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Auditors' hypothesis generation skills: The influence of experience and audit methodology structure

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AUDITORS' HYPOTHESIS GENERATION SKILLS: THE INFLUENCE OF EXPERIENCE AND AUDIT METHODOLOGY STRUCTURE

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ABSTRACT

The current study is an investigation into the effects of years of audit experience and audit methodology structure on auditors' hypothesis generation skills. Hypothesis generation is believed to be an important decision making process used by auditors. Because auditors learn auditing skills primarily through experience, those with more experience should be better at generating hypotheses than those with less experience. Audit methodology structure refers to the amount of structure in the auditors' decision environment. It has the potential of affecting auditors' learning of the audit process. Multiple linear regression analysis was used to test the effects of experience and structure on auditors' hypothesis generation skills. Not only did experience and structure explain a small percent of the total variance, but they are not significantly related to the dependent variables. One explanation for these unexpected results is that auditors exhibited their knowledge of accounting rather than auditing.

CHAPTER 1

INTRODUCTION

Introduction and Statement of Purpose

This study investigates the effect of audit work experience and audit methodology structure on auditors' hypothesis generation skills in an experimental analytical review setting. Although hypothesis generation appears to be a prevalent information processing strategy in many accounting decision settings, little is known about it. The current study is designed to examine two variables that may affect this decision process. The first variable, audit work experience, is likely to influence auditors' decision making because most of their understanding of the audit process is acquired primarily through on the job training. The second one, the level of audit methodology structure, could affect auditors' ability to learn from experience because various levels of structure result in different decision environments. More research is needed to examine the influence of these important variables on auditors' decisions because past empirical studies have provided inconclusive results.

Hypothesis generation appears to be a desirable decision process in which to examine the effects of audit experience and audit methodology structure. In fact, many

accounting decisions can be described as diagnostic problems in which the accountant generates and tests hypotheses (Einhorn 1976). In Einhorn's framework the auditor is a diagnostician facing a company with unusual symptoms. To evaluate these symptoms auditors direct their search for information based upon their generated hypotheses.

A good example of an accounting diagnosis problem is the use of analytical review procedures. These procedures in the initial audit planning help identify any potential financial statement errors or problems (Libby 1985). In this initial stage, the auditor may encounter unexpected relationships among the company's values. To investigate these relationships, he or she develops a series of plausible diagnoses (i.e., generates hypotheses) and a strategy for gathering evidence (i.e., tests hypotheses). Presumably, an auditor with a better understanding of the audit process would be a better diagnostician.

A significant part of an auditor's understanding of accounting and audit processes comes from professional experience (Gibbins 1984; Waller and Felix 1984). As auditors advance through the ranks in a firm, their progress depends in large part on their acquisition of the skills necessary to accept increasingly more responsibility for conducting an audit. These skills include recognizing expected and unexpected relationships among financial data. Auditors' exposure to such relationships should increase

with more experience. As a consequence, more experienced auditors should be better than less experienced ones at generating and testing hypotheses.

Auditors' experienced-based knowledge may be affected by different levels of audit methodology structure. Audit methodology structure refers to the systemization or formalization of the audit approach. Several of the larger accounting firms have implemented varying degrees of structure. An interesting question arises whether or not structure affects auditors' learning from experience. According to Gibbins (1984), professional judgments in public accounting are shaped by an interaction between general human judgment processes and the particular demands of public accounting. Auditors' knowledge structures are believed to be shaped by their decision environment. Because of the potential influence of the environment, differences in levels of structure could affect the auditor's ability to acquire experiential knowledge.

This study addresses the following question:

> What is the effect of months of audit experience and audit methodology structure on auditor hypothesis <u>generation</u> skills in an analytical review setting?

The purpose of the study is to explain the relative contribution of the independent variables (months of audit

experience and audit methodology structure) to the proportion of variance accounted for in the dependent variable (auditors' hypothesis generation). Regression analysis is used to examine the relationships between the independent and dependent variables. The dependent variable (hypothesis generation skills) is represented by hypotheses generated by each subject and a score representing the quality of the hypotheses. The quality of the hypotheses was rated by a panel of experts (i.e., certified public accountants specializing in auditing) after the study was administered.

Significance of the Study

Theoretical Implications

The current study is relevant to some recent theoretical speculations (Gibbins 1984; Waller and Felix 1984) about the effects of audit work experience on auditors' judgments. These speculations are based on findings from the psychological literature and observations of the auditor's decision making environment.

Waller and Felix's (1984) theoretical model of the professional auditor's knowledge-acquisition process emphasizes the importance of work experience. They organize the auditor's expertise into three areas: (1) knowledge of generally accepted accounting measurement/disclosure rules for events and reports, (2) knowledge of generally accepted rules for planning an audit, collecting and evaluating

evidence, forming an opinion on a report, and communicating the opinion, and (3) knowledge of the economic and social environment that produces the report, including knowledge of the accounting system that produces the report. The auditor's objective in the audit report process is to reach an opinion such that the probability of failure to observe material departures from prescribed measurement/disclosure rules is small. The opinion formulation process and the auditor's learning from experience are believed to interact with each other. That is to say, the auditor's experienced-based knowledge structures influence judgments at each step in the opinion formulation process, and repeated experience in applying the steps of the opinion formulation process leads to adaptations in these knowledge structures.

For two reasons, the results of the present study may provide empirical support for Waller and Felix's (1984) model. First, and in general, results indicating a strong relationship between years of audit experience and auditors' hypothesis generation and testing skills would affirm Waller and Felix's speculations about the influence of work experience on auditors' decisions. Second, some particular aspects of the model could be applied to how different levels of audit methodology structure influence auditors' learning and judgments. In the model, the auditor's cognitive structures (which represent his knowledge of the practice of auditing and which drive his

perceptions and judgments) are the product of experiential action and observation. Although the opinion formulation process is susceptible to description in a formal education setting, knowledge is acquired almost exclusively through professional experience. This experientially derived knowledge includes observations of events that occur simultaneously and feedback from auditors' actions and the resultant outcomes. Results indicating that audit methodology structure affects auditors' knowledge of the audit process would provide support for these particular aspects of the model.

Gibbins (1984) also suggests that the particular characteristics of decision making in public accounting interact with general human judgment processes to shape professional judgment. He argues that experience provides prestructured guides to judgment because it brings structure to the auditor's psychological processes. According to Gibbins' model, the decision environment influences auditors' knowledge structures. The environment contains pressures, motivations, rules, constraints, feedback, and other factors important to responding and learning. The role of audit methodology in this model would be that a structured or unstructured audit methodology represents a part of the environment that shapes the auditor's knowledge organization. This role is an important issue because resulting differences in their knowledge organizations may

lead to different responses to the same information (Tversky and Kahneman 1981).

Audit methodology structure can be viewed as framing what the auditor observes. They are designed to help him or her reach conclusions about the audit. A highly structured audit methodology could result in auditors becoming mechanistic in their thinking. In this environment auditors may not acquire the necessary skills to accept more responsibility as they progress in the firm. Alternatively, a structured environment could make learning the audit process much easier because it provides the auditor with a logical sequence of steps. Auditors in a highly structured environment may learn more than those in a minimally structured environment but with the same years of experience. Thus, this study should provide empirical evidence regarding the effect of audit methodology structure on auditors' learning from experience.

Practical Implications

In addition to theoretical issues, there are two important practical implications of this study. First, more information about how structure affects audit efficiency and effectiveness is likely to be provided. Ways to improve audit efficiency and effectiveness are considered valuable by the accounting profession. Firms that have not implemented a structured approach may feel that too little is known about its benefits to warrant the high cost of its

implementation. Empirical research investigating the effects of structured audit methodologies on audit decisions provides evidence to evaluate the benefits of such an approach.

Second, the findings could have substantial long-term effects on auditor training. Inexperienced auditors are trained and closely supervised by experienced auditors. During the course of normal advancement in a firm, inexperienced auditors begin their training on the job by working on small components of an audit. To be promoted within a firm, auditors are expected to acquire the skills and knowledge to accept more responsibility in conducting an audit. An important issue for all firms is whether during this advancement auditors acquire the necessary learning experiences to understand the entire audit process. As a result, studies which examine the effects of audit methodology structure may help identify specific factors that affect auditors' learning. The results of such studies can assist audit firms in adapting their formal and on the job training techniques.

Organization of Dissertation

The remainder of the dissertation is organized into four chapters. Chapter Two reviews the research literature relevant to the current study. Chapter Three describes the hypotheses and methodology used in the research. Chapter Four reports the results of the statistical analyses.

Finally, Chapter Five presents the theoretical and practical implications of the results.

CHAPTER 2

LITERATURE REVIEW

This review is organized into five sections: Hypothesis Generation and Testing, Analytical Review in Auditing, Experience Effects on Audit Decisions, Audit Methodology Structure, and Summary and Overview. These sections correspond to the dependent variable (hypothesis generation), the setting (analytical review task), the two independent variables (years of audit experience and audit methodology structure), and a summary of prior work and an overview of the role of the proposed study.

Hypothesis Generation and Testing

Hypothesis generation and testing seem to be common information processing strategies in auditing decisions. The importance of these strategies in the accounting profession has been noted by several researchers. Einhorn (1976) characterized auditors as diagnosticians evaluating a company's financial signals; the auditor conducts his investigation based upon his generated hypotheses. Libby (1981) described accounting situations as having characteristics similar to medical problems. An example is an auditor faced with results from statistical analytical review that suggest a change in the underlying process that generates the accounting numbers. If the change is

material, the auditor must develop strategies for gathering information that will lead to an appropriate diagnosis.

A major research study by Elstein, Shulman, and Sprafka (1978) investigating medical diagnoses demonstrates the importance of hypothesis testing in a diagnostic problem situation. These researchers used verbal protocol analysis and other measures of information search to construct and test a model of medical diagnostic reasoning. The authors were interested primarily in determining what distinguished "expert" physicians from nonexpert physicians. "Expert" was defined as those recognized by their colleagues as the best diagnosticians. In this five-year program of study, they used a variety of experimental tasks constructed to be as realistic as possible. Although they did not find any differences between the "expert" and nonexpert as they had defined them, the authors were able to make some observations about diagnostic problem solving. They characterized diagnostic problem solving as primarily involving the generation and testing of hypotheses. They found that the majority of errors for all physicians was in initial hypothesis generation. Subjects who generated the correct hypothesis some time during the process made the correct final diagnosis. As a result, Elstein, Shulman, and Sprafka (1978) concluded that the generation of hypotheses is the most important factor in clinical diagnosis.

Research examining hypothesis generation and testing is

relatively recent in accounting. One study in particular is relevant to the current study because of its focus on how auditors' hypothesis generation and testing skills are affected by their prior knowledge. To specifically address how prior knowledge affects auditors' hypothesis generation, Libby (1985) investigated the role of prior knowledge of financial statement errors in the generation of initial diagnostic hypotheses. In a preliminary analytical review setting, he tested the assumption that auditors' generation of financial statement error hypotheses would be influenced by their expected frequency of occurrence. Subjects were 68 practicing audit managers from one "big eight" accounting firm.

Thirty-seven auditors performed a hypothesis generation task while thirty-one auditors performed a frequency rating task. For the hypothesis generation task, subjects reviewed selected information and ratios of a hypothetical manufacturing company and then listed up to seven errors that might have caused a fluctuation in one of the ratios. For the frequency rating task, subjects estimated the relative frequency with which twelve types of financial statement errors occur in manufacturing audit engagements. The twelve errors were from a survey of auditing firms and represented a range of errors that occur in practice. By comparing the responses of the two groups (hypothesis generators and frequency raters), Libby tested the

hypothesis that financial statement errors perceived to occur more frequently are more likely to be generated as initial hypotheses. The results indicated a high correlation (r = .71, p < .01) between the two groups' responses.

