The impact of groups and decision aid reliance on fraud risk assessment

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Abstract
Purpose – The purpose of this paper is to investigate how the brainstorming component of Statement of Auditing Standards (SAS) No. 99 influences decision aid use and reliance, and the effectiveness of fraud risk assessment.

Design/methodology/approach – The research framework links the influences of the fraud assessment setting and decision aid reliance. The hypotheses are tested in an experiment with two manipulated factors: setting (group or individual) and decision aid (provided or not provided).

Findings – The results of the study provide insight on how the brainstorming impacts fraud risk assessment, decision aid use and decision aid reliance. The results show that groups using a decision aid with fraud risk factors demonstrate superior decision quality and effectiveness even with lower decision aid reliance.

Research limitations/implications – The influence of the setting (group or individual) on the fraud evaluation and detection is highlighted.

Practical implications – This paper will be informative for auditors and firms involved in designing an efficient and effective fraud risk assessment.

Originality/value – This paper integrates the fraud risk assessment and decision aid literature to evaluate decision quality and effectiveness of group fraud risk assessment.

Keywords Auditors, Fraud, Risk assessment, Group decision support systems, Auditing standards

Paper type Research paper

Introduction

Occurrences of fraud at organizations such as Enron and WorldCom have sensitized the public and the accounting profession to the devastating effects of fraud on all stakeholders, including employees, investors, creditors, companies and auditors. Fraud detection has historically been one of the key objectives of the auditing profession, and it became an even higher priority after these highly publicized scandals.

In 2002, the fraud guidance was expanded by the Statement of Auditing Standards (SAS) No. 99 (AICPA, 2002) to reinforce to auditors the need to maintain professional skepticism and overcome the tendency of over-reliance on client representation. SAS No. 99 includes a brainstorming requirement, which mandates an audit team to discuss the potential for material misstatements due to fraud and encourages the auditors to share client information and experiences in order to develop a better understanding of fraud possibilities (Ramos, 2003). Before SAS No. 99, the fraud risk assessment was typically performed by a senior on the engagement (Shelton et al., 2001). With the inception of SAS No. 99, key members of the audit team, from the lead
partner or manager to the new staff, meet during the planning stage to exchange ideas and brainstorm how management could conceal fraudulent financial reporting or misappropriation of assets (Beasley and Jenkins, 2003). Auditors therefore have to find an effective approach to performing a fraud risk assessment in a group setting to ensure that risks are not overlooked in the brainstorming process and that all inputs are incorporated in the risk profile of the company.

Shelton et al. (2001), while examining the fraud risk assessment process at the seven accounting firms, found that all firms utilize decision aids to assist auditors in the fraud risk assessment. Some firms require auditors to check-off fraud risk factors as being present or absent while others provide “SAS No. 82 risk factors by category and require the auditor to identify those that affect the audit plan” (Shelton et al., 2001, p. 25). A number of prior studies have investigated the fraud risk assessment process itself and its impact on the planned audit tests (Zimbelman, 1997; Payne and Ramsay, 2005). Another group of studies have examined the use of decision aids during the fraud risk assessment, including red-flag questionnaire (Pincus, 1989; Asare and Wright, 2004) or an expert system (Eining et al., 1997). However, when the decision aid is provided, the impact of group interaction on decision aid reliance and fraud risk assessment has not been sufficiently evaluated.

Multi-person decision making is common in auditing but most work has been focused on individual judgments (Arnold et al., 2000). While decision aids have been shown to benefit individual decision-making, findings have not been consistent for groups. Arnold et al. (2000) found that decision support systems may in fact impede group’s decision quality during materiality assessment task. In contrast, Bamber et al. (1996) found that groups using a group support system demonstrated higher acceptance of group decision and undertook a more thorough analysis in a disclosure decision. While accounting firms provide auditors with risk-factor decision aids to utilize during the overall fraud risk assessment process[1], it is not clear whether brainstorming teams actually utilize and rely on the decision aids during their assessment or whether such aids actually assist the brainstorming process.

This study extends fraud and multi-auditor literature by incorporating a brainstorming component into fraud risk assessment and examining its impact on the fraud evaluation when the decision aid is provided. The investigation is important for several reasons. First, decision aids are highly prevalent in the fraud assessment process (Shelton et al., 2001), thus this study integrates a decision aid into the assessment. Second, the SAS No. 99 brainstorming requirement has to be incorporated on all audits, and its impact on decision quality[2] and fraud assessment[3] is examined in light of arguments that brainstorming may or may not benefit the process (Hill, 1982; Nunamaker et al., 1991; Dennis and Valacich, 1993). Accounting firms invest resources in developing decision aids to assist auditors in the fraud assessment task; however, with the addition of the brainstorming requirement, it is not clear if decision aids play the intended role in the process. We evaluate if brainstorming component of the assessment influences the decision aid reliance[4].

