO that confirms widely held stereotypes, describing Taylor as detail orientated, task focused, nerdy, and a logical problem solver. For the *distinctive nondiagnostic dilution* manipulation, information provided about the CIO

contradicts these widely held stereotypes, describing Taylor as popular, emotional, well-liked, and a charismatic communicator.

Dependent Variables

As this experiment is concerned with how the dilution effect impacts internal auditor skeptical judgment, I measure skepticism at a situational "state" level consistent with studies by Glover and Prawitt (2014), Khan & Harding (2020), Nelson (2009), and Nolder and Kadous (2018) where a participant's assessment risk is a proxy for state-level skepticism – a lower risk assessment corresponds to diminished skeptical judgment. Specifically, participants demonstrate skeptical judgment by rating the risk of a material misstatement occurring as a result of IT control deficiencies.

Control Variables

My study accounts for several variables that could possibly confound results. First, I control for *participant trait skepticism* using the Hurtt (2010) professional skepticism scale. Static personality differences between participants should lead to systematically different risk judgments across conditions independent of the experimental treatment. I expect these static personality traits to have a strong effect on risk decisions and mask any effect from the experimental treatments if not controlled.

I account for *professional experience* and *professional identification* as previous studies have shown that both highly experienced external auditors, and those who identify with their profession, consistently display a high degree skeptical judgment that is less impacted by nondiagnostic information (Bamber & Iyer, 2007; Shelton, 1999). I measure professional identification by whether a participant has a CPA, CIA, CMA, or CISA certification. Experience is measured in years working as an internal auditor. Like

trait skepticism, I expect a strong effect from professional experience and identification that would mask the effects of the experimental treatments if uncontrolled.

I questioned whether participants who valued the relevant information presented within the case would systematically evaluate risk as higher compared to those who were comparatively unconvinced by the same information. As a proxy for relevant information persuasiveness, participants rated the importance of the system breach to their evaluation of future risk. The correlational analysis in Table 15 indeed confirmed that those who considered the breach important rated the risk of a misstatement higher ($r_{(157)}$=.303, p<.001). I further examined the correlation matrix noting there were significant correlations between breach importance and years of experience ($r_{(157)}$ = -.158, p=.049), participant age ($r_{(157)}$ = -.160, p=.045), and possession of a CPA license ($r_{(157)}$ = .229 p=.004). Therefore, participant rating of *breach importance* is accounted for in my study design. Notable, breach importance was uncorrelated to the independent variable.

During pre-experimental validation tests with MTURK participants, those assigned to the common nondiagnostic treatment rated the CIO as more *friendly, objective, trustworthy, reliable, warm, likeable, and approachable* compared to other treatments. Trustworthiness was eliminated as a control as it correlates strongly to the other variables. My study accounts for the remaining variables. Further, my main experiment responses showed significant correlations between the dependent variable and friendliness ($r_{(157)}$ = .183, p=.022), objectivity ($r_{(157)}$ = .204, p=.010), and reliability ($r_{(157)}$ = -.165, p=.039) reinforcing my decision to further evaluate these variables for consideration as controls. Finally, as noted previously, I assess *participant gender* to determine whether there is a systematic difference in answers possibly related to bias.

Statistical Measures

My initial data screening identified 14 possible controls that could confound participant risk judgment beyond the independent variable. To determine whether this laundry list of controls is relevant, I performed an exploratory regression analysis to develop a parsimonious best-fit model, eliminating several controls. My initial predictive model with all 14 controls appears below.

Initial Predictive Model

$$\Delta\ Skeptical\_Judgment_{i,t} = \beta_0 + \beta_1 Common\_Nondiagnostic + \beta_2 Distinctive\_Nondiagnostic + \beta_3 Trait\_Skepticism + \beta_4\ Breach\_Importance + \beta_5 CPA + \beta_6 CIA + \beta_7 CMA + \beta_8 CISA + \beta_9 Experience + \beta_{10} Friendly + \beta_{11} Warm + \beta_{12} Likeable + \beta_{13} Approachable + \beta_{14} Objective + \beta_{15} Reliable + \beta_{16} Gender + \varepsilon_{i,t}$$

The result of my exploratory analysis shows that a more parsimonious model controlling for trait skepticism, breach importance, and CIO warmth produce comparative results to the initial model. The other variables were not significant at a p=.05 level. A comparative analysis of the two models (Table 6) shows the r^2 change is not significant between the two models (r^2 = .295 vs r^2 =.253, p=.680) indicating that the removed variables did not significantly contribute to the model and may be discarded. The final predictive model is shown below.

Final Predictive Model

$$\Delta\ Skeptical\_Judgment_{i,t} = \beta_0 + \beta_1 Common\_Nondiagnostic + \beta_2 Distinctive\_Nondiagnostic + \beta_3 Trait\_Skepticism + \beta_4\ Breach\_Importance + \beta_5 Warm + \varepsilon_{i,t}$$

Table 3.2: Preliminary Model Comparison

Model	R	R^2	Adjusted R^2	Std. Error	R^2 Change	F Change	df1	df2	Sig F Change
1	.503	.253	.228	1.434	.253	10.217	5	151	<.001
2	.543	.295	.214	1.447	.042	.759	11	140	.680

Using my final predictive model, I run an Analysis of Covariance (ANCOVA) to determine whether my independent variables (irrelevant information diagnosticity) influence internal auditor skeptical judgment. My ANCOVA compares the participant risk judgment across the experimental conditions controlling for trait skepticism, breach importance, and perceived CIO warmth. To reiterate my hypothesized predictions, I expect the distinctive nondiagnostic treatment to dilute participant judgment (auditors will be less skeptical) compared to a control group. Participants will be more skeptical when common nondiagnostic is introduced compared to the distinctive nondiagnostic treatment.

Pre-Experimental Instrument Development and Validation

Testing the dilution effect requires participants to receive nondiagnostic information that is either stereotype confirming (common) or stereotype contradicting (distinctive). I developed my instrument through a multi-step validation process to ensure that the stereotypes deployed during this study reflect commonly held stereotypes. Gonzalez, et al. (2019) previously found agreement on seven characteristics stereotypical of a CIO: techy, innovative, geek, detail-orientated, task-focused, curious, and nerdy. Gonzalez, et al. (2019) further identified fifteen stereotypes of an IT professional that partially overlap CIO characteristics: detail-oriented, intelligent, logical, problem solver, technically competent, poor communicator, boring, introverted, isolated, male, lack of masculinity, nerd, geek, socially inept, and unable to build relationships. The first step of

my instrument development process was to validate the Gonzalez et al. (2019) stereotypes using Amazon's Mechanical Turk (MTURK) to determine which features are widely held.