Libby also investigated whether financial statement errors detected more frequently in practice are perceived to occur more frequently than those not detected as frequently in practice. To test this hypothesis, he compared the mean ratings of the thirty-one auditors (frequency raters) with actual data gathered from a sample of the firm's clients. The results indicated a high correlation (r = .82, p < .002) between the frequency of financial statement errors found in practice and auditors' perceptions of those frequencies.

Libby's results are important for the current study because experience appears to have an important influence on hypothesis generation. Although he did not systematically examine different experience levels, his results suggest that prior knowledge of financial statement errors (obtained through experience) affects auditors' perceptions of the frequency of those errors. Auditors' perceptions are very likely to affect their generation of financial statement error hypotheses. Libby's results are, however, not generalizable to other accounting firms because the subjects were from only one "big eight" firm. Comparisons with other firms are particularly relevant because differences in audit

methodology structure may affect auditors' development of hypothesis generation skills. Consequently, more research is needed to examine both the effects of experience and audit methodology structure.

Analytical Review in Auditing

In Statement on Auditing Standards No. 23, the AICPA defines analytical review procedures as substantive tests of financial information made by study and comparison of relationships among data. A basic premise underlying the application of analytical review procedures is that relationships among data are those that may be reasonably expected to exist and continue without evidence to the contrary. According to the professional standards, analytical review procedures can be used (1) in planning the audit, (2) in conducting the examination in conjunction with other procedures, and (3) as an overall review of financial information at the conclusion of the audit.

Analytical review appears to have great potential for increasing both audit efficiency and effectiveness. It focuses on the balance (summary of transactions) rather than on the components of the client's account balances (Kinney 1978). The auditor assesses the reasonableness of the balances in view of all known circumstances. In the analytical review process the auditor compares the client's reported balance (or balances in the case of a ratio) with the auditor's assessment of the likely audited balance.

Specific procedures can range from informal scanning and comparison by the auditor to application of statistical models. The auditors' assessment of the audited balance may be based upon an examination of the client's audited values for prior periods, data concerning the economy, and internal records (Kinney 1978). If a client's reported values are close to the auditor's expectations, the auditor's confidence in the validity of the client's reported balance is increased. The results of the review may indicate that additional procedures are needed or that the extent of other auditing procedures may be reduced.

Research examining analytical review procedures can be categorized into three areas: (1) statistical models, (2) usage in practice, and (3) behavioral studies. Statistical models research is quantitative in nature and involves investigating how specific statistical models perform. Research investigating current usage in practice is relatively new. Some of these studies have focused on how practitioners select and apply analytical review procedures, the effects of certain situational variables on auditor judgments regarding analytical review procedures, and surveys of practicing auditors concerning the type of analytical review procedures they use. The behavioral area has concentrated on aspects of auditors' decisions in analytical review settings. Because it is the most relevant to the current study, only behavioral research involving

analytical review settings are reviewed here.

Behavior research examining analytical review tasks can be characterized as having two research foci. The first addresses whether auditors use a specific heuristic in an analytical review setting. The second involves exploratory work designed to determine what particular processing strategies auditors are using.

Heuristics are "rules of thumb" or simple decision rules that people employ to reduce environmental complexity. There are several heuristics (e.g., anchoring, availability, and representativeness) that have been identified and studied by cognitive psychologists (Kahneman, Slovic, and Tversky 1982). Often, the use of heuristics results in accurate decisions, but in some situations their use can result in significant decision biases (Kahneman, Slovic, and Tversky 1982), at least relative to normative statistical models.

The heuristic that has been studied in analytical review settings is anchoring. Anchoring occurs when decision makers act as if they focus on an initial value (or anchor) in the decision setting and adjust their responses from that value (Kinney and Uecker 1982). Adjustments are usually in the "right" direction but are insufficient to obtain the "correct" value. The anchor could be based on experience, an initial value, or some outside source. In an analytical review setting, an auditor forms an assessment of

the likely audited value for a particular account or ratio of account balances for the period under audit, based on available information and his or her experience. The auditor then determines the subsequent audit procedures based on the closeness of the unaudited values to the likely audited values. If auditors focus on the unaudited values to assess the likely audited value, then they have anchored on the unaudited value. This anchoring could lead to unwarranted acceptance of the client's unaudited values.

Kinney and Uecker (1982) examined whether practicing auditors "anchored" on the client's unaudited account balances and ratios in performing an analysis of the gross margin of a small manufacturing firm. They hypothesized that auditors' investigation bounds for current unaudited values would be biased in the direction of the unaudited values. To test their hypothesis, audited components of gross profit and gross profit percentage for the last two years and the current year's unaudited values for a hypothetical company were provided to 179 audit seniors (yielding 154 usable responses). Subjects were divided into two groups; the unaudited values presented to one group were higher than the unaudited values presented to the other group. Subjects were asked to indicate an interval beyond which they would investigate the client's unaudited value. The results supported Kinney and Uecker's hypothesis in that auditors given high unaudited values set investigation

bounds higher than did the auditors given low unaudited values.

Biggs and Wild (1985) extended the work of Kinney and Uecker by adding a control group to the experimental design, providing some auditors with five years of audited data, and requiring auditors to specify both a point estimate of the audited value and a noninvestigation interval at a 95% confidence level. Auditors in the control group received only prior years' audited data. By comparing the responses of the high and low unaudited value groups with the control group, the extent of the unaudited data's influence could be determined. The five years of audited data permitted analysis of analytical review judgments in a richer information environment. The point estimate provided an additional measure of the influence of the unaudited data, and by specifying the size of the noninvestigation interval, a potential source of variation in the auditor responses was eliminated.

Biggs and Wild's findings were consistent with those of Kinney and Uecker. The auditors provided with two years of audited data plus the current unaudited data were influenced in the hypothesized direction by the unaudited data. In the five year setting the results also held, but the effects of the unaudited data were modified somewhat. The addition of the control group enabled Biggs and Wild to determine that auditors provided with high unaudited values were more

influenced by the unaudited values than auditors provided with low unaudited values.

The results of both studies (Biggs and Wild, Kinney and Uecker) could have been attributable to the data trends presented in the experimental settings. In each study, the data base consisted of two years of decreasing audited data with either (1) low unaudited values - unaudited data which were consistent with the prior trend or (2) high unaudited values - unaudited data which were inconsistent with the two prior years' trend. A low unaudited value would be consistent with the audited data trend and seemingly not influence the auditor as much as a high unaudited value which would be a reversal of the trend. Thus, from these two studies it is difficult to determine how the relationship between the audited and unaudited values influenced the auditors' responses.

Heintz and White (1989) extended the work of both Kinney and Uecker and Biggs and Wild in a number of ways. First, both increasing and decreasing data trends as well as trend reversals were presented to auditors so that the effect of unaudited data on analytical review judgments could be examined in different trend situations. Second, the realism of the audited and unaudited data was enhanced by basing the data on published industry statistics. Third, details about the analytical review setting were made more explicit. Finally, control over the administration of the

experiment was improved by having the auditors complete the task in the presence of one of the researchers. The results indicated that auditors used the unaudited value in forming their expectations of the current year audited value, but they did so in a conservative way. The auditors' point estimates and one of the noninvestigation bounds were significantly affected by the unaudited value, but there is evidence that the upper (lower) noninvestigation bound was not significantly influenced by a high (low) unaudited value.

Taken as a whole, the findings of Kinney and Uecker, Biggs and Wild, and Heintz and White indicate that auditors are subject to the anchoring heuristic in an analytical review setting. However, these results may be attributable in part to the relatively simplistic experimental setting used in these studies. Auditors' susceptibility to the anchoring heuristic in the experimental settings could be due to the lack of other normally available data. In an actual audit setting auditors would not be limited to a small set of data. Future research examining the use of heuristics in auditing decision settings should involve more complex decision settings.

The second focus of behavioral research examining analytical review involves exploratory work designed to determine what particular processing strategies auditors are using. This work is based primarily on verbal protocol

analysis. An example of this type research is Biggs, Mock, and Watkins (1988) in which verbal protocol analysis was used to examine auditors' decision processes in a complex analytical review setting. Due to the small sample of subjects (four auditors) examined, the findings cannot be generalized. Despite its limitations, this type of exploratory research can provide ideas for future studies using different methodologies and larger samples. Particularly relevant from Biggs, Mock, and Watkins (1988) to the current study is the idea that analytical review skills are built up in memory primarily through experience. This insight suggests that analytical review is a desirable task and setting in which to study the effects of experience on auditors' decisions.

Experience Effects on Audit Decisions

Long before accountants began studying behavioral aspects of accounting decisions, cognitive psychologists were investigating the influence of expertise in problem solving. Practice or experience appears to be an extremely important element of expertise. This importance is best demonstrated in the game of chess (Anderson 1980). For example, De Groot (1965, 1966) was interested in what distinguished expert or master chess players from novice players. On most of the measures examined, he found very little difference between the two groups. Nonetheless, De Groot discovered an interesting difference in each group's

ability to reconstruct problems from memory. He presented master players and novices with chess positions (positions that were actually encountered in games) for five seconds and then removed the chess position. The masters were able to reconstruct the positions of more than twenty pieces after only five seconds of study while the novices could reconstruct only four or five pieces. When they were presented with random chessboard positions rather than actual game positions, both masters and novices could reconstruct only a few pieces. Newell and Simon (1972) speculated that masters learn many patterns over time and also learn what to do in the presence of these patterns. When master players recall the positions, they are recalling more information stored in larger chunks (familiar patterns) than the novices who are recalling less information stored in smaller chunks (unfamiliar, unpatterned).

Experience or practice appears to be an important part of decision making in many applied disciplines. For example, practical experience in medicine and auditing is a substantial aspect of learning the discipline. After their formal education, physicians must fulfill internship and residency requirements at a hospital to complete their training. Formal education for auditors involve primarily learning accounting concepts and principles, but they acquire most of their audit training on the job.

The accounting profession has consistently acknowledged

the importance of work experience. In an early theoretical work, "A Statement of Basic Auditing Concepts" (1966), auditors' professional development is described as being dependent to a large degree upon a system of on-the-job training. This dependence still is true today; however, it is only recently that accountants have begun to speculate about how auditing experience affects auditors' decisions. The theoretical works of Waller and Felix (1984) and Gibbins (1984) are prime examples of these efforts. A major purpose of these works is to stimulate empirical tests of the effects of experience on auditor decisions.

There have been a number of studies that have directly or indirectly examined the effects of experience on auditor judgments. A review of these studies will reveal what has been discovered about the influence of experience. Conclusions from this review provide the basis for studying experience effects.

Several related studies (Ashton 1974; Ashton and Kramer 1980; Ashton and Brown 1980; Hamilton and Wright 1982) have examined the influence of work experience on auditors' judgments. Ashton (1974) examined practicing auditors' consensus and stability of judgments in evaluating audit evidence concerning the strength of an internal control subsystem. Consensus of judgment is defined as consistency across auditors' responses, and stability is defined as consistency within an individual auditor's responses. The

rationale for examining judgment consistency was that variations in judgment by different auditors or by the same auditor at different times may cause the cost or quality of an audit to fluctuate. In an experimental task involving a hypothetical manufacturing firm, subjects rated six indicators of internal control in a payroll subsystem on a scale from one (extremely weak) to six (adequate to strong) for thirty-two cases. The six indicators of internal control were presented to the subjects in the form of preanswered questions (yes or no) on an internal control questionnaire.