The results show that fraud risk decision aids are beneficial for comprehensive fraud risk assessments performed by brainstorming groups. Groups with the decision aid performed better than both individuals with the aid and unaided groups. According to Butler (1985), decision aids redirect auditor’s attention to broad classes of problems and, as such, help the group to stay focused and incorporate important areas into the risk assessment. Although groups demonstrate lower decision aid reliance
than individuals, it does not result in the detriment to the risks identified or the likelihood of fraud rating.

The remainder of the paper proceeds as follows. We begin with a literature review and hypothesis development, followed by the description of the experiment and methodology. We next provide the study's findings and conclude with a discussion of implications for auditors' fraud risk assessments.

**Literature review and hypothesis development**

*Fraud risk assessment guidance*

Financial statement users expect auditors to detect fraudulent financial reporting and fraud. In 1997, *SAS No. 82* was published by the AICPA to provide guidance to auditors on the consideration of fraud in the financial statement audit. It also required the evaluation of fraud risk during the planning stages of the audit and incorporation of the risk assessment into the engagement. The standard required auditors to assess the risk of material misstatement due to fraud, incorporate that assessment in designing the audit procedures and document the risks identified. Fraud risk assessment therefore became an integral part of the audit (AICPA, 1997). In 2002, *SAS No. 99* expanded fraud guidance through its clarification to auditors on their responsibility in fraud detection and its emphasis on incorporating fraud consideration into both the audit planning process and throughout the engagement. *SAS No. 99* reinforces that auditors need to maintain professional skepticism and overcome the tendency of over-reliance on client representation. The guidance also added a brainstorming requirement to ensure that experiences and information from all team members are included in the comprehensive fraud risk assessment (Ramos, 2003). Specifically, *SAS No. 99* requires auditors to brainstorm in teams and generate ideas about how fraud might be committed and concealed by the entity (AICPA, 2002).

*Information load and decision aids*

In performing the fraud risk assessment, auditors need to consider information on the industry, company and personal situations of the auditee's employees in order to make the evaluation. The task involves processing large amounts of information to obtain a cohesive picture of the fraud risk in the company. Accountants are subjected to the occurrence of information overload when trying to make such evaluations (Schick et al., 1990).

Information overload occurs when the supply of information exceeds information processing capacity of individual. The foundation of information overload studies is rooted in the research of psychologists and cognitive scientists such as Miller (1956), Schroder et al. (1967) and Simon and Newell (1971), who found that individual information processing, with the increase in complexity, increased up to a point. If information is provided beyond that point, it is not integrated in the decision-making process and the performance of the individual declines. Eppler and Mengis (2004) provide a detailed literature review of the information overload concept. Studies have examined how the performance (in terms of adequate decision making) of an individual varies with the amount of information he or she is exposed to (Schick et al., 1990). Schneider (1987) found that information attributes such as level of novelty, intensity, complexity, ambiguity or uncertainty can contribute to information overload.

One technique for reducing information overload is through the use of decision aids. Simply stated, a decision aid is “any explicit procedure for the generation, evaluation and selection of alternatives (courses of action) that is designed for practical
application and multiple use” (Rohrmann, 1986, p. 365). The availability of the decision aid replaces certain cognitive processes, which lead to an increase in effort on the task and result in more effective decision making (Peter and Benbasat, 1993). Decision aids such as checklists, audit programs and expert systems are all intended to improve efficiency, increase accuracy and decrease information load placed on the auditor. Public accounting firms use numerous tools to streamline the process of fraud risk assessment and make auditors more aware of potential fraud exposure. This paper focuses on the decision aids, which help users to “make decisions in a less structured decision context where judgment can play a critical role” (Rose, 2002, p. 66). The decision aid serves as an organizing framework for consideration of fraud risk factors. If the decision aid provides information to make fraud risk assessment more manageable for auditors, then there is a potential reduction in the information load.

Indeed, the goal of introducing a decision aid is to improve the decision-making behavior of the user (Brown and Eining, 1996). Ashton (1992) found that decision aids improve consistency, which translates into increased accuracy. Wright and Bedard (2000) found that when a checklist of risk factors was provided to novice auditors, their performance in the planning stage was improved. Overall, studies of decision making have generally found that decision aids improve decision quality in individuals (Benbasat and Nault, 1990).