I developed a series of five 15 question "guessing games" totaling 75 unique questions based on the Gonzalez, et. al (2019) list of CIO stereotypes. Participants guessed whether a target person was a CIO or a Chief Marketing Officer (CMO) based on a single piece of irrelevant information. For example, participants were told a person *speaks in a soft voice* (queuing the introverted or socially inept stereotypes) and asked to guess whether this hypothetical person was a CIO or a CMO. These assessments were performed over a five-day period on 136 high quality Amazon Mechanical Turk (MTURK) participants who had over a 90% successful response rate over a minimum of 500 tasks. To maximize participant diversity, I varied the release time of the surveys (early morning, morning, early afternoon, late afternoon, evening) over the five days. Participants consistently guessed either CIO or CMO between 72-100% of the time on 28 questions. The most consistent responses linked to introversion and intelligence (CIO) and extraversion (CMO) traits – CIOs are widely considered smart and introverted while CMOs are perceived as gregarious. The most consistent responses were selected for further development. The testing instrument is shown in Table 7.

While the guessing game was performed with MTURK participants, I repeated this validation with a group of internal auditors to ensure they would respond similarly to the general population. I recruited 12 participants from the Institute of Internal Auditors and ISACA LinkedIn pages to complete a portion of the guessing game using 27 pre-validated statements from Table 7. I accidentally omitted the question related to

membership in a fraternity/sorority. Except for one question about Tesla ownership, internal auditors responded consistently to the relevant CIO stereotype between 75 - 100% of the time, similar to MTURK participants.

Table 3.3: Stereotype Profile Mapping – Internal Auditor Responses

Most Like CIO	MTURK % Guess	Internal Auditor % Guess	Most like CMO.	MTURK % Guess	Internal Auditor % Guess
I enjoy working with computers.	100%	100%	I prefer social gatherings to reading books.	100%	92%
I like to work alone.	100%	100%	I participate in Toastmasters International.	93%	100%
I was a straight A student in college.	100%	83%	I always make eye contact when speaking with someone.	92%	100%
People say I'm very smart.	93%	83%	I enjoy reality television shows.	89%	83%
I speak in a soft voice.	90%	92%	I am an avid fan of the local professional hockey team.	88%	92%
I eat the same sandwich every day for lunch.	89%	92%	I like to work with other people.	86%	92%
I am quiet and reserved.	86%	100%	I prefer large group gatherings to personal meetings.	85%	100%
I have an extensive LEGO collection.	85%	92%	I once was arrested at a Phish concert for underage possession of alcohol.	85%	75%
I prefer reading books to attending social gatherings.	85%	100%	I take cooking classes at night.	85%	75%
I have two master's degrees.	81%	83%	I enjoy new experiences.	85%	100%
I prefer spending time alone.	81%	100%	I like romantic comedies.	85%	75%
I drive a Tesla.	74%	41%	I speak in a loud voice.	83%	83%
I spend weekends at home with family.	74%	92%	Co-workers describe me as friendly.	79%	100%
I drive a bicycle to work.	72%	83%	I was president of a college Greek Fraternity/Sorority	77%	Not Asked

To improve readability and flow I converted the pre-validated list of stereotypes in Table 7 from short sentences into two descriptive paragraphs about "Taylor" representing common or distinctive experimental conditions as shown in Table 8. I validated these paragraphs using 24 high quality MTURK users with a 90% acceptance rate over a minimum of 500 tasks. Participants were randomly assigned to read either the common or distinctive paragraph. Upon reading this paragraph participants assessed on an eleven-point Likert scale whether they felt Taylor was friendly, objective, trustworthy, competent, sincere, warm, likeable, approachable, accurate, and reliable. Results of a one-way ANOVA indicated participants assigned to the distinctive group rated Taylor

significantly more friendly ($F_{(1,22)} = 20.336$ $p<.001$), warm ($F_{(1,22)} = 7.95$, $p=.01$, likeable ($F_{(1,22)} = .007$ $p = .007$), and approachable ($F_{(1,22)} = 12.63$, $p=.002$) compared to the common group which is expected since the distinctive group describes Taylor as "friendly, social, and enjoys people." To ensure that responses do not differ based on perceptions of CIO "likeability" I control for these factors in my main study. There was no statistical difference between groups in objectivity, trustworthiness, competence, sincerity, accuracy, or reliability.

Once the MTURK participants rated Taylor, they were subsequently asked to free recall "everything they remembered about Taylor" to test differences in salience between the two paragraphs. Median fact recall was similar between the two groups (7 facts recalled for common versus 7.5 for the distinctive group) and not significantly different ($F_{(1,22)} = .088$, $p=.769$) implying similar salience. Finally, each group was given a series of twenty-two facts from their respective paragraph and asked to select whether they recall each fact. Questions were designed so that half the assigned facts were distractors from the opposite manipulation so a perfect respondent would recall eleven facts. Participants on average correctly recalled 94% of the relevant facts implying that these paragraphs are memorable.

Table 3.4: Table 8: Experimental Conditions

Common Nondiagnostic Manipulation Taylor enjoys working with computers and prefers working alone. People tend to comment that Taylor is extremely smart, and indeed Taylor was a straight A student in college. Despite this obvious intelligence, Taylor presents as quiet and reserved, typically speaking in a soft voice and spending weekends with family. While Taylor prefers books to social gatherings, other hobbies include an extensive LEGO collection and riding a bicycle to work daily despite owning a Tesla. Co-workers commented that Taylor eats the same sandwich every day for lunch.
Distinctive Nondiagnostic Manipulation Taylor enjoys working with people and strongly prefers large group gatherings to personal meetings. Taylor is famously friendly and is likely to be found at social gatherings or rooting for the local professional hockey team. Taylor communicates by speaking in a loud voice and always maintains eye contact. Taylor enjoys new experiences such as taking cooking classes at night or participating in Toastmaster's International (a public speaking club). Taylor attended numerous Phish concerts in the 1990's. When at home, Taylor prefers reality television or romantic comedies to reading books.

Chapter 4: Results

Manipulation and Attention Checks

I designed within-experimental filters as a series of attention and manipulation checks throughout the experiment. Each participant regardless of manipulation was asked a total of five attention check questions related to the case facts but not the independent variables, which they must correctly answer to continue the study as previously described in Table 10. *Eighty-six* participants failed the first attention check question and were removed from the experiment. Notably, hypothesis testing on the raw data without employing the following manipulation and attention checks produce nonsignificant results (and a very short paper) as grossly inattentive participants present as arbitrary responses.

Participants in all three manipulations were asked a series of five true/false attention check questions throughout the experiment that they had to answer correctly. Each attention check question was preceded by a screen of pertinent information and a warning in bold lettering emphasizing the importance of the information by reminding participants of the upcoming knowledge check. When participants failed the first attention check question, Qualtrics advanced to a thank you screen, the study was closed for that participant, and no further data was collected. I chose to eliminate these inattentive participants because information comprehension is key to this study and participants failing to read or understand study information would make decisions

without consideration of the independent variable. The first question is early in the experiment and based on a single piece of information presented with adequate warning of its importance. Incorrectly answering the first question demonstrates a lack of minimal engagement with the material.

