6-28-2010

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Recommended Citation

Selby, Daniel. "Do Auditors Adjust Their Audit Plans Accordingly When They Encounter Material Automated Control Weaknesses?" In *7th ICESAL 2010*, 182-95. Proceedings of 7th International Conference on Enterprise Systems, Accounting and Logistics.June 28-29, 2010, Rhodes Island, Greece.

7th International Conference on Enterprise Systems, Accounting and Logistics (7th ICESAL 2010)
28-29 June 2010, Rhodes Island, Greece

Do Auditors Adjust Their Audit Plans Accordingly When They Encounter Material Automated Control Weaknesses?

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Abstract

Automated control weaknesses are associated with defects in computer hardware or computer applications. AU 319 does not require auditors to add professionals with specialized skills in automated controls (or IT audit specialists) to the audit engagement. Auditors may encounter a material automated control weakness and adjust their audit plan without the assistance of an IT audit specialists. Thus, auditors may not adjust their audit plan enough to gain an understanding of the material automated control weakness. This is an important problem for auditors because this problem may result in misstated financial statements and incorrect internal control opinions if auditors fail to effectively examine automated control weaknesses. I conduct an experiment where Big Four auditors and IT audit specialists make audit planning adjustments. Results suggest that auditors' audit plan adjustments are influenced by non-diagnostic evidence. Results also suggest auditors do not adjust their audit plans for material automated control weaknesses as they much as they do for material manual process evidence. Finally, auditors do not adjust their audit plans for automated control weaknesses as much as IT audit specialists' adjust their audit plans for automated control weaknesses.

Keywords: material automated control weaknesses, non-diagnostic evidence, audit planning adjustments, IT audit specialists, evidence domain

1. Introduction

A material control weakness is a deficiency in internal control that has a reasonable possibility of producing a material misstatement in the financial statements (AICPA 2008). Once a material control weakness is identified, auditors are encouraged to improve their understanding of the material control weakness (PCAOB 2007, AICPA 2008, IAASB 2010a, IAASB 2010b). In order to understand the material control weakness, auditors may have to perform additional audit procedures (Kaplan 1985).

In this paper, I investigate whether auditors' audit plan adjustments for material control weaknesses are reduced by non-diagnostic evidence. I also investigate whether auditors' audit plan adjustments depend on the domain of the internal control evidence. For the purpose of gathering internal control evidence, auditors encounter control weaknesses that stem from automated controls or manual processes (Fogelman et al. 2007). Automated control weaknesses are weaknesses that are created by defects in computer hardware or computer applications (Hall and Singleton 2005; KPMG 2007). Manual process weaknesses, on the other hand, are created by human personnel within the control system. Although auditors tend to possess internal control skills that are best suited for manual processes (e.g., Duffy 2004), AU 319 does not require auditors to call on professionals with specialized skills in automated controls (AICPA 2002). Hunton et al. (2004) suggests that auditors tend to be overconfident in their ability to evaluate automated controls. So auditors, who lack the necessary automated control skills, may bypass the help of skilled professionals and insufficiently adjust their audit plans for material automated control weaknesses. For example, Brazel and Agolia (2007) conclude that auditors with low automated control skills may assign more resources than necessary to the substantive test phase of the audit. However, non-diagnostic evidence may influence auditors to insufficiently adjust their audit plans for material automated control weaknesses. My study provides empirical evidence on this issue.

Auditors' ability to effectively adjust their audit plans for material automated control weaknesses is important for three reasons. First, automated controls impact financial statement line items. Auditors may fail to modify the degree and extent of their planned audit procedures and limit their ability to understand the material automated control weaknesses. If the examination of the effect of the material automated control weakness on the financial statements is not effective, the financial statements may be issued with undetected material misstatements. Second, failure to adjust the audit plan after identifying a material automated control weakness may also limit the auditor's ability to issue the correct internal control opinion. If auditors' fail to gain the appropriate understanding of internal control weaknesses, based on the audit procedures that they perform, auditors' may give unqualified opinions of internal control structures when adverse opinions would be more appropriate. Third, if the procedures performed by auditors are insufficient to determine the effectiveness of internal controls, audit failure may occur. Specifically, stakeholders may rely on financial statement opinions and internal control opinions made by auditors that are materially incorrect.