The results of Ashton's study suggest that practicing auditors with two to three years of work experience exhibit a fairly high level of consensus (average correlation = .70) and stability (average correlation = .81). Ashton noted, however, that when specific auditors were considered, some of their responses were not consistent over time and some of their responses were not consistent with other auditors. He also noted that there was a range of agreement within firms (and experience levels) and between firms (and experience levels). Ashton called for further research to investigate reasons for some of the observed inconsistency between and within subjects.

In an extension of Ashton's study, Ashton and Kramer (1980) administered Ashton's instrument to undergraduate accounting students. Their results indicated that students'

responses did not differ significantly from those of practicing auditors with two to three years audit experience. These results led Ashton and Kramer to suggest that students could be good surrogates for auditing judgment experiments.

A plausible explanation for these results could be the nature of the experimental task. In actual decision environments auditors are confronted with a very complex set of interrelated cues, whereas the experimental tasks involved a series of isolated situations. Auditors' responses to a simple task may be an inaccurate representation of the decision processes and knowledge structures which they would use in actual audit tasks. Similar responses from students and auditors may indicate only that both groups respond in the same manner to uncomplicated situations, not that students are good surrogates for experienced auditors. Therefore, conclusions concerning the effects of experience on auditors' decisions in real-life settings are difficult to reach from the Ashton and Ashton and Kramer studies.

In an attempt to make Ashton's original experimental task more complex and realistic, Ashton and Brown (1980) modified his instrument by including two more cues. Thirty-one subjects with experience levels from one to three years participated in the study. Experience effects were found not to be significant.

Using a task and situation similar to the ones used in the studies discussed above, Hamilton and Wright (1982) explicitly examined the relationship between years of experience and various measures of auditor judgment. These measures were consensus of judgments, stability of judgments, relative weight given to the information, and subjects' degree of self-insight into their relative utilization of information. The sample included a broader range of experience levels and a larger percent of relatively experienced auditors. In this study, Hamilton and Wright assumed that a primary determinant of improved expertise in an area of expert judgment is experience. Their results indicated, however, a low correlation between years of experience and the various measures of auditor judgment, except for improved self-insight. As with Ashton and Kramer (1980), these results may be limited in how far they may be generalized because subjects performed a simplistic, isolated task. Such experimental tasks may result in experienced auditors not being required to use the patterns of knowledge they have developed.

Results that conflicted with these previously discussed studies were obtained by Nanni (1984). Thirty subjects whose audit experience ranged from three to seventeen years (with a mean of six years) rated sixteen internal control cases against three control objectives. The cases were comprised of simulated audit evidence. The results

indicated significant differences by firm affiliation, rank and years of audit experience and by extent of internal accounting control evaluation experience. These findings may be attributable to both a higher level of subjects' audit experience and a more complex decision setting than those in prior studies.

Krogstad, Ettenson, and Shanteau (1984) investigated the role of contextual information in making materiality judgments. Although both students and auditors who were used as subjects focused on how the contextual information affected net income, the groups appeared to use the cues differently. Students tended to focus on various individual cues while auditors related the cues as a group to the effect on net income. In contrast to Ashton and Kramer (1980), this study suggests that students may not be good surrogates in particular auditing tasks, perhaps because of their lack of experience.

In the area of Electronic Data Processing (EDP) auditing, Weber (1980) investigated the effects of experience on the recall of computer controls. He conducted an experiment with EDP auditors (both internal and external) and students to investigate some characteristics of the ways in which EDP auditors recall computer controls under a free recall situation. His results indicated that EDP auditors recalled more controls than students and that auditors' recalls clustered more than students' recalls. In other

words, auditors' recalls were more organized. In analyzing the responses among just the auditors, he found that the type of auditor (i.e., internal or external) had the only significant effect on the relationship between the number of computer controls recalled and auditor characteristics. The external auditors recalled more controls than the internal auditors.

Another methodology that has been used in examining experience effects on audit judgments is predecisional research. The main focus of predecisional research is the processing that occurs before the auditor makes a final judgment. Verbal protocol data are collected from subjects as they perform a task while thinking aloud. These verbalizations are then classified into predetermined categories relevant to a researcher's hypotheses. Because the amount of data collected and analyzed from each subject is so large, few subjects are used in each study. Although an abundance of detail can be studied, it is at the cost of subjective coding techniques and a small number of subjects.

Using protocol analysis Bouwman (1984) compared the decision making processes of experts and novices in the context of a financial analysis task. The novice group consisted of five masters degree students majoring in accounting, and the expert group consisted of three CPAs on the faculty. He found that, in general, novices and experts used similar decision making processes, but the relative

frequencies of specific processes used by the two groups were very different. Novices tended to use a passive, inductive strategy of collecting data, while experts frequently pursued specific observations. Experts were characterized as regularly summarizing results and formulating hypotheses. Moreover, the sequencing of the experts' decision making processes was much more complex and lacked the repetitiveness characterized by the novices' processes.

In another study using verbal protocol analysis, Biggs, Mock, and Watkins (1988) examined judgmental aspects of analytical review in a relatively complex setting. Using a case with over 100 pages of working papers, they investigated how experienced (two audit managers) and inexperienced (two new audit seniors) auditors designed and conducted analytical review and revised audit programs in light of their analytical review judgments. Biggs, Mock, and Watkins (1988) found several important differences in information acquisition between managers and seniors. Managers' information acquisition was much more comprehensive than that of seniors. The seniors and managers also exhibited differences in the emphasis placed on their information acquisition activities. For example, the seniors concentrated more of their information acquisition on the introductory case materials than did managers. Further, because the managers knew more about how

to conduct an analytical review and make audit program changes, they seemed not to rely on task instructions. As a result, Biggs, Mock, and Watkins (1988) suggest that analytical review skills are built up in memory primarily through experience.

Biggs, Mock, and Watkins (1988) also discovered some differences in the auditors' decisions. The managers appeared to make more subtle distinctions based upon the deeper structures of the problem while the seniors apparently responded to the surface features of the problem. The authors link these differences to previous psychological research which indicated similar results involving novices and experts. Such previous research indicates that expert decision making is based upon skills developed through experience and these skills are stored in memory structures.

As indicated by the review above, work experience research in auditing has produced inconclusive results. Two factors which might help explain the different findings is the nature of the auditing tasks used in the different studies. First, the complexity of tasks differed substantially among the studies. In many studies using simplistic tasks (e.g., Ashton 1974; Ashton and Kramer 1980; Hamilton and Wright 1982), the results indicated that experience had no effect on specific audit decisions. These results are not easily interpreted because the effects of experience on auditors' decisions may be difficult to

measure in unrealistic settings employing uncomplicated tasks. Additionally, results from studies with more task realism revealed differences in decision processes among experience levels. For example, in studies using protocol analysis, the tasks were fairly complex and more representative of an actual audit environment. Second, the type of audit task also varied across studies. The tasks have ranged from internal control evaluations to materiality assessments to analytical review judgments. Experience may affect some types of decisions but not others. Convergent findings of studies examining the same decision task but using different research methodologies could greatly strengthen confidence in results indicating experience effects.

Another factor which could explain the mixed findings is the range of experience examined. In the Ashton and related studies, for example, auditors had only one to three years of experience. With such a narrow distribution, differences attributable to auditor experience may be trivial or difficult to measure. Examining a sample of auditors with a wide range of years of experience would provide a more meaningful investigation of the effects of experience on auditors' decisions.

Future research on auditor work experience would benefit from the use of relatively realistic yet manageable experimental tasks, increased sample sizes, and systematic

control of the experience variable. In the verbal protocol studies, the tasks have been too complex to administer to many subjects. As a result, too few subjects have been utilized to permit generalization to the behavior of other auditors. Experimentally manageable tasks which are constructed from real-life audit settings would enable a larger sample of auditors to be studied. Furthermore, a more systematic approach is needed to examine experience effects on auditors' judgments. For example, future research employing ANOVA designs needs to define experience groups such that overlapping of experience between groups is substantially reduced. By using regression analysis, auditors' responses along a continuum of experience levels (i.e., from inexperienced beginning staff positions to very experienced audit partners) could be analyzed.

Structure of Audit Methodology

A structured audit methodology is a systematic approach to auditing characterized by a prescribed, logical sequence of procedures, decisions, and documentation steps and by a comprehensive and integrated set of audit policies and tools designed to assist the auditor in conducting the audit (Cushing and Loebbecke 1986). The structured auditing process is often explicitly represented in the form of an audit process flow chart. It is comprehensive because the audit tools and policies cover the entire auditing process from acceptance of the client to issuance of an audit

opinion. The audit tools are integrated such that the results from applying one audit tool at an earlier stage of the audit may be incorporated into other audit tools used in planning the later stages of the audit.

The implementation of audit methodology structure is a relatively recent phenomenon among large auditing firms. Firms have introduced structure to their decision environment for some of the following reasons: (1) a need to implement a consistent approach across a large practice, (2) a need to control audit risk and audit costs more effectively, and (3) a desire to obtain a distinguishable image in the market place (Cushing and Loebbecke 1986).

There are several perceived advantages of a more structured audit methodology.

(1) Because of increased competition among large auditing firms, many of the large firms are becoming more competitive in pricing audit services. By using a more structured approach, an auditing firm may hope to perform more efficient audits and thereby reduce its fees.

(2) Increased regulation and litigation have made it more important for the auditor to be able to demonstrate compliance with auditing standards. A structured audit methodology may facilitate quality control of audit work by helping to insure that the same general approach is followed on all audits. It also can provide a standard format for documenting audit findings and conclusions which may be

useful in legal proceedings.

(3) An increase in the complexity of data processing technology has changed the audit environment. A structured audit methodology can provide specialized auditing tools which help the auditor understand the new environment. Examples of such tools are EDP internal control questionnaires and computer audit software.

(4) The structured approach may facilitate the training of the audit staff because the methodology is based on a logical sequence of steps. Learning and understanding of the audit process may be improved with audit tools which are explained in terms of the overall audit approach.

(5) A more structured audit approach shifts control of decisions made in the audit to the central firm. This shift may be advantageous to a firm because it is a way of coping with increased complexity in the economic environment. To help the auditor understand and cope with unusual audit environments, specialized audit tools such as financial analysis techniques and financial disclosure checklists are developed by the central firm.

There also are several perceived disadvantages of structured audit methodology. First, if the methodology is designed to be applied to typical audits, it may be inflexible when applied to an atypical audit environment. Second, it could cause auditors to be less effective in all audit environments. With extensive use of preprepared audit

programs and checklists to provide structure, the auditor's thinking may become mechanistic. Consequently, the auditor could fail to observe important facts or fail to reach appropriate conclusions. Third, it may be less efficient in less complex environments. The auditor may perform procedures to comply with the requirements of the audit process in situations where the procedures are not necessary. Finally, the cost of developing and implementing structured approaches is very high.

There have been only a few studies which have investigated audit methodology structure. Cushing and Loebbecke (1986) conducted a descriptive study to determine what characterized structured versus unstructured firms. They developed a method to measure the degree of structure in a firm's audit methodology and applied this measurement method to the audit processes of twelve firms. They were able to classify the twelve firms into four categories (i.e., highly structured, semi-structured, partially structured, and unstructured).

Kinney (1985) offers evidence of how different levels of audit methodology structure can influence issues affecting the accounting profession. He examined auditing firms' preferences and voting patterns for recent auditing and reporting issues considered by the Auditing Standards Board. Because groups of firms have been observed to vote together on seemingly diverse issues, Kinney proposed a

positive theory to explain the observed voting pattern. He found that firms with a structured approach tended to favor codification of proposed guidance while firms with relatively unstructured technologies did not.