Participants failing subsequent attention check questions were not eliminated but instead prompted to change their answers as a matter of fairness to those who invested time and effort in an increasingly complex experiment but failed to correctly answer a later question either through confusion, misunderstanding, or a temporary attention lapse. For these subsequent questions, Qualtrics only collected the final, correct answer so I am unable to determine which participants changed their answers. Attention check questions are shown in Table 9.

Table 4.1: Attention Check Questions

	Question	Correct Response	Incorrect Response Treatment
1.	Pine Inc. is a national fast-food chain	False	Eliminated from study
2.	The above memo indicates that financial accounting controls are required to detect emerging frauds such as security breaches and cyber engineering	True	Prompted to change
3.	Per the letter you just read, the SEC chose to discipline companies who were targets of cyber-related frauds	False	Prompted to change
4.	The internal auditor interviewed the Chief Operating Officer (COO)	False	Prompted to change
5.	The CIO's servers were hacked	True	Prompted to change

The experimental groups were also subjected to a manipulation check based on whether they read the nondiagnostic information. Nondiagnostic information is foundational to this experiment's manipulations. To ensure that the nondiagnostic information was processed, the experimental groups were asked whether they recalled nondiagnostic facts about the CIO from the experiment. Participants who could not recall

more than six out of seven facts were eliminated from the results[1]. The control group was not subjected to this manipulation check as they were unexposed to nondiagnostic information. Asking the control group about nondiagnostic information when they are explicitly shielded from this information would potentially confound their judgment. *One hundred and twenty-three* participants failed this manipulation check and were eliminated from the study[2].

The manipulation checks were presented as a seven-item checklist tailored to each manipulation. For example, the distinctive group was not asked to recall common traits to prevent cross contamination of distinctive/common information between treatments. All seven items in the checklist were previously viewed descriptions of the CIO – there was no distractor information, and a participant should select all seven items if paying attention to the material. As with the attention check questions, participants were warned in bold lettering that they would be asked about this information as it was presented. Participants selecting less than six choices were removed from the study. Participants remaining in the study recalled each piece of information at least 85% of the time indicating that participants perceived the irrelevant information with a high degree of salience across treatments. Table 10 shows the results of manipulation check.

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[1] Responses did not significantly differ between the six and seven correct answer groups.

[2] Including participants who recalled less than six nondiagnostic items produced nonsignificant results.

Table 4.2: Manipulation Check Responses

Which of the following is true about Taylor? (Select all that apply)			
Common Nondiagnostic Group	**% Identified**	**Distinctive Nondiagnostic Group**	**% Identified**
Taylor prefers working alone	100%	Taylor takes cooking classes	100%
Taylor is quiet and reserved	100%	Taylor enjoys social gatherings	100%
Taylor has a LEGO collection	98%	Taylor is friendly	96%
Taylor owns a Tesla	98%	Taylor roots for the local hockey team	85%
Taylor speaks in a soft voice	98%	Taylor participates in Toastmaster's international	100%
Taylor is intelligent	100%	Taylor enjoys romantic comedies	94%
Taylor likes computers	96%	Taylor attended Phish concerts in the 1990s	92%

Inclusion Criteria

While this study is an experiment, the use of Qualtrics shares similar respondent quality problems to anonymous internet-based surveys. I therefore employed scholarly practices from the survey methods literature to improve response reliability (Leiner, 2019; Meade & Craig, 2012). Meade and Craig (2012) report up to 12% of respondents inattentively respond to surveys leading to outliers producing spurious results and type II errors. Scrubbing this data to identify and eliminate outliers however risks introducing experimenter bias into a study, and data may ultimately reflect the investigator's goals (Leiner, 2019; Meade & Craig, 2012). While there is no consensus on how to cleanly eliminate inattentive or fake data from online surveys – or whether to eliminate them at all – I relied on suggestions by Leiner (2019) and Mead & Criag (2012) to instill a combination of *within-experiment measures* and *post-hoc screening*[3].

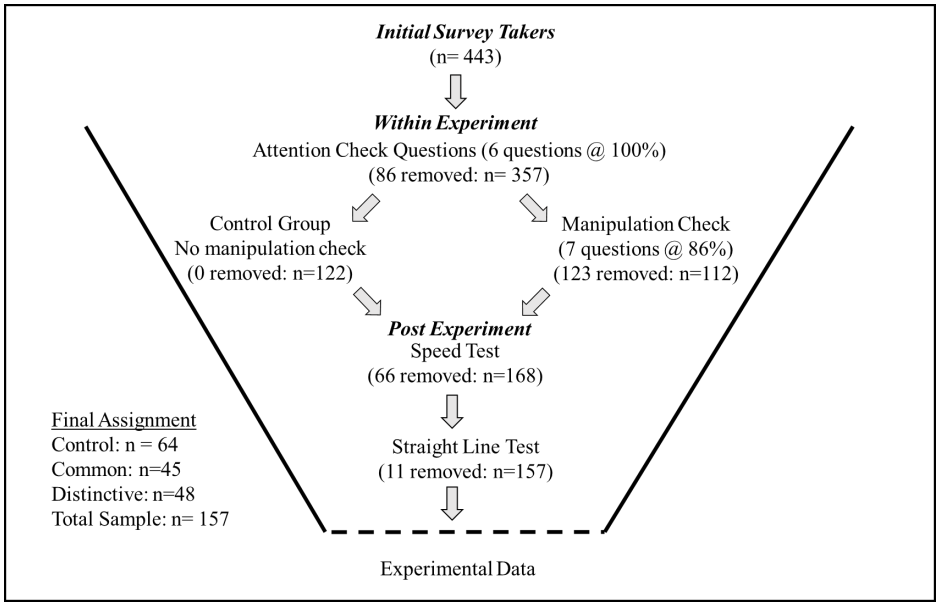
Upon completion of the experiment, participants were screened by two post-hoc factors to ensure response quality. Leiner (2019) suggests that filtering short completion times reliably identifies careless responders without compromising experimental validity. I identified speeders as participants completing the experiment in under 13 minutes, less

[3] Of the 77 participants removed during post-hoc examination, 58 were from the control group. Eliminating these participants did not affect results significance but led to equitable samples across treatments, alleviating expressed concerns about unequal group size.

than half of the median instrument completion time of 28 minutes. A cursory review of the removed speeder data indicated a large number of straight liners and other answer inconsistencies, affirming the methodological choice to eliminate them. *Sixty-six* participants were identified as speeders and eliminated.