I conduct an experiment in which I assess auditors' adjustment to the audit hours necessary to test controls of a material control weakness. I vary material control weakness as automated control or manual process. I also measure auditors' adjustment when non-diagnostic evidence is present. To determine whether fifty-two auditors adjust their audit plans sufficiently for a material automated control weakness, I compare their adjustments to the audit plan adjustments of thirty-seven IT audit specialists.

I find that auditors provide lower audit plan adjustments of material control weaknesses when they are exposed to non-diagnostic evidence. This finding is consistent with the prior literature on the influence of non-diagnostic evidence. I also provide evidence that auditors' audit plan adjustments for material internal control weaknesses are dependent on the domain of the internal control evidence. Specifically, auditors are less susceptible to non-diagnostic evidence when they evaluate material manual process weaknesses versus material automated control weaknesses. Most importantly, I find that auditors' audit plan adjustments for material automated control weaknesses are significantly lower than the adjustments made by IT audit specialists. My results suggest that auditors might not adjust their audit plans as much as they should when they examine material automated control weaknesses without the assistance of professionals with skills in automated controls.

My inferences are based on an experiment that captures an important environmental aspect of the audit that prior studies on the influence of non-diagnostic evidence have not captured. AU 319 permit auditors to evaluate material automated control weaknesses even though they may lack the information technology (IT) skills that would allow them to fully understand automated control weaknesses (AICPA 2002). This would mean that the magnitude of the audit plan adjustments by auditors exposed to non-diagnostic evidence could be sub-optimal for material automated control weaknesses. My experimental design captures this element by exposing auditors and IT audit specialists to (1) a material automated control weakness and a material manual process weakness, and (2) the respective material control weakness with non-diagnostic evidence from automated control risks and manual process risks. My evidence suggests that the influence of non-diagnostic evidence documented in prior studies may depend on whether the auditor has the skills to complete the task. I believe that this study provides the first empirical demonstration that internal control skill is another dimension of the influence of non-diagnostic evidence.

The remainder of the paper is organized as follows. Section II discusses the previous literature and develops my hypotheses. Section III describes the experiment. Section IV presents the results. Section V summarizes the findings and comments on the study's implications.

2. Hypothesis Development

Individuals reduce their assessments of diagnostic cues in prediction tasks when they are exposed to non-diagnostic cues (Nisbett et al. 1981; Tetlock et al. 1989; Tetlock et al. 1996). Prior research posits that individuals predict future events of interest based on the perceived similarity of features. Judgment based on similarities between mental models and diagnostic features of available information is normative behavior (Tversky 1977). Conversely, individuals have also been found to base their

perceptions on features that are non-diagnostic to the event of interest (Nisbett et al. 1981; Tetlock et al. 1989; Tetlock et al. 1996). Nisbett et al. (1981) referred to this non-normative behavior as the dilution effect.

The dilution effect has been widely used in the accounting literature to show that auditors reduce their fraud risk judgments (Hackenbrack 1992; Glover 1997; and Hoffman and Patton 1997) and going concern judgments (Shelton 1999) when they encounter non-diagnostic evidence. For example, the auditors in Hackenbrack's (1992) study evaluated diagnostic evidence initially in conjunction with non-diagnostic evidence and subsequently when the non-diagnostic evidence was removed. He found that auditors provided less diluted fraud risk assessments when they evaluated diagnostic evidence simultaneously with non-diagnostic evidence versus evaluating the diagnostic evidence alone.

The auditors in Glover's (1997) study were allowed to update their fraud risk judgment after reviewing each of his eight diagnostic evidence cues. Then he assigned the auditors to one long case that embedded one of the diagnostic evidence cues with non-diagnostic client information, non-diagnostic workpapers, and the non-diagnostic results of other audit procedures. Glover found that the auditors' fraud risk assessment was more diluted in the long case than their fraud risk assessments for the eight short cases.

Like Hackenbrack (1992) and Glover (1997), Hoffman and Patton (1997) also used a within-participant experimental design to examine dilution. The auditor judgments in Hoffman and Patton's (1997) study were made after participants read two diagnostic cues alone and then again after reading the same two diagnostic cues mixed with four additional non-diagnostic cues. Hoffman and Patton found that auditors' fraud risk assessments were less diluted when they were exposed to the diagnostic evidence cues than when they were exposed to the mixed evidence cues.