Geary and Burns (1985) examined the relationship between structure in the audit process and certain internal control evaluation and audit planning decisions. Their measure of audit structure was patterned after instruments used by researchers in organizational behavior. Results were mixed. Although structure seemed to enhance the auditor's capabilities to make certain internal control evaluation and audit planning decisions, it either had no effect on or actually impaired other decisions.

Although several accounting firms have adopted varying levels of structure in their audit approach, there is little empirical evidence on the effects of structure on auditors' decisions. Therefore, it is difficult to speculate on the details of how structured or unstructured environments affect learning. More descriptive research is needed to determine if different levels of audit methodology structure affect auditors' learning and, ultimately, the quality of their judgments.

Summary and Overview

In diagnostic problem solving settings, hypothesis generation and testing appear to be common human information processes; however, only a few studies have investigated

auditors' diagnostic problem solving abilities. Analytical review, which involves the study and comparison of relationships among data, appears to be an appropriate task for investigating auditors' diagnostic abilities. Research in this area has been limited and recent. Because of the importance of diagnostic abilities in accounting decision settings, more research is needed to examine auditors' hypothesis generation and testing skills. Specifically, factors that affect an auditor's acquisition of these skills should be investigated.

Audit work experience is believed to be a significant factor that affects auditors' decision processes, but past research has yielded conflicting results. These results could be attributable, in part, to the differences in the level of realism in the experimental settings employed. In addition, previous studies that used larger samples of subjects have not examined a wide range of experience levels. From these studies, it is difficult to reach conclusions about how different levels of experience affect decisions. Thus, future research should systematically incorporate wider ranges of experience levels and relatively realistic decision settings.

Audit methodology structure may have substantial effects on the auditor's learning process because different amounts of structure produce different decision environments. Because most auditors' knowledge of auditing

is acquired on the job, different decision environments could result in marked differences in what auditors learn about the audit process. Currently, there is little evidence regarding the effects of audit methodology structure on auditors' decision-making.

CHAPTER 3

METHODOLOGY

This chapter provides a detailed description of the methodology employed in the study. First, the three formal hypotheses are presented. The second section describes the independent and dependent variables along with the regression models. In the third section, the experimental instrument is discussed. The fourth section provides information about the procedures used to collect the data from subjects and to evaluate the subjects' responses.

Hypotheses

In this study, three hypotheses are tested to examine the effect of specific variables on auditors' hypothesis generation skills in an auditing decision setting. The first two hypotheses deal with the effects of audit work experience and audit methodology structure, respectively. The third hypothesis addresses the interaction effect of experience and structure on hypothesis generation skills.

Audit Work Experience

Hypothesis 1: More experienced auditors will have better hypothesis generation skills than those of less experienced auditors.

Audit work experience is hypothesized to be a significant variable affecting auditor judgment. This

contention is based upon recent theoretical speculations, existing empirical research, and the nature of auditor advancement within accounting firms.

Waller and Felix (1984) and Gibbins (1984) have speculated that work experience has a significant influence on auditors' decisions. These speculations are based on findings from the psychological literature and observations of the auditor's decision making environment. In Waller and Felix's model, the auditor's "knowledge structures" are seen to be the product of experiential action and observation. Knowledge structures influence auditors' perceptions and judgments by providing a pre-conceived interpretive framework within which to incorporate new information. Similarly, Gibbins argues that experience provides prestructured guides to auditors' judgments because it structures the auditor's psychological processes. Knowledge structures, however, are not static but are greatly influenced by experience with the environment. These environment experiences includes pressures, motivations, rules, feedback, and other factors relevant to learning.

Although earlier auditor decision studies (Ashton 1974; Ashton and Brown 1980; Ashton and Kramer 1980; Hamilton and Wright 1982) revealed no effects attributable to experience, more recent research (Biggs, Mock, and Watkins 1985; Bouwman 1984) has demonstrated such effects. As discussed in an earlier section, these later findings may be due to the more

complex and realistic decision settings used in these studies. Simple or artificial settings may not be conducive to revealing an experience effect. Their simplicity may obviate the use of experiential knowledge when auditors perform tasks in such settings.

The auditor's knowledge of the audit process is also likely to be affected by experience because of the nature of advancement within accounting firms. Auditors begin their careers by working on small segments of audits under the supervision of more experienced auditors. As they acquire more experience, auditors learn more about how the audit process is related to both expected and unexpected relationships within financial statements. More experienced auditors have had years of practice and have presumably been storing their audit experiences in memory. Because of repeated exposure to higher-order audit relationships (i.e., "the big picture"), auditors with more experience should be better able to make complex judgments and interpretations of audit data than those who have observed only segments of the audit.

In the current study, an analytical review task in the preliminary stage of an audit was used to test auditors' hypothesis generation skills. In practice, the purpose of analytical review procedures at the planning stage is to detect unexpected relationships in the financial statements. When these unexpected relationships are detected, the

auditor must determine their cause. To do this, the auditor generates hypotheses to help focus his or her information search strategy. The more experienced auditor will probably have performed more analytical review procedures than the inexperienced auditor. They will have more observations of expected and unexpected relationships. Therefore, experience is expected to be positively associated with auditors' ability to generate hypotheses.

Audit Methodology Structure

Hypothesis 2: Audit methodology structure is related to auditors' hypothesis generation skills.

Audit methodology structure has the potential for influencing the auditor's level of comprehension and prediction of current and future audit-related events. It is difficult to predict the direction of the effect, however, because little is known about how audit methodology structure affects the auditor's learning of the audit process. Nonetheless, because structured methodologies may alter the perceived nature of the audit environment, a shift away from behavior found with unstructured methodologies appears likely.

In Gibbins' (1984) model, auditors' knowledge structures are shaped by the audit environment. Audit methodology is a potentially important part of the environment that shapes the auditor's knowledge structures.

A highly structured audit decision environment could facilitate the training of the audit staff because the methodology is based upon a logical sequence of steps. A structured audit approach may clarify and facilitate the development of analytical strategies used by auditors. Structure may also assist in the retention of lessons learned through experience in auditing because it offers a pre-existing framework to use in categorizing and interpreting these observations. Thus, auditors who work in a highly structured decision environment may learn more than auditors with the same years of experience but who work in a minimally structured one.

Alternatively, the auditor's thinking may become mechanistic in a highly structured environment because of extensive use of preprepared audit programs and checklists. Prescribed and prepared guidelines may be relied upon in lieu of judgment and reason. If the auditor's thinking becomes mechanistic, he could fail to observe important facts or fail to reach appropriate conclusions. As a result, the auditor may not acquire necessary analytical skills as he advances within a firm using a structured methodology. A question this study seeks to answer then, is what are the effects of audit methodology structure.

Interaction Effects

Hypothesis 3: The joint effect of years of audit experience and audit methodology

structure is related to auditors' hypothesis generation skills.

An even cloudier set of issues is raised by the possible interaction of experience and structure. Years of audit experience and audit methodology structure are independent of each other. They may, however, have an interactive effect on auditors' hypothesis generation skills. For example, the effects of audit methodology structure may be more pronounced for auditors with fewer years of experience. A highly structured audit methodology may be particularly beneficial to those with little audit experience because a structured environment provides considerable guidance in performing the audit. This structured environment would provide a consistent approach to auditing that would likely reinforce learning of the auditing process. In contrast, in a minimally structured audit environment, auditors with little experience may be hindered because they have not had the benefit of extensively structured decision aids to reinforce learning. Hypothesis 3 is tested to determine if an interaction effect exists, and if so, what is its nature.

Independent and Dependent Variables and Regression Models

The two independent variables are months of audit experience and levels of audit methodology structure. Months of audit experience is a continuous variable. Audit methodology structure is a categorical variable with two

levels - highly structured and minimally structured.

Three dependent measures -- (1) subjects' total quality scores, (2) subjects' mean quality scores, and (3) number of hypotheses identified -- are used to examine the effects of audit experience and audit methodology structure on auditors' hypothesis generation skills. The first two measures, subjects' total and mean quality scores, indicate the effects of experience and structure on the quality of auditors' hypothesis generation skills. The third dependent measure, the number of hypotheses identified, indicates the effects of experience and structure on the quantity of hypotheses identified. These dependent measures are based upon subjects' responses to an analytical review task. This task requires subjects to list as many hypotheses as possible to explain a change in the quick ratio.

The quality of subject responses is measured by applying a quality score to each of the hypotheses offered by a subject. The hypothesis quality scores are developed by having a panel of "expert" auditors evaluate subject responses. The "experts" rated the quality of a composite list of subject hypotheses on a seven point Likert-type scale. Medians of the panel's ratings of each hypothesis on the composite list are computed and applied to the subjects' responses to obtain a total quality score for each subject. If a subject identifies two hypotheses with corresponding median "expert" ratings of three and five, then his or her

total score would be eight (the addition of the median ratings for each hypothesis). A subject's mean quality score is his or her total quality score divided by the number of hypotheses generated. Further details explaining the composite list, the panel of "experts," the definition of quality, and the "expert" evaluation procedures are provided in the Procedures section of this chapter.

The effects of experience and audit methodology structure on auditors' hypothesis generation skills are tested using multiple linear regression analysis. The regression models are as follows:

$$Y_1 = a + b_1 x_1 + b_2 x_2 + b_3 x_1x_2 + e,$$

$$Y_2 = a + b_4 x_1 + b_5 x_2 + b_6 x_1x_2 + e,$$

$$Y_3 = a + b_7 x_1 + b_8 x_2 + b_8 x_1x_2 + e,$$

where Y_1 is the subjects' total quality scores,

Y_2 is the subjects' mean quality scores,

Y_3 is the subjects' number of hypotheses generated,

x_1 is the years of audit experience measure,

x_2 is the audit methodology structure measure,

x_1x_2 is the interaction of x_1 and x_2,

e represents random error, and

b_n are estimates of the regression coefficients.

Although multiple linear regression and analysis of variance are interchangeable in the case of categorical independent variables, multiple regression was chosen for

this study because it is the superior method of analysis when one or more of the independent variables is continuous, as is true in the present case (Cohen and Cohen 1975; Kerlinger and Pedhazur 1973). Further, multiple regression is preferred over ANOVA in the following cases: (1) when cell frequencies in a factorial design are unequal and disproportionate and (2) when studying linear, quadratic, or other trends in data. Each of these considerations is relevant to the present study. First, as previously indicated, the independent variables are both continuous and categorical. Second, if auditors are grouped by years of experience, it is likely that the cell frequencies will be unequal. Third, hypothesis one involves a linear trend between the independent and dependent variables.

Experimental Instrument

Subjects received a booklet containing instructions, a description of the experimental setting, the task, and a debriefing questionnaire. A copy of this booklet is contained in Appendix A. Both the experimental setting and task were modified from ones developed by Libby (1985). They were selected for the current study because of their original design; they provided complex stimuli with which auditors could generate initial hypotheses based on information concerning the nature of a company's operations and some basic financial indicators. The experimental setting and task represent an increase in the realism from

those in many previous studies. Ashton (1974), Ashton and Brown (1980), Ashton and Kramer (1980), and Hamilton and Wright (1982) provided subjects with only a brief narrative about the client's background. In the current study, detailed company and industry background information are presented along with two prior years' audited financial statements and selected financial ratios. Although the setting and task are necessarily an abstraction of complex, "real world" audit environments, the information in the case is representative of similar companies with the hypothetical client's background and economic environment.

