Structured versus Non-Structured Interacting Electronic Fraud Brainstorming in Hierarchical Audit Groups

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Abstract:

Both international (ISA 240) and U.S. (SAS No. 99) accounting standard-setters require audit firms to organise a discussion session/ brainstorming session at the audit planning stage for each audit, in order to discuss how and where a company's financial statements might be susceptible to material misstatement due to fraud. This study introduces a structured interacting electronic brainstorming platform into the audit context and examines whether it improves auditors' fraud brainstorming performance in the fraud hypotheses generation task when compared with the non-structured interacting electronic brainstorming platform which has been investigated in prior literature. In the structured interacting electronic brainstorming platform, idea inputs are shown by categories rather than in chronological sequence on a computer screen.

Understanding the comparative effect of different forms of electronic brainstorming and exploring the most appropriate interacting electronic brainstorming method are important since it is likely to improve the effectiveness of brainstorming sessions in audit firms. The structured interacting electronic brainstorming platform has been found to be useful in improving users' productivity and creativity in psychology. However, this study finds that the structured interacting electronic brainstorming platform has no effect on the brainstorming performance of the three-person hierarchical audit groups. Moreover, the use of the structured interacting electronic brainstorming platform has no effect on fraud brainstorming performance and mental simulations of seniors, but it even has a negative effect on the fraud brainstorming performance and mental simulations of managers. Furthermore, this study finds that there is no significant correlation between auditors' brainstorming performance in the fraud hypotheses task and changes in their fraud risk assessments.

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ABSTRACT

Both international (ISA 240) and U.S. (SAS No. 99) accounting standard-setters require audit firms to organise a discussion session/ brainstorming session at the audit planning stage for each audit, in order to discuss how and where a company's financial statements might be susceptible to material misstatement due to fraud. This study introduces a structured interacting electronic brainstorming platform into the audit context and examines whether it improves auditors' fraud brainstorming performance in the fraud hypotheses generation task when compared with the non-structured interacting electronic brainstorming platform which has been investigated in prior literature. In the structured interacting electronic brainstorming platform, idea inputs are shown by categories rather than in chronological sequence on a computer screen.

Understanding the comparative effect of different forms of electronic brainstorming and exploring the most appropriate interacting electronic brainstorming method are important since it is likely to improve the effectiveness of brainstorming sessions in audit firms. The structured interacting electronic brainstorming platform has been found to be useful in improving users' productivity and creativity in psychology. However, this study finds that the structured interacting electronic brainstorming platform has no effect on the brainstorming performance of the three-person hierarchical audit groups. Moreover, the use of the structured interacting electronic brainstorming platform has no effect on fraud brainstorming performance and mental simulations of seniors, but it even has a negative effect on the fraud brainstorming performance and mental simulations of managers. Furthermore, this study finds that there is no significant correlation between auditors' brainstorming performance in the fraud hypotheses task and changes in their fraud risk assessments.

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CHAPTER1

INTRODUCTION

1.1 INTRODUCTION

Fraud detection is a crucial objective of an audit (Carpenter 2007; Hoffman and Zimbelman 2009; Hammersley 2011; Chen, Trotman, and Zhou 2015). International auditing standards, including International Standard on Auditing (ISA) 240, *The Auditor's Responsibility to Consider Fraud in an Audit of Financial Statements*, and International Standard on Auditing (ISA) 315, *Understanding the Entity and its Environment and Assessing the Risks of Material Misstatement*, require audit firms to organise a discussion session at the audit planning stage for each audit, in order to discuss how and where a company's financial statements might be susceptible to material misstatement due to fraud. In the U.S., the Public Company Accounting Oversight Board (PCAOB) has issued a similar regulation, the Statement on Auditing Standards (SAS) No. 99 *Consideration of Fraud in a Financial Statement Audit*, which requires a brainstorming session for each audit in order to highlight the significance of fraud detection. The common aim of these regulations is to increase the likelihood that auditors will detect material misstatement due to fraud.

While the brainstorming method is not specified in the auditing standards, the most commonly used method in audit firms is face-to-face brainstorming (Brazel, Carpenter and Jenkins 2010; Dennis and Johnstone 2016). However, prior social psychology research argues that face-to-face brainstorming is unlikely to be optimal as it is likely to

cause three productivity loss problems, namely, production blocking[1], evaluation apprehension[2] and social loafing[3], and it has been found that alternative brainstorming methods outperform face-to-face brainstorming (see Kerr and Tindale 2004).

One alternative brainstorming method which outperforms face-to-face brainstorming is electronic brainstorming. The psychology literature suggests that electronic brainstorming is more effective as it can mitigate production blocking and evaluation apprehension problems found in face-to-face brainstorming (Dennis and Valacich 1993; Guzzo and Dickson 1996; Kerr and Tindale 2004). The superior performance of electronic brainstorming over face-to-face brainstorming has been supported by an audit fraud brainstorming experiment. Lynch, Murthy, and Engle (2009) find that both forms of electronic brainstorming (interacting and nominal) outperform face-to-face brainstorming while there is no significant difference between interacting electronic brainstorming and nominal electronic brainstorming. Interacting electronic brainstorming occurs where participants interact via a computer, whereas nominal electronic brainstorming refers to when participants complete a task individually without interaction via a computer, and where their unique ideas are combined after the brainstorming session. Both Chen et al. (2015b) and Lynch et al. (2009) investigate the effectiveness of interacting electronic brainstorming and nominal electronic brainstorming in audit fraud brainstorming. Using student participants, Lynch et al. (2009) do not find differences between interacting and nominal electronic brainstorming. However, while using audit seniors and managers as participants, Chen et al. (2015b) find

[1] Production blocking occurs when only one group member can communicate at a time. This can result in forgetting ideas, suppressing ideas, and remembering and listening rather than idea creation (Chen et al. 2015b).

[2] Evaluation apprehension refers to individuals withholding ideas due to fear of negative evaluation of their ideas (Chen et al. 2015b).

[3] Social loafing or free riding involves individuals relying on others to complete the task for such reasons as perception that their inputs are unidentifiable or dispensable (Chen et al. 2015b).

that participants in nominal electronic brainstorming groups identify a significantly greater quantity of fraud risk factors[4], and generate a greater quantity and higher quality[5] of fraud hypotheses[6] than those in the interacting electronic brainstorming groups. They also find that the social loafing of seniors in the interacting electronic brainstorming groups drives differences between the interacting electronic brainstorming groups and the nominal electronic brainstorming groups, and that social loafing of seniors is greater in fraud hypotheses generation tasks than in fraud risk factors identification tasks. Chen et al. (2015b) suggest this is due to the more complex nature and higher knowledge requirement of fraud hypotheses generation tasks.

This study extends Chen et al. (2015b) by introducing a structured alternative interacting electronic brainstorming platform (hereafter "structured brainstorming platform") into the audit fraud context and investigating whether it affects auditors' fraud brainstorming performance when compared with the non-structured interacting electronic brainstorming platform (hereafter "non-structured brainstorming platform") used in Chen et al. (2015b). Specifically, this study examines the question: Does the structured brainstorming platform improve auditors' fraud brainstorming performance?

Ideas generated by audit group members are shown in temporal order in the non-structured brainstorming platform used in Chen et al. (2015b). In a paper relating to idea creativity, Toubia (2006) introduces an alternative interacting electronic brainstorming platform, which is referred to as an "ideation game". By using the "ideation game", idea inputs are shown on a computer screen by categories/ topics rather than in chronological

[4] Fraud risk factors identification refers to identifying manager's incentives, opportunities, and attitudes towards the commission of fraud (Chen et al. 2015b).
[5] A quality fraud hypothesis is a hypothesis identified by fraud experts.
[6] Fraud hypotheses generation refers to the generation of hypotheses about how and where auditors suspect that a material misstatement due to fraud might occur in their client's financial statements and how management could perpetrate a fraudulent financial statement (Chen et al. 2015b).

sequence. Specifically, when participants intend to submit a new idea, they have the option of deciding to contribute a parent-idea by clicking on "Enter an idea not building on any previous idea" or, alternatively, they can create a child-idea based on an existing idea by first selecting the idea number of the existing idea they want to build upon and then clicking on "Submit" to enter their new idea. Child-ideas are shown directly under each selected parent-idea with a different indentation. Additionally, when participants intend to input a child-idea, they are provided with a menu of "conjunctive phrases" (e.g., "more precisely," "however…") to link their ideas with the parent-ideas they wish to build upon. Thus, semantically related ideas are clustered in a proximate location. This structured brainstorming platform has been used in management accounting research as a communication tool for participants to generate creative ideas (Chen, Williamson and Zhou 2012). Trotman, Bauer, and Humphreys (2015) call for research to apply this structured brainstorming platform used in Chen et al. (2012) to fraud brainstorming and to examine whether adding such a structure could influence auditors' performance in fraud brainstorming. This study addresses this call for research.

Understanding the comparative effect of different forms of electronic brainstorming on fraud hypotheses is important because research in both psychology and auditing has shown electronic brainstorming is generally more effective than non-electronic brainstorming. Exploring the most appropriate interacting electronic brainstorming method is likely to lead to improvements in the effectiveness of brainstorming sessions in audit firms. However, researchers in IT claim that physical proximity has a considerable influence on collaborative work such as group discussions and brainstorming. The lack of physical proximity in electronic communication could be mitigated by applying structured techniques (Kiesler and Cummings 2002; Kudaravalli and Faraj 2008; O'Leary, Wilson and Metiu 2014). The most widely-used structured

technique in enterprises is office automation systems[7] (Tapscott 2012). With office automation systems, a prevalent application is an instant messenger which provides an online platform for employees to communicate with each other. The structured brainstorming platform introduced in this study is a variation of instant messenger. It is highly likely that audit firms use a similar platform for their internal discussions/brainstorming. Thus, investigating the effectiveness of a structured brainstorming platform has practical implications for audit firms.

During a fraud brainstorming session, auditors normally complete four types of tasks, namely, fraud risk factors identification, fraud hypotheses generation, fraud risk assessment, and audit procedure modification (Hammersley 2011). This study compares the performance of participants between the structured interacting electronic brainstorming groups (hereafter "structured groups") and the non-structured interacting electronic brainstorming groups (hereafter "non-structured groups") in fraud hypotheses generation.

Some psychology research asserts that a structured brainstorming platform could assist participants to generate a greater number of ideas since the information processing speed of participants could be accelerated by clustering semantically related ideas in a proximate location and participants are likely to pay more attention to the idea inputs of other group members (Rumelhart and Ortony 1977; Dennis, Aronson, Heninger, and Walker 1999; Dugosh, Paulus, Roland and Yang 2000; Nijstad, Stroebe, and Lodewijkx 2002; Nijstad and Stroebe 2006; Toubia 2006). However, it is also possible that a structured brainstorming platform has a negative effect on participants' fraud hypotheses generation. For example, some prior psychology studies argue that a structured

[7] Office automation system refers to the use of integrated computer and communications systems to support administrative procedures in an office environment (Olson and Lucas Jr, 1982).

brainstorming platform may trigger a fixation problem, which limits participants' ability to generate ideas (Jansson and Smith 1991; Cardoso and Badke-Schaub 2011; Luo and Toubia 2015). In addition, prior auditing literature finds that a structured decision aid is likely to impair auditors' performance (Pincus 1989; Frederick 1991; Asare and Wright 2004).

This study includes 108 auditors (72 seniors and 36 managers) from two Big 4 firms in Australia. They were randomly assigned into 36 three-person groups with one manager and two seniors in each group. The study manipulated the form of interacting electronic brainstorming platform at two levels between-subjects for a fraud hypotheses generation task: the two levels are a structured brainstorming platform and a non-structured brainstorming platform. The experiment has the same case material and experimental procedures as Chen et al. (2015b). Moreover, all the data of the non-structured groups in this study is the same as the data for the interacting electronic brainstorming groups in Chen et al. (2015b). Chen et al. (2015b) compare fraud brainstorming performance between the nominal and non-structured interacting electronic brainstorming groups while this study compares fraud brainstorming performance between the structured and non-structured brainstorming groups. Since the experiment in this study followed the same experimental procedures as Chen et al. (2015b), participants in this experiment also brainstormed the fraud risk factors. The reason that this study does not compare auditors' brainstorming performance with regard to fraud risk factors identification tasks is that the manipulation in this study, which is in the form of interacting electronic brainstorming platform (structured *versus* non-structured), has not been implemented in the fraud risk factors identification task.

The major findings of this study are as follows. First, this study finds that the use of a structured brainstorming platform does not have a significant effect on the

brainstorming performance of three-person hierarchical audit groups in fraud hypotheses generation. Second, managers generate a significantly greater quantity and higher quality of fraud hypotheses than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform. Third, managers have more developed mental simulations than seniors, and this effect is not reduced by the use of the structured brainstorming platform. Fourth, there is no significant relationship between auditors' brainstorming performance in fraud hypotheses generation and changes in their fraud risk assessments. Fifth, further analyses demonstrate that the use of the structured brainstorming platform has no effect on fraud brainstorming performance and mental simulations of seniors, but it even has a negative effect on the fraud brainstorming performance and mental simulations of managers.

This study makes several major contributions to the fraud brainstorming literature. First, Trotman et al. (2015) advocate an increased emphasis on electronic fraud brainstorming and they call for research to explore the most appropriate electronic brainstorming form. This study responds to their call by introducing and implementing an alternative interacting electronic brainstorming platform in the audit context and it examines whether it has a significant effect on auditors' performance in the fraud hypotheses generation task. This structured brainstorming platform has been found to be useful in highlighting and articulating the relationships between ideas and it has been used in research studies that involve idea generation tasks in other areas (Toubia 2006; Chen et al., 2012). However, the results of this study show that this structured brainstorming platform does not result in a greater quantity or higher quality of fraud hypotheses being generated by the three-person hierarchical groups. While the structured interacting electronic brainstorming platform did not affect seniors' performance it adversely affects the performance of managers.

Additionally, this study contributes to the decision aid literature by providing evidence of the detrimental effect of supplying an online structure on the fraud brainstorming performance of more experienced auditors. A fraud brainstorming working paper by Dennis and Johnstone (2016) also finds that the influence of the intervention in interacting brainstorming is conditional on the level of knowledge of auditors. Their results show that the intervention, which is prompted leadership, only improves the brainstorming performance and mental representations of seniors and not managers. However, the present study suggests that an intervention could even adversely affect the brainstorming performance and mental simulation of managers.

Furthermore, the results of this study have practical implications for audit firms. Since audit firms are transitioning towards greater use of electronic procedures (e.g. adopting electronic working papers), it is likely that they wish to improve effectiveness in electronic fraud brainstorming (Trotman et al. 2015). Additionally, as instant messenger is widely used in enterprises, it is probable that audit firms will provide a structured electronic communication platform for auditors to discuss. However, the results of this study suggest that applying a structured electronic communication platform could disturb the information-processing systems of managers which will lead to even worse fraud brainstorming performance. Thus, audit firms should consider the side-effects of an electronic intervention when they ask more experienced auditors to participate in fraud brainstorming sessions.

CHAPTER 2

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. FRAUD BRAINSTORMING SESSIONS

2.1.1. An introduction to brainstorming sessions in auditing

Detecting fraud is difficult since the rare occurrence of fraud limits auditors' generation and development of specific fraud knowledge and experience (Carpenter, Gaynor, and Duetschi 2002; Hammersley 2011; Simon 2012; Boritz, Kochetova-Kozloski, and Robinson 2015; Perols, Bowen, Zimmermann, and Samba 2017). Furthermore, the form and content of frauds are variable which also increases the difficulty of its detection. Nonetheless, failure of effective fraud detection seriously impairs users' confidence and reliance on an entity's financial statements. As mentioned in the Introduction in Chapter 1, in response to contemporary accounting scandals, accounting standards setters have issued new regulations to emphasise the importance of fraud detection and to remind auditors of their responsibilities in fraud detection. Both international (ISA 240; ISA 315) and U.S. (SAS No.99) auditing standards require audit firms to have a "planning discussion" or "brainstorming session" at the audit planning stage for each audit, in order to discuss how and where the client's financial statements might be susceptible to material misstatement due to fraud. In the brainstorming sessions, auditors normally complete four types of tasks, namely, fraud risk factors identification, fraud hypotheses generation, fraud risk assessment, and audit procedure modification (Hammersley 2011).

Using the field survey method, Brazel et al. (2010) find that 80% of their observations used face-to-face brainstorming, which supports the argument that face-to-

face group brainstorming is the most commonly used brainstorming method in audit firms (Bellovary and Johnstone 2007). In both psychology and auditing, another brainstorming method that has been frequently discussed and used to compare with face-to-face brainstorming is nominal brainstorming. Nominal brainstorming is a form of *ad hoc* group brainstorming where individual group members work independently and the ideas of all group members are combined mechanically after a brainstorming session.

2.1.2. Overview of prior studies on brainstorming sessions in auditing

In the most recent decade, audit regulations for brainstorming sessions have promoted an increasing number of accounting studies to examine the effectiveness of different forms of fraud brainstorming. In a review paper of group judgment and decision-making in auditing, Trotman et al. (2015) summarise the prior fraud brainstorming experiments and categorise them in a table according to the brainstorming forms/interventions and task types (Fig. 2, p. 9). The literature review of fraud brainstorming in the present study is based on Fig 2 in Trotman et al. (2015). Some other relevant experiments of audit fraud brainstorming which are not in the scope of Trotman et al. (2015) are also considered in this literature review. All of them are summarised and categorised by brainstorming forms/interventions and task types in Table 2.1.

Carpenter (2007) compares face-to-face brainstorming with nominal brainstorming. Her results show that face-to-face brainstorming leads to a productivity loss in the overall quantity of fraud hypotheses generated when compared with nominal brainstorming. However, participants who used face-to-face brainstorming generated a greater number of quality fraud hypotheses. Thus, Carpenter (2007) asserts that face-to-face brainstorming methods could improve audit brainstorming efficiency by mitigating non-quality fraud ideas. Using internal auditors as participants, Carpenter, Reimers, and

	Fraud Risk Factor Identification	Fraud Hypothesis Generation	Fraud Risk Assessments	Audit Program Modification
Individual Brainstorming				
Simultaneous versus *Sequential Unpacking*		Chen, Khalifa, and Trotman (2015)	Chen, Khalifa, and Trotman (2015)	
Face-to-Face Brainstorming				
Nominal versus *Interacting* Groups	Lynch, Murthy, and Engle (2009)	Carpenter (2007)	Carpenter (2007) Lynch, Murthy, and Engle (2009)	
Interacting Groups versus Other Alternatives				
- *Brainstorming Guidelines*		Trotman, Simnett and Khalifa (2009)	Trotman, Simnett and Khalifa (2009)	
- *Pre-mortem Instructions*		Trotman, Simnett and Khalifa (2009)	Trotman, Simnett and Khalifa (2009)	
- *Strategic Reasoning*			Hoffman & Zimbelman (2009)	Hoffman & Zimbelman (2009)
- *Use of Prompts*				
o *Content Facilitation*	Lynch, Murthy, and Engle (2009)		Lynch, Murthy, and Engle (2009)	
o *Documentation Specificity*	Hammersley, Bamber, and Carpenter (2010)			Hammersley, Bamber, and Carpenter (2010)
o *Priming*	Hammersley, Bamber, and Carpenter (2010)			Hammersley, Bamber, and Carpenter (2010)
o *Quality-differentiated partner leadership*		Dennis and Johnstone (2016)	Dennis and Johnstone (2016)	Dennis and Johnstone (2016)
Electronic Brainstorming				
Nominal versus *Interacting Electronic*	Lynch, Murthy, and Engle (2009) Chen, Trotman, and Zhou (2015)	Chen, Trotman, and Zhou (2015)	Lynch, Murthy, and Engle (2009) Chen, Trotman, and Zhou (2015)	

Table 2.1 Summary of Previous Audit Fraud Brainstorming Experiments

Fretwell (2011) find similar results: internal auditors who used face-to-face brainstorming identified a lower quantity but higher quality, of fraud risks than internal auditors who used nominal brainstorming.