Shelton (1999) used a between-subject design. The auditors in her study were either provided with diagnostic evidence only or diagnostic evidence plus non-diagnostic evidence. She observed that the going concern assessments of less experienced auditors were affected by the presence of non-diagnostic evidence. She also found that the going concern assessments of the experienced participants in her study did not vary significantly based on the presence of non-diagnostic evidence. Shelton concludes that experience mitigates the effects of dilution.

The existing accounting literature (Hackenbrack 1992; Glover 1997; Hoffman and Patton 1997; and Shelton 1999) did find that auditors provided lower judgments when they were exposed to non-diagnostic evidence. Like Hackenbrack, I use a within-subject design and asked auditors to make an initial assessment based on a combination of diagnostic and non-diagnostic evidence. Then I asked auditors to make their subsequent assessment with diagnostic evidence alone. However, I investigate dilution in an internal control evidence setting where the non-diagnostic evidence is expected to reduce audit planning judgments of material control weaknesses. I predict that auditors will reduce their audit planning judgments of material control weaknesses when non-diagnostic evidence is present. The hypotheses, stated in the alternative form, are:

H1a: Auditors' audit plan adjustments for material manual process weaknesses when non-diagnostic evidence is present will be lower than when non-diagnostic is not present.

H1b: Auditors' audit plan adjustments for material automated control weaknesses when non-diagnostic evidence is present will be lower than when non-diagnostic is not present.

Domain knowledge has been used to explain differences in performance. Audit firms facilitate the acquisition of domain knowledge by assigning auditors to areas of domain specialization. For example, Brazel and Agoglia (2007) describe how Big Four audit firms minimize business risks by encouraging auditor specialization in computer assurance. As auditors acquire specialization computer assurance, they improve their ability to transfer their knowledge from previously solved problems with automated controls to new problems that are related to their specialization (Frederick and Libby 1986; Vera-Munoz et al. 2001, Owhoso et al. 2002).

Vera-Munoz et al. (2001) found that management accountants outperformed financial auditors when both groups were asked to identify opportunity costs. Management accountants and financial auditors both have declarative knowledge in identifying opportunity costs. However, Vera-Munoz et al. (2001) attribute their results to the fact that management accountants have superior domain knowledge in measuring opportunity costs because they routinely consider opportunity costs. Financial auditors do not consider opportunity costs on a routine basis. But, financial auditors do work with manual process evidence more often than automated evidence (Tarantino 2006). I predict that auditors will recognize a greater need to adjust the audit plan for material manual process control weaknesses than for material automated control weaknesses. The hypothesis, stated in the alternative form, is:

H2: Auditors' audit plan adjustments for a diagnostic automated control weakness will be lower than their audit plan adjustments for a diagnostic manual control weakness.

IT auditors and financial auditors assess the strengths of the control points within an internal control system. The control points involve two internal control evidence domains: manual processes and automated controls (AICPA 2008). Manual process evidence is created by humans within the internal control system. Automated control evidence is created by the IT infrastructure. Auditors tend to have more internal control skills in manual process evidence than automated control evidence (Tarantino 2006, Singleton 2007). Auditors will not adjust their audit plans for material automated control weaknesses as much as professionals with skills in automated controls. The hypotheses, stated in the alternative form, are:

H3: Auditors' audit plan adjustments will be lower than IT audit specialists' audit plan adjustments for diagnostic automated control weaknesses.

H4: Auditors' audit plan adjustments will be lower than IT audit specialists' audit plan adjustments for a diagnostic automated control weakness with non-diagnostic evidence

3. Research Method

3.1 Participants

Fifty-two auditors from each of the Big 4 accounting firms volunteered. The auditors had an average of 49 months of audit engagement experience. The auditors had worked on an average of 9.05 client engagements that involved manual processes risks. The auditors also worked on an average of 2.57 client engagements that involve automated control risks. The IT audit specialists also had an average of 49 months of experience. The IT audit specialists worked on an average of 20.76 client engagements that involved automated controls.

3.2 Pre-testing

Two rounds of pre-testing were used. The cues were pre-tested in the first round by two Big Four senior managers who were both licensed as Certified Public Accountants and Certified Information System Auditors. Both senior managers were employed with two different Big Four accounting firms. Round one pre-testing helped to identify the diagnostic and non-diagnostic evidence cues. During the second round of pre-testing, the evidence cues were rated between 1 (least diagnostic) and 100 (most diagnostic) by four Big Four IT audit specialists and four Big Four auditors. Both rounds of pre-testing revealed which evidence cues were diagnostic cues and which cues were non-diagnostic cues. The average rating for each evidence cue is provided in Figure 1. The average rating for the diagnostic material manual process weakness is 90. The average rating for the diagnostic automated control weakness is 80. The average ratings for the four non-diagnostic manual process cues ranged between 2.6 and 15.9. The average ratings for the four non-diagnostic automated control cues ranged between 3.8 and 22.6.