Each subject was provided with (1) three pages of background information describing the client, (2) two prior years' audited financial statements, and (3) a financial ratio profile for the two prior years and the current year. The background information is relatively detailed and includes information normally available to auditors performing analytical review in the audit planning stage. The client is described as a publicly owned manufacturer of mining equipment located in Pittsburgh, Pennsylvania. Information is provided about the types of equipment manufactured, sales markets, composition of the board of directors, market share prediction, operating activities, and industry statistics. Two prior years' audited income statements and balance sheets are presented. To avoid confounding effects, there are no major differences between

the two years. Current year financial statements were not provided so that the auditors would be less restricted in identifying causes for the change in the quick ratio.

The financial ratio profile appears after the background information and the financial statements. The profile consists of (a) the gross margin percentage, (b) the current ratio, and (c) the quick ratio for the two prior years (audited values) and the current year (unaudited values). These ratios were selected based upon a survey of ratio use and ratio analysis training materials from five "big eight" firms (Coakley 1982, as cited in Libby 1985). The quick ratio for the current year reflects approximately a 20 percent increase from that of the prior audited years. As contrasted to an increase of .07 percent in the gross margin percentage and an increase of 12 percent in the current ratio, the relatively large increase in the quick ratio was intended to provide the subjects with a reason to investigate its cause. During pilot testing of the instrument, practicing auditors indicated that the increase was sufficiently large to cause them to pursue specific reasons for its change.

The experimental task required auditors to "(1) list as many specific causes as you can which may have led to the change in the quick ratio and (2) list as many procedures as you can which you would perform to confirm or disconfirm each potential cause you identified in task (1)." The first

part of the task involves hypothesis generation skills and the second one addresses hypothesis testing skills. Because hypothesis generation and testing appear to be natural companions in decision processes, hypothesis testing was included for exploratory purposes for future research. Due to the exploratory nature of this investigation, no formal hypotheses were developed regarding hypothesis testing. The hypothesis testing procedures listed by each subject are directly related to the specific causes identified in part one and are not comparable across subjects; consequently, the procedures are analyzed in a descriptive manner.

The modifications to the experimental setting and task used by Libby (1985) are worthy of note. First, two years instead of one year of audited financial statement data and ratios are included in the current study to increase the realism of the setting. In practice, auditors would have at least two years of audited data when performing an analytical review. Second, South Africa was eliminated as one of the major markets in the industry information to avoid potentially confounding effects due to that country's current political problems. Third, while Libby required auditors to list up to six responses, the present study required subjects to list as many responses as possible. Fourth, the current task required auditors to list procedures to investigate the causes of the change in the quick ratio, while Libby's did not. Finally, the wording of

the task was changed from "list possible errors" to "list possible causes." Results of pretesting with practicing auditors indicated that "errors" connoted an unnecessarily negative approach to analytical review procedures; the procedures involve more than looking for errors.

Although the current setting and task were not as complex as those used in verbal protocol studies, they were, nonetheless, intended to be relatively complex. Their complexity was limited, however, in order for the subjects to complete the task within one hour. For two reasons the setting and task in the current study were believed to be sufficiently complex to result in measurably different responses from subjects. First, in Libby's (1985) study, auditors using a similar setting and task generated forty-one different types of causes for the change in the quick ratio. Second, results of pilot testing conducted with eight practicing auditors (with 2.5 to 8 years of experience) from the offices of four "big eight" firms (two having highly structured methodologies and two having minimally structured ones) located in Indianapolis, Indiana, indicated that the current experimental setting and task were desirable for the purposes of this study. During preliminary discussions before the pilot subjects knew the nature and purpose of the current experimental task, each one identified analytical review as an audit task in which increased levels of experience should result in better

performance. They stated that they relied upon specific experiences from previous audits to identify potential causes of financial ratio changes. After preliminary discussions, each pilot auditor performed the experimental task. An examination of their responses to the task revealed that there was a wide range of responses both in quantity and substance. During discussions with the pilot subjects after they had performed the task, they confirmed that a change in the quick ratio has the potential to stimulate many different responses because most transactions affect the current accounts.

The last section of the experimental booklet contained the debriefing
questionnaire that requested information about subjects' auditing experience, education, and perceptions of the structure of their decision environment. Questions about types of audit experience and education were included in the event that years of experience was not a potent measure of audit experience. Questions (adapted from Bamber, Snowball, and Tubbs 1989) relating to auditors' perceptions of audit methodology structure within their own firm were used as a secondary measure of audit methodology structure.

Procedures

The collection and evaluation of the data for this study were conducted in two phases. In the first phase, data were collected from subjects who completed the

experimental instrument (previously described). In the second phase, the data collected in phase one were evaluated by "expert" auditors who rated the quality of the subjects' responses. The two phases are described separately in the following two sections.

Data Collection--Phase I

Administration of Experimental Instrument

The study was administered through a contact person in each firm. Direct monitoring by the researcher of the subjects' performance of the task would have been desirable for tighter experimental control, but most subjects' work schedules did not permit it. As a result, subjects were provided with explicit written instructions. The clarity of these instructions was investigated in a second pilot test with twelve practicing auditors from the offices of four "big eight" firms located in Indianapolis, Indiana. The same offices but different auditors were used in both pilot tests. The experimental booklets were sent and returned by mail. Debriefing discussions were conducted with all twelve pilot auditors by telephone. Results of this testing indicated that the auditors followed the instructions and appeared to have written as much as possible in the time allowed. These results provided reasonable assurance that the experimental task could be properly completed without the presence of the researcher.

The booklets were delivered to each contact person

during an office visit in order to emphasize the importance of the study and the instructions. The following general written instructions (see Appendix A) to each subject were discussed with the contact person: "(1) Please complete the project in one sitting. You should select about an hour that you can devote to the project; (2) Work on the project in your normal work environment if possible;(3) Refrain from using any professional materials (auditing manuals or programs) in completing the task; and (4) You should return the completed project to the person in your office who is responsible for it about a week after receiving it. Do not send it to me."

Subjects

Booklets were distributed to 112 professional auditors (28 per firm) from the offices of four "big eight" CPA firms, (two with highly structured and two with minimally structured audit methodologies) located in Chicago, Illinois. Of the 112 booklets originally distributed, 87 were returned. Two reasons were cited by the contact persons for the 25 unreturned booklets. The auditors either did not have the time to complete them or had left the firm subsequent to being chosen for participation. Each firm's management selected the subjects in order to obtain a sample with the appropriate levels of experience (one to eight years). This range was sufficient to study the effect of experience. A relatively even

distribution of subjects within that range was achieved. Subjects who had worked for the firm before its current level of audit methodology structure was achieved or who had worked for other accounting firms were not included in the sample.

The necessary sample size was estimated based upon the results of a statistical power analysis of the assumptions and design of this study (Cohen 1977). A total of approximately 90 subjects was estimated to be needed. This number of subjects was calculated with an alpha = .10 and desired power of the test equal to .80. The power of a statistical test of a null hypothesis is the probability that it will lead to the rejection of the null hypothesis. According to Cohen, the value .80 should be used when the investigator has no other basis for setting the desired power value.

Evaluation of Subject Responses--Phase II

Composite List of Hypotheses

Subjects' responses to the analytical review task completed in phase one of the study were combined into a composite list to be evaluated by the panel of "expert" auditors. The composite list (see Appendix B) consisted of 103 hypotheses identified by the subjects. This list was prepared from approximately 800 hypotheses originally written by the subjects. The reduction of 800 to 103 hypotheses was accomplished in a systematic manner. Each of

the hypotheses was first organized into five financial statement categories and a general one, as follows: (1) cash and marketable securities, (2) accounts receivable, (3) current liabilities, (4) assets other than quick assets, (5) profit and loss, and (6) miscellaneous. Hypotheses were grouped into the five financial statement categories because the hypotheses made direct reference to the variables in those categories. For example, the hypothesis "Cash and marketable securities are overstated" was classified in the cash and marketable securities category. Any hypothesis that could not be classified as one of the first five categories was put into the general one. For example, "There is an error in computing the quick ratio" was classified in the miscellaneous category.

After the approximately 800 hypotheses were organized into the six categories described above, duplicate and similar responses were eliminated. Duplicate responses were two or more hypotheses that had virtually the same wording. Only one of these responses was included on the composite list. Similar responses were ones with different wording but which in the researcher's judgment had the same meaning. For example, the following were considered similar responses: (1) "Accounts receivable has increased significantly because of foreign dominated accounts receivables and currency gains." (2) "Weaker U.S. dollar compared to European currencies makes receivables for those

sales higher. Also relative more sales are being made overseas therefore exchange risk plays a larger part." The former response was included on the composite list because in the researcher's judgment it best communicated the meaning of both responses. This same process of elimination was used for all similar responses.

The hypotheses appeared on the composite list as they were originally written, with some minor exceptions. Incomplete sentences were made into complete ones. For example, "Additional compensating balances" was changed to "There were additional compensating balances." Further, in one instance the wording of two similar responses was combined to create one response. "Change in the method for the allowance for receivables" and "accounts receivable has increased significantly because of reduction of bad debt reserve" were combined as follows "Accounts receivable has increased because of a change in the method of computing the allowance for uncollectibles." It is believed that these minor changes did not materially affect the "experts" evaluations.

Panel of "Expert" Auditors

The panel of "experts" consisted of twelve auditors with at least six years of audit experience from the offices of six "big eight" firms located in Indianapolis, Indiana. A contact person in each office selected these auditors based upon two criteria: (1) they were primarily engaged in

auditing rather than in administration and (2) they were considered to be extremely skilled auditors. The six firms represented three levels of audit methodology structure - two highly structured, two moderately structured, and two minimally structured. These different levels of structure provided a means to check for systematic differences among the experts' evaluations due to audit methodology structure.

Definition of Quality

A definition of quality was provided to the "expert" auditors to establish a common basis for evaluation of subject hypotheses (see Appendix B). Quality is defined as (1) the appropriateness or correctness of the response, (2) the auditor's understanding of the underlying accounting process, (3) the auditor's appreciation for factors that can cause specific accounts to change, and (4) the auditor's appreciation for any special risks related to specific accounts or conditions. This definition was designed to incorporate various factors that reflected auditors' knowledge of the auditing process. Results of pretesting with two practicing auditors indicated that the definition was suitable for the "experts'" task.

Rating Procedures

The "expert" auditors rated the quality of subjects' hypotheses using a card sorting technique. Each "expert" received a packet (sent and returned by mail) with instructions, the experimental setting and the task, 103

index cards containing the hypotheses on the composite list (see Appendix B), a four foot rating scale, and numbered envelopes. The instructions included a brief introduction about the general nature of the "experts'" task along with a definition of quality and specific instructions regarding the rating procedures. The specific instructions were as follows:

Instructions for Rating Task

You will sort 103 cards, which contain auditors' responses, into 7 piles representing the seven points on a seven point scale. Based upon the results of pretesting with other auditors, this task is best done without interruptions. Here are some important items to think about as you are sorting: (a) sort the cards across all 7 piles if possible; (b) cards with responses of equal quality should be put in the same pile; (c) the piles can be different sizes, and (d) some of the cards could be incorrect responses and should be classified as having the lowest quality. Please use the following steps to facilitate your task:

1. Read the study materials which were given to the auditors.
2. Spread the four foot scale with the scale points across your desk.
3. Read and sort the cards based upon their quality into piles on the scale.

4. When all the cards have been sorted, it is essential that you go back through each pile to insure consistency within your classifications. After you have completed the task, place each of the seven piles into a corresponding, numbered envelope. For example, the cards in pile one should be placed in envelope #1, those in pile two should be placed in envelope #2, etc.