My final post-experimental screen involved a manual, cursory review or eye balling of the data to identify long strings of identical responses as suggested by Meade and Craig (2012). For example, participants who entered 10's for every question would corrupt the final dataset, confound results, disrupt normality tests, and potentially appear as a statistical outlier on a boxplot. *Eleven* participants were identified as straight liners, which I defined as answering over 20 responses with the same number, typically a 10, 5, or a 0 on an eleven-point Likert scale. The eliminated responses were in my opinion unambiguously and egregiously fake. Figure 4 summarizes my data filtering process.

Figure 4.1: Data Cleansing Process



Experimental Validation

Strength of Nondiagnostic Information

I validated the strength of the dilution manipulations consistent with Shelton (1999), requesting participants to ex post rate the perceived relevance of several pieces of diagnostic and nondiagnostic information on an eleven-point Likert scale (0 indicating not at all relevant). Participants should rate nondiagnostic information as less relevant to a participant's risk decision than diagnostic information. In general, this was the case as a T–statistic showed that diagnostic information had a significantly higher mean relevance score (7.16) than nondiagnostic (5.87), ($t_{(156)}$ =13.008, p<.001). Somewhat shockingly a significant number of participants rated nondiagnostic information as highly relevant. While survey fatigue may be a factor, I address the overrating of nondiagnostic information in the discussion section of this dissertation as they raise concerns not just for experimental validity but of internal auditor professional judgment. Tables 11 -13 break down the average scores on the post-experimental validation assessment.

Table 4.3: Post-Experimental Relevance Rating

Rate the relevance of the following: *(0-10 Likert Scale where 0 is highly irrelevant)*	
Diagnostic Information	**Mean (SD)**
Procurement cards were stolen	7.41 (2.17)
Company servers were hacked	7.17 (2.09)
Pine did not detect the breach until customer cards were fraudulently charged	7.71 (2.19)
Valuable company data was stolen	7.45 (2.18)
IT discovered and self-identified the issue.	6.70 (2.05)
The company's master file was breached.	7.35 (2.09)
The company was socially engineered.	6.88 (2.23)
Compensating controls prevented a misstatement	7.18 (2.12)
The company does not have an unrecorded liability.	6.69 (2.19)
The company trains employees to detect and deter social engineering	6.93 (2.19)
The system administrator gave system access to a hacker disguised as a victim.	7.05 (2.27)
The firewall detected a malicious act.	7.37 (1.99)
Average Control Group Diagnostic Score	*7.16*

Table 4.4: Post-Experimental Relevance Rating

Rate the relevance of the following: *(0-10 Likert Scale where 0 is highly irrelevant)*	
Common Nondiagnostic Information	**Mean (SD)**
The CIO likes working with computers	6.56 (3.00)
The CIO prefers working alone	6.88 (2.71)
The CIO was a straight A student in college	5.91 (2.80)
The CIO is quiet and reserved	6.40 (3.17)
The CIO has an extensive LEGO collection	5.76 (3.52)
The CIO prefers books to social gatherings	6.36 (3.20)
The CIO rides a bicycle to work daily	5.55 (3.64)
The CIO prefers to spend weekends with the family	5.79 (3.52)
The CIO eats the same sandwich for lunch daily	4.83 (3.57)
The CIO owns a Tesla	5.38 (3.65)
The CIO speaks in a soft voice	5.50 (3.52)
Average Common Group Score	*5.91*

Table 4.5: Post-Experimental Relevance Rating

Rate the relevance of the following: *(0-10 Likert Scale where 0 is highly irrelevant)*	
Distinctive Nondiagnostic Information	**Mean (SD)**
The CIO enjoys working with people	6.19 (2.63)
The CIO prefers large gatherings to personal meetings	6.24 (2.75)
The CIO roots for the local hockey team	5.00 (3.47)
The CIO speaks in a loud voice	5.53 (3.38)
The CIO maintains eye contact when speaking	5.89 (3.47)
The CIO attended numerous Phish concerts in the 1990s	6.19 (3.44)
The CIO takes cooking classes at night	6.30 (3.70)
The CIO participates in Toastmasters International	5.67 (3.39)
The CIO enjoys reality television and romantic comedies to reading books	5.23 (3.48)
The CIO is friendly	5.80 (3.17)
The CIO enjoys new experiences	5.89 (3.33)
Average Distinctive Group Score	*5.82*
Average of Distinctive and Common Treatment Groups	*5.87*

Table 4.6: Descriptive Statistics

(0-10 Likert Scale where 0 is highly irrelevant) n=157	**Control Mean (SD)**	**Common Mean (SD)**	**Distinct Mean (SD)**	**All Data Mean (SD)**
To what extent do you agree or disagree with the following?				
The CIO was competent	6.75 (1.91)	6.69 (2.08)	6.21 (2.36)	6.57 (2.10)
The CIO was friendly	7.44 (1.54)	7.24 (1.69)	7.35 (1.94)	7.35 (1.70)
The CIO was objective	6.37 (2.14)	6.71 (1.90)	6.18 (2.06)	6.41 (2.05)
The CIO was trustworthy	6.77 (2.09)	6.87 (2.08)	6.39 (2.40)	6.68 (2.18)
The CIO was sincere	6.94 (1.78)	7.08 (1.59)	6.72 (2.44)	6.91 (1.95)
The CIO was warm	6.92 (1.78)	7.15 (1.80)	6.53 (2.27)	6.87 (1.95)
The CIO was likeable	6.60 (1.84)	6.73 (1.72)	6.61 (2.00)	6.64 (1.85)
The CIO was approachable	6.92 (1.91)	7.05 (1.86)	6.72 (2.21)	6.90 (1.98)
The CIO was intelligent	6.82 (1.83)	7.19 (1.65)	6.80 (2.01)	6.92 (1.86)
The CIO was motivated to be accurate	6.62 (2.13)	6.47 (2.11)	6.84 (2.01)	6.65 (2.08)
The CIO was reliable	6.70 (2.01)	6.85 (2.09)	6.46 (2.33)	6.67 (2.13)