Figure 1: Evidence Cues and Round Two Pre-test Relevance Rating (Average ratings in parentheses, 1=least diagnostic and 100=most diagnostic)

Diagnostic Control Weaknesses

Automated: "ABC Banking Corp. implemented an ERP module for electronic funds transfer that receives data from a legacy system that does not transfer hash totals, control totals, and record counts." (80)

Manual: "ABC Banking Corp. EFT personnel can send wire transfers before obtaining authorization." (90)

Non-diagnostic Automated Control Risk Cues

"During the current year under audit, ABC Bank Corp. modified their PIN system to restrict personnel access to the Human Resource system via the company's Intranet after three failed login attempts." (3.8)

"ABC Bank Corp. uses IT to initiate orders for the purchase and delivery of supplies based on predetermined decision rules of what to order and in what quantities based on system-generated decisions. No other documentation of orders placed or supplies received is produced or maintained, other than through the IT system. Changes to this process are documented." (16.3)

"New packaged software applications were installed this year to manage the travel expense files for ABC Banking Corp.'s Retail Banking Operation managers. Their IT staff has formal training and experience using this new software." (16.5)

"ABC Bank Corp. uses automated fraud prevention technology to monitor and data warehouse accountholder card usage and activation in the current year under audit. They also used the technology to monitor closed accounts, dormant accounts, and deceased accounts in the current year under audit." (22.6)

Non-diagnostic Manual Process Control Risk Cues

"Fraud prevention department personnel attend mandatory fraud training on a routine basis. They notify accountholders of dubious account activity." (15.9)

"Human resource and employee benefits hotline personnel verify the identity of all callers before ensuing phone conversations." (12.4)

"Travel expense reimbursement forms require inspection and authorization by the employee's immediate supervisor and the supervisor's manager before the authorized form is entered into the travel reimbursement system." (2.6)

"ABC Bank Corp. maintains physical security over purchase orders for the purchase and delivery of supplies by limiting access to blank order forms and supplies received to appropriate personnel." (7.4)

Figure 1: Evidence Cues and their Round Two Pre-test Task-Relevance Ratings

3.3 Case Material

Big Four auditors and IT audit specialists read an overview that summarized the purpose of the study. The auditors and IT audit specialists then acknowledged that they were interested in the results of the study and volunteered to participate (the participant response rate was 91%). Then I provided each participant with a password and a personal identification number (PIN). Participants used their password to enter the program. After reading the general instructions, participants entered their PIN and provided their formal consent to participate in the study.

Participants initially rated the effectiveness of the prior year's controls after reading a brief narrative about a hypothetical financial institution and an excerpt from

the hypothetical company's unqualified independent internal control opinion of the previous year. The 7-point scale was labeled from left to right as "extremely effective" (coded as 1), "effective" (coded as 2), "somewhat effective" (coded as 3), "neutral" (coded as 4), "somewhat ineffective" (coded as 5), "ineffective" (coded as 6), and "extremely ineffective" (coded as 7). The purpose of this step was to allow the participants to establish a baseline perception of the effectiveness of internal controls in the prior year. The average baseline rating was 2.15. So the participants felt that the internal controls were effective in the prior year.

Half of the participants were randomly assigned to the manual process evidence domain first then to the automated control evidence domain. The remaining participants were assigned to the automated control evidence domain first then to the manual process evidence domain second. The order that the participants encountered the control risk settings were not found to be significant ($t = 0.64$, p-value = 0.19).

Participants' audit planning judgments were collected via a computer program that was designed according to the Tailored Design Method (Dilman 2007). The program controlled for order effects by randomizing the presentation order of the control risk setting evidence cues and the program also controlled the order in which the participants completed the tasks in the experiment (Favere-Marchesi 2006). The program mandated responses and prevented the changing of responses once participants had already answered a question and proceeded to the next webpage. Participants were not subject to any time pressure and spent an average of 38.15 minutes completing the experiment.