Many auditing experiments compare the effectiveness of face-to-face brainstorming with alternative interacting brainstorming methods. There are four types of alternative interacting brainstorming that have been investigated: brainstorming guidelines, pre-mortem instructions, strategic reasoning, and use of prompts.

Trotman, Simnett and Khalfia (2009) introduce two alternative interacting brainstorming formats (brainstorming guidelines and pre-mortem instructions) and examine whether these two brainstorming methods could enhance auditors' performance in a fraud hypotheses generation task when compared with the traditional face-to-face brainstorming. Participants in the brainstorming guidelines groups were provided with Osborn's four brainstorming guidelines[8]. Pre-mortem is a type of backwards/ diagnostic thinking which is proposed by Klein (1999). Participants in the pre-mortem groups were told to imagine it is months after the audit was completed and a material fraud has been found in the client's financial statements. Results of Trotman et al. (2009) show that both brainstorming guidelines and the pre-mortem instructions are useful for participants to generate a greater quantity and higher quality of fraud hypotheses when compared with the traditional face-to-face brainstorming.

Using an actual fraud case documented in a SEC Accounting and Auditing Enforcement Release, Hoffman and Zimbelman (2009) investigate the effectiveness of

[8] These four guidelines are 1) criticism is rules out; 2) freewheeling is welcome; 3) combination and improvement are sought; 4) quantity is wanted.

strategic reasoning[9] and brainstorming in terms of auditors' procedure modifications when the level of fraud risk is high. Results show that both strategic reasoning and brainstorming result in participants more effectively modify audit procedures to detect concealed frauds. Specifically, the three-person brainstorming groups modified the audit procedures more effectively than participants working individually, even when the instruction of strategic reasoning was not provided. Moreover, participants who received the strategic reasoning instructions have modified the audit procedures more effectively than participants who did not receive the strategic reasoning instructions, even for participants who worked individually.

Hammersley, Bamber, and Carpenter (2010) do not directly investigate the effectiveness of an audit fraud brainstorming session but provide auditors with some outputs of a brainstorming session. They examine whether fraud risk priming[10] and the specificity of fraud risk documentation[11] during the audit planning stage have any effect on auditors' subsequent fraud risk assessment and evidence evaluation. Hammersley et al. (2010) find that, in the unprimed condition, participants who received the specific memo make higher fraud risk assessments and more evidence requests than participants who received the summary memo. However, in the primed condition, participants who received the specific memo provide lower fraud risk assessments and requested less additional evidence than participants who received the summary memo.

[9] The strategic reasoning is a set of three questions that require auditors to consider when generating ideas for audit procedure modifications: (1) What potential frauds may have occurred? (2) How could management conceal the potential frauds from the standard audit plan? (3) How could the audit plan be modified to detect the concealed frauds?

[10] Fraud risk priming is an instruction that had been given to half of the participants to reconsider the important fraud risks documented during the audit planning before participants started the evidence evaluation task.

[11] The specificity of fraud risk documentation is manipulated at two levels between-subjects: the two levels are summary memo and specific memo. In the summay memo, a general description of the brainstorming session is provided. The specific memo includes not only the content in the summary memo but also eight specific fraud risks discussed during the brainstorming session.

2.1.2.1 Interacting electronic brainstorming

As mentioned in the Introduction in Chapter 1, the psychology literature demonstrates that there are three productivity loss problems associated with face-to-face brainstorming, namely, production blocking (Lamm and Trommsdorff 1973; Dennis and Valacich 1993; Nijstad et al. 2002; Dennis, Minas, and Bhagwatwar 2013), evaluation apprehension (Diehl and Stroebe 1987; Nijstad and Stroebe 2006), and free riding (Dugosh et al. 2000; Paulus, Larey, and Dzindolet, 2001; Tan and Tan, 2008). Both psychology and information systems literature find that problems of production blocking and evaluation apprehension could be mitigated by using electronic brainstorming since computer-based communication ensures the simultaneous inputs of all group members and also warrants anonymity which could lessen the fear of negative evaluation. Thus, face-to-face brainstorming is outperformed by electronic brainstorming (Dennis and Valacich 1993; Guzzo and Dickson 1996; Kerr and Tindale 2004). Additionally, Pearson and Singleton (2008) assert that audit firms are relying more on computer-based systems. Therefore, it is crucial to investigate how to improve auditors' effectiveness in electronic brainstorming.

Lynch et al. (2009) are the first and only auditing study that compares the effectiveness of face-to-face brainstorming with electronic brainstorming. Lynch et al. (2009) also examine whether content facilitation[12] could improve the effectiveness of audit fraud brainstorming. Using 188 auditing students as experiment participants, they find that both nominal electronic brainstorming and interacting electronic brainstorming methods could improve participants' performance in identifying fraud risk factors when compared with face-to-face brainstorming. When comparing the effectiveness of nominal

[12] Content facilitation is a type of decision aid which provides participants with specific alternatives to consider, during the brainstorming sessions.

and interacting electronic brainstorming methods in identifying fraud risk factors, Lynch et al. (2009) do not find any significant difference. In addition, content facilitation has a positive effect on auditors' brainstorming performance.

Using auditors as participants, Chen et al. (2015b) also investigate and compare the effectiveness of nominal electronic brainstorming with interacting electronic brainstorming. They find that interacting electronic brainstorming groups are outperformed by nominal electronic brainstorming groups in both the fraud risk factors identification task and the fraud hypotheses generation task. Specifically, nominal electronic brainstorming groups identify a significantly larger number of fraud risk factors, and generate a greater quantity and higher quality of fraud hypotheses than interacting electronic brainstorming groups. Chen et al. (2015b) claim that the significant difference between these two treatments is driven by the social loafing of seniors in interacting electronic brainstorming groups and these seniors demonstrate a greater degree of social loafing in the more complex and difficult task, namely, fraud hypotheses generation task.

Guzzo and Dickson (1996) and Trotman et al. (2015) suggest that brainstorming research should move on from comparing face-to-face brainstorming with electronic brainstorming and concentrate on what type of electronic brainstorming is most effective. This study introduces a structured alternative interacting electronic brainstorming platform and investigates whether this platform influence auditors' fraud brainstorming performance in the fraud hypotheses generation task when compared with the non-structured interacting electronic brainstorming platform used in Chen et al. (2015b). Since the AICPA also points out the importance of mental simulation of improper revenue recognition (SAS No.99, Paragraph 41), this study also examines the mental simulation

of auditors. Furthermore, as audit regulators also require auditors to make effective assessments of potential fraud risks, this study considers and measures auditors' fraud risk assessments as well. Additionally, this study explores whether auditors' brainstorming performance in the fraud hypotheses generation task results in changes in their fraud risk assessments.

The remainder of the chapter is organised into the following structure. Section 2.2 first reviews the previous literature on audit task representation/ structure, and then discusses both the advantages and disadvantages of a structured brainstorming platform and develops hypotheses to compare the effectiveness of the structured brainstorming platform and the non-structured brainstorming platform in terms of auditors' fraud hypotheses generation. Section 2.3 reviews prior auditing studies that demonstrate the differential effect of interventions on managers' and seniors' performance in a fraud brainstorming session, and then hypothesises the differential effect of the structured brainstorming platform on managers and seniors. Section 2.4 reviews prior auditing studies on auditors' mental simulation and develops hypotheses for the differential effect of the structured brainstorming platform on the mental simulation of managers and seniors. Section 2.5 reviews prior auditing studies related to fraud risk assessment and raises a research question relating to the relationship between auditors' brainstorming performance in fraud hypotheses generation and the changes in their risk assessments.

2.2. STRUCTURED AND NON-STRUCTURED BRAINSTORMING GROUPS FRAUD HYPOTHESES GENERATION

2.2.1. Prior studies on audit task representation/structure

As early as 1986, Cushing and Loebbecke noted that large auditing firms were moving towards a more structured audit process. The trend towards greater structure reflects audit firms' need to control the audit quality since a structure is believed to

provide a comprehensive framework and systematic guidance for an audit (Power 2003). Thus, some auditing studies introduce several types of structures and investigate whether a structure could improve auditors' performance in fraud related tasks.

Hoffman and Zimbelman (2009) demonstrate that providing a structure of interpersonal communication in the form of a list of questions could help auditors engage in deeper levels of strategic reasoning which make auditors provide more effective modifications for the audit procedures in response to fraud risks.

Nonetheless, providing a structure does not always have a positive effect on an auditor's judgment. One audit decision aid which is believed to add structure to auditors' consideration of fraud is a red-flags questionnaire. Pincus (1989) examines the effectiveness of the red-flags questionnaire on auditors' fraud risk assessments by manipulating the evaluation of fraud and the use of a red-flags questionnaire. She finds that the red-flags questionnaire does not have a significant effect on auditors' fraud risk assessment for the no-fraud case and even has a dysfunctional effect in the fraud case. Specifically, when fraud exists in a case, auditors who used the red-flags questionnaire make even lower fraud risk assessments than auditors who did not use the red-flags questionnaire.

Asare and Wright (2004) examine the effectiveness of two structured decision aids, namely, a standard audit checklist and a standard audit program, on auditors' fraud detection plans. Their results also show that providing a structure leads to a less effective diagnosis of fraud and impairs auditors' ability to respond to fraud risk. More specifically, auditors who used a standard risk checklist make significantly lower fraud risk assessments when compared with auditors who did not use a checklist for assistance. In

addition, the use of a standard audit program by auditors leads to a relatively less effective fraud program.

2.2.2 The advantages and disadvantages of a structured brainstorming platform

The idea of the structured brainstorming platform in this study derives from an "ideation game" in Toubia (2006). Toubia (2006) claims that a practical, web-based asynchronous "ideation game" is beneficial for participants in the generation of a greater number of ideas. Toubia (2006) uses this 'ideation game" as a measure of the contribution made by participants, and the effect thereon, where the objective is to examine whether participants' creativity could be influenced by the type of incentive schemes in place. The structured brainstorming platform in this study follows all the "parent-child ideas" and "conjunctive phrases" functions in the "ideation game".

Goldenberg, Mazursky, and Solomon (1999) claim that structure, not randomness, is the key to creativity. Valacich and Schwenk (1995) find a positive relationship between multiple simultaneous dialogues and performance for groups which use group support systems. In an information systems study, Dennis et al. (1999) find that a simple structure could improve participants' performance in electronic brainstorming. Specifically, participants who were provided with three separate windows (each window focuses on a different aspect of the problem) for submitting ideas generate 40% more ideas than participants who only have one window to submit all ideas. Thus, the structured brainstorming platform has the potential to improve auditors' performance in brainstorming sessions. First, it could accelerate auditors' information processing speed which could lead to more fraud hypotheses generations (Rumelhart and Ortony 1977; Garner 2014). The psychology literature claims that the idea generation task consists of two stages: the knowledge activation stage and the idea production stage (Amabile 1983; Nijstad et al., 2002; Anderson and Bower 2014). The knowledge activation stage is the

foundation for the idea production stage. In the knowledge activation stage, previous ideas generated are assembled as search cues to probe and activate images in a person's long-term memory (Nijstad et al., 2002; Nijstad and Stroebe 2006; Hills, Todd, and Jones 2015). Since the structured brainstorming platform organises auditors' fraud hypotheses generations by topics/ themes, it could accelerate auditors' speed in probing and activating semantically related images that are linked in their long-term memory, which could result in 'trains of thought' in the idea production stage. Thus, the structured brainstorming platform could make the brainstorming more efficient and effective (Cohen and Bousfield 1953; Gruenewald and Lockhead 1980; Nijstad et al. 2002; Anderson and Bower 2014).

Second, this structured brainstorming platform could reduce auditors' cognitive load which could also assist them to generate more fraud hypotheses (Nunamaker, Briggs, Mittleman, Vogel, and Pierre 1996; Reining and Shin 2002). Psychology researchers claim that the memory capacity of human beings is extremely limited and an average adult could only hold four chunks of information on one occasion (Cowan, 2001; Baddeley, 2007; Ma, Husain, and Bays, 2014). In addition, Davies (2011) claims that human beings also have limited ability to separate complex and relevant information from irrelevant information. Krätschmer and Kaufmann (2002) assert that a structured brainstorming platform could reduce users' cognitive load by assisting them to filter and identify relevant information, especially when the task is complex. Thus, the use of the structured brainstorming platform is believed to be useful in improving participants' brainstorming performance (Ivanov and Cyr 2006).

Third, this structured brainstorming platform could make auditors pay more attention to fraud hypotheses generated by the other auditors in their groups, which

inspires more fraud hypotheses generations of their own. Psychology researchers find that paying attention to the other group member's ideas has a positive effect on an individual's performance as it improves cognitive stimulation ((Dugosh *et al.*, 2000; Nijstad and Stroebe 2006; Sung and Choi 2012; Korde and Paulus 2017).

Fourth, this structured brainstorming platform could lessen misunderstanding and ambiguity among auditors. Garcia and Jacobs (1998) find that significant amounts of messages in a non-structured brainstorming platform deal with misunderstanding and ambiguity since all ideas are merely organised in temporal order. Sometimes it is difficult and time-consuming to link new responses to the existing arguments or questions[13]. A structured brainstorming platform is believed to be helpful for reducing the misunderstanding and ambiguity in brainstorming as child-ideas are directly linked to the relevant parent-ideas (Smith, Cadiz, and Burkhalter 2000).

However, as mentioned in the previous section, accounting researchers find that providing a structure could be detrimental rather than beneficial to auditors in fraud-related tasks (Pincus 1989; Asare and Wright, 2004). Thus, the use of the structured brainstorming platform is likely to trigger productivity losses and limit its benefits.

First, the structured brainstorming platform could lead to cognitive interference among auditors. Interference refers to memory loss that is due to the interaction of a retrieval cue with similar traces stored in memory (Criss, Malmberg, and Shiffrin 2011). As mentioned previously, a search cue needs to be assembled to probe a person's long-term memory, in order to generate ideas. Nevertheless, a new search cue is required to be made if no new ideas could be generated under the existing train of thought. Long-time

[13] For example, if two group members A and B, make different suggestions at the same time and another group member C put a comment "agree" a few seconds later, on the computer screen, it is hard to tell whether C agree with A or B, or both A and B.

brainstorming in certain categories restrains the participants' ability to quickly assemble a new search cue, which will aggravate cognitive interference (Perttula and Sipilä 2007). In the early 1990s, some researchers introduced the concept of output interference[14] into accounting and found that investors' and auditors' judgments are negatively influenced by output interference. Frederick (1991) finds that output interference for auditors' retrieval of internal controls occurs in the taxonomic organisation condition. Although fraud hypotheses generation task in this study varies from memory retrieval/recall, the concept that creating and organising ideas into a specific structure impairs an auditor's performance is identical.

Cognitive fixation is a form of cognitive interference which is highly likely to be caused by the use of a structured brainstorming platform (Jansson and Smith 1991; Cardoso and Badke-Schaub 2011; Kohn and Smith 2011; Luo and Toubia 2015). Fixation is "something that blocks or impedes the successful completion of various types of cognitive operations, such as those involved in remembering, solving problems, and generating creative ideas" (Smith 2003, p. 16). The fixation problem is mostly unconscious and unintentional (Luo and Toubia 2015). Even if participants are explicitly warned of the fixation problem and advised to diverge their thinking, fixation and its effect still remain and could not be completely removed (Smith, Ward, and Schumacher, 1993; Wiley, 1998; Storm and Angello 2010; Kohn and Smith 2011). Auditors may fixate on his/her own fraud hypotheses, which limit their ability to generate hypotheses based on hypotheses generated by the other auditors in the group.

Second, the structured brainstorming platform is more difficult to follow than the non-structured brainstorming platform. For the non-structured brainstorming platform,

[14] Output interference means that whatever is thought about first interferes with and inhibits later thoughts on that issue.

participants only need to fix their gazes at the bottom of the screen as it is the only position where new fraud hypotheses will appear. However, for the structured brainstorming platform, new fraud hypotheses could blossom on any part of the screen. It is possible that participants may miss some fraud hypotheses generated by the other auditors in the group. If this is the case, the improved stimulation gained by paying attention to other group members' hypotheses will be limited.

Third, some researchers argue that participants may experience more, instead of less, information load as the number and length of simultaneous dialogues increases, (Newell and Simon 1972; Nagasundaram and Dennis 1993; Schulz, Schneider, de Vries, van Osch, van Nierop, and Kremers 2012).

Fourth, auditors are familiar with an unstructured approach to brainstorming (Beasley and Jenkins 2003; Hammersley 2011; Gissel and Johnstone 2017) and may generate hypotheses in their usual framework.

As discussed above, the structured brainstorming platform has both advantages and disadvantages over the non-structured brainstorming platform. It is uncertain whether the productivity gains from the benefits dominate the productivity losses from the limitations. Thus, H1a and H1b are set in the null form:

H1a: There will be no difference in the quantity of fraud hypotheses generated between the three-person hierarchical groups that use the structured brainstorming platform and those that use the non-structured brainstorming platform.

H1b: There will be no difference in the quality of fraud hypotheses generated between the three-person hierarchical groups that use the structured

brainstorming platform and those that use the non-structured brainstorming platform.

2.3. THE DIFFERENTIAL EFFECT OF THE STRUCTURED BRAINSTORMING PLATFORM ON MANAGERS' AND SENIORS' FRAUD HYPOTHESIS GENERATION

2.3.1. Prior studies on different fraud hypothesis generation of managers and seniors

H1a and H1b investigate the effectiveness of the structured brainstorming platform in terms of the group-level performance of participants. This study also investigates whether this structured brainstorming platform as a type of intervention has a differential effect on auditors with varying ranks.