Social Identity				
I think highly of the CIO	6.376 (1.90)	6.58 (2.35)	5.62 (2.78)	6.20 (2.34)
I felt a resemblance to the CIO	5.81 (2.40)	5.46 (2.13)	5.19 (2.52)	5.52 (2.36)
The CIO's successes were my successes	6.14 (2.07)	5.88 (2.18)	5.33 (2.90)	5.82 (2.43)
I felt a connection to the CIO	5.96 (2.20)	5.78 (2.18)	5.54 (2.27)	5.78 (2.20)
Aggregate Social Identity Score	*6.07 (1.77)*	*5.92 (1.66)*	*5.42 (2.24)*	*5.83 (1.90)*
Hurtt Scale				
I often accept other people's explanations without further thought	4.89 (1.04)	4.26 (2.50)	4.32 (2.68)	4.57 (2.52)
I feel good about myself	6.51 (1.75)	6.89 (2.49)	6.46 (2.70)	6.59 (7.74)
I wait to decide on issues until I can get more information	6.83 (2.10)	7.56 (1.78)	7.72* (1.83)	7.27 (1.98)
The prospect of learning excites me	7.36 (1.88)	7.60 (1.72)	7.71 (1.58)	7.52 (1.75)
I am interested in what causes people to behave the way that they do	7.14 (1.87)	7.61 (1.73)	7.03 (2.18)	7.22 (1.94)
I am confident in my abilities	7.46 (1.68)	7.89 (1.45)	7.51 (1.84)	7.58 (1.68)
I often reject statements unless I have proof, they are true	6.81 (1.79)	6.34 (2.10)	6.32 (2.18)	6.55 (1.20)
Discovering new information is fun	7.40 (1.77)	7.78 (1.61)	7.40 (1.82)	7.49 (1.75)
I take my time when making decisions	7.00 (1.96)	7.32 (1.61)	7.28 (1.76)	7.16 (1.82)
I tend to immediately accept what other people tell me	5.33 (2.73)	4.54 (2.42)	4.62 (2.50)	4.93 (2.60)
Other people's behavior does not interest me	4.94 (2.22)	5.06 (2.57)	5.10 (2.74)	5.00 (2.45)
I am self-assured	6.86 (1.74)	7.25 (1.46)	7.17 (1.84)	7.04 (1.71)
My friends tell me that I usually question things that I see or hear	6.81 (2.14)	6.75 (1.90)	5.77* (1.97)	6.47 (2.08)
I like to understand the reason for other people's behavior	7.29 (1.54)	7.65 (1.82)	6.77 (2.15)	7.21 (1.83)
Aggregate Hurtt Score:	*6.68 (1.04)*	*6.75 (.95)*	*6.55 (.93)*	*6.66 (.96)*
Other Descriptive Data				
Risk that an IT control failure will lead to a misstatement (DV)	6.83 (1.31)	7.00 (1.37)	6.09 (2.08)	6.65 (1.63)
Significance of breach to your evaluation of risk	7.32 (1.53)	7.44 (1.81)	7.42 (1.66)	7.42 (1.65)
Years of internal auditing experience	3.88 (2.60)	5.07 (2.83)	4.83 (2.88)	4.51 (2.79)
Do you have the following licenses or certifications?	**Control Count (%)[a]**	**Common Count (%)[a]**	**Distinctive Count (%)[a]**	**All Data Count (%)[a]**
CPA	29 (45%)	18 (40%)	12 (25%)	59 (38%)
CIA	31* (48%)	32 (71%)	32 (67%)	95 (61%)
CMA	17 (26%)	10 (22%)	5 (10%)	32 (20%)
CISA	7 (11%)	6 (13%)	9 (19%)	22 (14%)
No Certification	5 (8%)	3 (7%)	8 (17%)	16 (10%)

**Score differences between groups with a Two-tailed significance at the .05 level*

a. Measures whether participants hold certification

Table 4.7: Pearson Correlation Table

N=157	1[a]	2[a]	3[a]	4[a]	5	6[a]	7	8	9[a]	10	11	12	13	14
(0) Risk (DV)	.30**	.36**	.18*	.20*	.21*	.17*	.10	-.02	.04	.09	.16	.08	.05	-.18*
(1) Importance	1	.23**	.24**	.15	.02	.08	.00	-.01	.20*	.12	.21**	.23**	.23**	.05
(2) Hurtt Score		1	.44**	.36**	.37**	.37**	.39**	.30**	.40**	.34**	.27**	.43**	.34**	-.08
(3) Friendliness			1	.34**	.43**	.34**	.36**	.29**	.48**	.44**	.38**	.47**	.20*	-.03
(4) Objective				1	.46**	.50**	.42**	.43**	.34**	.30**	.51**	.37**	.51**	-.03
(5) Trustworthy					1	.70**	.73**	.61**	.51**	.54**	.61**	.49**	.39**	-.07
(6) Reliable						1	.67**	.68**	.55**	.57**	.63**	.49**	.45**	-.04
(7) Sincere							1	.58**	.58**	.55**	.57**	.58**	.39**	-.04
(8) Competent								1	.53**	.53**	.61**	.42**	.40**	-.10
(9) Warm									1	.58**	.44**	.66**	.36**	-.08
(10) Likeable										1	.50**	.51**	.31**	.00
(11) Intelligence											1	.41**	.46**	.00
(12) Approachable												1	.39**	-.04
(13) Motivated													1	.04
(14) Dilution (IV)														1

** Significant at a .05 level*
***Significant at a .01 level*

a. Breach importance, Hurtt score, and CIO friendliness, objectivity, and reliability are included as controls in regression model. Trustworthiness is excluded due to multicollinearity concerns. Warmth is included in the regression based on pre-test responses.

Comparison of Means

To confirm my hypotheses, I performed an ANCOVA controlling for trait skepticism, breach importance, and CIO warmth. Table 16 shows the results. The ANCOVA model shows that the treatment groups significantly differ from the control group ($F_{(2,155)}$=5.116, p=.007), however a planned contrast shows this difference is entirely attributed to the distinctive nondiagnostic condition. The distinctive nondiagnostic condition is significant and negative, indicating the presence of dilution (t= -.743, p=.008) supporting hypothesis H1a. Participants systematically rate risks lower (are less skeptical) in the presence of stereotype contradicting information. The common nondiagnostic treatment group did not significantly differ from the control group indicating that common nondiagnostic information does not dilute judgment (t=.130, p=.642). This is consistent with representativeness theory; however, it does not support hypothesis H1b which states that common nondiagnostic information will increase skepticism over a control condition. All three experimental controls maintain their significance in the model.

Table 4.8: Analysis of Covariance

Analysis of Covariance	
Panel A: Means (Standard Deviations)	
Control Group	6.83 (1.31)
Common Nondiagnostic	7.00 (1.37)
Distinctive Nondiagnostic	6.09 (2.08)
Total	6.65 (1.63)

Panel B: ANCOVA Model					
Source	**SS**	**Df**	**MS**	**F-Statistic**	**P-value**
Model	105.115	5	21.023	10.217	<.001
Intercept	8.493	1	8.493	4.127	.044
Treatment Group	21.055	2	10.528	5.116	.007
Trait Skepticism	40.502	1	40.502	19.683	<.001
Breach Importance	27.829	1	27.828	13.524	<.001
Warmth	10.917	1	10.917	5.306	.023
Error	310.714	151	2.058		
Total	7368.341	157			
R^2 = .253					
Adj. R^2 = .228					

Panel C: Simple Contrasts						
Cells	**Weights**	**Est.**	**Std. Error**	**Lower Bound**	**Upper Bound**	**Sig.**
Common vs Control Condition	-1, 1,0[a]	.130	.279	-.422	.682	.642
Control vs Distinctive Condition	-1,0, 1[b]	-.743	.276	-1.289	-.197	.008

[a]Contrast coefficients are -1 for the control condition and +1 for the common nondiagnostic information condition.
[b]Contrast coefficients are -1 for the control condition and +1 for the distinctive nondiagnostic information condition.