Public accounting firms use numerous tools to streamline the process of fraud risk assessment and to make auditors more aware of potential fraud exposure. Some firms require auditors to check-off fraud risk factors as being present or absent, while others provide a listing of risk factors and require auditors to identify those that affect the audit plan (Shelton et al., 2001). Many used standard risk checklists based on SAS No. 82 and now structure the checklists around SAS No. 99 risk factors (Shelton et al., 2001; Beasley and Jenkins, 2003; Asare and Wright, 2004; Mock and Turner, 2005). Such decision aids are designed to focus auditors’ attention on the broader classes of problems that can occur in a fraud situation (Butler, 1985). To be consistent with the practice, the decision aid in this study is based on SAS No. 99 risk factors.

**Brainstorming**

The idea behind the SAS No. 99 brainstorming requirement is to use experiences and information from all team members to come up with the comprehensive fraud risk assessment (Ramos, 2003). SAS No. 99 requires auditors to brainstorm in teams and generate ideas about how fraud might be committed and concealed by the entity. Thus, comprehending the team interaction during the brainstorming process entails an understanding of group behavior.

According to Dennis et al. (1997), groups engage in three activities to reach a decision: information recall (either from memory or notes), information exchange (either giving or receiving information) and information processing (actually using information). Multi-person decision making is common in auditing but most work has been focused on individual judgments (Arnold et al., 2000). While decision aids have been shown to benefit individual decision-making, findings have not been consistent for groups. Arnold et al. (2000) found that decision support systems may in fact impede group’s decision quality during materiality assessment task. In contrast, Bamber et al. (1996) found that groups using a group support system demonstrated higher acceptance of group decision and undertook a more thorough analysis in a disclosure decision. We evaluate whether groups with a decision aid outperform unaided groups in the fraud risk assessment. Because a decision aid provides an organizing framework
for consideration of fraud risks, it is expected that groups with the decision aid based on SAS No. 99 risk factors will demonstrate superior decision quality by identifying more quality fraud ideas (see[1]) than the groups without a decision aid:

H1. Brainstorming groups with the decision aid will generate more quality fraud ideas than groups without a decision aid.

A number of studies have compared the relative performance of individuals and interacting groups and found superior performance in groups due to improved decision consistency and groups’ superior ability to process high information load (Hill, 1982; Iselin, 1991). Chalos and Pickard (1985) looked at the information overload theory as it relates to group vs individual performance. An information processing advantage was identified when the decisions were made in groups. It was determined that, contrary to individuals, groups were able to improve decision accuracy. O’Donnell et al. (2000) found improved decision quality in group decision making as compared to individuals when internal control assessment was performed. According to Carpenter (2007), brainstorming teams generate more quality fraud ideas than individuals due to brainstorming-related process gains. Because of such processing gains from the group interaction, brainstorming teams are expected to outperform individuals even when the decision aid is available. This study predicts that groups will maintain performance advantage over individuals when the decision aid is available during the fraud risk assessment. This leads to:

H2. Brainstorming groups with the decision aid will generate more quality fraud ideas than individuals with a decision aid.

Decision aid reliance
Decision aids are provided to auditors to overcome the effects of cognitive constraints and to improve their performance. However, unless the decision aids are actually used, even the best aids will not reduce the cognitive load or improve decision quality. While there are many components that impact decision aid reliance, most studies concentrate on under-reliance, which is associated with performance that is worse than can be achieved when the aid is used (Rose, 2002).

According to Whitecotton (1996), decision aid reliance is a function of both individual and task characteristics. Causes of under-reliance in terms of individual factors were examined by Arkes et al. (1986), who showed that as prior knowledge and experience increase, performance decreases as a result of the decreased reliance on the decision aid. Whitecotton (1996) found that individuals with more confidence had lower reliance on the decision aid while experience did not explain decision aid reliance. From the task perspective, Arkes et al. (1986) found that monetary incentives and performance feedback decreased reliance and resulted in the decrease in the performance. Ashton (1990) found a similar trend when he examined if decision aid reliance is affected by decision task characteristics such as incentives, outcome feedback and justification requirements. In an attempt to create an overall reliance framework, Arnold and Sutton (1998) proposed the Theory of Technology Dominance, which produced a four-factor model of reliance for intelligent decision aids where reliance is dependent on task experience, task complexity, decision aid familiarity and cognitive fit. The model was empirically tested and largely supported in Hampton’s (2005) empirical study of the theory.

The accounting profession depends heavily on groups and decision aids to make fraud assessments and other decisions. This decision-making setting is an area that
has not been explored as it relates to the decision aid reliance. Therefore, this study investigates if groups differ from individuals in their reliance on the decision aid during a fraud risk assessment.