5. Place all seven envelopes and study materials into a large envelope, write your name on the envelope, and return it to the person in your firm who gave you the materials.

The card sorting technique was chosen to facilitate the auditors' rating task. As compared to rating a list of hypotheses with a pencil and paper, the sorting technique made the task more interesting, enabled the auditors to review easily the consistency of their ratings, and made the task manageable. The 103 hypotheses were provided to the experts organized into the five financial statement categories and the general one used to prepare the composite list. This organization was intended to expedite the evaluation of 103 hypotheses. The auditors were encouraged to use all seven points of the rating scale to discourage them from unintentionally favoring one end of the scale. The rating task was pretested with two auditors from the office of one "big eight" firm located in Indianapolis, Indiana, and two accounting faculty (both teach auditing and

have audit experience) from two universities in Indiana. Results of this pretesting revealed that the instructions were clear, the task was interesting, the task could be performed within 90 minutes, and the organization of the cards expedited the task.

CHAPTER 4

RESULTS OF DATA ANALYSES

This chapter describes the analyses of the data and results. It is divided into the following four sections: (1) Summary of the Descriptive Data, (2) Regression Analysis, (3) Analysis Using Other Measures of Independent Variables, and (4) Auditors' Hypothesis Testing Skills.

Summary of the Descriptive Data

The subjects were 87 practicing auditors from the offices of four "big eight" accounting firms located in Chicago, Illinois. Their audit experience ranged from 12 to 110 months with a mean of 56.7 months. Forty subjects were from two firms with structured audit methodologies (n = 28, n = 12) and 47 were from two firms with unstructured methodologies (n = 23, n = 24).

Three dependent measures, (1) subjects' total quality scores, (2) subjects' mean quality scores, and (3) number of hypotheses identified, were used to examine the effects of audit experience and audit methodology structure on auditors' hypothesis generation skills.

Subjects' total and mean quality scores were based upon median quality ratings provided by a panel of "expert" auditors. As described in Chapter 3, a panel of twelve "expert" auditors judged the quality of subjects' hypotheses

(see Appendix B for Composite List of Hypotheses) on a seven point Likert-type scale. The reliability of their ratings was tested by calculating Cronbach's alpha. The level of reliability was quite high with an overall alpha of .89. In addition, when each hypothesis was deleted from the computation, the overall alpha never dropped below .88. By deleting each hypothesis and recalculating the overall alpha, it is possible to determine if the deletion of a particular hypothesis causes a substantial increase or decrease in the overall reliability of the judges' ratings.

Data also were analyzed based on the median quality ratings of only eleven judges, because some of the ratings provided by one of the judges appeared to deviate substantially from the others. The deviate judge's ratings on ten (9.7%) of the 103 hypotheses were completely opposite from those of the other eleven judges. These deviations were cause for concern because this judge took two months (even with two reminders from the researcher) to complete and return the task, as contrasted to three weeks for the other eleven judges. The results of all analyses based upon the ratings of the eleven and twelve judges were comparable. All results reported here are based on the quality ratings of the twelve judges.

The median rating for each hypothesis was used to calculate a total and mean quality score for each subject. The median rating rather than the mean rating was chosen as

the measure of the typical rating for each hypothesis because, in general, the median is less affected by extreme cases. In the current study, this is particularly relevant because the sample of "experts" was small. Nonetheless, all the analyses were also performed using the mean ratings, with comparable results. A total quality score for each subject was computed by applying the median ratings to each subject's hypotheses. For example, a subject who identified two hypotheses with a median rating of 2 and 4, respectively, would receive a total quality score of 6. One of the assumptions for using the total quality score as a measure of auditors' decision making skills was that higher scores represented better hypothesis generation skills. However, a potential problem with this assumption is that high scores could have been the result of numerous low quality hypotheses. To compensate in part for this problem, a mean quality score (total quality score divided by number of hypotheses identified) also was calculated for each subject.

Descriptive statistics of the three dependent measures (subjects' total quality scores, mean quality scores, and number of hypotheses) organized by eight levels of experience are summarized in Table 1. Each level represents approximately one year beginning with subjects with 12 to 24 months of experience. This presentation permits review of each dependent measure across the range of experience (12 to

TABLE 1
DESCRIPTIVE STATISTICS
DEPENDENT MEASURES BY EXPERIENCE LEVELS

	Experience Levels*							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Measures								
Subjects' Total Quality Scores								
Median	20.50	23.00	25.75	24.00	17.00	26.50	22.00	23.50
Mean	18.92	22.75	27.79	34.55	21.64	25.82	25.65	23.75
Std Dev	8.65	6.27	9.63	20.15	15.14	6.37	10.79	4.01
Range	25.00	20.00	34.00	60.50	54.50	19.50	36.00	12.00
Subjects' Mean Quality Scores								
Median	2.82	3.31	3.10	3.50	3.13	13.09	3.42	3.10
Mean	2.86	3.25	3.11	3.54	3.26	3.21	3.47	3.17
Std Dev	.43	.40	.29	.41	.29	.33	.50	.15
Range	1.46	1.38	1.04	1.04	.82	1.12	1.90	.38
Number of Hypotheses								
Median	7.00	7.00	8.00	7.50	5.00	7.00	6.00	7.00
Mean	6.42	7.00	8.92	9.40	6.64	8.09	7.39	7.50
Std Dev	2.39	1.76	2.91	4.60	4.88	2.12	3.02	1.38
Range	7.00	6.00	10.00	14.00	18.00	6.00	10.00	4.00
n	12	12	12	10	11	11	13	6

Total *n* = 87

Legend:
*Experience Levels:
(1) $\geq$ 12 but $\leq$ 24 months
(2) > 24 but $\leq$ 36 months
(3) > 36 but $\leq$ 48 months
(4) > 48 but $\leq$ 60 months
(5) > 60 but $\leq$ 72 months
(6) > 72 but $\leq$ 84 months
(7) > 84 but $\leq$ 96 months
(8) > 96 but $\leq$ 120 months

110 months) for the entire sample. Table 1 shows that there are differences in the median and mean scores among the different levels of experience. Across the first four levels of experience, there appears to be an increasing trend for the mean values for two of the independent variables: (a) subjects' total quality scores (18.92, 22.75, 27.79, and 34.55) and (b) number of hypotheses (6.42, 7.00, 8.92, and 9.40). A similar increasing trend for the mean values of the subjects' mean quality scores appears across the first four levels of experience (2.86, 3.25, 3.11, and 3.54) with the exception of a decrease in the third experience level. Beyond the fourth level of experience for all three dependent variables, the data appear not to fit a regular pattern. In general, for all experience levels evidence of variability in the data can be seen in the relatively large standard deviations of the means.

Table 2 contains descriptive statistics for the three dependent measures (subjects' total quality scores, subjects' mean quality scores, and number of hypotheses) organized by level of audit methodology structure (unstructured and structured). The median and mean values of the three dependent measures appear to be similar for the two levels of structure. Where there are differences in the medians and means, the values for the structured firms are slightly larger than for the unstructured. The range of values is wide for all dependent measures across both levels

TABLE 2
DESCRIPTIVE STATISTICS
DEPENDENT MEASURES BY
AUDIT METHODOLOGY STRUCTURE

	Structure Levels	
	Unstructured	Structured
Measures		
Subjects' Total Quality Scores		
Median	23.50	23.50
Mean	24.40	25.75
Std Dev	10.79	12.78
Range	54.00	76.00
Subjects' Mean Quality Scores		
Median	3.10	3.28
Mean	3.21	3.26
Std Dev	.47	.35
Range	2.33	1.70
Number of Hypotheses		
Median	7.00	7.00
Mean	7.53	7.78
Std Dev	3.11	3.29
Range	17.00	18.00
n	47	40

Total n = 87

of structure. This variability is also evident in the relatively large standard deviations of the means.

Descriptive statistics are also reported in Table 3 for each level of structure across the eight levels of experience. This presentation allows for examination of each dependent measure across the entire range of experience within the unstructured and structured designations, respectively. For each level of structure there are differences in the median and mean scores across experience levels for each dependent variable. There is an increasing trend for both structured and unstructured firms in the first four levels of experience but there is an irregular pattern beyond the fourth level.

Because each level of structure is comprised of two firms, Table 4 provides descriptive statistics by firm. Based upon a visual inspection of the data, there appear to be differences between firms 1 and 2 (unstructured). Firm 1 has noticeably lower median and mean values for all three dependent variables.

Regression Analysis

The effects of experience and audit methodology structure on auditors' hypothesis generation skills were tested using multiple linear regression analysis. Analyses of the data were performed using a computerized statistical program (SPSSX). The regression models, which are described

TABLE 3
DESCRIPTIVE STATISTICS
DEPENDENT MEASURES BY STRUCTURE LEVELS AND EXPERIENCE LEVELS

	Experience Levels*							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unstructured Measures								
Subjects' Total Quality Scores								
Median	17.00	19.25	26.50	24.00	18.50	26.50	21.25	24.00
Mean	18.00	21.63	28.75	31.63	25.80	27.07	21.50	23.90
Std Dev	10.90	6.79	10.79	16.96	20.42	6.64	6.85	4.46
Range	25.00	20.00	29.50	35.50	51.50	19.50	20.50	12.00
Subjects' Mean Quality Scores								
Median	2.92	3.10	3.17	3.49	3.03	3.09	3.58	3.08
Mean	2.85	3.09	3.15	3.53	3.19	3.19	3.65	3.15
Std Dev	.46	.40	.38	.54	.33	.41	.66	1.57
Range	1.27	1.37	1.04	1.01	.80	1.12	1.90	.38
Number of Hypotheses								
Median	6.00	6.50	8.00	7.00	5.00	7.00	5.50	7.00
Mean	6.00	7.00	9.00	8.50	8.20	8.57	5.83	7.60
Std Dev	3.03	2.00	2.53	3.79	6.83	2.37	1.17	1.52
Range	7.00	6.00	7.00	8.00	17.00	6.00	3.00	4.00
n	6	8	6	4	5	7	6	5
Structured Measures								
Subjects' Total Quality Scores								
Median	20.50	26.75	25.25	26.25	16.25	22.75	23.50	23.00
Mean	19.83	25.00	26.83	36.50	18.16	23.63	29.21	23.00
Std Dev	6.61	5.15	9.25	23.38	9.32	6.09	12.71	..
Range	17.00	11.50	27.00	60.50	27.50	12.00	33.50	..
Subjects' Mean Quality Scores								
Median	2.74	3.56	3.09	3.50	3.26	3.23	3.27	3.29
Mean	2.87	3.57	3.08	3.55	3.31	3.23	3.32	3.29
Std Dev	.44	.12	.20	.36	.28	.17	.28	..
Range	1.23	.28	.60	1.03	.72	.31	.76	..
Number of Hypotheses								
Median	7.00	7.50	8.00	7.50	5.00	7.00	8.00	7.00
Mean	6.83	7.00	8.83	10.00	5.33	7.25	8.71	7.00
Std Dev	1.72	1.41	3.49	5.33	2.42	1.50	3.55	..
Range	4.00	3.00	10.00	14.00	7.00	3.00	10.00	..
n	6	4	6	6	6	4	7	1

Legend:
*Experience Levels: See Table 1

TABLE 4
DESCRIPTIVE STATISTICS
DEPENDENT MEASURES BY FIRM

	Firms by Structure			
	Unstructured		Structured	
Measures	Firm (1)	Firm (2)	Firm (3)	Firm (4)
Subjects' Total Quality Scores				
Median	21.50	25.75	23.75	23.25
Mean	22.98	25.77	24.82	27.92
Std Dev	12.75	8.55	8.48	19.88
Range	54.00	40.50	37.00	76.00
Subjects' Mean Quality Scores				
Median	3.07	3.19	3.31	3.19
Mean	3.16	3.25	3.27	3.25
Std Dev	.58	.34	.35	.38
Range	2.33	1.59	1.35	1.50
Number of Hypotheses				
Median	6.00	8.00	7.00	7.00
Mean	7.13	7.92	7.61	8.17
Std Dev	3.65	2.52	2.62	4.63
Range	17.00	11.00	11.00	18.00
n	23	24	28	12

Total *n* = 87

in Chapter 3, are as follows:

$$Y_1 = a + b_1 x_1 + b_2 x_2 + b_3 x_1x_2 + e,$$

$$Y_2 = a + b_4 x_1 + b_5 x_2 + b_6 x_1x_2 + e,$$

$$Y_3 = a + b_7 x_1 + b_8 x_2 + b_8 x_1x_2 + e,$$

where Y_1 is the subjects' total quality scores,

Y_2 is the subjects' mean quality scores,

Y_3 is the subjects' number of hypotheses generated,

x_1 is the years of audit experience measure,

x_2 is the audit methodology structure measure,

x_1x_2 is the interaction of x_1 and x_2,

e represents random error, and

b_n are estimates of the regression coefficients.