Chapter 5: Discussion, Conclusions, and Recommendations

Conclusion and General Discussion

Behavioral psychology proposes that human subjects moderate, or dilute, their judgment in the presence of nondiagnostic information through the representativeness heuristic. This study provides evidence that under experimental conditions internal auditors' judgments are affected by the representativeness heuristic. Consistent with the dilution effect, this study shows that internal auditors make less skeptical risk judgments when relevant information is supplemented with stereotype contradicting (distinctive) nondiagnostic information. My study further provides evidence supporting dilution theory (Nisbett et al., 1981) that stereotype supporting (common) nondiagnostic information does not dilute judgment compared to a control condition (diagnostic information only). Overall, my study shows that internal auditors make risk decisions consistent with representativeness theory and that stereotype contradicting irrelevant information about an audit client may result in less skeptical risk judgments due cognitive feature matching. While internal auditors can cognitively match a stereotypical CIO personality with an IT control risk leading to an extreme risk rating (this person is someone who engages in this action), an atypical CIO contradicts this match leading to less extreme judgment (this is not a person who engages in this action).

While cognitive psychology studies of dilution show that *common nondiagnostic information* does not dilute judgment (Peters & Rothbart, 2000), prior behavioral

accounting studies with external auditors were unable to replicate cognitive psychology's results, instead showing a small but notable dilutive effect of common nondiagnostic information (Hackenbrack, 1992). This study succeeds by relying on a more streamlined experimental manipulation compared to prior accounting studies while controlling for individual differences in trait skepticism, relevant information persuasiveness (breach importance), and perceived CIO warmth. The streamlined experimental design limits the influence of confounding forces such as participant distraction, salience, and information overload. Controlling for innate and perceptual differences between participants such as trait skepticism and information persuasiveness further isolates the effect of nondiagnostic information increasing the likelihood that the measured effect is attributed to representativeness.

As predicted, stereotype contradicting *distinctive nondiagnostic information* led to significantly less skeptical internal auditor judgments (dilution) compared to either an absence of nondiagnostic information or the presence of common nondiagnostic information. Notably, the nondiagnostic information provided was related to the CIO's personality and was designed to contradict widely held stereotypes of the CIO as intellectual and introverted. Curiously, the CIOs who did not abide by these stereotypes but instead presented as outgoing and extraverted were rewarded with more favorable risk ratings and would presumably be subjected to less rigorous audit scrutiny. In an IT setting this unearned lower risk perception could be costly if the relevant facts indicate a higher risk than assessed. With knowledge that distinctive nondiagnostic information reduces professional skepticism future researchers and internal audit teams can develop tools to counteract suboptimal dilution.

Limitations

This study has several limitations related to the nature of anonymous internet-based survey research. Nearly 61% of initial responses were discarded when filtered through four rigorous screening processes. While I assessed this screening was necessary to produce quality results, the number of discarded respondents is significant.

Several successful respondents overvalued irrelevant information in this study as shown in Table 17. While on aggregate respondents rated relevant information as *significantly more relevant* than irrelevant information, nearly 40% rated obviously irrelevant information as highly relevant (greater than a 7 on a 10-point Likert scale), punctuated by 27% reporting that *the CIO eats the same sandwich for lunch daily* was highly relevant to the risk of a material misstatement. The most likely explanation for this overrating of irrelevant information is respondent inattentiveness. Notably, study responses did not differ based on the type of qualification held – for example neither CIAs nor CPAs rated risks differently than other groups. Additionally, responses did not change based on professional experience.

Table 5.1: Perceived Importance of Irrelevant Information

	Control	Common	Distinctive
How relevant is the following to your risk decision? *11-point Likert scale (10=highly relevant)*	Mean (SD)	Mean (SD)	Mean (SD)
Importance of Relevant Information	7.00 (1.37)	7.35 (1.38)	7.19 (1.22)
Importance of Nondiagnostic Information		5.99 (2.65)	5.76 (2.64)
Relevant score is significantly higher than nondiagnostic score.		t=2.97, p=.005	t=3.41, p=.001
Select Nondiagnostic Responses *Number of responses above 7(%) 11-point Likert*		High Relevance n=45	High Relevance n=48
CIO eats the same sandwich every day for lunch		12 (27%)	
CIO has an extensive LEGO collection		13 (29%)	
CIO rides a bicycle to work daily		11 (24%)	
All irrelevant information		17 (38%)	19 (40%)
CIO takes cooking classes at night			13 (27%)
CIO attended several Phish concerts in the 1990s			15 (31%)
CIO is an avid fan of the local hockey team			13 (27%)

Areas for Future Research

As a key part of corporate governance, internal auditors are responsible for a wide range of professional judgments pertaining to institutional and systemic risk (IIA 2021). These judgments are presumably made in a dynamic business environment conductive to heuristic processing where decision time is short and information incomplete. This study shows that internal auditor judgments are influenced by these heuristic judgments of management's personality unrelated to business performance.

An internal auditor, or another member of management suboptimally evaluating management performance based on irrelevant personality traits potentially undermines workforce diversity efforts and company performance. Future scholars should consider the extent to which nondiagnostic information impacts personnel decisions, assess the potential harm stemming from these decisions, and address mechanisms to identify and correct hiring decisions unduly influenced by the dilution effect.

While it is reasonable to expect a collegial interaction between an internal auditor and client to contain a mixture of purely diagnostic information about business processes and social platitudes unrelated to the work at hand, it is comforting to know that most nondiagnostic information does not dilute judgment unless it contradicts the internal auditor's stereotype of the client (distinctive). Whether these preconceived notions change over time is an interesting area for further study. It is possible that the dilution effect is fleeting as these relationships develop and perceptions change.

This study concludes by encouraging future exploration into how additional constructs may interact with the dilution effect. My theoretical model proposed that classical dilution is a function of the representativeness heuristic, a point supported by this study. My model subsequently identified five other factors (information overload, emotional triggers, social identity, misidentification, and pressure) that could interact with representativeness potentially leading to interesting insight into internal audit decision-making. While my study focuses on a relatively complex IT scenario and a narrow financial misstatement risk, exploring different internal auditor decisions such as an operational or consulting engagement could provide additional insight into the dilution effect. Finally, future research can explore whether factors such as supervision can mitigate the dilution effect and improve internal auditor judgment.

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Appendix I: Experimental Case Materials

Experimental Overview and Instructions
Assume you are an internal audit supervisor for publicly traded Pine Inc. asked to assess management's **internal controls over financial reporting related to information technology (IT)** security.