Studies indicate that groups tend to demonstrate an information processing advantage over individuals, leading to increased performance due to the reduction in information overload (Chalos and Pickard, 1985; see also Schroder et al., 1967). Groups can work with more pieces of information, thus decreasing the information load for individuals that make up the group. Decision aids have been found to improve decision consistency and accuracy (Ashton, 1992) and Todd and Benbasat (1992) found that individuals relied on the decision aid to reduce their information processing burden. To decrease information load, individuals are more likely to rely on a risk-based decision aid than groups:

\[ H3. \text{ Decision aid reliance will be greater for individuals than brainstorming groups in performing a fraud risk assessment.} \]

**Likelihood of fraud rating**

While group setting is expected to have a positive impact on the decision quality, it is also important to investigate if it will translate into a more effective fraud risk assessment. An unexpected phenomenon was observed by Pincus (1989), who used audit seniors to evaluate if the red flags checklist is an effective method for recognizing fraud. The checklist was expected to raise auditors’ sensitivity to the possibility of fraud in the fraud situations. The study found that in fraud cases, the use of red flags did not have the desired impact on the likelihood of fraud rating in individuals due to either participants’ inability to consider all relevant cues or undue preference for one set of cues over another.

Asare and Wright (2004) confirmed Pincus’s (1989) findings in a study using red-flag questionnaires based on SAS No. 82 risk categories. The study found that individual auditors who used a standard risk checklist made lower likelihood of fraud assessments than those without a risk checklist in a case where fraud exists. It was concluded that standard audit decision aids may not facilitate individual strategic reasoning needed to make the appropriate likelihood of fraud evaluation. According to Ahlawat (1999), group processing can improve judgment quality due to greater exertion of cognitive effort. In this study, it is expected that group interaction will be able to counteract lower likelihood of fraud rating associated with the individual decision aid use as noted in Pincus (1989) and Asare and Wright (2004):

\[ H4. \text{ In a fraud case, contrary to the significant variation in the fraud likelihood rating observed in individuals with and without decision aids, the variation between the likelihood of fraud rating between aided and unaided brainstorming groups will not be significant.} \]

**Method**

The study examines the decision quality and fraud likelihood rating in the fraud risk assessment by groups and individuals with and without a decision aid. It is anticipated that individuals will demonstrate higher reliance on a decision aid than groups, whereas groups are expected to identify more quality fraud ideas and produce a more effective fraud likelihood assessment. In order to examine these relationships, an experiment was designed and conducted as follows.
Participants
Participants included 62 students from two undergraduate auditing classes taught by the same professor at a large southeastern university during a spring term. Out of the total, 58 were seniors and four were master's-level students. The competency level of two classes was similar as indicated by average self-reported GPA of 3.35 and 3.34. Also, the composition was comparable with 59 percent female in one and 60 percent female in a second class. Students had been exposed to the fraud risk assessment and performed risk assessments as part of previous class assignments. These participants were selected to achieve a homogeneous participant group in terms of training, which might create differences in fraud detection abilities (Pincus, 1989).

Experimental task
The participants performed a fraud risk assessment in a $2 \times 2$ between-subjects experimental design. The task was completed by brainstorming groups and individuals performing the assessment with or without a decision aid. Participants had to read a case adapted from the AICPA Ethics and Fraud in Business: Cases and Commentary[6] (see Appendix 1), which included company background information, management description and practices, and accounts payables processes for a company with a fraud-motivated manager and weak internal controls.

Similar to Pincus (1989), individual participants were asked to take the role of the company’s external auditor during the planning phase. Individual participants were instructed to read the case, identify and list fraud factors, and rate the likelihood of fraud occurring. Individuals using the decision aid had to complete a scale, which was used to measure decision aid reliance. A total of 27 participants completed the experiment individually, with 15 performing the assessment with the decision aid and 12 without the decision aid. Another set of participants performed the same task as a group. The groups were asked to read the case and brainstorm the risks associated with the scenario prior to making the evaluation. DeSanctis and Gallupe (1987, p. 590) defined a decision-making group as “two or more people who are jointly responsible for detecting a problem, elaborating on the nature of the problem, generating possible solutions, evaluating potential solutions or formulating strategies for implementing solutions”. A total of 35 individuals participated and formed nine, two-person groups that used a decision aid, and eight groups that did not have access to a decision aid[7].

As a group, participants had to list risks observed in the case, rate the likelihood of risk occurring and complete the reliance scale, if applicable.

The study utilized student participants who were graduating seniors or master’s-level students and are typical of the new staff at audit firms (O’Donnell et al., 2000). SAS No. 99 requires key members of the audit team – from the lead partner or manager to the new staff – to be involved in the brainstorming session on how management could perpetrate and cover up fraudulent reporting or misappropriation of assets. While this study does not include partner- or manager-level participants, the information provided in the case on company background and potential management integrity issues is typical of the information that more experienced team members would contribute to the brainstorming session (Beasley and Jenkins, 2003).