Summaries of the results from the regression analyses are presented in Tables 5-7.

The results of the regression analysis using subjects' total quality scores as the dependent variable are reported in Table 5. The regression equation explains a negligible amount of the variance (1.3 percent), and it is not statistically significant ($p = .766$). The lack of any substantial relationships between the independent and dependent variables is corroborated by regression coefficients which are not statistically significant ($p > .05$). Plots of the data also did not reveal any systematic pattern. The intercorrelations among the dependent and independent variables, reported in Table 8, further

TABLE 5
SUMMARY OF REGRESSION ANALYSES
TOTAL QUALITY SCORES

Dependent Measure:
Subjects' Total Quality Scores

Independent Measures:
Experience, Audit Methodology Structure, Interaction

$R^2 = .013$

	df	Sum of Squares	Mean Square	F	p
Regression	3	160.30	53.43	.382	.766
Error	83	11599.15	139.75		
Total	86	11759.45	193.18		

	B	Std. Error	T	p
Independent Measures:				
Experience	.039	.060	.640	.524
Audit Methodology Structure	.846	5.885	.144	.886
Interaction (Experience X Structure)	.009	.093	.105	.917

TABLE 6
SUMMARY OF REGRESSION ANALYSIS
SUBJECTS' MEAN QUALITY SCORES

Dependent Measure:
Subjects' Mean Quality Scores

Independent Measures:
Experience, Audit Methodology Structure, Interaction

$R^2 = .085$

	df	Sum of Squares	Mean Square	F	p
Regression	3	1.27	.43	2.594	.058
Error	83	13.59	.16		
Total	86	14.86	.59		

	B	Std. Error	T	p
Independent Measures:				
Experience	.004	.002	2.390	.019
Audit Methodology Structure	.165	.201	.819	.415
Interaction (Experience X Structure)	-.001	.003	-.566	.573

TABLE 7
SUMMARY OF REGRESSION ANALYSIS
NUMBER OF HYPOTHESES

Dependent Measure:
Number of Hypotheses

Independent Measures:
Experience, Audit Methodology Structure, Interaction

$R^2 = .004$

	df	Sum of Squares	Mean Square	F	p
Regression	3	3.80	1.26	.121	.947
Error	83	866.15	10.43		
Total	86	869.95	11.69		

	B	Std. Error	T	p
Independent Measures:				
Experience	.005	.016	.320	.750
Audit Methodology Structure	.137	1.608	.085	.932
Interaction (Experience X Structure)	.002	.025	.079	.937

TABLE 8
CORRELATION MATRIX

Intercorrelations among five variables

Variables:

	(1)	(2)	(3)	(4)	(5)
(1) Total Quality Scores	...				
(2) Mean Quality Scores	.452	...			
(3) Number of Hypotheses	.957	.215	...		
(4) Experience (in months)	.099	.277	.052	...	
(5) Structure	.058	.068	.038	.025	...

Total n = 87

illustrate this finding. For example, the intercorrelation (1) between the total quality scores and experience is .099, and (2) between the total quality scores and structure is .058.

In Table 6, the results of the regression analysis using subjects' mean quality scores as the dependent variable indicate that the regression equation explains 8.5 percent of the total variance. The marginally significant F value derives from the fact that the regression coefficient for experience is statistically significant ($p = .019$). However, the intercorrelation between the mean quality scores and experience (.277) reported in Table 8, suggests that the significant result represents a weak relationship. Plots of the data do not show a systematic pattern.

The results of the regression analysis using number of hypotheses as the dependent variable are reported in Table 7. The regression equation explains only .4 percent of the total variance. No coefficients even approach statistical significance. The intercorrelations, reported in Table 8, show no relationship between (1) the number of hypotheses and experience (.052) and (2) the number of hypotheses and structure (.038). Plots of the data also revealed no systematic relationship.

Tables 5-7 also show that the interaction between experience and structure was not significant for any of the three dependent variables. The highest regression

coefficient was only .009.

The nonsignificant results reported above with respect to experience effects were quite surprising. Therefore, additional analyses were performed to investigate the effects of experience more rigorously. The analyses included tests using (a) the first 3 and 4 levels of experience, (b) experience categories of low, medium, and high, (c) experience within each level of structure, (d) "higher" quality hypotheses, and (e) hypotheses with "high" judge consensus. Overall, the results were consistent with those previously discussed. Details of the additional analyses are summarized below:

(a) To investigate the possibility of an increasing trend of performance in the early years of experience, the first three and four levels of experience, respectively, were examined using multiple linear regression analysis. This analysis was intended to examine whether experiential effects are more evident in the early years of auditors' careers. The results for all three dependent variables are not statistically significant ($p > .05$) for either the first three or four levels of experience.

(b) ANOVA was performed across two sets of groupings of the eight levels of experience. The groupings were intended to reflect low medium, and high levels of experience. One set consisted of three groupings of experience ((1) $\leq$ 36 months, (2) > 36 months and $\leq$ 72, (3) > 72 months) and the

second set consisted of five groupings of experience ((1) ≤ 24 months, (2) > 24 and ≤ 48 months, (3) > 48 and ≤ 72 months, (4) > 72 and ≤ 96 months, (5) > 96 months), respectively. For all three dependent variables, there are no statistically significant ($p > .05$) differences for either set.

(c) Using multiple linear regression, experience was analyzed separately within each structure level. The results indicate that for unstructured firms experience is not significantly ($p > .05$) related to any of the dependent measures. For structured firms, experience is significantly ($p = .031$) related to subjects' mean quality scores, but the regression equation explains only one percent of the total variance.

(d) Hypotheses with "higher" quality ratings (median ratings equal to or greater than four on the seven point scale) were analyzed using multiple linear regression. The use of only "higher" quality hypotheses was intended to eliminate subjects whose total scores were high because they generated many low quality hypotheses. As a result, it was expected that there would a positive relationship between experience and subjects' total and mean quality scores. The results are not statistically significant ($p > .05$) for subjects' total and mean quality scores.

(e) Hypotheses with "high" judge consensus were analyzed using multiple linear regression analysis. Because

hypotheses with low judge consensus might increase the error in the regression equation, they were eliminated from the analysis in a systematic manner. Measures of judge consensus were operationalized in two ways. First, for each of the 103 hypotheses, the highest percent of agreement on one of the seven possible rating points was calculated. For example, if seven of the twelve judges chose the same rating for a particular hypothesis and the other five chose another, the highest percent of agreement on one rating for that hypothesis would be 58 percent (7/12). Second, for each of the 103 hypotheses, the highest percent of agreement on two ratings was calculated. These two ratings had the two highest percents of agreement and were adjacent on the rating scale. For example, if five judges chose the same point on the rating scale and four chose an adjacent point, the highest percent of agreement for that hypothesis would be 75 percent (9/12). If the two highest percents of agreement were not adjacent, only the one rating with the highest percentage of agreement was used.

The two methods of calculating the percent of agreement for each hypothesis resulted in two distributions of the hypotheses which were listed in increasing order of agreement. Each distribution was then divided into three relatively equal levels of agreement (low, medium, and high). Using both subjects' total and mean quality scores as the dependent variables, the following four multiple

linear regression analyses were performed: (1) based upon hypotheses in the upper 2/3's of the distribution (medium and high levels of agreement) with highest percent of agreement on one rating; (2) based upon hypotheses in the upper 2/3's of the distribution (medium and high levels of agreement) with highest percent of agreement on two ratings; (3) based upon hypotheses in the upper 1/3 of the distribution (high levels of agreement) with highest percent of agreement on one rating; and (4) based upon hypotheses in the upper 1/3 of the distribution (high levels of agreement) with highest percent of agreement on two ratings. The results for subjects' total and mean quality scores are not statistically significant ($p > .05$) for all four analyses.

Analysis Using Other Measures of Independent Variables

Additional regression analyses were performed using other measures of experience and audit methodology structure that were gathered in the debriefing questionnaire (see Appendix A). These other measures of experience included (1) number of analytical review experiences, (2) audit planning experience (yes or no), (3) number of audit planning experiences, and (4) audit experience in specific industries (financial institutions, manufacturing, insurance, nonprofit, service, retail, agriculture, and mining) by level of expertise (none, some, extensive, or specialist). The other measures of structure were based upon nineteen questions (adapted from Bamber, Snowball, and

Tubbs 1989) that requested auditors' perceptions of the level of structure in their own firms. The nineteen questions were grouped into three areas: (1) five questions regarding the amount of authority available to perform their job, (2) thirteen questions involving the degree to which their work was covered by written documentation, and (3) one question relating to the routine nature of their work. The independent variables for each of these three groupings were coded as the sum of the subjects' responses to these questions. The dependent variables were subjects' total quality scores, subjects' mean quality scores, and number of hypotheses.

A stepwise procedure was used to construct the regression equations. In this procedure, variables are considered for entry in order of the size (largest to smallest) of the correlation coefficient (independent variable correlated with the dependent variable). Before any variables are entered into the equation, an F test is calculated to test if the correlation of the independent to dependent variable is significantly ($p < .05$) greater than zero. Typically this procedure is recommended when the goal of the research is for investigatory rather than hypothesis-testing purposes. The variables examined were exploratory in nature. The objective was to determine which variables, if any, might be useful in predicting auditors' decision making skills. For example, for the many additional

measures of experience, no theoretical basis exists for determining a priori which ones would be the most useful in investigating auditors' hypothesis generation skills. In addition, there were no expectations regarding the additional measures of audit methodology structure that were based upon the auditors' perceptions of structure in their own firm. Little is known about the accuracy of auditors' perceptions of structure. In most cases, auditors' perceptions would be limited to their experience with their own firms, thus reducing the comparability of their responses.

A summary of the significant stepwise regression results is presented in Table 9. The results are mixed. There are no significant relationships between the additional measures of experience, structure, and two of the dependent variables (total quality scores and number of hypotheses). The only statistically significant relationships are between the mean quality scores and three experience variables (experience in financial institutions, audit planning experience, and experience in service companies).