Please answer all questions truthfully and to the best of your knowledge.

Your time is valuable, but so is your knowledge. Upon completion of this experiment, you will be entered into a drawing for **one of twenty $50 Amazon gift cards** to be awarded on December 1, 2022. Approximately 10% of all respondents will receive a card.

Company Information
Pine Inc. performs telecommunications and media services in the United States and Latin America. The Media segment develops, produces, and distributes feature films, television, gaming and other content. The telecommunications segment provides wireless technology services. The company was founded in 1983 and is headquartered in Dallas, TX.

You will be asked questions about Pine throughout this experiment.

Question 1: Pine Inc. is a national fast-food chain
a. True
b. False

United States Securities and Exchange Commission (SEC)
Warning Letter Regarding Emerging Risks

INTRODUCTION
A group that spans numerous industries **each lost millions of dollars** due to cyber-related frauds. In those frauds, perpetrators either **used stolen passwords** or otherwise **breached company systems** to compromise electronic communications purporting to be from a company executive or vendor, causing the personnel to wire large sums or pay invoices to accounts controlled by the perpetrators of the scheme. **Every type of business is a potential target** of cyber-related fraud.

While the **cyber-related threats** posed to company assets are relatively new, the expectation that companies will have **sufficient internal accounting controls** and that those **controls will be reviewed and updated** as circumstances warrant is not new.

The Commission has determined **not to pursue an enforcement action** in these matters at this time.

You will be asked questions about this letter throughout this experiment.

Question 2: The above memo indicates that financial accounting controls are required to detect emerging frauds such as security breaches and cyber-engineering.

a. True
b. False

Question 3: Per the letter you just read, the SEC chose to discipline companies who were targets of cyber-related fraud.

a. True
b. False

Pine's enterprise **system had been breached** in November. Approximately 2,000 customer records were stolen from the customer master file. Much of the information lost was harmless. However, some of it would be of value to competitors. Additionally, approximately 500 customers had procurement card information on file.

Control Condition

You are about to view an interview between the senior internal auditor, Jordan, and Taylor, the Chief Information Officer (CIO)

Common nondiagnostic Condition

You are about to view an interview between the senior internal auditor, Jordan, and Taylor, the Chief Information Officer (CIO). The audit files contain a brief description of Taylor's background.

Taylor enjoys working with **computers** and prefers working **alone**. People tend to comment that Taylor is extremely **smart**, and indeed Taylor was a **straight A student** in college. Despite this obvious intelligence, Taylor presents as **quiet and reserved**, typically speaking in a **soft voice** and spending weekends with **family**. While Taylor prefers **books** to social gatherings, other hobbies include an extensive **LEGO** collection and riding a **bicycle** to work daily despite owning a Tesla. Co-workers commented that Taylor eats the same **sandwich** every day for lunch.

You will be asked questions about Taylor throughout this experiment.

Question 4: Which of the following is true about Taylor (Select all that apply)

- o Taylor prefers working alone
- o Taylor is quiet and reserved
- o Taylor has a LEGO collection
- o Taylor owns a TESLA
- o Taylor speaks in a soft voice
- o Taylor is intelligent
- o Taylor likes computers

Distinctive nondiagnostic Condition

You are about to view an interview between the senior internal auditor, Jordan, and Taylor, the Chief Information Officer (CIO). The audit files contain a brief description of Taylor's background.

Taylor enjoys working with **people** and strongly prefers large group **gatherings** to personal meetings. Taylor is famously **friendly** and is likely to be found at **social** gatherings or rooting for the local professional **hockey** team. Taylor communicates by speaking in a **loud voice** and always maintains **eye contact**. Taylor enjoys new experiences such as taking **cooking classes** at night or participating in **Toastmaster's International** (a public speaking club). Taylor attended numerous **Phish** concerts in the 1990s. When at home, Taylor prefers reality **television** or romantic **comedies** to reading books.

You will be asked questions about Taylor throughout this experiment.

Question 4: Which of the following is true about Taylor (Select all that apply)

- Taylor takes cooking classes
- Taylor enjoys social gatherings
- Taylor is friendly
- Taylor roots for the local hockey team
- Taylor participates in Toastmasters International
- Taylor enjoys romantic comedies
- Taylor attended numerous Phish concerts in the 1990s

Part II: Management Response to Inquiry

As part of planning the audit, the senior auditor on the engagement, Jordan, follows up on management's self-reported issue with Taylor Smith, the Chief Information Officer (CIO) of Pine Inc. The following is the discussion between Jordan and Taylor.

Jordan *(senior auditor):* I scheduled this meeting with you to discuss your self-reported finding as we prepare our controls audit.

Taylor *(CIO):* I'd be happy to discuss that with you.

Jordan *(senior auditor):* You mentioned that your main servers were hacked in November. Additionally, you found evidence that the customer master file was breached.

Taylor *(CIO):* It looks like we were socially engineered. Someone began attacking our system. Of course, our firewall picked it up. Then one of our system administrators got a phone call, and the caller said that our system was attacking his system. Our administrator said he didn't think that was the case and that we were being attacked also. In any event, the two decided that they would work on this problem together, and our administrator gave the caller access to part of our system. Well, the caller was the hacker, and he used his access to our system to breach the customer master file. As you know, he

got about 500 procurement card numbers. Luckily, the liability on those is limited. And do not forget, Jordan, we trained our people against this type of threat.

Jordan *(senior auditor):* How quickly did you discover the breach?

Taylor *(CIO):* You know, Jordan, that's the insidious thing. When one of our employees lets hackers into our system, we do not have any mechanism to catch them. If we do not stop them at the gate, it's trouble. We didn't know that our system had been breached until the customer's cards started getting charged fraudulently, and it eventually led back to our shop.

Jordan *(senior auditor):* Is there any possibility of an unrecorded liability here?

Taylor *(CIO):*
I do not think we have an unrecorded liability, Jordan. It could have been larger, but we caught it in time. All the cards have been stopped. We've paid damages and none of our customers have indicated legal action. I think we are fine.

Jordan *(senior auditor):* That's great to hear Taylor. I don't think I have anything else for now.

Question 5: The internal auditor interviewed the Chief Operating Officer (COO)

a. True
b. False

Question 6: The CIO's servers were hacked?

a. True
b. False

Assume you are an internal audit supervisor for publicly traded Pine Inc. asked to assess management's **internal controls over financial reporting related to information technology (IT) security.**

Question 7: How would you assess the risk that a future IT control failure will lead to Pine misstating their financials over the **next twelve months**?

Risk that an IT control failure will lead to a material financial misstatement at Pine (0-100%)

0%	50%	100%
Zero likelihood		Certainty

Question 8: Assess the significance of Pine Co's system breach to your evaluation of their internal control risk.