Two prior audit fraud brainstorming studies have examined and found that their interventions only have an effect on the brainstorming performance of seniors and not managers. Chen et al. (2015b) find that the use of interacting electronic brainstorming does not lead to a significant difference in managers' brainstorming performance in both the fraud risk factors identification task and the fraud hypotheses generation task when compared with managers of nominal electronic brainstorming. However, seniors' performance in the fraud risk factors identification task and the fraud hypotheses generation task has been harmed due to the social loafing problem raised by the use of interacting electronic brainstorming. Dennis and Johnstone (2016) demonstrate that their intervention, which is the prompted leadership, only changes the mental representations of seniors, not managers. In addition, an indirect effect of prompted leadership on brainstorming outcomes is only significant for seniors, not managers. Dennis and Johnstone (2016) assert that the differential effect of their intervention on the mental representations and brainstorming outcomes of managers and seniors is attributable to the moderation effect of the level of knowledge of auditors.

2.3.2 Moderating role of auditor knowledge on the effect of the structured brainstorming platform

Knowledge has a significant effect on auditors' performance in fraud risk factors identification, fraud hypotheses generation and audit program modification (Hammersley 2011). Tan (2001) asserts that "rank within the firm is a more-refined proxy for knowledge than experience". Thus, this study uses seniors (managers) as proxies for less-knowledgeable (more-knowledgeable) auditors.

Prior auditing literature finds that managers are more effective than seniors in assessing fraud risk (Knapp and Knapp 2001) and producing high quantity and quality judgments in the fraud brainstorming tasks (Carpenter, 2007; Chen et al., 2015b). Chen et al. (2015b) find that the difference in fraud hypothesis generation performance between managers and seniors is higher in the interacting electronic brainstorming groups than in the nominal electronic brainstorming groups, suggesting that seniors engage in a greater extent of social loafing in a more complexed task. This study examines how the structured brainstorming platform introduced to the interacting electronic brainstorming groups influences auditors' brainstorming performance.

The structured brainstorming platform is expected to narrow the gap of brainstorming performance between managers and seniors. First, structured brainstorming platform may improve seniors' performance since it could reduce seniors' cognitive load and accelerate seniors' information processing speed. Shelton (1999) find that seniors have more difficulty than managers and partners in sifting relevant information from irrelevant information. And seniors are more likely to fail to integrate information than managers (Moeckel 1990). The structured brainstorming platform could help seniors alleviate these problems. Moreover, the benefits of using a structured brainstorming platform seem larger for seniors than for managers. Dennis and Johnstone

(2016) argue that less-knowledgeable auditors (i.e. seniors) have more room for improvement as more-knowledgeable auditors (i.e. managers) are relatively more reluctant to change. In an information system paper, Jensen, Lowry, Burgoon, and Nunamaker (2010) also find that the decision aid they implement in their experiment is more beneficial to less-task-knowledge users.

On the other hand, whether and how managers' performance is influenced by the structured brainstorming platform is less clear. Wiley (1998) asserts that domain knowledge may inhibit creative problem solving since it promotes fixation. By investigating consumers' performance in a structured electronic idea generation platform, Luo and Toubia (2015) find that consumers with high domain-specific knowledge are more prone to cognitive fixation induced by stimulus ideas than consumers with low domain-specific knowledge. Since managers have more knowledge than seniors, they may have a greater degree of fixation problems when using a structured brainstorming platform, which may not improve their performance in fraud brainstorming tasks. Additionally, Sternberg (2014) asserts that sometimes inflexibility surrounding the change in information-processing system could make experts perform worse than non-experts. Specifically, inflexibility could lead to a decreased likelihood of retrieving the best-fitting piece of knowledge. As the structured brainstorming platform is a new system which requires auditors to alter their information-processing habit, it might negatively effect managers' performance in fraud hypotheses generation as they are more inflexible. Furthermore, prior accounting research finds that higher-rank auditors often rely less on decision aids since they are confident in their own knowledge and expertise (Arkes, Dawes, and Christensen 1986; Ashton 1992; Eining, Jones, and Loebbecke 1997). Less reliance on decision aids usually leads to even worse performance (Ashton 1990; Ashton 1992). Overall, this study expects that the structured brainstorming platform is

more beneficial to seniors, thus it could narrow the gap of the brainstorming performance between managers and seniors. Therefore, H2 hypotheses are:

H2a: Managers generate a greater quantity of fraud hypotheses than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform.

H2b: Managers generate a higher quality of fraud hypotheses than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform.

2.4. THE DIFFERENTIAL EFFECT OF THE STRUCTURED BRAINSTORMING PLATFORM ON MANAGERS' AND SENIORS' MENTAL SIMULATION

SAS No.99 Paragraph 41 requires that auditors "should ordinarily presume that there is a risk of material misstatement due to fraud relating to revenue recognition". Mentally simulating an intended action is crucial as it could have a significant effect on participants' subsequent performance with the real task (Kahneman and Tversky 1982; Schacter, Addis, and Buckner 2007; Gentner and Stevens 2014). In the last stage of the experiment of this study, participants are told about four fraud risk factors from the case facts that are relevant to potential sales-revenue material misstatements due to fraud. They were asked to describe in detail how the sales revenue of the retail company in the case could be overstated due to financial statement fraud, how these potential frauds relate to the fraud risk factors provided, and how management of the client in the case could have perpetrated frauds. This study examines whether the structured brainstorming platform has a differential effect on the mental simulation of managers and seniors.

2.4.1. Prior studies on mental stimulations of managers and seniors

Johnson-Laird and Byrne (1991) developed a mental model theory which suggests that human reasoning depends on mental models. Bell and Solomon (2002) claim that the mental models of auditors have sufficiently faithful representations of relevant information about clients' past, current and future business status. Thus, mental models could assist auditors to make more accurate assessments of material misstatement risk and design more effective audit procedures to test their predictions and inferences.

One way that people use their mental models is to perform a mental simulation (Markman and Gentner 2001). Auditors use his/her mental model to simulate an outcome that is likely to occur (or has already occurred but is unknown) for their clients (Bell and Solomon 2002). The quality of audit judgment depends on whether auditors' mental model is sufficient to make a reliable simulation. Auditors' mental simulation is crucial in fraud brainstorming as it could determine the effectiveness of subsequent audit procedure planning which could influence audit quality. There are two auditing research studies that directly investigate and measure auditors' mental simulation in fraud brainstorming tasks.

Trotman et al. (2009) examines the notion of mental simulation in the accounting research field. Pre-mortem, one of their experimental treatments is a variation of the mental simulation idea proposed by Klein (1999). It is a type of backwards thinking[15]. Trotman et al. (2009) predict and find that auditors in the pre-mortem brainstorming treatment generate a significantly greater quantity, and higher quality of, material misstatements due to fraud. After group brainstorming sessions, each individual auditor

[15] In Trotman et al. (2009), auditors in the pre-mortem treatment have being told "to imagine a scenario where it is months after an audit has been completed and no material fraud was uncovered in the fraud; however, it has just been announced in the press that a material financial reporting fraud has occurred for that client".

was asked to complete an additional mental simulation task which was to select and describe one potential material misstatement due to fraud from the case facts. Their descriptions in the mental simulation task are assessed by using the same three measurements as Klein (1999) proposes: coherence, applicability, and applicability. However, data analyses of Trotman et al. (2009) show that there are no significant differences between the three brainstorming treatments in the mental simulation scores (coherence, applicability, completeness and a total score of the previous three scores).

Using the same case material as Trotman et al. (2009), Chen et al. (2015b) also investigate and measure auditors' mental simulation[16]. With managers' mental simulation, they find no significant difference between interacting and nominal electronic brainstorming groups. On the other hand, with seniors' mental simulation, they find that the mental simulations of seniors in interacting electronic brainstorming groups are less developed than those of seniors in nominal electronic brainstorming groups, due to the existence of social loafing by less experienced auditors in interacting electronic brainstorming groups. In addition, Chen et al. (2015b) find a positive correlation between auditors' mental simulations and the number of fraud hypotheses generated.

2.4.2 The effect of the structured brainstorming platform on auditors' mental stimulations

Following Trotman et al. (2009) and Chen et al. (2015b), this study also measures the mental simulations of auditors from three perspectives: coherence, applicability, and completeness.

[16] Since Chen et al. (2015b) use the same case material and experimental procedures as this study, the mental simulation task in Chen et al. (2015b) is the same as the mental simulation task in this study. Specifically, participants were provided with four fraud risk factors related to sales revenue and were asked to describe how the sales revenue of the retail company in the case could be overstated due to financial statement fraud, how these potential frauds relate to the fraud risk factors provided, and how management of the client in the case could have perpetrated frauds. Participants' mental simulation in Chen et al. (2015b) is assessed from the same three perspectives as Trotman et al. (2009): coherence, applicability and completeness.

Psychology research finds that the exposure to a high amount of ideas may stimulate more associations (Dugosh and Paulus 2005). Thus, this study predicts that the results of mental simulation should be consistent with the results of quantity and quality of fraud hypotheses. Since H2a and H2b predict that the structured brainstorming platform will narrow the gap of the mental simulations between managers and seniors, this study hypothesises that:

H3: Managers have more developed mental simulations than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform.

2.5. FRAUD RISK ASSESSMENT OF STRUCTURED AND NON-STRUCTURED BRAINSTORMING GROUPS

SAS No. 99 and ISA 240 require auditors to gather necessary information to make effective fraud risk assessments of the likelihood that potential frauds may occur. According to prior literature, many factors could influence the effectiveness of auditors' fraud risk assessments.

Provision of information (e.g. information about a client's material weakness, instruction to assess the fraud risk of financial statement) could influence auditors' fraud risk assessments. Hammersley, Johnstone, and Kadous (2011) find that providing a set of information about a client's material weaknesses could lead to auditors submitting higher fraud risk assessments as fraud cues become more salient. Knapp and Knapp (2001) manipulate the provision of explicit fraud risk assessment instructions and find that auditors who received the explicit fraud risk assessment instructions provide more effective fraud risk assessments than those who did not receive the instructions. Moreover, audit managers provide more effective fraud risk assessments. Specifically, audit

managers make higher fraud risk assessments when fraud is present and lower fraud risk assessments when fraud is absent. On the other hand, there is no significant difference between audit seniors when fraud is or is not present. Results of Hammersley et al. (2010) show that documentation of fraud planning discussions influences the subsequent fraud risk assessments of auditors. They find that unprimed auditors who were provided with specific fraud memos make a higher final fraud risk assessment than those who were provided with summary memos. However, for primed auditors, those who received specific fraud memos have a lower final fraud risk assessment than those who received summary memos.

The decomposition of fraud risk assessment also has an effect on auditors' assessment of the potential fraud risk. However, prior accounting literature has mixed findings in terms of the direction of this effect. Zimbelman (1997) finds that separating fraud risk assessments into intentional and unintentional misstatements increases auditors' attention to fraud red-flag cues, compared with holistic fraud risk assessment. However, results of Wilks and Zimbelman (2004) show that auditors' fraud risk assessments could be reduced by using decomposition. Wilks and Zimbelman (2004) advance the decomposition of fraud risk assessments into the three elements of a fraud triangle: incentive, opportunity, and attitude. They find that when asked to provide decomposed fraud risk assessment, auditors are more sensitive to incentive and opportunity cues than when auditors are required to make a holistic fraud risk assessment. However, this increased sensitivity only exists when the incentive and opportunity cues indicate a low fraud risk level. When the level of fraud risk is high, the decomposition technique does not assist auditors to make higher fraud risk assessments.

Use of decision aids has been found to have an adverse effect on auditors' fraud risk assessments. Pincus (1989) examines the effectiveness of a red-flags questionnaire on auditors' fraud risk assessments. She finds no difference between users and non-users in the no-fraud case. When fraud exists in the case, auditors who used the red-flags questionnaire made even significantly lower fraud risk assessments than auditors who did not use the red-flags questionnaire. Results of Asare and Wright (2004) also show that the use of fraud decision aids leads to a less effective diagnosis of fraud. Specifically, Asare and Wright (2004) find that auditors who used a standard risk checklist make significantly lower fraud risk assessments, compared with those auditors who did not use a checklist for assistance.

In a fraud-related literature review paper, Hammersley (2011) claims that in fraud brainstorming, fraud risk assessment plays a vital role by linking fraud risk factor identification and fraud hypotheses generation with audit program modification. Specifically, auditors' sensitivity to fraud risk factors and fraud hypotheses affects their assessment of fraud risks, which influences their judgment and decision-making in auditing procedure changes (Hoffman and Zimbelman 2009; Nieschwietz, Schultz Jr. and Zimbelman 2000; Hammersley, 2011; Carpenter and Reimers, 2013; Trompeter, Carpenter, Desai, Jones, and Riley Jr. 2013). All published fraud brainstorming experiments have measured auditors' fraud risk assessments. Table 2.2 summarises those experiments by brainstorming task and the number of fraud risk assessments measured in the experiments.

Most fraud brainstorming experiments only ask participants to assess fraud risk once. Carpenter (2007) and Chen, Khalifa, and Trotman (2015) find that auditors who perform better in fraud risk factors identification tasks and fraud hypotheses generation

tasks, make even less effective fraud risk assessments. Carpenter (2007) provides evidence that even though auditors in the nominal brainstorming treatment generate more fraud hypotheses than auditors in the face-to-face brainstorming treatment, auditors in the face-to-face brainstorming treatment provide more effective fraud risk assessments, especially when fraud is present. Chen et al. (2015a) also find that although the sequential unpacking makes auditors identify a greater quantity and higher quality of frauds hypotheses than the simultaneous unpacking, the sequential unpacking has a negative effect which leads to lower fraud risk assessments of auditors. However, Trotman et al. (2009) find no significant differences between their three experimental treatments in fraud risk assessments even though interacting groups identify significantly fewer frauds than the brainstorming guideline groups and the pre-mortem groups. In sum, the relationship between fraud risk assessments and other fraud tasks is not well understood at this time.

Lynch et al. (2009) ask participants to make fraud risk assessments twice: the first one is after participants have finished reading the case material but before they have started brainstorming fraud risk factors; and the second one is after the brainstorming sessions. They compare the change in participants' fraud risk assessments and find that all participants significantly increase their fraud risk assessments after the brainstorming sessions. Thus, Lynch et al. (2009) argue that auditors' fraud risk assessments could be enhanced by simply attending a fraud brainstorming session. However, they do not examine whether participants in different treatment groups have a different degree of change in their fraud risk assessments.

Chen et al. (2015b) is the only study that measures auditors' fraud risk assessments three times: the first one is after participants have finished reading the case material but

	One Fraud Risk Assessment	Two Fraud Risk Assessments	Three Fraud Risk Assessments
Fraud Risk Factors Identification		Lynch, Murthy, and Engle (2009)	Chen, Trotman, and Zhou (2015)
Fraud Hypothesis Generation	Carpenter (2007) Trotman, Simnett, and Khalifa (2009) Chen, Khalifa, and Trotman (2015)		Chen, Trotman, and Zhou (2015)
Audit Program Modification	Hoffman and Zimbelman (2009) Hammersley, Bamber, and Carpenter (2010)		

One fraud risk assessment: those fraud brainstorming experiments only ask participants to assess fraud risk once.
Two fraud risk assessment: this fraud brainstorming experiment ask participants to assess fraud risk twice.
Three fraud risk assessment: this fraud brainstorming experiment ask participants to assess fraud risk three times.

Table 2.2 Summary of Previous Audit Fraud Brainstorming Experiments Which Measure Participants' Fraud Risk Assessments

before they have started brainstorming fraud risk factors; the second one is after the brainstorming of fraud risk factors; and the last one is after the brainstorming of fraud hypotheses. They find that auditors in interacting electronic brainstorming groups increase their fraud risk assessments more than those in nominal electronic brainstorming groups although nominal electronic brainstorming groups performed significantly better than interacting electronic brainstorming groups in both the fraud risk factors identification task and the fraud hypotheses generation task.

Since this study uses the same case material and experimental procedures as Chen et al. (2015b), it also measures participants' fraud risk assessments three times. Different from Chen et al. (2015b), however, this study focuses on the relationship between auditors' brainstorming performance in fraud hypotheses generation and changes in their fraud risk assessments.

RQ: Is there a relationship between individual auditor's brainstorming performance in fraud hypotheses generation task and the change in his/her fraud risk assessments?

CHAPTER 3

METHODOLOGY

3.1 PARTICIPANTS

One hundred and eight auditors, including 72 seniors and 36 managers from two Big 4 accounting firms in Australia participated in the experiment. The seniors had an average audit experience of 42 months and the managers had an average audit experience of 90 months.

Full confidentiality of personal information was promised to all participants before the experiment began. In addition, all participants were given a A$70 gift voucher for participating in the experiment.

3.2 EXPERIMENTAL PROCEDURES

The experiment is a 2 × 1 between-subjects design. This study manipulated the form of interacting electronic brainstorming platform at two levels for a fraud hypotheses generation task: the two levels are a structured brainstorming platform and a non-structured brainstorming platform.

The experiment was conducted in the conference rooms of the participating accounting firms. Participants chose a preferred time to attend from a list of potential times for experimental sessions. Each session took between 60 and 70 minutes.

At the beginning of each session, participants were randomly assigned to a three-person hierarchical group with two seniors and one manager. There are six exceptions: three groups consist of one senior and two managers, and three groups consist of three

seniors. Each three-person hierarchical group was randomly assigned to either the structured group treatment or the non-structured group treatment. Each participant used a computer with Internet to brainstorm with the other two group members and to complete the experiment. No verbal communication was allowed.

Although participants possibly observed the rank of the other participants in the same room, they did not know the identity of their group members. Thus, it is less likely to have an evaluation apprehension problem. Additionally, participants were required to assess the extent of their perceived evaluation apprehension in the post-experimental survey questionnaire. Data analyses, which will be presented in the Results in the following Chapter 4, supports the view that evaluation apprehension is not a problem for this study. Moreover, new fraud hypotheses generated by the other group members do not display automatically on each participant's computer screen. A participant could press the "F5" key on the keyboard to refresh the conversation page or submit one new fraud hypothesis of his/her own before viewing new fraud hypotheses generated by the other group members. The goal is to minimise potential production blocking.

After all participants of each session completed the signing of the confidentiality agreement, the experiment commenced by delivering brief instructions after which participants were provided with seven minutes for reading case material about a hypothetical fashion retailer. Exhibit 3.1 shows the research design and experimental procedures. The experiment consists of three stages.