At the conclusion of the experiment, participants completed demographic information and were debriefed about the purpose of the study and informed that approximately half of the participants were provided with the decision aid during the task. Neither groups, nor individuals were compensated for participation.
**Decision aid**
The red-flag approach has a long history in assisting auditors in fraud detection. The method was developed in the 1970s and provided a set of warning signs based on economic factors (Sorenson and Sorenson, 1980). This approach is effective, as “red flags are situational indicators. They indicate that the auditor should be more watchful than usual, and in combinations they may indicate that the auditor should be suspicious” (Uretsky, 1980). When SAS No. 82 was published in 1997, it also provided fraud risk factors (red flags) to assist auditors in performing the fraud risk assessment with the assumption that companies with higher fraud potential have characteristics that are different from other companies (Mock and Turner, 2005). Prior studies investigated if risk factors influence auditor evaluation of fraud likelihood (Pincus, 1989; Asare and Wright, 2004) and impact the planning process (Wright and Bedard, 2000; Mock and Turner, 2005).

The decision aid used in the study is modeled on SAS No. 99 fraud risk factors based on three categories of risk (Mock and Turner, 2005). It was modified to make it usable during an experiment and cover red flags related to management and operating characteristics of the accounts payables cycle (see Appendix 2). Participants in the decision aid treatment received a list of these risk factors as part of their experimental materials.

**Measurement of variables**

**Reliance.** Decision aid reliance is defined as the extent of use of the aid by participants (Rose, 2002). In prior research, reliance is frequently operationalized as agreement with the decision aid; however, it is a problematic measure, as agreement with the aid does not necessarily indicate reliance (Rose, 2002). For this study, based on Hampton (2005), a seven-point Likert scale (raging from strongly disagree to strongly agree) was developed to evaluate users’ reliance on the decision aid. Three different measures were used to obtain the information on the extent of decision aid usage. Item 1 is reverse-coded and asks if a participant preferred making the assessment without the decision aid. Item 2 asks if the decision aid was useful in performing the fraud assessment. Finally, Item 3 asks if the participant relied on the decision aid in performing the assessment.

**Quality fraud ideas.** Consistent with Carpenter (2007), we considered the fraud risk factors documented by participants as quality ideas if it clearly identified the risks determined independently and agreed upon by two accounting researchers. The case contained three pre-determined fraud risks: the manager’s financial situation, the manager’s ability to override the control system, and the lack of top-level oversight.

**Likelihood of fraud.** Likelihood of fraud was measured on a scale of 0-100 where 0 equals no chance of fraud and a score of 100 represents complete certainty that there is fraud (Pincus, 1989). In this study, the case is based on the situation where fraud has occurred; thus, a higher rating would represent a more accurate reflection of the fraud risk.

**Results**
The results provide evidence on how the group environment and decision aids influence fraud risk assessment and decision aid reliance. The data collected from the experimental procedures were analyzed using non-parametric statistics to accommodate the small sample size.
The impact of the group setting and the decision aid on the number of quality fraud ideas identified is examined in the first two hypotheses. It is expected that the decision aid will contribute to improvement in decision quality. Descriptive statistics provided in Table I, indicate higher risk identification for participants with the decision aid. The Kruskal-Wallis test was performed to examine if having a decision aid has an impact on the number of risks accurately identified\(^8\). The results show that a decision aid has a statistically significant effect on fraud risks identified by individuals and groups (chi-squared = 5.742, \(p = 0.017\)).

To investigate \(H1\), the Mann-Whitney \(U\)-test\(^9\) was performed to explore if differences exist in the decision quality of individuals and brainstorming groups with and without the decision aid. The group comparison indicates a significant result (\(U = 14, p = 0.011\)) where groups with the decision aid identified more quality fraud ideas than groups without the aid. The findings indicate that the decision aid improves decision quality for brainstorming groups. Refer to Table II.

To test whether \(SAS\) No. 99 brainstorming requirement improves the fraud risk assessment, \(H2\) examines if groups with the decision aid identified more actual risks than individuals with the aids. The results of Mann-Whitney \(U\)-test show a significant difference between the performance of groups and individuals with the decision aid (\(U = 40, p = 0.036\)). Refer to Table II. The support for this hypothesis indicates that

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean of RISKPRES</th>
<th>Std deviation</th>
<th>Range of RISKPRES</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>No</td>
<td>1.67</td>
<td>0.98</td>
<td>0-3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2.13</td>
<td>0.83</td>
<td>0-3</td>
<td>15</td>
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<tr>
<td></td>
<td>Average</td>
<td>1.93</td>
<td>0.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Groups</td>
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<td>1.88</td>
<td>0.64</td>
<td>1-3</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>2.67</td>
<td>0.71</td>
<td>1-3</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>2.29</td>
<td>0.77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table I.**