0	1	2	3	4	5	6	7	8	9	10
Immaterial										Very Significant

Question 9: To what extend do you agree or disagree with the following:

a. The CIO acted like a typical CIO.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

b. The CIO acted professionally.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

c. The CIO acted like a CIO who maintains strong internal controls.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

d. I felt a connection to the CIO.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

e. I felt a resemblance to the CIO.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

f. The CIO's successes are my successes.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

g. I think highly of the CIO.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

h. The CIO was competent.

0	1	2	3	4	5	6	7	8	9	10
Strongly disagree										Strongly Agree

Question 10: Rate the degree of partnership you sensed between the auditor and CIO.

0	1	2	3	4	5	6	7	8	9	10
Adversarial										Close Partnership

Question 11: Rate your impressions of the following CIO characteristics

a. CIO was friendly.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

b. CIO was objective.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

c. CIO was trustworthy.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

d. CIO was competent.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

e. CIO was sincere.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

f. CIO was warm.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

g. CIO was likeable.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

h. CIO was approachable.

0	1	2	3	4	5	6	7	8	9	10
Strongly Disagree										Strongly Agree

i. CIO was intelligent

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

j. CIO was Motivated to be accurate

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

k. CIO was reliable

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

Question 12: Statements that people use to describe themselves are given below. Please circle the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

a. I often accept other people's explanations without further thought.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

b. I feel good about myself.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

c. I wait to decide on issues until I can get more information.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

d. The prospect of learning excites me.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

e. I am interested in what causes people to behave the way that they do.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

f. I am confident of my abilities.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

g. I often reject statements unless I have proof that they are true.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

h. Discovering new information is fun.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

i. I take my time when making decisions.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

j. I tend to immediately accept what other people tell me.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

k. Other people's behavior does not interest me.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

l. I am self-assured.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

m. My friends tell me that I usually question things that I see or hear.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

n. I like to understand the reason for other people's behavior.

0 1 2 3 4 5 6 7 8 9 10
Strongly Disagree Strongly Agree

Question 13: You previously assessed the risk that a future IT control failure will lead to Pine misstating their financials over the next twelve months.

On a scale between 0 (not at all relevant) and 10 (very relevant), rate the **relevance** of the following to **assessing this risk**.

All treatment groups

Information	Information Relevance Rating
a. 500 procurement card numbers were stolen.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
b. Company servers were hacked.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
c. Pine Inc. did not detect the breach until customer cards were fraudulently charged.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
d. Valuable company information was stolen.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
e. Compensating controls prevented a material misstatement.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
f. The company does not have an unrecorded liability based on the control failures.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
g. The company trains their employees to detect and deter social engineering and other malicious attacks.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
h. The systems administrator gave system access to a hacker disguised as a fellow malicious attack victim.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
i. The firewall detected a malicious attack.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
j. The company was socially engineered.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
k. The company's customer master file was breached.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant

l. IT management discovered and self-identified issues to audit.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant

Common nondiagnostic treatment only

Information	Information Relevance Rating
a. The CIO enjoys working with computers.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
b. The CIO prefers working alone.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
c. The CIO is smart.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
d. The CIO was a straight A student in college.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
e. The CIO is quiet and reserved.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
f. The CIO has an extensive LEGO collection.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
g. The CIO prefers books to social gatherings.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
h. The CIO rides a bicycle to work every day.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
i. The CIO prefers to spend weekends with families.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
j. The CIO eats the same sandwich daily for lunch.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
k. The CIO owns a Tesla.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
l. The CIO speaks in a soft voice	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant

Distinctive Nondiagnostic Condition Only

Information	Information Relevance Rating
a. The CIO enjoys working with people.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
b. The CIO prefers large gatherings to personal meetings.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
c. The CIO roots for the local hockey team.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
d. The CIO speaks in a loud voice.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
e. The CIO maintains eye contact.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
f. The CIO attended Phish concerts in the 1990s.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
g. The CIO takes cooking classes at night.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
h. The CIO participates in toastmasters international.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
i. The CIO enjoys reality television or romantic comedies over reading books.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
j. The CIO is friendly.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant
k. The CIO enjoys new experiences.	0 1 2 3 4 5 6 7 8 9 10 Not at all Relevant Extremely Relevant

Question 14: Rate your IT auditing comfort and experience.

0 1 2 3 4 5 6 7 8 9 10
Very Low Very High

Question 15: How many years of experience do you have as an internal auditor?

a. No experience
b. One year or less
c. 1-5 years
d. 5-10 years
e. >10 years

Question 16: How many years of IT auditing experience do you have?

a. No experience
b. One year or less
c. 1-5 years
d. 5-10 years
e. >10 years

Question 17: How many years of professional work experience (internal audit plus other jobs) do you have?

a. No experience
b. One year or less
c. 1-5 years
d. 5-10 years
e. >10 years

Question 18: What is the highest audit role you have held?

a. Audit staff or senior
b. First line supervisor/manager (supervised auditors)
c. Second line supervisor/manager (supervised supervisors)
d. Executive (director, chief auditor, etc.)
e. No audit experience.

Question 19: Do you have the following licenses or certifications? (check all that apply)

a. No certifications
b. Certified Public Accountant (CPA)
c. Certified Internal Auditor (CIA)
d. Certified Management Accountant (CMA)
e. Certified Information Systems Auditor (CISA)
f. Other (please list)

Question 20: Which of the following describes your accounting education?

a. Undergraduate accounting degree
b. Graduate accounting degree
c. No accounting degree but have taken several accounting courses
d. No accounting degree have taken an accounting course or two
e. No accounting degree, no accounting experience
f. Other (Please list) _____

Question 21: How many years outside of internal auditing have you worked as a public accountant?

a. Zero
b. Less than 2 years
c. Between 2 and 5 years
d. More than 5 years

Question 22: Which of the following best describes your age?

a. 20-29
b. 30-39
c. 40-49
d. 50-59
e. 60-69
f. >70

Question 23: What is your preferred gender identity?

a. Female
b. Male
c. Non-binary/third gender
d. Prefer not to answer

Question 24: You have completed the experiment. If you would like to be entered into a drawing for a $50 Amazon gift card, please click on the following link to enter your name and contact information [hyperlink to separate Qualtrics Survey]

Thank you for completing this study!

Amazon Gift Card Drawing Registration

Thank you for completing this study. As a reward for your time and effort you will be entered into a drawing for a $50 Amazon gift card. Winners will be drawn randomly upon the completion of the study no earlier than December 1, 2021.

To register for this drawing please enter your contact information. We will only contact you if you have won a gift card. This information will not be used for solicitation or marketing purposes, and your information is not traceable to your survey answers.

Preferred Name on Gift Card: _____

Street Address: _____

City: _____ **State:** _____ **Zip Code:** _____

Email Address: _____