Stage I

After reading the case, each participant was asked to provide an initial independent fraud risk assessment. The fraud risk assessment requires participants to use their

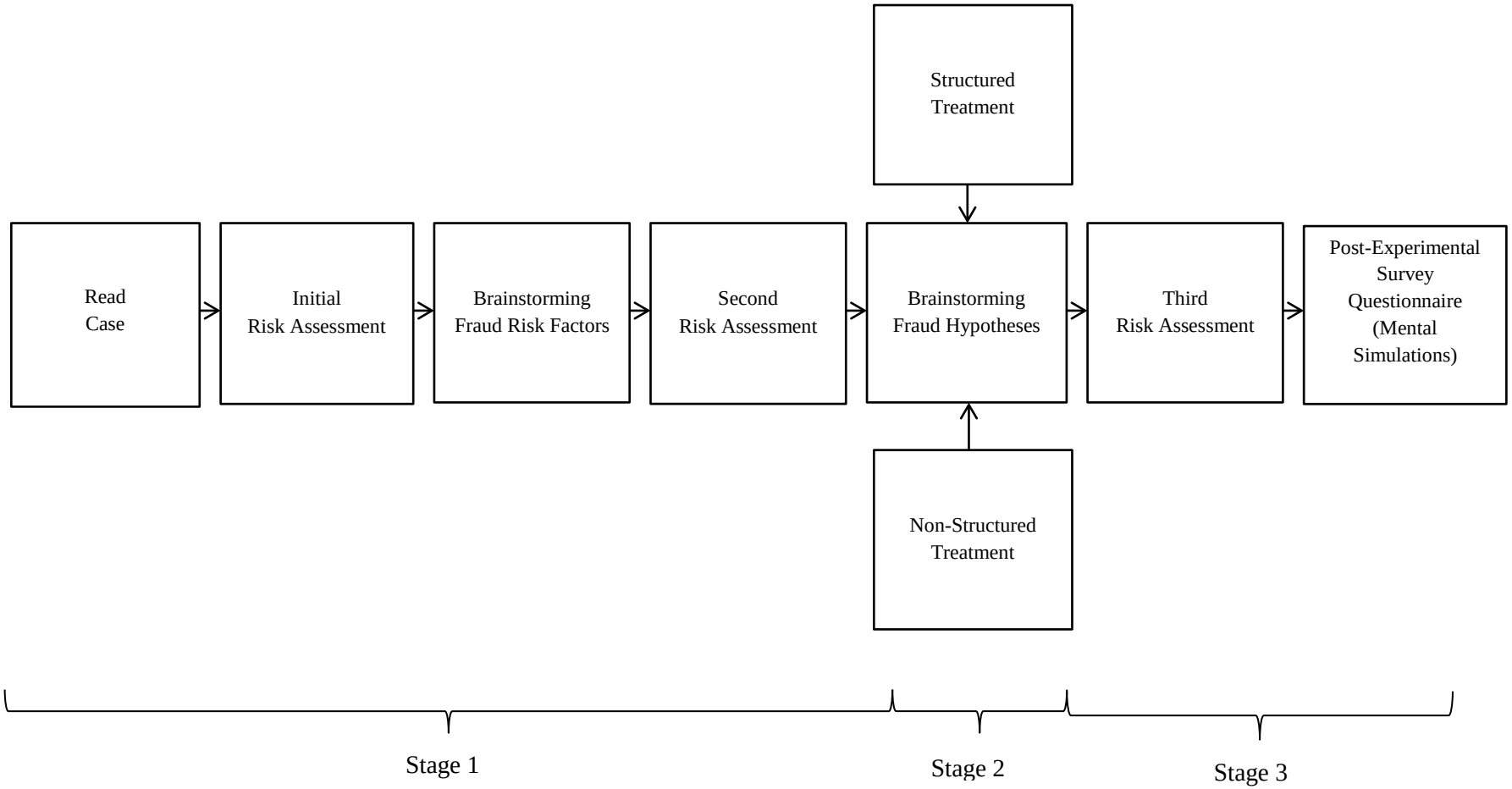

EXHIBIT 3.1

Research Design and Experimental Procedure

professional knowledge and judgment to assess the likelihood that a material misstatement due to fraud has occurred for the fashion retailer in the current financial year, on an 11-point Likert scale, from 0 (Extremely Unlikely) to 10 (Extremely Likely).

Participants then brainstormed for 18 minutes to identify the potential fraud risk factors based on the case material. As mentioned in the Introduction in Chapter 1, fraud risk factors identification refers to identifying managers' incentives, opportunities, and attitudes towards the commission of fraud (Chen et al. 2015b). Since all participants used the non-structured brainstorming platform to brainstorm in this stage, the present study does not expect any differences in the number of fraud risk factors identified between participants having the same rank. Each participant completed a second independent fraud risk assessment after completion of the brainstorming task of fraud risk factors identification.

Stage II

In the second stage, participants were asked to brainstorm for another 18 minutes to generate fraud hypotheses. Specifically, by adding the specific elements of the fraud risk factors of companies, participants brainstormed in terms of how and where they suspected that a material misstatement due to fraud might occur in the fashion retailer's financial statements and how a fraudulent financial statement could be perpetrated by the company's management. Fraud hypotheses generation is a more difficult and complex task than fraud risk factors identification.

This brainstorming task of fraud hypotheses generation is where experiment manipulation has been implemented. Participants in the non-structured groups used the same non-structured brainstorming platform as in the previous fraud risk factors identification task, whereas participants in the structured groups used the structured

brainstorming platform to submit their fraud hypotheses ideas. Specifically, when participants in the structured groups intend to submit a new fraud hypothesis, they have the option of deciding to contribute a parent-hypothesis by clicking on "Enter an idea not building on any previous idea" or, alternatively, they can create a child-hypothesis emanating from an existing hypothesis by first selecting the number of the existing hypothesis they wish to build upon and then clicking 'Submit" to enter their new fraud hypothesis. Child-hypotheses are shown directly under each selected parent-hypothesis with a different indentation. In addition, when participants intend to input a child-hypothesis, they are provided with a menu of "conjunctive phrases" (e.g., "more precisely," "however…") to link their hypotheses with the parent-hypothesis they wish to build upon. Thus, semantically related fraud hypotheses are clustered in a proximate location by using the structured brainstorming platform.

Stage III

At the start of the third stage, each participant was asked to complete a third independent fraud risk assessment. Subsequently, all participants completed an individual post-experimental survey questionnaire. In the post-experimental survey questionnaire, information was obtained for the study about individual participant's rank, general audit working experience, and fraud detection experience (e.g. whether they had been involved in an audit engagement where a material misstatement due to fraud had been discovered, in how many engagements did they experience this, and how many hours of fraud detection training did they receive in the most recent two years). Participants were also asked to assess the level of perceived difficulty of the fraud risk factors identification task and the fraud hypotheses generation task respectively, on an 11-point Likert scale, with 0 being Extremely Easy and 10 being Extremely Difficult. Moreover, participants'

perceived level of evaluation apprehension was also measured by providing them with four statements[17] to rate on four individual seven-point Likert scales (1 = Strongly Disagree, 7 = Strongly Agree). A mental simulations task was also included in the post-experimental survey questionnaire.

3.3 CASE

The case used in the experiment was adopted from Trotman et al. (2009) which is an abbreviated version of an international case. The case was developed by a Big 4 accounting firm for training seniors in work paper documentation including fraud risk documentation (Chen et al. 2015b). The case materials contain information regarding a fashion retailer's legal and operating structure, operations, customers, suppliers, employees, investments and financing. The case also includes information about the company's industry conditions, economic, political, social, and legal environment, the key accounting policies, and practices in the retail industry. At the end, the case provides details of the fashion retailer company's financial performance and a summary of concerns and examples of misconduct or unprincipled behaviour.

3.4 MEASUREMENT OF VARIABLES AND DATA CODING

3.4.1 Quantity of fraud risk factors identified, quantity and quality of fraud hypotheses generated

This study has measured several variables: the quantity of fraud risk factors, the quantity and quality of fraud hypotheses, fraud risk assessments, and participants' mental simulations[18]. The quantity of fraud risk factors and the quantity of fraud hypotheses were

[17] The four statements are 1) I was reluctant to offer an idea for fear of criticism from other members; 2) I was inhibited in offering an idea due to the presence of others; 3) Although no overt criticism was expressed, I was reluctant to offer an idea that was 'way out', for fear of disapproval from members; 4) I withheld ideas for fear of possible disapproval from other members.

[18] Consistent with Chen et al. (2015b), this study does not measure the quality of fraud risk factors identified. The reason is that the aim of this brainstorming is to identify all visible fraud risks. Quantity is the most important factor.

measured as the number of unique valid ideas brainstormed by participants[19]. The coding was completed by a graduate student with several years of auditing experience in a Big 4 accounting firm. The brainstorming transcripts were randomly ordered before presenting to the coder. Specifically, each statement in the transcripts was assigned a random number to avoid an order effect. After receiving the organised transcripts, the coder was required to assess each statement in the transcripts as valid/ not valid based on the solution, as described below.

The model solution of the quantity of fraud risk factors and fraud hypotheses consists of two components. The first part is the same as the one used in Trotman et al. (2009) which contains an initial list of fraud risk factors and fraud hypotheses[20]. In the second part, some extra fraud risk factors and fraud hypotheses have been added during the coding process. The coder was instructed to use professional judgment to add fraud risk factors identified and fraud hypotheses generated that seemed reasonable but they were not included in the first part which is the official solution. In order to ensure the suitability of adding these fraud risk factors and fraud hypotheses to the solution, one accounting professor, who was blind to the treatments, coded the added items independently and reconciled them with the assessments of the coder. The final version of the solution to the case includes 57 fraud risk factors and 17 fraud hypotheses[21]. Table 3.1 shows the 17 fraud hypotheses, and also the number of groups that generated each fraud hypothesis in non-structured groups and structured groups.

[19] Redundant fraud risk factors and fraud hypotheses across group members are excluded for the group-level analyses but included for the individual-level analyses.

[20] The initial list of fraud risk factors and fraud hypotheses was developed by the same Big 4 accounting firm that developed the case.

[21] Consistent with Trotman et al. (2009) and Chen et al. (2015b), this study includes a fraud hypothesis on the misappropriation of assets (Item 17 in Table 1) in the coder's solution for fraud hypotheses. Although asset misappropriation is not generally regarded as a financial statement fraud, it is included under the wider definition of fraud by the Association of Certified Fraud Examiners (ACFE 2008).

Following Trotman et al. (2009), there are two quality measurements for fraud hypotheses, namely, the expert-identified misstatements and the expert-identified frauds. The 11 expert-identified misstatements which are labelled with a dagger in Table 3.1 were identified as misstatements that were most likely to occur, according to a group of audit experts from the Big 4 accounting firm which developed the case. The seven expert-identified frauds which are labelled with an asterisk in Table 3.1 were identified by the same group of audit experts as having a higher risk of fraud according to the case materials[22].

3.4.2 Fraud Risk Assessment

As outlined in Exhibit 3.1 and described in the experimental procedures in this chapter, each participant was asked to assess the likelihood that a material misstatement due to fraud had occurred at this fashion retailer in the current financial year and they were required to provide fraud risk assessments three times on three individual 11-point Likert scales, with 0 indicating "Extremely Unlikely" and 10 indicating "Extremely Likely".

3.4.3 Mental Simulation

With the mental simulation task in the post-experimental survey questionnaire, participants were informed about four fraud risk factors relevant to potential sales-revenue material misstatements due to fraud from the case facts which had been identified by audit partners. They were required to describe in detail how the sales revenue of the fashion retailer company in the case could be overstated due to financial statement fraud,

[22] The solution is developed and provided by the same international team of partners and senior managers which developed the case. The team of experts made initial suggestions and followed this with a preliminary answer generation process. The final answer was achieved by having several iterations within the team and reaching a consensus between these experts (Trotman et al. 2009).

TABLE 3.1
Fraud Hypotheses Generated and the Number of Non-Structured and Structured Groups Generating Each Fraud Hypothesis

Potential Material Misstatements Due to Fraud	Non-Structured	Structured
A. Revenue Recognition		
1. Management may have created fictitious sales.*†	5	4
2. Management may have falsely recognised non-cash sales that have not occurred and then reversed after year-end as "returns" (as company has a faulty goods return policy).*†	6	5
3. Management may have deliberately recognised concession stand revenue before it has been earned.*†	4	7
4. The sales return provisions for both retail and wholesale customers may be understated by management.	18	17
B. Overstating Assets		
5. Costs not directly incurred in the purchase of new domestic stores may have been incorrectly capitalised. *†	10	7
6. Costs not directly associated with the new loan may have been incorrectly capitalised. *†	6	7
7. Refurbished store costs capitalised may include costs that should be expensed in the current period. †	18	15
8. The estimated useful lives of fixtures and fittings may have been unjustifiably increased to reduce depreciation expense.	7	8
9. Management may have recognised non-existent inventory with a consequential understatement of cost of goods sold. *†	0	1
10. Management may not have written down inventory to below cost when write-downs were appropriate. This is relevant because the case mentions that conditions within the retail industry remain relatively poor. This has caused a number of brands to constantly offer marked down goods. †	11	14
11. Management may have unjustifiably understated the allowance for doubtful debts.†	16	18
C. Understating Liabilities		
12. Understate tax provision. The case mentions that calculating the tax provision is complex and judgmental. †	15	15
D. Understatement of Expenses		
13. Management may have delayed the recognition of current year's expenses (e.g., advertising) by overstating prepayments. The case mentions that the industry normally pays for advertising and promotion in advance before work is carried out.	16	10
14. Management could understate employee costs by using overly conservative assumptions in leave calculations. *†	5	3
15. Management may use overly conservative assumptions in any asset impairment calculations, e.g., in doubtful debt provisions or in impairment of fixed assets, etc.	4	2
16. Management could hold off on processing of expense invoices at year-end.	1	1
E. Misappropriation of Assets		
17. Management could have misappropriated assets.	18	12

* Fraud hypotheses identified by the experts to have a higher risk of fraud based on the case facts.

† Fraud hypotheses identified by the experts as being most likely to occur in the case.

Non-Structured: groups using non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: groups using structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

how these potential frauds relate to the fraud risk factors that were provided, and how management of the fashion retailer in the case could have perpetrated fraud.

Following Klein (1999), Trotman et al. (2009) and Chen et al. (2015b), this study measures participants' mental simulation from three perspectives, namely, coherence, applicability, and completeness. Coherence assesses whether there is a causal chain that makes sense in the participants' descriptions and whether the steps logically follow each other. Applicability assesses the extent to which the sequence of events causes the fraud[23]. Completeness assesses the coverage of the four potential revenue-related frauds mentioned.

Two coders[24] independently coded each of the three perspectives of the mental simulation transcripts on a six-point Likert scale (0 = Extremely Low, 5 = Extremely High). The mental simulation transcripts of participants were randomly ordered before they were provided to the coders, in order to prevent an order effect. In the cases where there is a significant difference between two coders[25], the second coder independently recoded the transcripts and reconciled them with the first coder's assessments. Following Trotman et al. (2009) and Chen et al. (2015b), this study also investigates a composite mental simulation index by summing the scores of coherence, applicability and completeness. Cronbach's Alpha between two coders is 0.890 for coherence, 0.908 for applicability, 0.896 for completeness, and 0.946 for mental simulation index, which indicates a reasonable level of reliability. Thus, the following data analyses of mental simulations in this study use the average of two coders' assessments.

[23] Klein described applicability as "Will it get what I need?" (Klein 1999, p. 58).
[24] The first coder is the same coder for fraud risk factors coding and fraud hypotheses coding. The second coder is the same accounting professor, who was ratifying the addition of fraud risk factors and fraud hypotheses for the official solution.
[25] Significant difference is defined as a difference which is equal to or greater than 2.

CHAPTER 4

RESULTS

4.1 QUANTITY AND QUALITY OF FRAUD HYPOTHESES

As mentioned in the Methodology in Chapter 3, all participants used the non-structured brainstorming platform to brainstorm fraud risk factors. In addition, there are no significant differences between participants in the non-structured and structured groups in terms of the number of months of audit experience (Non-Structured Group 58.83 months versus Structured Group 56.93 months, p = 0.781, two-tailed), the number of fraud training hours (Non-Structured Group 11.83 hours versus Structured Group 10.32 hours, p = 0.581, two-tailed) and the percentage of audits in the retail industry (Non-Structured Group 12.75% versus Structured Group 25.69%, p = 0.197, two-tailed) which is the industry setting in the case. Thus, the present study does not expect a significant difference in the quantity of fraud risk factors identified between the non-structured and structured groups. However, the structured groups generate a significantly greater quantity of fraud risk factors than the non-structured groups (untabulated, Structured Group 19.39 versus Non-Structured Group 15.56, p = 0.012, two-tailed). This significant difference is driven by other unknown factors rather than the experimental manipulation which is the form of interacting electronic brainstorming platforms. Consequently, quantity of fraud risk factors is included as a covariate in the subsequent data analyses of the quantity and quality of fraud hypotheses, for both group-level and individual-level analyses.

In addition, as described in the Methodology in Chapter 3, at the beginning of each experimental session, participants were randomly assigned to a three-person hierarchical group with two seniors and one manager. However, there are six exceptions: three groups

consist of one senior and two managers, and three groups consist of three seniors. Consistent with Chen et al. (2015b), for the three groups consisting of two managers and one senior, the manager who has more years of audit experience is labelled as a "manager", whereas the less experienced manager is labelled as a "senior". For the three groups having three seniors, the senior with the most audit experience is labelled as a "manager". For all the data analyses of mental simulation and fraud risk assessments, this study uses the actual rank of each participant. To enhance the robustness of the results, this study also uses participants' actual ranks to analyse their fraud hypotheses performance.

4.1.1 Test of H1a and H1b

Table 4.1 shows the original means and the adjusted means of the quantity and quality of fraud hypotheses generated by both non-structured and structured groups. The first two columns display the original means of the quantity and quality of fraud hypotheses. The last four columns present the adjusted means of the quantity and quality of fraud hypotheses, after controlling the group-level quantity of fraud risk factors. As explained at the beginning of this chapter, the adjusted means are more appropriate because the quantity of fraud risk factors identified by participants is required to be controlled. Thus, the results shown in the last four columns are used to test H1a and H1b.