Mean and standard deviation of risks identified by individuals and brainstorming groups with and without the decision aid

**Note:** RISKPRES = proxy for decision quality, number of quality fraud ideas identified by the participants

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean of RISKPRES</th>
<th>Std deviation</th>
<th>Mann-Whitney U</th>
<th>(p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>No</td>
<td>1.88</td>
<td>0.64</td>
<td>14</td>
<td>0.011</td>
</tr>
<tr>
<td>Groups</td>
<td>Yes</td>
<td>2.67</td>
<td>0.71</td>
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</tbody>
</table>

**Tests of decision aid and group impact on the decision quality comparison of groups with and without the decision aid (H1)**

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean of RISKPRES</th>
<th>Std deviation</th>
<th>Mann-Whitney U</th>
<th>(p) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>Yes</td>
<td>2.13</td>
<td>0.83</td>
<td>40</td>
<td>0.036</td>
</tr>
<tr>
<td>Groups</td>
<td>Yes</td>
<td>2.67</td>
<td>0.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Test of setting impact on decision quality with all participants using a decision aid (H2)**

**Note:** RISKPRES = proxy for decision quality, number of quality fraud ideas identified by the participants

**Table II.**
groups are able to identify more quality fraud risk ideas than individuals when the decision aid is provided. Therefore, group brainstorming, as part of the fraud risk assessment, is a beneficial addition to the fraud risk assessment process.

The findings above confirm the beneficial impact of decision aids and group brainstorming on the quality of fraud risk assessment. However, unless the decision aid is utilized, it will not reduce cognitive load or improve decision quality. To explore decision aid reliance in groups and individuals, the reliance construct is measured using participant ratings from a three-item reliance scale provided to groups and individuals performing the task with the decision aid. Exploratory factor analysis (EFA) is conducted to assess the item loadings for the reliance construct. One underlying reliance factor was extracted[10]. The reliability of the scale is 0.88 and exceeds the 0.70 cutoff recommended by Nunnaly (1978).

H3 predicted that individuals, to reduce information load associated with the task, will have higher reliance on the decision aid than groups. The results are based on 13 individuals and eight groups with the decision aid who rated their reliance. The Mann-Whitney $U$-test supports the expectation of higher reliance for individuals ($U = 354.5$, $p = 0.048$). Refer to Table III. This is an interesting finding as it appears that although individuals rate their reliance on a decision aid higher than brainstorming groups, the latter are able to come up with more quality fraud ideas.

The preceding analysis investigated the impact of group setting on decision quality and decision aid reliance. Next, the likelihood of fraud occurring in the presented case, as rated by groups and individuals, for $H4$ was analyzed. Asare and Wright (2004) and Pincus (1989) found that individual auditors who used a standard risk checklist made lower likelihood of fraud assessments when fraud existed than those without a risk checklist. It was concluded that standard audit decision aids may not facilitate individual strategic reasoning needed to make the appropriate fraud risk assessment. In this study, it was expected that group interaction would be able to counteract the tendency for lower fraud risk ratings observed in individuals with the decision aid. The results for the Mann-Whitney $U$-test for individuals are consistent with the prior literature where, in a fraud case, individuals with the decision aid assessed the fraud risk significantly lower than no-aid participants ($U = 16$, $p = 0.014$). Refer to Table IV.

### Table III.
Factor analysis and test of setting impact on decision aid reliance ($H3$)

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean of reliance</th>
<th>Std deviation</th>
<th>Mann-Whitney $U$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>Yes</td>
<td>5.46</td>
<td>1.92</td>
<td>354</td>
<td>0.048</td>
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<td>Group</td>
<td>Yes</td>
<td>4.83</td>
<td>1.86</td>
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</table>

### Table IV.
Test of setting impact on fraud risk assessment ($H4$)

**Panel A:** Individual fraud rating with and without the decision aid

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean</th>
<th>Std deviation</th>
<th>Mann-Whitney $U$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals</td>
<td>No</td>
<td>81.67</td>
<td>7.07</td>
<td>16</td>
<td>0.014</td>
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<tr>
<td>Individuals</td>
<td>Yes</td>
<td>63.33</td>
<td>25.12</td>
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</tr>
</tbody>
</table>

**Panel B:** Group fraud rating with and without the decision aid

<table>
<thead>
<tr>
<th>Setting</th>
<th>Decision aid</th>
<th>Mean</th>
<th>Std deviation</th>
<th>Mann-Whitney $U$</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups</td>
<td>No</td>
<td>82.71</td>
<td>19.83</td>
<td>22</td>
<td>0.485</td>
</tr>
<tr>
<td>Groups</td>
<td>Yes</td>
<td>78.74</td>
<td>5.17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
As predicted, groups were able to maintain comparable fraud rating with and without the decision aid ($U = 22, p = 0.485$), thus indicating that group brainstorming can improve the quality of fraud assessments[11].