Similar to Nisbett et al. (1981) and Hoffman and Patton (1997), I gave participants four non-diagnostic cues and one diagnostic cue (for each internal control evidence domain). Participants were given the opportunity to adjust the audit plan after reading four non-diagnostic manual process cues (or automated control cues depending on initial order assignment) with the diagnostic material manual process weakness cue (or diagnostic automated control weakness cue depending on the order of the initial assignment). Participants were then given the opportunity to adjust the audit plan based only on the diagnostic manual process weakness cue (or diagnostic automated control weakness depending on the order of the initial assignment). Participants repeated these steps for the remaining internal control evidence domain.

Participants were asked to provide their audit planning judgments. They rated the number of audit hours necessary to effectively complete the audit relative to the prior year on an 11-point scale. The scale contained three labels, "Significantly Decrease" (coded as 1), "Do Not Adjust" (Coded as 6), or "Significantly Decrease" (coded as 11). The remaining points on the scale were not labeled. The participants then responded to six multiple choice questions related to internal control risks from Gleim and Hillison's (2006) professional examination preparation guide. The multiple choice questions were intended to distract participants from the next control risk setting case. Participants were then prompted to repeat these steps for the next internal control evidence domain case. After completing the second internal control evidence domain case, participants completed a background questionnaire, six new multiple choice questions that dealt with Electronic Fund Transfers, and a manipulation check.

The manipulation check asked participants to rate the relevance of each evidence cue on a 7-point scale. The left extreme of the scale was labeled as

"extremely non-diagnostic" and coded as 1. The right extreme of the scale was labeled as "extremely diagnostic" and coded as 7. The mean rating and standard deviation of the diagnostic material control weakness cues was 5.99 and 1.41, respectively. The mean rating and standard deviation of the non-diagnostic evidence cues was 5.22 and 1.52, respectively. A two-sample t-test of the diagnostic control weaknesses cues and non-diagnostic control risk evidence cues revealed that the participants were able to differentiate diagnostic material control weaknesses from non-diagnostic evidence ($t = 4.91$, p-value < .001).

4. Analysis and Results

Table 1 provides mean and standard deviations of the auditors' planning adjustments. The mean response and standard deviation of the auditors' judgments for the diagnostic material manual process weakness was 8.90 and 1.84, respectively. The mean response and standard deviation of the auditors' planning adjustments for the same diagnostic material manual process weakness combined with non-diagnostic manual control evidence was 7.67 and 1.58, respectively. The mean response and standard deviation of the auditors' judgments for the diagnostic material automated control weakness was 7.96 and 1.64, respectively. The mean response and standard deviation of the auditors' planning adjustments for the same diagnostic material automated control weakness combined with non-diagnostic automated control evidence was 7.17 and 1.91, respectively. The mean response and standard deviation of the IT audit specialists' judgments for the diagnostic material automated control weakness was 8.35 and 1.44, respectively. The mean response and standard deviation of the IT auditor specialists' planning adjustments for the same diagnostic material automated control weakness combined with non-diagnostic automated control evidence was 7.73 and 1.36, respectively.

Table 1: Within-Participant Audit Planning Adjustments, Descriptive Statistics

	Auditors		IT Audit Specialists	
Evidence	Mean	S.D.	Mean	S.D.
Manual Process Control Weakness	8.90	1.84	--	--
Mixed Manual Control Process Evidence	7.67	1.58	--	--
Automated Control Weakness	7.96	1.64	8.35	1.44
Mixed Automated Control Evidence	7.17	1.91	7.73	1.36

Notes:

Manual Process Control Weakness: One Diagnostic Manual Process Evidence Cue

Mixed Manual Control Process Evidence: One Diagnostic Manual Process Evidence Cue & Four Non-diagnostic Manual Control Risk Setting Cues

Automated Control Weakness: One Diagnostic Automated Control Evidence Cue

Mixed Automated Control Evidence: One Diagnostic Automated Control Evidence Cue & Four Non-diagnostic Automated Control Risk Setting Cues

The results to the test of my hypotheses are provided in Table 2. H1a predicts that auditors' manual control risk planning adjustments would be lower when additional non-diagnostic evidence is present than when it is not present. This would mean that the non-diagnostic evidence cues would influence auditors to reduce their manual control risk planning adjustments. As predicted, H1a is significant (t = -5.12, p = <.000).