The results show that there are no significant differences between the non-structured and structured groups in the quantity (8.87 versus 8.07, $p = 0.156$, two-tailed) and quality (expert-identified misstatements: 5.75 versus 5.14, $p = 0.103$, two-tailed; expert-identified frauds: 2.19 versus 1.75, $p = 0.159$, two-tailed) of fraud hypotheses generated. Then the null hypotheses H1a and H1b cannot be rejected. Overall, the results demonstrate that the structured brainstorming platform has no effect on a three-person

TABLE 4.1

The Quantity and Quality of Fraud Hypotheses Generated by Non-Structured and Structured Groups
Means and Adjusted Means of Quantity and Quality of Fraud Hypotheses Generated

	Mean		Adjusted Mean			
	Non-Structured	Structured	Non-Structured	Structured	Difference	Sig. (two-tails)
Quantity of Fraud Hypotheses	8.39	8.56	8.87[a]	8.07[a]	0.80	0.156
Quality of Fraud Hypotheses (Expert-identified misstatements)	5.50	5.39	5.75[a]	5.14[a]	0.61	0.103
Quality of Fraud Hypotheses (Expert-identified frauds)	2.00	1.94	2.19[a]	1.75[a]	0.44	0.159

[a] Covariates appearing in the model are evaluated at the following values: quantity of fraud risk factors identified = 17.47.
Non-Structured: groups using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Structured: groups using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each non-structured and structured group. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.
Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each non-structured and structured group that are among the 11 expert-identified misstatements in Table 3.1. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.
Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each non-structured and structured group that are among the seven expert-identified frauds in Table 3.1. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.

hierarchical group's brainstorming performance in fraud hypotheses generation, either from the quantity or the quality perspective.

4.1.2 Test of H2a and H2b

H2a and H2b predict that managers generate a greater quantity and higher quality of fraud hypotheses than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform. Thus, a significantly positive difference between managers and seniors in general and an interaction between the form of brainstorming platform and rank are expected.

Table 4.2 compares the quantity and quality of fraud hypotheses generated by managers and seniors in the non-structured and structured groups. Panel A shows both the original means and adjusted means of the quantity and quality of fraud hypotheses generated after controlling the quantity of fraud risk factors identified by each participant, as well as the differences between managers and seniors within these two treatments groups. This study conducts a 2 x 2 ANCOVA analysis with the form of brainstorming platform (Non-Structured versus Structured) and rank (Manager versus Senior) as the independent variables, the quantity of fraud risk factors identified by each auditor as the covariate, and the quantity and quality of fraud hypotheses generated as the dependent variables. The ANCOVA results in Panel B, Table 4.2 show that the main effects of Structure are significant for both the quantity ($F = 13.088$, $p = 0.000$, two-tailed) and quality (Expert-identified misstatements: $F = 13.967$, $p = 0.000$, two-tailed; expert-identified frauds: $F = 3.384$, $p = 0.069$, two-tailed) of fraud hypotheses generated. The main effects of Rank are significant for the quantity ($F = 3.460$, $p = 0.033$, one-tailed) and one measure of quality (Expert-identified misstatements: $F = 2.780$, $p = 0.049$, one-tailed) of fraud hypotheses generated. Moreover, the two-way interactions for the quantity ($F =$

14.977, p = 0.000, one-tailed) and both measures of the quality of fraud hypotheses (Expert-identified misstatements: F = 15.327, p = 0.000, one-tailed; Expert-identified frauds: F = 4.732, p = 0.000, one-tailed) are significant. It shows that the structured brainstorming platform has a differential effect on seniors and managers such that the gap between managers' and seniors' performance narrows in the fraud hypotheses generation task. The follow-up simple contrasts also support this argument. Managers generate a significantly greater quantity (5.54 versus 3.74, p = 0.000, one-tailed) and higher quality (Expert-identified misstatements: 3.77 versus 2.43, p = 0.000, one-tailed; Expert-identified frauds: 1.22 versus 0.71, p = 0.010, one-tailed) of fraud hypotheses than seniors in the non-structured groups. While there are no significant differences in the quantity (3.16 versus 3.77, p = 0.086, one-tailed) and quality (Expert-identified misstatements: 1.91 versus 2.43, p = 0.063, one-tailed; Expert-identified frauds: 0.60 versus 0.75, p = 0.249, one-tailed) of fraud hypotheses generated by managers and seniors in the structured groups. Overall, managers generate a greater quantity and higher quality of fraud hypotheses than seniors, but the structured brainstorming platform narrows the gap of managers' and seniors' brainstorming performance in the fraud hypotheses generation task. Thus, H2a and H2b are supported.

However, additional analyses in Panel C, Table 4.2 show that these differences are the result of the structured brainstorming groups results in poorer performance by managers. Specifically, managers of the structured groups generate a significantly fewer quantity (3.16 versus 5.54, p = 0.000, two-tailed) and lower quality (Expert-identified misstatements: 1.91 versus 3.77, p = 0.000, two-tailed; Expert-identified frauds: 0.60 versus 1.22, p = 0.015, two-tailed) of fraud hypotheses than managers of the non-structured groups. However, there are no significant differences between seniors of these two treatments in the quantity (3.77 versus 3.74, p = 0.928, two-tailed) and quality

(Expert-identified misstatements: 2.43 versus 2.43, p = 0.981, two-tailed; Expert-identified frauds: 0.75 versus 0.71, p = 0.826, two-tailed) of fraud hypotheses generated. This suggests that the structured brainstorming platform interferes with managers' usual structure and negatively affects managers' brainstorming performance in the fraud hypotheses generation task.

TABLE 4.2
Comparisons between the Quantity and Quality of Fraud Hypotheses Generated by Managers and Seniors in Non-Structured and Structured Groups

Panel A: Means and Adjusted Means of Quantity and Quality of Fraud Hypotheses Generated

		Mean		Adjusted Mean	
		Non-Structured	Structured	Non-Structured	Structured
Quantity of Fraud Hypotheses	Manager	5.56 (n=18)	3.72 (n=18)	5.54[a] (n=18)	3.16[a] (n=18)
	Senior	3.31 (n=36)	3.92 (n=36)	3.74[a] (n=36)	3.77[a] (n=36)
	Difference			1.80	-0.61
Quality of Fraud Hypotheses (Expert-identified misstatements)	Manager	3.78 (n=18)	2.28 (n=18)	3.77[a] (n=18)	1.91[a] (n=18)
	Senior	2.14 (n=36)	2.53 (n=36)	2.43[a] (n=36)	2.43[a] (n=36)
	Difference			1.34	-0.52
Quality of Fraud Hypotheses (Expert-identified frauds)	Manager	1.22 (n=18)	0.72 (n=18)	1.22[a] (n=18)	0.60[a] (n=18)
	Senior	0.61 (n=36)	0.78 (n=36)	0.71[a] (n=36)	0.75[a] (n=36)
	Difference			0.51	-0.15

TABLE 4.2 (continued)

Panel B: ANCOVA Results

Source of Variance	Quantity of Fraud Hypotheses			Quality of Fraud Hypotheses (Expert-identified misstatements)			Quality of Fraud Hypotheses (Expert-identified frauds)		
	df	F-statistic	Sig	df	F-statistic	Sig	df	F-statistic	Sig
Structure	1	13.088	0.000	1	13.967	0.000	1	3.384	0.069
Rank	1	3.460	0.033*	1	2.780	0.049*	1	1.380	0.122*
Structure × Rank	1	14.977	0.000*	1	15.327	0.000*	1	4.732	0.016*
Covariate: Quantity of Fraud Risk Factors	1	39.916	0.000	1	29.856	0.000	1	8.143	0.005

Panel C: F-statistic of Simple Contrasts (p-value)

	Quantity of Fraud Hypotheses	Quality of Fraud Hypotheses (Expert-identified misstatements)	Quality of Fraud Hypotheses (Expert-identified frauds)
Non-Structured: Managers versus Seniors	16.255 (p = 0.000)*	15.408 (p = 0.000)*	5.563 (p = 0.010)*
Structured: Managers versus Seniors	1.889 (p = 0.086)*	2.384 (p = 0.063)*	0.462 (p = 0.249)*
Managers: Non-Structured versus Structured	21.228 (p = 0.000)	22.179 (p = 0.000)	6.091 (p = 0.015)
Seniors: Non-Structured versus Structured	0.008 (p = 0.928)	0.001 (p = 0.981)	0.048 (p = 0.826)

[a] Covariates appearing in the model are evaluated at the following values: quantity of fraud risk factors identified = 8.111.

*p-values are one-tailed for testing directional predictions. All other p-values in this table are two-tailed.

This table presents the descriptive statistics and analyses for the quantity and quality of fraud hypotheses generated by managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the quantity and quality of fraud hypotheses generated as the dependent variables.

Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each participant in the non-structured and structured groups. Redundant fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the 11 expert-identified misstatements in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the seven expert-identified frauds in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

4.2 MENTAL SIMULATIONS

4.2.1 Test of H3

H3 predicts that managers have more developed mental simulations than seniors, but the structured brainstorming platform will narrow the gap of the mental simulations between managers and seniors. Therefore, a significant difference between managers and seniors in general and an interaction between the form of brainstorming platform and rank are anticipated.

As explained in the Methodology section in Chapter 3, the data analyses of mental simulations in this study use the average of two coder's assessments. Additionally, there were two participants who did not answer this part of the question and were removed when analysing the data.

Table 4.3 compares the mental simulations of managers and seniors in the non-structured and structured groups. Panel A shows both the original means and the adjusted means of participants' mental simulation scores, also the differences of the mental simulation between managers and seniors within these two treatments groups. The analysis in Panel B is based on a 2 x 2 ANCOVA with the form of brainstorming platform (Non-Structured versus Structured) and rank (Manager versus Senior) as the independent variables, the quantity of fraud risk factors identified by each auditor as the covariate, and a mental simulation measure (Mental Simulation Index, Coherence, Applicability, and Completeness) as the dependent variable. The results show that the main effects of Rank are significant for Mental Simulation Index ($F = 5.401$, $p = 0.011$, one-tailed) and Coherence ($F = 4.369$, $p = 0.020$, one-tailed), and marginally significant for Completeness ($F = 2.746$, $p = 0.051$, one-tailed). While none of the two-way interactions for the mental simulations is significant. It reveals that the structured brainstorming platform does not have a differential effect on managers and seniors and therefore the gap between

managers' and seniors' mental simulations could not be narrowed. The simple contrasts in Panel C show that managers have a higher Mental Simulation Index (8.34 versus 6.71, p = 0.014, one-tailed), Coherence (2.95 versus 2.40, p = 0.046, one-tailed), and Applicability (2.98 versus 2.35, p = 0.049, one-tailed) scores than seniors in the non-structured groups. However, for the structured groups, there is no significant difference between managers and seniors in either measure of mental simulations. Overall, the structured brainstorming platform does not narrow the gap of the mental simulations between managers and seniors. Thus, H3 is partially supported.

Additional analyses in Panel C, Table 4.3 show that managers of the structured groups had marginally significantly lower scores than managers of the non-structured groups for the Mental Simulation Index (6.98 versus 8.34, p = 0.094, two-tailed) and for Applicability (2.15 versus 2.98, p = 0.051, two-tailed). However, there are no significant differences between seniors in the structured and non-structured treatments for either measure of mental simulations.

TABLE 4.3
Comparisons between Mental Simulations of Managers and Seniors in Non-Structured and Structured Groups

Panel A: Means and Adjusted Means of Mental Simulations

		Mean		Adjusted Mean	
		Non-Structured	Structured	Non-Structured	Structured
Mental Simulation Index	Manager	8.47 (n=18)	7.42 (n=18)	8.34[a] (n=18)	6.98[a] (n=18)
	Senior	6.28 (n=52)	6.33 (n=54)	6.71[a] (n=52)	6.21[a] (n=54)
	Difference			1.63	0.77
Coherence	Manager	2.97 (n=18)	2.97 (n=18)	2.95[a] (n=18)	2.88[a] (n=18)
	Senior	2.31 (n=52)	2.50 (n=54)	2.40[a] (n=52)	2.47[a] (n=54)
	Difference			0.55	0.41
Applicability	Manager	3.03 (n=18)	2.31 (n=18)	2.98[a] (n=18)	2.15[a] (n=18)
	Senior	2.19 (n=52)	2.04 (n=54)	2.35[a] (n=52)	2.00[a] (n=54)
	Difference			0.63	0.15
Completeness	Manager	2.47 (n=18)	2.14 (n=18)	2.42[a] (n=18)	1.95[a] (n=18)
	Senior	1.78 (n=52)	1.79 (n=54)	1.96[a] (n=52)	1.74[a] (n=54)
	Difference			0.46	0.21

TABLE 4.3 (continued)

Panel B: ANCOVA Results

	Mental Simulation Index			Coherence			Applicability			Completeness		
Source of Variance	df	F-statistic	Sig	df	F-statistic	Sig	df	F-statistic	Sig	df	F-statistic	Sig
Structure	1	3.275	0.073	1	0.000	0.983	1	4.822	0.030	1	2.992	0.087
Rank	1	5.401	0.011*	1	4.369	0.020*	1	2.109	0.075*	1	2.746	0.051*
Structure × Rank	1	0.769	0.192*	1	0.104	0.374*	1	0.880	0.175*	1	0.397	0.265*
Covariate: Quantity of Fraud Risk Factors	1	8.088	0.005	1	1.828	0.179	1	3.862	0.052	1	9.890	0.002

Panel C: F-statistic of Simple Contrasts (p-value)

	Mental Simulation Index	Coherence	Applicability	Completeness
Non-Structured: Managers versus Seniors	5.044 (p = 0.014)*	2.899 (p = 0.046)*	2.785 (p = 0.049)*	2.575 (p = 0.056)*
Structured: Managers versus Seniors	1.190 (p = 0.139)*	1.715 (p = 0.097)*	0.165 (p = 0.343)*	0.600 (p = 0.220)*
Managers: Non-Structured versus Structured	2.860 (p = 0.094)	0.034 (p = 0.855)	3.902 (p = 0.051)	2.217 (p = 0.140)
Seniors: Non-Structured versus Structured	0.678 (p = 0.412)	0.079 (p = 0.780)	1.214 (p = 0.273)	0.916 (p = 0.341)

[a] Covariates appearing in the model are evaluated at the following values: quantity of fraud risk factors identified = 8.038.

*p-values are one-tailed for testing directional predictions. All other p-values in this table are two-tailed.

This table presents the descriptive statistics and analyses for the mental simulations of managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the mental simulations as the dependent variables.

Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Coherence: how well the fraud risk factors, fraud hypotheses, and management perpetration of theses frauds are tied together, how well the steps follow each other, and whether the causal chain makes sense.

Applicability: whether the sequence of events causes the fraud.

Completeness: the extent to which the four potential revenue-related frauds are mentioned.

Coherence, Applicability, and Completeness are coded on a six-point scale, with 0 indicating “Extremely Low” and 5 indicating “Extremely High”.

Mental Simulation Index: the sum of Coherence, Applicability, and Completeness scores.

4.2.2 Correlation between auditors' mental simulations and their brainstorming performance in the fraud hypotheses generation task

Table 4.4 shows that auditors' mental simulation index scores are positively correlated with the quantity ($r = 0.263$, $p = 0.003$, one-tailed) and one quality measure (Expert-identified misstatements: $r = 0.274$, $p = 0.002$, one-tailed) of fraud hypotheses generated. While there is no significant correlation between auditors' mental simulation index scores and the other quality measure of fraud hypotheses generated (Expert-identified frauds: $r = 0.141$, $p = 0.075$, one-tailed). In addition, the Coherence scores of auditors' mental simulations are positively correlated with the quantity ($r = 0.162$, $p = 0.049$, one-tailed) of fraud hypotheses generated but not with either quality measure of fraud hypotheses generated (Expert-identified misstatements: $r = 0.135$, $p = 0.084$, one-tailed; Expert-identified frauds: $r = 0.103$, $p = 0.148$, one-tailed). Furthermore, the Applicability scores of auditors' mental simulations are positively correlated with one quality measure (Expert-identified misstatements: $r = 0.203$, $p = 0.018$, one-tailed) of fraud hypotheses generated but not with the other quality measure ($r = 0.055$, $p = 0.289$, one-tailed) and the quantity ($r = 0.107$, $p = 0.137$, one-tailed) of fraud hypotheses generated. Moreover, the Completeness scores of auditors' mental simulations are positively correlated with the quantity ($r = 0.368$, $p = 0.000$, one-tailed) and both quality measures (Expert-identified misstatements: $r = 0.299$, $p = 0.001$, one-tailed; Expert-identified frauds: $r = 0.183$, $p = 0.031$, one-tailed) of fraud hypotheses generated.

TABLE 4.4
Correlation between Auditors' Mental Simulation and Their Brainstorming Performance in the Fraud Hypotheses Generation Task

	Quantity of Fraud Hypotheses		Quality of Fraud Hypotheses (Expert-identified misstatements)		Quality of Fraud Hypotheses (Expert-identified frauds)	
	Coefficient	P-value (one-tailed)	Coefficient	P-value (one-tailed)	Coefficient	P-value (one-tailed)
Mental Simulation Index	0.263	**0.003**	0.274	**0.002**	0.141	0.075
Coherence	0.162	**0.049**	0.135	0.084	0.103	0.148
Applicability	0.107	0.137	0.203	**0.018**	0.055	0.289
Completeness	0.368	**0.000**	0.299	**0.001**	0.183	**0.031**

All p-values in this table are one-tailed.
Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each participant in the non-structured and structured groups. Redundant fraud hypotheses across group members within the same group are retained for this analysis.
Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the 11 expert-identified frauds which are daggered (†) in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this analysis.
Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the seven expert-identified frauds which are asterisked (*) in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this analysis.
Coherence: how well the fraud risk factors, fraud hypotheses, and management perpetration of theses frauds are tied together, how well the steps follow each other, and whether the causal chain makes sense.
Applicability: whether the sequence of events causes the fraud.
Completeness: the extent to which the four potential revenue-related frauds are mentioned.
Coherence, Applicability, and Completeness are coded on a six-point scale, with 0 indicating "Extremely Low" and 5 indicating "Extremely High".
Mental Simulation Index: the sum of Coherence, Applicability, and Completeness scores.

4.3 FRAUD RISK ASSESSMENTS

SAS No. 99 and ISA 240 require auditors to assess the likelihood that potential frauds may occur. As mentioned above in the Methodology in Chapter 3, each participant was required to provide fraud risk assessments three times on three individual 11-point Likert scales, with 0 indicating "Extremely Unlikely" and 10 indicating "Extremely Likely". Since participants were asked to provide fraud risk assessments three times, there are two changes in their fraud risk assessments. This study first explores whether managers and seniors of the non-structured groups and the structured groups vary with regard to the extent of changes in their fraud risk assessments.

Table 4.5 shows the comparisons between fraud risk assessments and the changes in fraud risk assessments by managers and seniors in non-structured and structured groups. Panel A presents both the original means and adjusted means of fraud risk assessments and change in fraud risk assessments. The following data analyses are based on the adjusted means. The ANCOVA results in Panel B show that the two-way interaction for the change in fraud risk assessment from fraud risk assessment 1 to fraud risk assessment 2 is marginally significant ($F = 3.284$, $p = 0.073$, two-tailed). It indicates that the change in fraud risk assessment from fraud risk assessment 1 to fraud risk assessment 2 is different for managers and seniors in the structured groups. However, the two-way interaction for the change in fraud risk assessment from fraud risk assessment 2 to fraud risk assessment 3 is not significant ($F = 2.183$, $p = 0.143$, two-tailed). Comparisons between treatments in Panel C show that seniors of the structured groups negatively change their fraud risk assessments compared with seniors in the non-structured groups, after they have completed brainstorming of fraud hypotheses (0.10 versus -0.31, $p = 0.094$, two-tailed). One possible reason for this significant difference between seniors is that

managers in the structured groups generate significantly lower quantity of fraud hypotheses than managers in the non-structured groups which makes the potential frauds of the client look less salient to seniors.