**Discussion and conclusions**

This study jointly investigates the brainstorming requirement of *SAS No. 99* and decision aid use in fraud risk assessments. The results show decision aids to be beneficial in the performance of comprehensive fraud risk assessments. Groups with the decision aid performed better than both individuals with the aid and unaided groups (H1 and H2). Results are summarized in Table V. According to Butler (1985), decision aids redirect auditor’s attention to broad classes of problems and, as such, the findings demonstrate the benefits associated with the *SAS No. 99* brainstorming requirement and also indicate that providing groups of auditors with a decision aid can help the group to stay focused and incorporate important areas into the risk assessment.

The results of the decision aid reliance testing show that although individuals demonstrated greater reliance on the decision aid (H3), groups performed better in terms of identifying a higher number of quality fraud ideas seeded in the case. Groups with or without the aid were more consistent in their likelihood of fraud rating (H4). This is an important finding as it indicates that group’s ability to share information is an important component for performing a risk assessment representative of the situation.

The study has important practical implications. The *SAS No. 99* brainstorming requirement has altered the client’s fraud risk assessment process. Thus, it is pertinent to investigate forces influencing the group’s task performance. This study shows that when decision aids are provided for the use in the fraud risk assessment, groups demonstrate lower decision aid reliance then individuals. At the same time, lower reliance does not result in the detriment to the risks identified or the likelihood of fraud rating.

There are limitations that must be considered when interpreting the results of this investigation. The study has small sample sizes, uses two-people groups, and does not include auditors of various levels usually involved in the brainstorming process. While study’s participants were typical of the new staff at the audit firms as all were graduating seniors or master’s-level students (O’Donnell *et al.*, 2000), future research should examine larger, multi-layered teams. The phenomenon observed is expected to be even more prevalent in a real fraud risk assessment where the situations are more complex and auditors face higher likelihood of cognitive overload in their need to process large quantities of information.

The findings of this study suggest several important avenues for future research. Future studies can explore the impact of group characteristics and dynamics on the

<table>
<thead>
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<th>Prediction</th>
<th>Results</th>
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<tr>
<td>H1. Decision quality of groups with the decision aid will exceed the decision quality of groups without a decision aid</td>
<td>Supported</td>
</tr>
<tr>
<td>H2. Decision quality of groups with the decision aid will exceed decision quality of individuals with a decision aid.</td>
<td>Supported</td>
</tr>
<tr>
<td>H3. Decision aid reliance will be greater for individuals than groups in the fraud risk assessment</td>
<td>Supported</td>
</tr>
<tr>
<td>H4. In a fraud case, group interaction will be able to counteract lower fraud ratings associated with the decision aid use observed in individuals</td>
<td>Supported</td>
</tr>
</tbody>
</table>

**Table V.** Results summary
fraud risk assessment. In order to assist in the design of an efficient and effective fraud risk assessment, it would be informative to evaluate if auditors performing evaluation as a nominal group prior to a brainstorming session outperform brainstorming groups which did not need to prepare formalized individual judgments prior to a brainstorming session. The concept of setting has not been explored sufficiently as it relates to the decision aid reliance. Future work can build on the findings of this study that individuals are more likely to rely on the decision aid as compared to groups but demonstrate inferior performance in terms of a number of quality fraud ideas and the extent to which the decision aid influences the likelihood of fraud rating.

Notes

1. The current fraud risk assessment process was confirmed in an interview with a senior manager with recent experience at two Big Four firms and one second-tier firm.
2. We define decision quality in terms of the number of quality fraud ideas generated by the participants which were present in the experimental case as was pre-determined by the researchers (Carpenter, 2007).
3. Fraud assessment was evaluated based on the likelihood of fraud rating by the participants (Pincus, 1989).
4. Consistent with the decision aid literature, decision aid reliance is defined as the extent of use of the aid by the participants (Rose, 2002).
5. The authors would like to thank an anonymous reviewer for this comment.
6. The case is obtained from AICPA (n.d.).
7. One group in the aided condition had three members because there were an unequal number of participants.
8. In order to determine if there is an interaction effect in terms of brainstorming and the decision aid impact on the quality fraud ideas identified, ANOVA was conducted but no statistically significant effect between the setting and the decision aid was found $F(2, 40) = 0.401, p = 0.530$. Also, the same result was obtained when the data were converted to ranks.
9. The test is based on the joint ranking of the observations from the two samples (Laudau and Everitt, 2004).
10. The three reliance items loaded on the reliance factor with loadings of 0.926, 0.950 and 0.706, respectively.
11. In order to determine if there is an interaction effect in terms of brainstorming and the decision aid impact on the fraud likelihood rating, an ANOVA was conducted but no statistically significant effect between the setting and the decision aid was found $F(1, 29) = 1.525, p = 0.227$.