H1b also predicts that auditors' automated control risk planning adjustments will be lower when non-diagnostic evidence is present than when it is not present. This would mean that the non-diagnostic evidence cues would influence auditors to reduce their manual control risk planning adjustments. As predicted, H1b is significant (t = -2.89, p = .002).

H2 predicts that auditors' planning adjustments of the diagnostic material automated control weakness will be lower than their planning adjustments of the diagnostic material manual control weakness. This would mean that financial statement auditors do not anticipate that the material automated control weakness used in this study warrants the same magnitude of audit plan adjustment as the material manual process weakness used in this study. As predicted, H2 is significant (t = 3.49, p = <.000).

H3 predicts that auditors' planning adjustments of the diagnostic material automated control weakness will be lower for auditors than IT audit specialists. This would mean that financial statement auditors may insufficiently adjust their audit plan for material automated control weaknesses. The statistical results are displayed in Panel B of Table 2. As predicted, H3 is significant, but only marginally significant (t = 1.49, p = <.064).

H4 predicts that auditors' planning adjustments of the diagnostic material automated control weakness with non-diagnostic automated evidence is lower for auditors than IT audit specialists. This would mean that financial statement auditors may insufficiently adjust their audit plan for material automated control weaknesses with non-diagnostic automated evidence. As predicted, H4 is significant, (t = 1.91, p = <.023).

Table 2: Audit Planning Adjustments Statistical Tests of Hypotheses

Panel A: Dependent Tests

	t	p-value
Mixed Manual Process Evidence < Manual Process Weakness	-5.12	<.000
Mixed Automated Control Evidence < Automated Control Weakness	-2.90	.002

Automated Control Weakness < Manual Process Weakness	2.75	<.000

Panel B: Dependent Tests

	t	p-value
Auditor Automated Control Weakness < IT Automated Control Weakness	1.49	.064
Auditor Mixed Auto Control Evidence < IT Mixed Auto Control Evidence	1.91	.023

Notes:

Manual Process Control Weakness: One Diagnostic Material Manual Process Weakness Cue

Mixed Manual Control Process Evidence: One Diagnostic Material Manual Process Weakness Cue & Four Non-diagnostic Manual Process Evidence Cues

Automated Control Weakness: One Diagnostic Material Automated Control Weakness Cue

Mixed Automated Control Evidence: One Diagnostic Material Automated Control Weakness Cue & Four Non-diagnostic Automated Control Evidence Cues

5. Conclusions

This study presents evidence that auditors reduce their planning adjustments when they encounter non-diagnostic evidence. This finding is consistent with the existing literature on non-diagnostic evidence. The results in this study also suggest that auditors may not adjust their audit plans as much for material automated control weaknesses as they would for material manual process weaknesses. Auditors also did not adjust as much for material automated control weaknesses as material manual process weaknesses when non-diagnostic evidence is present.

The implication of my findings is that auditors may not revise their audit plans enough to gain an understanding of material automated weaknesses. Auditors have the option to add professionals who have automated control skills to the audit engagement team. However, AU 319 does not require them to add professionals with automated control skills to the engagement. Auditors, without automated control skills or the assistance of professionals with automated control skills, could issue unqualified internal control and financial statement opinions when adverse opinions would be more appropriate. If auditors were to add professionals with automated control skills to the engagement and follow the professional's recommendations to adjust the audit plan when material automated control weaknesses are identified, the influence of the non-diagnostic evidence may be mitigated. I leave these issues for future research.

One limitation of my study is that I used one material weakness for each of the two internal control evidence domains. This limitation results from the pre-testing phase as a condition of my research design. My goal was to identify an internal control weakness for both internal control evidence domains that would resonate as diagnostic between auditors and IT audit specialists. The diagnostic cues met the expectations of the auditors involved in the pre-test phase and appear to be diagnostic to the actual experimental participants for the manipulation check. However, other cues may have elicited different results.

Another limitation of my study is that my participants were only exposed to one internal control domain at a time. This too was a condition of my research design. In practice, auditors and IT audit specialists may encounter automated control evidence simultaneously with manual process evidence. I restricted the participants to one internal control domain at a time with the intent of simplifying the task. Adding that level of complexity to the task could potentially make the instrument more time consuming and harder to complete. If this were to be the case, the results from my experiment could be unreliable (Dilman 2007). This issue awaits empirical investigation.

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