Table 4.6 shows that there is no significant correlation between auditors' changes in fraud risk assessments and their brainstorming performance in the fraud risk factors identification task and the fraud hypotheses generation task.

TABLE 4.5
Comparisons between Fraud Risk Assessments and the Changes in Fraud Risk Assessments by Managers and Seniors in Non-Structured and Structured Groups

Panel A: Means and Adjusted Means of Fraud Risk Assessments and Change in Fraud Risk Assessments

		Mean		Adjusted Mean	
		Non-Structured	Structured	Non-Structured	Structured
Fraud Risk Assessment 1	Manager	6.00 (n = 18)	5.56 (n = 18)	6.00[a] (n = 18)	5.57[a] (n = 18)
	Senior	5.69 (n = 35)	5.33 (n = 36)	5.67[a] (n = 35)	5.34[a] (n = 36)
Fraud Risk Assessment 2	Manager	6.67 (n = 18)	5.83 (n = 18)	6.27[b] (n = 18)	5.82[b] (n = 18)
	Senior	6.03 (n = 35)	5.92 (n = 36)	6.00[b] (n = 35)	6.15[b] (n = 36)
Fraud Risk Assessment 3	Manager	6.61 (n = 18)	6.00 (n = 18)	6.31[b] (n = 18)	6.04[b] (n = 18)
	Senior	6.17 (n = 35)	5.64 (n = 36)	6.10[b] (n = 35)	5.84[b] (n = 36)
Change in Fraud Risk Assessment from Fraud Risk Assessment 1 to Fraud Risk Assessment 2	Manager	0.67 (n = 18)	0.28 (n = 18)	0.68[b] (n = 18)	0.22[b] (n = 18)
	Senior	0.33 (n = 35)	0.58 (n = 36)	0.40[b] (n = 35)	0.55[b] (n = 36)
Change in Fraud Risk Assessment from Fraud Risk Assessment 2 to Fraud Risk Assessment 3	Manager	-0.06 (n = 18)	0.17 (n = 18)	0.04[b] (n = 18)	0.22[b] (n = 18)
	Senior	0.14 (n = 35)	-0.28 (n = 36)	0.10[b] (n = 35)	-0.31[b] (n = 36)

Panel B: ANCOVA Results

	Change in Fraud Risk Assessment from Fraud Risk Assessment 1 to Fraud Risk Assessment 2			Change in Fraud Risk Assessment from Fraud Risk Assessment 2 to Fraud Risk Assessment 3		
Source of Variance	df	F-statistic	Sig	df	F-statistic	Sig
Structure	1	0.718	0.399	1	0.299	0.585
Rank	1	0.022	0.881	1	1.219	0.272
Structure * Rank	1	3.284	0.073	1	2.183	0.143
Covariate: Risk Assessment 1	1	1.742	0.190	1	11.895	0.001
Quantity of Fraud Risk Factors	1	1.176	0.281	1	1.083	0.301

Panel C: F-statistic of Simple Contrasts (p-value)

	Change in Fraud Risk Assessment from Fraud Risk Assessment 1 to Fraud Risk Assessment 2		Change in Fraud Risk Assessment from Fraud Risk Assessment 2 to Fraud Risk Assessment 3	
	Manager	Senior	Manager	Senior
Non-Structured Groups versus Structured Groups	2.687 (p = 0.104)	0.591 (p = 0.444)	0.305 (p = 0.582)	2.859 (p = 0.094)

[a] Covariates appearing in the model are evaluated at the following values: Quantity of Fraud Risk Factors = 8.103.
[b] Covariates appearing in the model are evaluated at the following values: Fraud Risk Assessment 1 = 5.598, Quantity of Fraud Risk Factors = 8.103. All p-values in this table are two-tailed.
This table presents the descriptive statistics and analyses for the changes in fraud risk assessment by managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the changes in fraud risk assessments being the dependent variables.
Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.
Fraud Risk Assessment 1: participants' fraud risk assessments directly after reading the case, but before the brainstorming.
Fraud Risk Assessment 2: participants' fraud risk assessments after the brainstorming of fraud risk factors.
Fraud Risk Assessment 3: participants' fraud risk assessments after the brainstorming of fraud hypotheses.

TABLE 4.6

Correlations between Changes in Fraud Risk Assessments and Main DVs of Managers and Seniors in Non-Structured and Structured Groups

		Change in fraud risk assessment from risk assessment 1 to risk assessment 2 & Quantity of fraud risk factors		Change in fraud risk assessment from risk assessment 2 to risk assessment 3 & Quantity of fraud hypotheses		Change in fraud risk assessment from risk assessment 2 to risk assessment 3 & Quality of risk hypotheses (Expert-identified misstatements)		Change in fraud risk assessment from risk assessment 2 to risk assessment 3 & Quality of risk hypotheses (Expert-identified frauds)	
		r	P value (two-tails)	r	P value (two-tails)	r	P value (two-tails)	r	P value (two-tails)
Non-Structured	Manager	0.307	0.231	0.079	0.764	-0.122	0.640	-0.177	0.498
	Senior	-0.087	0.624	-0.065	0.715	-0.060	0.737	0.168	0.343
Structured	Manager	0.119	0.650	-0.039	0.881	0.006	0.981	-0.016	0.953
	Senior	0.154	0.376	-0.017	0.924	-0.057	0.746	-0.143	0.411

Covariate: Fraud Risk Assessment 1. All p-values in this table are two-tailed.

Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Fraud Risk Assessment 1: participants' fraud risk assessments directly after reading the case, but before the brainstorming.

Fraud Risk Assessment 2: participants' fraud risk assessments after the brainstorming of fraud risk factors.

Fraud Risk Assessment 3: participants' fraud risk assessments after the brainstorming of fraud hypotheses.

Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each participant in the non-structured and structured groups. Redundant fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the 11 expert-identified misstatements in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the seven expert-identified fraud in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

4.4 ADDITIONAL ANALYSES

4.4.1 Parent-Child Fraud Hypotheses

Table 4.7 presents relevant statistics to explore who used the structured brainstorming platform more frequently to make child-hypotheses and whose parent-hypotheses did those child-hypotheses build upon. There are 67 and 142 parent-hypotheses generated by 18 managers and 36 seniors in the structured groups, respectively. For the 67 parent-hypotheses generated by managers, 55 out of them (82.09%) are pure parent-hypotheses, which means that there are no additional child-hypotheses built upon them. The percentage of pure parent-hypotheses is similar for the parent-hypotheses generated by seniors (114 out of 142, 80.28%). The high percentages of pure parent-hypotheses demonstrate that the main function of the brainstorming platform, namely, the "parent-child ideas" function, is rarely utilised by participants. On the other hand, managers built a higher percentage of child-hypotheses on his/her own parent-hypotheses (6 out of 67, 8.96%) than seniors (3 out of 142, 2.11%). The untabulated result of the z-test shows that 8.96% is significantly different from 2.11% ($p = 0.023$, two-tailed). While these percentages are small, this provides more support for the argument in Chapter 2 that managers are more likely to fixate on certain ideas, namely his/ her own parent-hypotheses. It is also consistent with the findings related to social loafing of seniors found in Chen et al. (2015b) who suggest that social loafing relates to seniors not believing their own contributions will be valuable to the group.

TABLE 4.7
Child-Hypotheses Analyses Based On Managers' and Seniors' Parent-Hypotheses

		Manager (n =18)				**Senior (n =36)**				
Quantity of Fraud Hypotheses	**Number of Parent-Hypotheses (% of a. Total)**	With Child-Hypotheses		Without Child-Hypotheses	Total	With Child-Hypotheses			Without Child-Hypotheses	Total
		4 (5.97%)		55 (82.09%)	59 (88.06%)	10 (7.04%)			114 (80.28%)	124 (87.32%)
	Number of Child-Hypotheses (% of a. Total)	Manager based on His/ Her Own Parent Idea	Two Seniors in the Group	N/A		Senior on His/ Her Own Parent Idea	Another senior in the Group	Manager in the Group	N/A	
		6 (8.96%)	2 (2.99%)		8 (11.94%)	3 (2.11%)	9 (6.34%)	6 (4.23%)		18 (12.68%)
	Total Number of Parent and Child Hypotheses				**67**					**142**

4.4.2 Post-experimental questionnaire

4.4.2.1 Evaluation Apprehension

Evaluation apprehension refers to individuals withholding ideas due to fear of negative evaluation of their ideas (Chen et al. 2015b). In the post-experimental questionnaire, four individual statements [26] were presented to assess participants' perceived evaluation apprehension and participants were asked to indicate their agreement to each statement on a seven-point Likert scale, with 1 indicating "Strongly Disagree" and 7 indicating "Strongly Agree". Data analyses show that the extent of participants' perceived evaluation apprehension is quite low and there is no significant difference between participants in the non-structured groups and the structured groups (S1: 1.78 versus 1.69, t = 0.450, p = 0.653, two-tailed; S2: 1.93 versus 1.69, t = 1.068, p = 0.288, two-tailed; S3: 2.00 versus 1.96, t = 0.137, p = 0.891, two-tailed; S4: 1.72 versus 1.72, t = 0.000, p = 1.000, two-tailed). The results support the view that the evaluation apprehension problem could be mitigated by using electronic brainstorming (Gallupe, Dennis, Cooper, Valacich, Bastianutti, and Nunamaker 1992; Paulus 2000; Michinov 2012; Paulus, Kohn, Arditti, and Korde 2013).

4.4.2.2 Perceived Difficulty

In the post-experimental questionnaire, participants were also asked to assess the level of perceived difficulty of the fraud risk factors identification task and the fraud hypotheses generation task respectively, on an 11-point Likert scale, with 0 being Extremely Easy and 10 being Extremely Difficult. This study investigates whether there are any significant differences between participants in their perceived difficulties of these two

[26] The four statements are: 1) I was reluctant to offer an idea for fear of criticism from other members; 2) I was inhibited in offering an idea due to the presence of others; 3) Although no overt criticism was expressed, I was reluctant to offer an idea that was 'way out,' for fear of disapproval from members; 4) I withheld ideas for fear of possible disapproval from other members.

brainstorming tasks. The results are shown in the following two tables. Table 4.8 and Table 4.9 respectively present a comparison of perceived difficulty of the fraud risk factors identification task and the fraud hypotheses generation task between managers and seniors in the non-structured and structured groups. Since the perceived difficulty of brainstorming tasks is believed to be associated with auditors' fraud-related experience (Hammersley 2011), this study conducts four ANCOVA for both perceived difficulties[27] controlling: (1) the fraud detection experience of participants (whether they had been involved in an audit engagement where a material misstatement due to fraud had been discovered); (2) the number of fraud detections of participants (in how many engagements did they experience a material misstatement due to fraud); (3) the fraud training experience of participants (how many hours of fraud detection training did they receive in the most recent two years); (4) all the above three fraud-related experience variables. As can be seen from Table 4.8 and Table 4.9, the main effects of Rank are significant for both the perceived difficulty of the fraud risk factors identification task (F-value = 10.57, p = 0.002, two-tailed) and the fraud hypotheses generation task (F-value = 8.37, p = 0.005, two-tailed). The results demonstrate that seniors perceive both tasks (fraud risk factors identification and the fraud hypotheses generation) to be more difficult than managers do and the manipulation of brainstorming structure has no significant effect on perceived difficulty. The above results hold when each of these controls is included.

[27] For all the data analyses related to perceived difficulties, this study uses the real rank rather than the adjusted rank of participants because perceived difficulties are personal-based.

TABLE 4.8
Comparison of Perceived Difficulty of the Fraud Risk Factors Identification Task between Managers and Seniors in Non-Structured and Structured Groups

Panel A: Means of Difficulty 1 of Managers and Seniors

	No Control		**Controlling fraud detection experience**		**Controlling fraud detection number**		**Controlling fraud training experience**		**Controlling all three variables**	
	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured
Manager	3.28	2.61	3.29	2.61	3.28	2.61	3.30	2.58	3.30	2.60
Senior	4.00	4.11	4.00	4.11	4.03	4.11	4.00	4.12	4.03	4.11

Panel B: ANOVA and ANCOVA Results

Source of Variation	F-value	Sig.	F-value	Sig.	F-value	Sig.	F-value	Sig.	F-value	Sig.
Structure	0.66	0.418	0.69	0.409	0.71	0.401	0.75	0.388	0.83	0.364
Rank	10.57	0.002	10.38	0.002	10.62	0.002	10.66	0.001	10.36	0.002
Structure * Rank	1.30	0.258	1.33	0.252	1.16	0.283	1.45	0.231	1.26	0.265

All p-values in this table are two-tailed.
This table presents the descriptive statistics and analyses for the perceived difficulties of managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANOVA/ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the perceived difficulties being the dependent variables.
Fraud detection experience: whether an auditor had been involved in an audit engagement where a material misstatement due to fraud had been discovered.
Fraud detection number: the number of engagements in which an auditor experienced a material misstatement due to fraud.
Fraud training experience: the number of hours of fraud detection training which an auditor had received in the most recent two years.
For the perceived difficulty of the fraud risk factors identification task, participants were asked to assess on a 11-point Likert scale with 0 being Extremely Easy and 10 being Extremely Difficult.

TABLE 4.9
Comparison of Perceived Difficulty of the Fraud Hypotheses Generation Task between Managers and Seniors in Non-Structured and Structured Groups

Panel A: Means of Difficulty 2 of Managers and Seniors

	No Control		Controlling fraud detection experience		Controlling fraud detection number		Controlling fraud training experience		Controlling all three variables	
	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured	Non-Structured	Structured
Manager	3.67	3.61	3.68	3.61	3.66	3.62	3.67	3.61	3.67	3.66
Senior	4.53	4.94	4.53	4.94	4.55	4.94	4.53	4.94	4.55	4.91

Panel B: ANOVA and ANCOVA Results

Source of Variation	F-value	Sig.	F-value	Sig.	F-value	Sig.	F-value	Sig.	F-value	Sig.
Structure	0.23	0.635	0.21	0.650	0.22	0.640	0.23	0.635	0.22	0.644
Rank	8.37	0.005	8.20	0.005	8.31	0.005	8.26	0.005	7.79	0.006
Structure * Rank	0.39	0.535	0.41	0.524	0.30	0.583	0.37	0.544	0.24	0.626

All p-values in this table are two-tailed.
This table presents the descriptive statistics and analyses for the perceived difficulties of managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANOVA/ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the perceived difficulties being the dependent variables.
Fraud detection experience: whether an auditor had been involved in an audit engagement where a material misstatement due to fraud had been discovered.
Fraud detection number: the number of engagements in which an auditor experienced a material misstatement due to fraud.
Fraud training experience: the number of hours of fraud detection training which an auditor had received in the most recent two years.
For the perceived difficulty of the fraud hypotheses generation task, participants were asked to assess on a 11-point Likert scale with 0 being Extremely Easy and 10 being Extremely Difficult.

4.4.3 Robustness

4.4.3.1 Test of H1a and H1b

As mentioned at the beginning of this chapter, there are three groups having two managers and one senior and three groups having three seniors. This study completes an additional analysis by removing these six groups to check the robustness of the results of H1a and H1b. The following Table 4.10 shows that the results of H1a and H2b in Table 4.1 still hold after removing those six groups. Specifically, there is no significant difference between the non-structured and structured groups in the quantity (9.04 versus 7.97, p = 0.151, two-tailed) and quality (expert-identified misstatements: 5.74 versus 5.07, p = 0.135, two-tailed; expert-identified frauds: 2.30 versus 1.69, p = 0.138, two-tailed) of fraud hypotheses generated.

TABLE 4.10

The Quantity and Quality of Fraud Hypotheses Generated

in Non-Structured and Structured Groups

(Six Groups Removed)

Adjusted Means of the Quantity and Quality of Fraud Hypotheses Generated

	Non-Structured	Structured	Difference	Sig. (two-tails)
Quantity of Fraud Hypotheses	9.04[a]	7.97[a]	1.07	0.151
Quality of Fraud Hypotheses (Expert-identified misstatements)	5.74[a]	5.07[a]	0.67	0.135
Quality of Fraud Hypotheses (Expert-identified frauds)	2.30[a]	1.69[a]	0.61	0.138

[a] Covariates appearing in the model are evaluated at the following values: quantity of fraud risk factors identified = 17.27.

Non-Structured: groups using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: groups using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each non-structured and structured group. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.

Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each non-structured and structured group that are among the 11 expert-identified misstatements in Table 3.1. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.

Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each non-structured and structured group that are among the seven expert-identified frauds in Table 3.1. Redundant fraud hypotheses across group members within the same group are excluded for this group-level analysis.

4.4.3.2 Test of H2a and H2b

Recall that in testing of H2a and H2b, individual participant's adjusted rank was used. The following data analyses use individual participant's actual rank to check the robustness of the results shown in Table 4.2 related to H2a and H2b. The results, which are displayed in the following Table 4.11, show that the findings in Table 4.2 still hold: managers generate a greater quantity and higher quality of fraud hypotheses than seniors, but this effect is weaker for the structured brainstorming platform when compared with the non-structured brainstorming platform. Specifically, the two-way interactions for the quantity (F= 11.095, p = 0.001, one-tailed) and quality of fraud hypotheses (Expert-identified misstatements: F = 8.947, p = 0.002, one-tailed; Expert-identified frauds: F = 2.993, p = 0.044, one-tailed) are significant. Furthermore, the simple contrasts also show that managers generate a significantly greater quantity (5.35 versus 3.82, p = 0.001, one-tailed) and higher quality (Expert-identified misstatements: 3.51 versus 2.55, p = 0.005, one-tailed; Expert-identified frauds: 1.13 versus 0.75, p = 0.044, one-tailed) of fraud hypotheses than seniors in the non-structured groups. However, there are no significant differences in the quantity (3.17 versus 3.78, p = 0.095, one-tailed) and quality (Expert-identified misstatements: 1.91 versus 2.43, p = 0.071, one-tailed: Expert-identified frauds: 0.60 versus 0.75, p = 0.254, one-tailed) of fraud hypotheses generated by managers and seniors in the structured groups.