References


Further reading


Appendix 1. Case – Duarf, Inc.
Duarf, Inc. owns several media businesses, such as newspapers, radio stations and magazines. Last year, the company decided to centralize all of its accounts payable processing, such as purchase orders, vendor maintenance, invoice processing and check printing. To accomplish this centralization plan, the company purchased the latest technology. Following the purchase, training sessions were held for all users of the new system.

This technology included a robust database software package. The software provided internal controls, including matching invoices to purchase orders and receiving reports, signature dollar limits, segregation of processing duties and a controlled vendor list. All of the internal controls associated with the software were adequately designed. They were tested and found to be functioning properly within the system. Duarf, Inc. had realized the planned cost savings and management was delighted with the results.

Sandy Blanquet was a senior manager supervising the accounts payable process at Duarf, Inc. Sandy started at Cloudy News, a mid-size newspaper, about ten years ago. As a result of the acquisition, Sandy was offered the opportunity to take part in centralizing the accounts payable processing for all of Duarf, Inc.’s subsidiaries. After the centralization process was completed, Sandy took on the responsibility of overseeing the entire department, from opening mail to processing payables to cutting checks. He managed 20 employees through four supervisors. In addition to managing the department, he was a check signer.

Sandy’s system access only allowed him to view accounts payable data. He could not process any transactions, edit the vendor list or print checks. However, he did review all voucher packages requiring a second signature. All checks had a facsimile signature printed by the computer system’s check printers. Checks over $5,000 required a second signature (in other words, Sandy’s signature). Checks over $50,000 required a third signature by the vice president.

Sandy had always enjoyed the high life. He drove a new sports car. He lived in an upscale home. He took great vacations. Having just returned from an extended vacation to Hawaii with his credit cards closing in on their limits, Sandy found that the advertising market had taken a turn for the worse. A couple of months later Sandy was in trouble because most of his savings were invested in Duarf, Inc. stock. He was overdue on his car payment and his mortgage.

Other employees involved in accounts payable processing were Jack Cross, Mabali Smith and Juan Namkaps. Jack Cross started at Duarf, Inc. three years ago as a corporate accounts payable
associate. His work ethic and knowledge of the process were valuable assets to Sandy during the centralization process. After the centralization was completed, Jack was promoted to senior associate responsible for maintaining the approved vendor list. On occasion, Sandy had Jack add new vendors to the controlled vendor list if the invoice had to be processed right away.

Mabali Smith recently returned from her honeymoon. Mabali started with Duarf, Inc. at the time of the centralization and was an accounts payable associate with invoice processing responsibilities. She reviewed invoices to ensure proper authorization and entered invoices in the system.

Juan Namkaps started with Cloudy News five years ago, and had known Sandy for most of those years. When Cloudy News was acquired by Duarf, Inc., Juan was offered a supervisor position in the accounts payable department. His primary responsibilities were to review all of the purchase order matching exceptions and to supervise five associates. He had the authority to override the purchase order matching process and post invoices for payment. Occasionally Sandy requested him to skip the normal matching process and pay invoices without the purchase order.

Appendix 2

(1) Situational pressure risk factors. Do one or more employees have:

- Significant observed changes from past behavior patterns?
- High personal debts or financial losses?
- Inadequate income for lifestyle?
- Extensive stock market or other speculation behavior?
- Excessive gambling?
- Undue family, company or community expectations?
- Excessive use of alcohol or drugs?
- Perceived inequities in the organization?
- Resentment of superiors and frustration with job?
- Peer group pressures?
- Undue desire for self-enrichment and personal gain?
- Emotional trauma in home life or work life?

(2) Accounts payable risk factors. Are there:

- Recurring identical amounts from the same vendor?
- Lack of three-way matching of PO, invoice and receiving information?
- Payments to vendor have increased dramatically for no apparent reason?
- Lack of segregation of duties between the following:
  - Processing of accounts payable invoice and updates to vendor master files?
  - Check preparation and posting to vendor account?
  - Check preparation and mailing of signed checks?
- No proper documentation of additions, changes or deletions to vendor master file?
- Insufficient supervisory review of accounts payable activity?
- Payments made on copies of invoices, not originals?
- Lack of documentation for payment of invoices?
- Missing or easy access to blank checks, fax and manual check preparation machines?
MRR
33,3

- No reconciliation performed of accounts payable subledger to general ledger control account?
- Systematic pattern of adjustments to accounts payable for goods returned?

(3) Manager ability to override the control system.

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