TABLE 4.11
Comparisons between the Quantity and Quality of Fraud Hypotheses Generated by Managers and Seniors in Non-Structured and Structured Groups
(Use each individual participant's actual rank)

Panel A: Means and Adjusted Means of Quantity and Quality of Fraud Hypotheses Generated

		Mean		Adjusted Mean		
		Non-Structured	Structured	Non-Structured	Structured	Difference
Quantity of Fraud Hypotheses	Manager	5.50 (n=18)	3.72 (n=18)	5.35[a] (n=18)	3.17[a] (n=18)	2.18
	Senior	3.33 (n=36)	3.92 (n=36)	3.82[a] (n=36)	3.78[a] (n=36)	-0.04
	Difference			1.53	-0.61	
Quality of Fraud Hypotheses (Expert-identified misstatements)	Manager	3.61 (n=18)	2.28 (n=18)	3.51[a] (n=18)	1.91 [a] (n=18)	1.60
	Senior	2.22 (n=36)	2.53 (n=36)	2.55[a] (n=36)	2.43[a] (n=36)	0.12
	Difference			0.96	-0.52	
Quality of Fraud Hypotheses (Expert-identified frauds)	Manager	1.17 (n=18)	0.72 (n=18)	1.13[a] (n=18)	0.60[a] (n=18)	0.53
	Senior	0.64 (n=36)	0.78 (n=36)	0.75[a] (n=36)	0.75[a] (n=36)	0.00
	Difference			0.38	-0.15	

TABLE 4.11 (continued)

Panel B: ANCOVA Results

Source of Variance	Quantity of Fraud Hypotheses			Quality of Fraud Hypotheses (Expert-identified misstatements)			Quality of Fraud Hypotheses (Expert-identified frauds)		
	df	F-statistic	Sig	df	F-statistic	Sig	df	F-statistic	Sig
Structure	1	11.307	0.001	1	11.280	0.001	1	2.821	0.096
Rank	1	1.949	0.133*	1	0.708	0.201*	1	0.565	0.227*
Structure × Rank	1	11.095	0.001*	1	8.947	0.002*	1	2.993	0.044*
Covariate: Quantity of Fraud Risk Factors	1	35.224	0.000	1	26.684	0.000	1	7.517	0.007

Panel C: F-statistic of Simple Contrasts (p-value)

	Quantity of Fraud Hypotheses	Quality of Fraud Hypotheses (Expert-identified misstatements)	Quality of Fraud Hypotheses (Expert-identified frauds)
Non-Structured: Managers versus Seniors	10.836 (p = 0.001)*	7.087 (p = 0.005)*	2.989 (p = 0.044)*
Structured: Managers versus Seniors	1.743 (p = 0.095)*	2.203 (p = 0.071)*	0.444 (p = 0.254)*
Managers: Non-Structured versus Structured	17.162 (p = 0.000)	15.473 (p = 0.000)	4.451 (p = 0.037)
Seniors: Non-Structured versus Structured	0.015 (p = 0.902)	0.162 (p = 0.688)	0.000 (p = 0.995)

[a] Covariates appearing in the model are evaluated at the following values: quantity of fraud risk factors identified = 8.111.

*p-values are one-tailed for testing directional predictions. All other p-values in this table are two-tailed.

This table presents the descriptive statistics and analyses for the quantity and quality of fraud hypotheses generated by managers and seniors in the non-structured and structured groups. This study conducts a 2 x 2 ANCOVA analysis with Structure (Non-structured versus Structured) and Rank (Manager versus Senior) being the independent variables and the quantity and quality of fraud hypotheses generated as the dependent variables.

Non-Structured: individuals using the non-structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Structured: individuals using the structured brainstorming platform for interacting electronic brainstorming of fraud hypotheses.

Quantity of fraud hypotheses: the number of unique valid fraud hypotheses generated which are listed in Table 3.1 by each participant in the non-structured and structured groups. Redundant fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified misstatements): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the 11 expert-identified misstatements in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

Quality of fraud hypotheses (expert-identified frauds): the number of fraud hypotheses generated by each participant in the non-structured and structured group that are among the seven expert-identified frauds in Table 3.1. Redundant expert-identified fraud hypotheses across group members within the same group are retained for this individual-level analysis.

CHAPTER 5

CONCLUSION

5.1 CONCLUSION

This study investigates whether a structured interacting electronic brainstorming platform affects auditors' fraud brainstorming performance in a three-person hierarchical group when compared with a non-structured interacting electronic brainstorming platform, the latter previously being used in practice. Fraud brainstorming performance is measured by the quantity and quality of fraud hypotheses generated. Furthermore, this study investigates whether this structured interacting electronic brainstorming platform has a differential effect on the brainstorming performance of fraud hypotheses generation and mental simulation of auditors with varying ranks, seniors versus managers. Additionally, this study also explores the correlations between auditors' brainstorming performance in the fraud hypotheses generation task and the changes in their fraud risk assessments.

This study has five major findings. First, this study finds that there are no significant differences between the structured and non-structured groups in the quantity and quality of fraud hypotheses generated. Second, this study finds that managers generate a significantly greater quantity and higher quality of fraud hypotheses than seniors, but this gap between managers and seniors is reduced by the use of the structured brainstorming platform. Third, this study provides evidence that managers have more developed mental simulations than seniors, and the structured brainstorming platform does not narrow the gap between managers and seniors for these mental simulations. Fourth, there is no significant correlation between auditors' brainstorming performance in fraud hypotheses

generation tasks and changes in their fraud risk assessments. Fifth, additional analyses show that the structured brainstorming platform has negative effects on the brainstorming performance and the mental simulations of managers. Specifically, managers in the structured groups generate significantly fewer quantity and lower quality of fraud hypotheses than managers in the non-structured groups and the mental simulations of managers in the structured groups are less developed than managers in the non-structured groups. This is likely because the structured brainstorming platform conflicts with the existing knowledge structures of managers. However, the structured brainstorming platform does not have a significant effect on seniors' brainstorming performance and their mental simulations.

This study contributes to the fraud brainstorming literature by first comparing the effectiveness of two forms of interacting electronic brainstorming platforms in fraud hypotheses generation tasks. By doing so, this study responds to the call from Trotman et al. (2015) who advocate the conduct of auditing research to explore the most appropriate form of electronic brainstorming. This study introduces and implements a structured interacting electronic brainstorming platform which has been claimed to be useful in other areas in the audit fraud context. The results of this study show that the structured interacting electronic brainstorming platform does not improve the three-person hierarchical audit groups' brainstorming performance in fraud hypotheses generations and even has an unfavourable effect on managers. In addition, this study contributes to the decision aid literature. Dennis and Johnstone (2016) find that the effect of their intervention, which is the prompted leadership, is conditional on the level of knowledge of auditors in interacting brainstorming. Specifically, they find that prompted leadership could improve the brainstorming performance and mental representations of seniors but

not managers. This study claims that an intervention could even be disadvantageous for managers in the brainstorming task in terms of fraud hypotheses generations.

The results of this study also have practical implications for audit firms. Although the most commonly used brainstorming method in audit firms is face-to-face brainstorming, both the psychology and auditing literatures argue that face-to-face brainstorming is outperformed by alternative brainstorming methods, including electronic brainstorming. In addition, due to the increased use of electronic workpapers and electronic reviews, it is likely that audit firms wish to improve the effectiveness of electronic brainstorming. This study compares the effectiveness of two forms of interacting electronic brainstorming platforms and finds that a structured interacting electronic brainstorming platform has some potential negative effects with regard to the fraud brainstorming performance of managers. The results suggest that audit firms should consider whether an electronic intervention might conflict with the existing knowledge structures of managers before implementing electronic intervention for fraud brainstorming.

This study has limitations which warrant future research. First, this study only considers auditors' performance in the first three stages of the fraud brainstorming process, and it does not examine the last stage which involves the modification of audit procedures. As noted in Hammersley (2011), the generation of greater quantity and higher quality of fraud hypotheses does not necessarily result in more appropriate audit tests. Future research could investigate whether auditors' performance in the brainstorming process has any significant effect on their potential selection of tests when planning audit procedures.

Second, in both interacting electronic brainstorming treatments in this study, the communication between group members is anonymous. However, in practice, the brainstorming sessions could be anonymous or not. Thus, the anonymous setting limits the generalisability of the research in this study if the brainstorming is not anonymous.

Third, the data in Table 4.7 in Section 4.4.1. shows that participants in the structured groups make little use of the "parent-child ideas" function in the structured brainstorming platform. However, the reasons for this outcome are unknown and this warrants future research.

There are other potential topics for future research. Trotman et al. (2015) claim that an important focus of future fraud brainstorming research should be to explore ways to reduce process losses. Since the electronic brainstorming is effective in mitigating the productivity loss problems of production blocking and evaluation apprehension, a promising research area is to explore how to alleviate the problem of social loafing. Social loafing of audit seniors has been found in interacting electronic brainstorming (Chen et al. 2015b). Psychology researchers suggest that the problem of social loafing could be mitigated by social comparison between group members (Shepherd, Briggs, Reinig, Yen, and Nunamaker 1995; Ellemers, De Gilder, and Haslam 2004; Michinov and Primois 2005; Dennis et al. 2013). One facilitation technique for social comparison which has been frequently used in psychology experiments is providing performance feedback of all group members to participants. Future research could provide real-time performance feedback of all auditors in a three-person hierarchical group and examine whether it could mitigate the problem of social loafing of the less-experienced auditors in the interacting electronic brainstorming context. For example, researchers could program and add an electronic scorecard on the computer screen to show the quantities of fraud hypotheses

generated by every auditor in the group. The upward social comparison might lessen the problem of social loafing among less-experienced auditors and enhance the effectiveness of interacting electronic brainstorming in the audit fraud context.

Another promising future research topic is to investigate whether presenting ideas discussed in previous brainstorming sessions have any effect on auditors' performance in the following brainstorming session. One of the important advantages of computerised communication is that the communication details and evidence are fully recorded and preserved which ensures a user-friendly access to desired information (Dennis, Valacich, Carte, Garfield, Haley, and Aronson 1997). Audit firms should take advantage of this technology. Specifically, access to electronic records of previous brainstorming sessions could assist auditors, especially less-experienced auditors, to become familiar with the background of a client. In addition, presenting ideas discussed in the previous brainstorming sessions is a type of priming which is believed to be able to influence group performance in interacting electronic brainstorming (Postmes, Spears, Sakhel and De Groot 2001). Although Hammersley et al. (2010) have introduced priming in the audit fraud brainstorming context, they have not completed a brainstorming session or investigated the influence of priming on auditors' brainstorming performance.

Moreover, future research could adopt the eye-tracking technology to investigate what types of and whose fraud hypotheses arouse the most interest of other group members and when auditors pay greater attention to other group members' hypotheses generations. This could lead to greater understanding of cognitive stimulation in brainstorming sessions.

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APPENDIX 1
CASE

Assume that you have been assigned to the audit of Beta Ltd.

On the pages that follow is an abbreviated version of Beta's *'Understanding the Entity'* document. Please spend up to 7 minutes reading this material to become familiar with the company and its environment.

You will be able to refer to this information while brainstorming and making the audit judgments asked of you in this study.

IV. Understanding the entity [KAM 3376]

A. Entity's business and its industry and environment [KAM 3391]

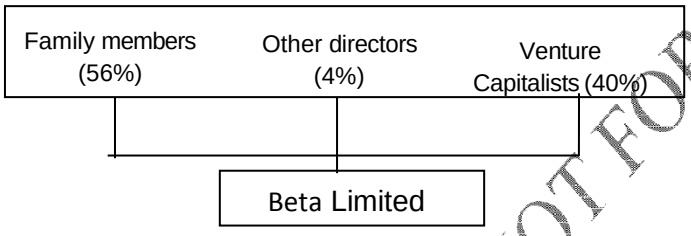
1. Entity's business

a. Legal and operating structure

Beta is a fashion retailer operating in Euroland through retail stores. It also makes wholesale sales. It offers fashion clothes designed primarily for the 18-30 market.

Beta is registered in Euroland, and is required to comply with Euroland Company Law. The Company has 35 stores, which are all based in Euroland (including the 3 stores which were purchased in the year). In the past few years management has expanded its wholesale sales geographically into new markets, in order to meet the growth targets of the Venture Capitalists. These operations continue to be controlled from Euroland, by the divisional heads.

Legal structure and ownership structure



There has been no change in the legal structure or ownership in the year.

Governance

The Board of Directors has five executives and three non-executive directors. Two of the non-executives have been appointed in the year. Apart from the new appointments, there have been no changes in governance structure in the year.

The CEO, COO and Design and Procurement Director have each been in the business for over 20 years, and have a good understanding of both Beta and the retail sector. The Sales and Marketing Director and CFO also have many years of experience within retail.

The Executive Committee comprises the following individuals, with the following responsibilities:

CEO - Overall development of Beta, property acquisitions and dealings. Retail operations and development, sales promotion and marketing.

Design and Procurement Director - Original designs for Beta garments.

COO - Buying and merchandising, warehouse distribution, systems (except accounting systems). Has significant range of responsibilities and particularly large workload at present.

Sales and Marketing Director - Sales promotions and advertising

CFO - Finance function, accounting systems, company secretary, HR

Three non-executive Directors – Attend all Executive Committee meetings and Audit Committee meeting

The three non-executive directors make up the Audit Committee. The CFO sits on the Audit Committee by invitation. The Audit Committee was set up on the advice of the Big 4 to improve corporate governance. The aim of the Audit Committee is to:

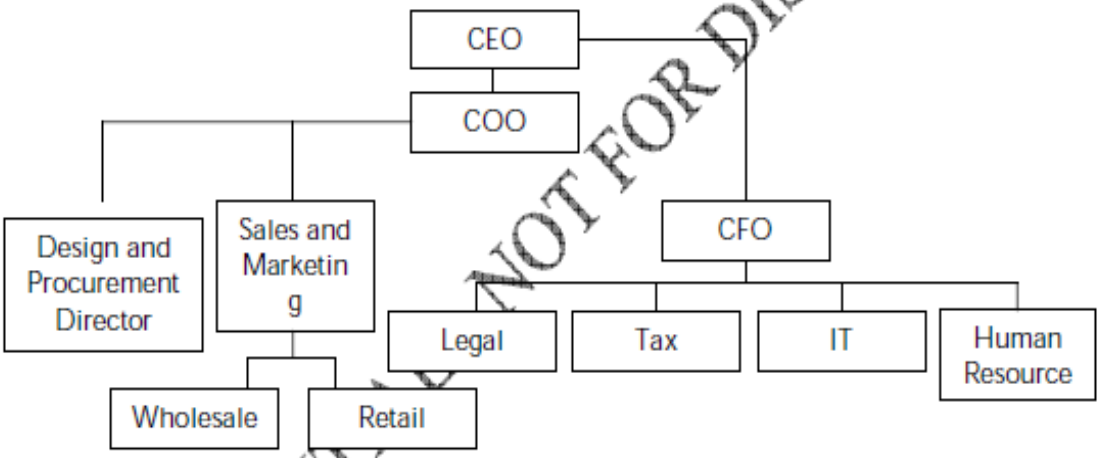
- Liaise directly with the external auditors about the year end accounts; and
- Review and guide the work of the internal audit department.

The internal audit department (IA) comprises a manager and two staff. IA reports directly to the Audit Committee, which summarises key findings and reports these to the Executive Committee. IA produces an annual internal audit plan, which is amended and approved by the Audit Committee. The audit plan details, which stores are to be visited on which dates. The activities of IA focus primarily on store operations and include:

- Inventory test counts and test of controls;
- Bank reconciliations;
- Sales reconciliations; and
- Ad-hoc projects as instructed by the Audit Committee.

Internal audit plans to visit all stores at least once per year. Problem stores are visited more frequently.

Operating structure



There has been no change in the operating structure in the year.

The Finance department includes the Head of Tax, the in-house legal counsel and the Head of IT. The Ethics Officer is part of the human resources department.

Lines of communication are not formally defined, and the CEO has a hands on role in daily operations. However, each division is headed up by a director who sits on the Executive Committee.

a. Objectives and strategies

Objectives	**Strategy and method of implementing strategy**
Increase market share by 1% per annum, of fashionable clothing for 18-30 year olds.	*Use known and credible designers* Beta recruits designers who are known in the media and promotes them. This increases its brand image and markets the specific products concerned. *Continue to update store design to latest customer wishes* Beta is in the process of updating its store design in its largest stores.
Increase revenue cumulatively by 45% by 31 January 08	*More domestic stores* Beta is in the process of opening a number of new domestic stores. Beta plans to open a further 5 to 7 new domestic stores in 2006 with the new store design. *Expansion in non-domestic market* In order to increase revenue further, wholesale sales in the international markets are being expanded. *Right product / right place / right time / right quantity* Inventory management and logistics are critical.

a. Conduct of operations

Stages of production

The key operational activities may be summarized as follows:

- Range planning and designing
- Supplier selection and buying
- Inventory management and logistics
- Marketing
- Sales

Delivery of products

Beta has a large portfolio of domestic stores, which are a mixture of leased and owned. Wholesale sell to retail and large wholesale customers. In order to increase revenue, a program has been established for opening new stores (3 have been opened in the year, with a further 5 – 7 planned for 2006). Further wholesale sales in international markets are being pushed.

d. Customers

The customer groups may be split into three categories, retail, wholesale (domestic and foreign) and concession income.

- Retail – Customers pay with cash, debit cards, or credit cards. There are no contracts with these customers and there are no warranties. 80% of transactions are paid for with cash or debit cards, the remaining is paid for using credit cards. The credit card companies typically make one payment, on the Monday of every week, which covers all transactions in the previous 7 day period. This is paid directly into Beta's bank account. Customers have 28 days to return a product. If they return it within this period they are entitled to a full refund. A sales return reserve of 0.5% is maintained for one month of retail sales.
- Wholesale – Wholesalers are all extended a standard 30 days credit. Customers pay invoices by either posting a cheque to the central finance department, or by depositing money directly into Beta's bank account. They are entitled to a full refund for faulty products. In an attempt to expand abroad, wholesalers have been offered standard credit terms of 45 days, although further concessions have been made in the period. They are entitled to a full refund for faulty products. A sales return of 0.5% is maintained for six months of wholesale sales.

Concession income – Some areas within stores are rented to other retailers. Rent is payable quarterly in advance, along with a forecast turnover rent. A balancing payment is paid annually for turnover, based on audited sales figures.

e. Suppliers

Beta depends on 30 to 40 core suppliers for 80% of products; the remaining 20 % are purchased from 100 other suppliers. The buying department aims to have 20 suppliers accounting for 80% of supplies by the summer 2007 season.

There are many suppliers in the market. Beta does not have any exclusive, long-term contracts in place, which enables suppliers to be changed at minimal cost. However, as a result of this, Beta typically has standard payment terms of 30 days.

Beta does not yet have electronic links with its core suppliers. However, the supply of goods is stable, and no major issues have arisen in the year.

f. Employees

Availability

There is a large pool of suitably skilled labor available for work in stores.

Due to the high profile nature of the Company, many applications from suitable candidates are received for roles within senior management.

Competitive remuneration packages have also ensured that sufficient, appropriately skilled people have applied for roles within sales, marketing and finance.

Government regulation

There are no specific regulations for the industry.

Types of employees

There are no planned changes in the type of employees employed by Beta.

Compensation arrangements

There is an employee bonus scheme. Employees are evaluated and reviewed annually and are rewarded financially based on certain operational performance measures. Financial rewards are only applied after employees have completed their first six months probationary period. Once the probationary period has been completed, employees are also entitled to join the company pension scheme.

Most employees are entitled to staff discounts, apart from casual store staff and other temporary workers.

Targets are agreed for management as part of the budget setting process. The key financial target is growth in operating profit.

The targets are not purely financial but also relate to other non-financial targets, such as footfall conversion rates and stock outs.

Market research by placement agencies has shown that compensations are in line with the industry average. These were obtained and inspected by the Big 4.

Each member of the Executive Committee is on a rolling contract. Specific terms and base salaries are as follows:

CEO – Base salary is AUD 325,000. Contractual termination payment of AUD 800,000.

Design and Procurement Director – Base salary is AUD 225,000. No contractual termination payments.

COO – Base salary is AUD 255,000. Contractual termination payment of AUD 500,000. Sales and Marketing Director – Base salary is AUD 200,000. No contractual termination payment.

CFO – Base salary is AUD 180,000. No contractual payment terms
All directors have an annual discretionary bonus of up to 60% of his base salary. The bonus is based on a variety of indicators, with the principal financial driver being achievement of 12% growth in operating profit. All of their service agreements are terminable with one year's notice.

The aggressive target in respect of operating profit may give senior management an incentive to misstate the financial statements.
Staff turnover
Staff turnover has continued to be below internal targets and industry averages throughout the period.

Pension arrangements
All full time employees are entitled to participate in Beta's stakeholder pension plan. Beta will match employee contributions into the scheme up to a maximum of 4%. There has been no change in the arrangements during the period.

g. Investments

There have been no acquisitions of subsidiary undertakings, mergers or disposals of business activities in the period. There are currently no plans to undertake any such activities.

The 3 new domestic stores in the year have been acquired and have been accounted for within Beta. Costs not directly incurred in the purchase of the new domestic stores may have been incorrectly capitalized, in order to help management meet the targets set by the Venture Capitalists.

h. Financing

There have been no changes in the equity structure in the year. During the year Beta secured a AUDo 6 million loan from the bank in order to acquire the three new stores. The loans are secured by the new properties. The associated set-up costs have been capitalized. Due to the pressure to report in line with the Venture Capitalists targets, management may have incorrectly capitalized costs not associated with setting up the loan.

Further loans from the bank may be required to fund continued expansion. There are several bank covenants in place, which Beta must adhere to in order to retain the loan. In order to comply with these covenants, there may be an incentive for senior management to misstate the financial statements.

No new financial instruments have been acquired.

There are no planned changes in the capital structure or in the financing strategies.

i. Related parties

Related party	**Relevant transactions with related party** (including business rationale for transaction)
Son of the CEO, David Wilson	Beta purchased packaging materials approximating $200,000 from a company owned and operated by the son of the CEO. The goods were purchased at standard catalogue prices.

j. Litigations and claims

We are not aware of any litigation and claims; however, a potential risk of regulatory non-compliance exists in respect of packaging and waste regulations.

2. *Entity's industry and environment*

a. Industry environment

Economic activity and competitive environment

Conditions within the Retail industry remain relatively poor. This has caused a number of brands to constantly offer marked down goods. This threatens the market share of Beta as they have traditionally had restricted sale periods.

The introduction of new brands like Zara and Mango may threaten Beta's market share, as these companies offer desirable fashion wear which is significantly cheaper.

Large department stores are introducing designer clothing at a similar price range to Beta.

People are changing where and when they shop. The consumer is beginning to prefer to shop at retail centers outside of the city centre and many businesses have moved their stores as a result.

An increase in regional shopping centre rental rates and a change in the core operating hours of stores such as Beta, means consumers are now able to shop on Sundays and after hours.

Beta intends to expand through new stores. They have factored the above into their expansion policy for new stores. Beta's supply management chain is considerably less sophisticated than many of its competitors. Whilst this is appropriate given Beta's current size, this may require upgrading id the Company continues to expand.

A recent court case against a supermarket chain wishing to sell designer clothing at reduced prices was won by the supermarket, thus allowing them to stock and sell the designer items without the permission of the designer.

Copying branded products is increasing. These products are very similar to the originals, and are often sold at much cheaper prices.

Given the relatively poor environment, and the aggressive operating profit target growth of 12%, there is a risk that management have an incentive to mis-state the financial statements.

Financing

Interest rates remain relatively stable, and Beta did not have problems securing further financing during the year. Beta has a strong working capital base, therefore there is no associated financial statement risk.

a. Economic, political and social environment

Political

Government is reducing the number of out of town development sites therefore reducing expansion opportunities. The expansion policy may impact Beta as regards to finding suitable sites for expansion.

Economic

The economy in Euroland remains relatively stable. Overall market inflation is forecast to remain below 2% for the forthcoming year; this will result in interest rates remaining stable at around 4%. This helps Beta, as their sales are dependant on the amount of disposable income.

There have been no changes in the tax regulations in the year. However, based on prior experience, calculating the tax provision is complex and judgmental.

Social

There is an increasing customer awareness of ethical and environmental issues when buying goods. There have been a number of cases recently where large retailers have suffered customer boycotts due to such issues.

Beta is aware of these issues when selecting suppliers and choosing sites. There is not considered to be any associated financial statement risk.

c. Legal and regulatory environment

Packaging and waste regulations

Companies are now being required to minimize the packaging they use and to take responsibility for what happens to their packaging once discarded by the consumer. There are possible contingent liabilities for fines for non-compliance. As the Company increases the amount of goods sold, there is an assertion level risk that Beta have breached the packaging and recycling laws and therefore should create a provision for the pending litigation.

A. Entity's accounting policies and practices [KAM 3453]

1. Applicable financial reporting framework

a. New accounting standards and controversial or emerging areas with lack of authoritative guidance or consensus

All new IFRSs with an effective date pre 31 January 2006 have been adopted. All other IFRSs have already been adopted.

b. Regulatory (financial reporting and tax-related) inquiries, investigations, and/or enforcement actions

None identified.

2. Changes to selection and application of accounting policies by the entity, including initial selection and application

None identified.

3. Critical accounting policies

The following have been identified as critical accounting policies in the industry:

- Revenue recognition policies in respect of wholesale sales. (see permanent file sect. PF 20-610)
- Depreciation of fixtures and fittings and estimates of useful economic life. (see permanent file sect. PF 20-620)
- Treatment of store fit out and refurbishment costs (The costs associated with upgrading the stores are capitalized; however it is a complex task to distinguish between those costs, which maintain, and those which enhance the stores. As a result, some costs may be inappropriately capitalized). (see permanent file sect. PF 20-650)
- Treatment of advertising and promotion costs. (see permanent file sect. PF 20-700)
- Treatment of returns reserve. (see permanent file sect. PF 20-800)

The selection and application of the accounting policies is considered to be acceptable and appropriate for Beta, are still relevant given our understanding of the entity's business, and are consistent with the accounting policies generally used in the industry.

4. Impact of entity structure on financial reporting

The Company is accounted for on a divisional basis. The divisional packs are aggregated to provide the result of Beta Ltd.

A. Entity's financial performance [KAM 3484]

1. External expectations

Venture Capitalists

Concern is over mid-term capital growth. They are looking for:

- Sustainable growth
- Asset value
- Cash

management

Specific targets

include:

- 12% growth in operating profit per annum
- Comply with all debt covenants

Other shareholders

Family members own 56%, 4% is owned by other directors. Motivation is for dividends.

Bank

During the year Beta secured a AUD 6 million loan from the bank. Further loans from the bank may be required to fund continued expansion. There are several bank covenants in place which K Beta must adhere to in order to retain the loan, namely:

- Total consolidated net borrowings on the last day of each calendar month shall not exceed 50% of total net assets; and
- The ratio of PBIT to net Interest Payable will be equal to or exceed 3:1 for each period of 12 months ending on 30 April, 31 July, 31 October and 31 January each year.

All parties have been supplied with the monthly management accounts. The monthly pack includes actuals, performance against budget, and a 3 month rolling forecast. The expectation is for results in line with forecast.

2. *Analysis*

a. Analysis prepared by the entity and related results

Key aspects of September's results are summarized below. Refer to C1-50 for a full set of the September management accounts.

The management accounts originate from the underlying general ledger, which is used for audit purposes.

Retail sales are forecast to grow by 13% and wholesale sales by 20% by the year end. 8% of the retail growth is forecast to be generated by the three new stores opened in the year. Wholesale sales have grown significantly as a result of sales to three new department stores and an increase in international sales.

Results to date are slightly behind forecast, as a result there is a large pressure on the remaining 4 months. Management is confident that the forecast is achievable, as sales in the industry during December and January are typically higher than in the other months.

Operating costs are above forecast, as some store fit-outs have been brought forward.

Tangible fixed assets – two new stores were acquired in May 2005, a further store was purchased during October 2005.

Whilst the Company is currently behind full year forecast, the KPIs demonstrate that Beta has had a strong year.

Whilst the retail gross margin has deteriorated slightly in the period, this is as a result of the acquisition of two new stores, as well as the refurbishment of existing stores. Wholesale gross margin has also deteriorated marginally, as margins have been squeezed in order to grow sales.

The store refurbishments have been successful, with an increased average transaction size and transaction closure rate in those stores which have undergone the renovation.

b. Results of analysis prepared by the engagement team

Whilst revenue has grown significantly, this has not been matched by cash generation; instead the Company has seen a large increase in trade receivables.

	Basis of calculation	Actual (30 September 2005) – 8 months	Prior year (31 January 2005) – 12 months
Gross margin – retail	Retail operating profits / retail sales	15%	16%
Gross margin – wholesale	Wholesale operating profits / wholesale sales	7%	7%
Inventory turnover	Cost of goods sold / average inventory	6.03	5.14

Number of days to sell inventory	365 / inventory turnover	61	71
Accounts receivable days - retails	(365 * average retails trade receivable) / net retail credit sales	6	6
Accounts receivable days - wholesale	(365 * average wholesale trade receivable) / net wholesale credit sales	52	30
Doubtful debt allowance as a percentage of trade receivables	(Doubtful debt allowance / trade receivables) * 100	0.02	0.02
Average number of days payable outstanding	(365 * average accounts payable) / purchases	38	32
Return on total assets	Net income before extraordinary items / average total assets	0.26	0.48
Current ratio	Current assets / current liabilities	1.30	1.04
Bank covenant	Net borrowings < 50% of total net assets (end of each month)	Complied 1 February – 30 September	Complied all year
Bank covenant	PBIT > 3 * Interest payable on 30 April, 31 July, 31 October and 31 January	Complied on 30 April and 31 July	Complied all year

The inventory turnover KPI and the number of days to sell inventory KPI, indicates that the Company continues to efficiently manage its inventory. It indicates that the quality, and hence the value, of the stock has not deteriorated in the period.

The retail accounts receivable days is in line with expectations – credit card companies typically have payment terms of 5 working days.

The wholesale accounts receivable days are considerably higher than the standard 30 days payment terms. This supports the fact that management has been entering into customer specific contracts, with unique payment terms.

Typical payment terms with suppliers are 30 days. Management has extended the average number of days payable outstanding to 38 days.

The return on assets and current ratio illustrate that the Company continues to perform strongly. Management continues to utilize the Company's assets to generate profits, and the current ratio demonstrates that there is a considerable 'margin of safety' within Beta's working capital.

1. Events or conditions raising doubt about the entity's ability to continue as going concern

Whilst the retail environment remains poor, Beta has remained profitable, continues to generate cash and all of the debt is long term. As a result of the procedures performed to date, we are not aware of any significant events or conditions that raise doubt about Beta's ability to continue as a going concern.

A. Summary of instances or concerns of misconduct or unethical behavior
[KAM 3549]

Reported instance or concern	Effect on the audit approach
A cash fraud was noted at one of the stores during the year.	Whilst the case was non-significant, it was detected by the internal control system. No effect on the planned audit approach.
A couple of employees within the warehouse were found to be stealing inventory, and were selling it on to market traders. This was detected upon review of the inventory shrinkage KPI.	The thefts are considered non-significant, and they were detected by management. There is no effect on our planned audit approach.

APPENDIX 2
RESEARCH INSTRUMENTS

The purpose of the study is to help us understand the judgments made by auditors related to the susceptibility of the financial statements to material misstatement due to fraud.

You have been randomly assigned into groups of three persons each. You will be asked to read a case, then brainstorm with your group members and respond to a series of questions on this case on different screens in this computer-based study.

In order to keep the length of the experiment reasonable, the case materials are necessarily abstracted from that which you would normally encounter in practice. Please provide your best judgment based on the information provided. The entire study will take 60 minutes to complete.

The experiment includes three stages:

Stage 1 (First Brainstorming Task): you will be asked to brainstorm to generate the **fraud risk factors** affecting Beta Ltd that may create an **incentive** or **pressure** for management or others to commit fraud, provide the **opportunity** for fraud to be committed, and indicate an ability **to rationalize** the fraudulent action.

Stage 2 (Second Brainstorming Task): you will be asked to brainstorm about **how** and **where** you believe Beta's financial statements might be susceptible to material misstatements due to frauds, and **how** management could perpetrate those frauds. Please remember that you are asked to identify potential material misstatements due to fraud and NOT fraud risk factors in this stage.

For example, management bonuses linked with a profit target is an example of a fraud risk factor, whereas any misstatement it causes in the financial statements is a potential material misstatement. Please include the likely direction of the misstatement (i.e. overstatement or understatement) and be specific about how management could commit the fraud. For example: Depreciation is understated. Management may have used incorrect asset lives to calculate depreciation.

You will have 18 minutes each for Stages 1 and 2. It is important to concentrate on the task for the full 18 minutes in each stage. If you run out of ideas at any point, please go back to your earlier ideas to generate related ideas.

Stage 3 (Other Information): you will then be asked a number of further questions related to the case and your experience.

If you have any questions during the experiment, please do not hesitate to ask us.

Non-Structured Interacting Electronic Brainstorming Treatment

First Brainstorming Task	Second Brainstorming Task
Brainstorm to generate the **fraud risk factors** affecting Beta Ltd that may: • create an **incentive** or **pressure** for management or others to commit fraud; • provide the **opportunity** for fraud to be committed; or • indicate an ability **to rationalize** the fraudulent action. **Example:** Management bonuses linked with a profit target provides an incentive.	Brainstorm about: • ***how*** and ***where*** you believe Beta's financial statements might be susceptible to material misstatements due to frauds; and • ***how*** management could perpetrate those frauds. **Example:** Depreciation is potentially understated. Management may have used incorrect asset lives to calculate depreciation.

If you run out of ideas at any point, please go back to your earlier ideas to generate related ideas.

Structured Interacting Electronic Brainstorming Treatment

First Brainstorming Task	Second Brainstorming Task
Brainstorm to generate the **fraud risk factors** affecting Beta Ltd that may: • create an **incentive** or **pressure** for management or others to commit fraud; • provide the **opportunity** for fraud to be committed; or • indicate an ability **to rationalize** the fraudulent action. **Example:** Management bonuses linked with a profit target provides an incentive.	Brainstorm about: • ***how*** and ***where*** you believe Beta's financial statements might be susceptible to material misstatements due to frauds; and • ***how*** management could perpetrate those frauds. **Example:** Depreciation is potentially understated. Management may have used incorrect asset lives to calculate depreciation. • Use the function of **'enter a new idea'** to contribute a new idea that is not related to existing ideas; • Use the function of '**build on an existing idea**' to generate related ideas; • The conjunctive phrases help you organize ideas.

If you run out of ideas at any point, please go back to your earlier ideas to generate related ideas.

POST-EXPERIMENTAL QUESTIONNAIRE

*1. Please write down your login username.

	Extremely unlikely 0	1	2	3	4	5	6	7	8	9	Extremely likely 10
*2. Overall, what is the likelihood that a material misstatement due to financial statement fraud has occurred for Beta Ltd this financial year? Please indicate by circling a number on the following scale from 0 to 10, with 0 being Extremely unlikely and 10 being Extremely likely.	○	○	○	○	○	○	○	○	○	○	○

	Extremely easy 0	1	2	3	4	5	6	7	8	9	Extremely difficult 10
*3. Please rate the difficulty level of the first brainstorming task that requires you to generate fraud risk factors on the following scale from 0 to 10, with 0 being Extremely easy and 10 being Extremely difficult.	○	○	○	○	○	○	○	○	○	○	○

	Extremely easy 0	1	2	3	4	5	6	7	8	9	Extremely difficult 10
*4. Please rate the difficulty level of the second brainstorming task that requires you to brainstorm how and where the financial statements might be susceptible to material misstatement due to fraud on the following scale from 0 to 10, with 0 being Extremely easy and 10 being Extremely difficult.	○	○	○	○	○	○	○	○	○	○	○

*5.

The audit partner has identified the following fraud risk factors that are relevant to potential sales-revenue material misstatements due to fraud:

- *there is a bonus incentive scheme for both staff and directors with growth in operating profit a key target*

- *retail sales are forecast to grow by 8.3% and wholesale sales by 13.3% by year end when conditions in the retail industry are relatively poor*
- *management has been entering into customer specific contracts with wholesalers, with unique payment terms*
- *the company has a returns policy and a sales return provision*

Please describe in as much detail as possible how Beta's sales revenue could be overstated due to financial statement fraud, how these potential frauds relate to the fraud risk factors identified by the audit partner, and how the management could have perpetrated the frauds.
You have 5 minutes to complete this task so again we emphasize the importance of providing as much detail as you can.

Pleas respond to the following questions using the 7-point scale provided, with 1 being Strongly disagree and 7 being Strongly agree. Please click under the number that indicates the best representation of your judgment.

	Strongly disagree 1	2	3	4	5	6	Strongly agree 7
*6. I was reluctant to offer an idea for fear of criticism from other members.	○	○	○	○	○	○	○
*7. I was inhibited in offering an idea due to the presence of others.	○	○	○	○	○	○	○
*8. Although no overt criticism was expressed, I was reluctant to offer an idea that was "way out," for fear of disapproval from members.	○	○	○	○	○	○	○
*9. I withheld ideas for fear of possible disapproval from other members.	○	○	○	○	○	○	○

*10. Please indicate your audit experience in years and months

*11. What is your position in your firm?

*12. Have you or your audit team detected any financial statement fraud?

- [ ] Yes
- [ ] No

*13. If your answer to the previous question is yes, on how many audit engagements (approximately)?

*14. In the past 2 years how many hours (approximately) of fraud detection training have you had?

*15. What percentage of your audits have been in the retail industry?

Congratulations!

You have now finished this experiment. Thank you for your participation!