When many independent variables are considered for entry, the stepwise procedure may result in statistical significance by chance. Therefore, a hierarchical procedure was used to examine further the three statistically significant experience variables (financial institutions,

TABLE 9
SUMMARY OF SIGNIFICANT STEPWISE REGRESSIONS

	B	R^2	R^2 Increase	F
Dependent Measure:				
Subjects' Mean Quality Scores				
Independent Measures:				
Experience				
Financial Institutions	.1558	.0874	.0874	8.144 **
Audit Planning	.4578	.1654	.0780	8.326 **
Service Companies	.1163	.2059	.0405	7.175 **

** p < .01

audit planning, and service). The variables that did not result in statistical significance in the stepwise procedure were entered into the equation first as a block; then, the three experience variables were entered last. In this way, any variance shared with other nonsignificant variables is removed, and the remaining variance accounted for by the last three variables is unique to those three. The results, which are summarized in Table 10, indicate that experience in service companies is the only variable significantly related to subjects' mean quality scores. However, this relationship represents only a 4.28 percent increase in the explained variance. In addition, the correlation (see Table 11) between the mean quality scores and service companies is only .209.

Auditors' Hypothesis Testing Skills

As was explained in Chapter 3, auditors' hypothesis testing skills were also examined for exploratory purposes. The hypothesis testing task involved subjects listing auditing procedures to confirm or disconfirm the causes they listed in the hypothesis generation task. The resulting lists of procedures are not comparable across subjects because they are directly related to the causes, which are different across subjects.

Descriptive statistics (i.e., medians, means, standard deviations and ranges of the number of procedures) are provided by experience level (see Table 12), by structure

TABLE 10
SUMMARY OF HIERARCHICAL REGRESSION
SUPPLEMENTAL MEASURES OF EXPERIENCE

	B	R^2	R^2 Increase	F	
Dependent Measure:					
Subjects' Mean Quality Scores					
Independent Measures:					
Experience					
Financial Institutions	.1393	.1949	.0440	1.493	
Audit Planning	.4453	.2452	.0503	1.824	
Service Companies	.1275	.2880	.0428	2.080	*

* $p < .05$

TABLE 11
CORRELATION MATRIX

Intercorrelations among sixteen variables

Variables:

	(1)	(2)	(3)	(4a)	(4b)	(4c)
(1) Total Quality Scores	...					
(2) Mean Quality Scores	.452	...				
(3) Number of Hypotheses	.957	.215	...			
(4) Experience Variables						
(a) Analytical Review	.066	.180	.050	...		
(b) Audit Planning	.116	.286	.060	.328	...	
(c) Audit Planning Times	.044	.174	.022	.516	.009	...
(d) Financial Institutions	.048	.296	-.035	.226	.022	.063
(e) Manufacturing	.145	.049	.145	.351	.400	.209
(f) Insurance	-.032	.159	-.065	.024	.076	.157
(g) Nonprofit	-.014	.120	-.042	-.102	.191	-.026
(h) Service	-.003	.209	-.073	.066	-.028	.105
(i) Retailing	.131	-.056	.165	.129	.120	.169
(j) Agriculture	.133	.008	.118	.220	.012	.061
(k) Mining	.003	.175	-.047	.108	.093	-.055
(l) Experience in months	.099	.277	.052	.588	.407	.739
(5) Structure Variables						
(a) Authority	-.070	-.038	-.066	-.080	.050	-.217
(b) Documentation	-.139	-.098	-.099	-.032	-.100	.019
(c) Routine	.024	-.091	.043	-.208	.114	-.018
(d) Structure levels	.058	.068	.038	.122	-.035	.073

TABLE 11 Continued

	(4d)	(4e)	(4f)	(4g)	(4h)	(4i)
(1) Total Quality Scores						
(2) Mean Quality Scores						
(3) Number of Hypotheses						
(4) Experience Variables						
(a) Analytical Review						
(b) Audit Planning						
(c) Audit Planning Times						
(d) Financial Institutions	...					
(e) Manufacturing	-.293	...				
(f) Insurance	.077	-.094	...			
(g) Nonprofit	.040	.094	-.142	...		
(h) Service	.053	.001	-.143	.243	...	
(i) Retailing	-.190	.132	.044	-.002	.024	...
(j) Agriculture	.020	.113	-.176	-.038	.108	.145
(k) Mining	.104	.185	-.140	.010	.008	-.079
(l) Experience in months	.061	.362	.060	.055	.084	.082
(5) Structure Variables						
(a) Authority	-.226	.070	.044	-.023	-.115	-.110
(b) Documentation	-.041	-.125	.184	-.130	.036	.013
(c) Routine	-.356	.072	-.046	-.131	-.013	-.059
(d) Structure Levels	.029	.216	.054	-.071	-.224	.077

	(4j)	(4k)	(4l)	(5a)	(5b)	(5c)	(5d)
(1) Total Quality Scores							
(2) Mean Quality Scores							
(3) Number of Hypotheses							
(4) Experience Variables							
(a) Analytical Review							
(b) Audit Planning							
(c) Audit Planning Times							
(d) Financial Institutions							
(e) Manufacturing							
(f) Insurance							
(g) Nonprofit							
(h) Service							
(i) Retailing							
(j) Agriculture	...						
(k) Mining	.249	...					
(l) Experience in months	.153	.157	...				
(5) Structure Variables							
(a) Authority	.063	.033	-.150	...			
(b) Documentation	-.196	.059	-.069	-.135	...		
(c) Routine	-.243	-.151	-.149	.175	.016	...	
(d) Structure Levels	-.124	-.078	-.025	-.024	-.014	.110	...

TABLE 12
DESCRIPTIVE STATISTICS
PROCEDURES BY EXPERIENCE LEVELS

	Experience Levels*							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Procedures								
Median	16.0	13.5	19.0	16.5	15.0	14.0	19.0	14.5
Mean	15.5	16.3	21.0	18.4	15.5	20.4	18.1	17.8
Std Dev	8.0	7.6	8.4	9.5	9.0	13.0	7.1	8.7
Range	23.0	22.0	24.0	30.0	32.0	39.0	23.0	24.0
n	12	12	12	10	11	11	13	6

Total n = 87

Legend:
* Experience Levels:
(1) ≥ 12 but ≤ 24 months
(2) > 24 but ≤ 36 months
(3) > 36 but ≤ 48 months
(4) > 48 but ≤ 60 months
(5) > 60 but ≤ 72 months
(6) > 72 but ≤ 84 months
(7) > 84 but ≤ 96 months
(8) > 96 but ≤ 120 months

level (see Table 13), and by firm (see Table 14). There are differences across experience levels. There is an increasing trend for the first three levels of experience but beyond the third level there does not appear to be a systematic pattern to these differences (see Table 12). For example, the mean values increase for the first three levels of experience (15.5, 16.3, 21.0), decrease in the fourth and fifth levels (18.4, 15.5), increase in the sixth levels (20.4), and decrease in the seventh and eighth levels (18.1, 17.8). The median values show a similar irregular pattern. In addition, the variability is considerable within each experience level as evidenced by the large standard deviations and the wide ranges.

Although the lists of procedures are not comparable across subjects, t-tests were performed to examine the differences between (1) the two levels of structure and (2) the two firms within each structure level. The results of these tests should be interpreted with caution given the lack of comparability across the responses. The mean values, reported in Table 13, for the structured level are higher than the unstructured, but the results of a t-test indicate no statistically significant ($p > .05$) differences. In Table 14, there appear to be differences among the firms, but a discernible pattern is absent. T-tests of the two firms within each structure level indicate that there are no statistically significant ($p > .05$) differences.

TABLE 13
DESCRIPTIVE STATISTICS
PROCEDURES BY AUDIT METHODOLOGY STRUCTURE

	Structure Levels	
	Unstructured	Structured
Number of Procedures		
Median	14.0	18.5
Mean	16.3	19.7
Std Dev	8.7	8.9
Range	33.0	39.0
n	47	40

Total n = 87

TABLE 14
DESCRIPTIVE STATISTICS
PROCEDURES BY FIRM

	Firms by Structure			
	Unstructured		Structured	
	Firm (1)	Firm (2)	Firm (3)	Firm (4)
Number of Procedures				
Median	12.0	16.0	12.0	19.5
Mean	14.8	17.8	19.3	20.6
Std Dev	9.5	7.7	8.4	10.2
Range	32.0	31.0	29.0	37.0
n	23	24	28	12

Total n = 87

CHAPTER 5

SUMMARY AND DISCUSSION

Summary

This study examines the effects of audit experience and audit methodology structure on auditors' hypothesis generation skills. These skills are investigated because they appear to be important decision making processes used by auditors. Experience and structure are believed to be important variables affecting these skills.

Auditors with more experience are expected to have better hypothesis generation skills than those with less experience (hypothesis one). The rationale for this expectation is found in the nature of auditor training and advancement, recent theoretical speculations (Gibbins 1984; Waller and Felix 1984), and in the results of past research (Biggs, Mock, and Watkins 1988; Bouwman 1984). Auditors learn most of their auditing skills from work experience. Further, auditors' advancement within an accounting firm is dependent upon their acquisition of the appropriate skills to handle increasingly more responsibility. Auditors' judgments are thought to be influenced by repeated experience in applying the steps in the audit opinion formulation process.

Although work experience is a considerable part of the auditor's training, prior studies have not consistently demonstrated its influence on auditor decisions. Experience effects have been found primarily in studies with relatively complex decision settings involving few subjects, but not in those with simplistic settings involving many subjects. These simplistic settings may not have required auditors to use their expertise. In an attempt to overcome the potential problem of too simplistic a setting, the current study provided subjects with a moderately complex one.

Audit methodology structure is examined as a possible mediating factor affecting auditors' hypothesis generation skills (hypothesis two). Theoretically, there are conflicting expectations regarding the effects of structure. On one hand, a high level of structure could enhance learning because it presents the audit process in a logical sequence of steps. On the other hand, more structured environments could encourage a mechanistic approach to auditing that adversely affects auditors' learning. Because of the conflicting expectations concerning the influence of structure on auditors' decision processes, a nondirectional effect was hypothesized.

The possibility that structure might have differential effects on auditors' hypothesis generation skills at various experience levels is also examined (hypothesis three). An interaction effect between experience and structure is

investigated to determine if different levels of structure have divergent effects on auditors' hypothesis generation skills at various stages in their careers.

The effects of experience, structure, and the interaction between experience and structure on auditors' hypothesis generation skills are tested by analyzing the responses of eighty-seven practicing auditors to an analytical review task. This task was chosen because it is a diagnostic problem solving one that involves the use of auditors' hypothesis generation skills. The participating auditors, whose experience ranged from one to ten years, were from either a relatively high or low structure environment (as defined by Cushing and Loebbecke). In responding to the task, the subjects identified as many causes (hypotheses) as possible that would explain the relatively large change (20 percent increase) in the quick ratio presented in the decision setting. The quality of the subjects' responses, which were compiled into a composite list, was then evaluated by a panel of twelve "expert" auditors who rated the responses on a seven point Likert-type scale. A median rating for each hypothesis obtained from the "expert" judges is applied to each subject's list of hypotheses to obtain subjects' total and mean quality scores. The total and mean quality scores along with the number of hypotheses identified are then analyzed using multiple linear regression to determine the effects of

experience, structure, and their interaction.

The results of the analyses provide almost no evidence that experience and structure affect auditors' hypothesis generation skills in an analytical review task. In addition to accounting for only a small percent of the total variance, none of the regression analyses is statistically significant. The only statistically significant ($p < .05$) result is the regression coefficient for subjects' mean quality scores and experience.

Supplementary analyses involving additional measures of experience and structure were also performed. These additional measures include types of audit experience (e.g., experience in particular industries) and the subjects' perceptions of the level of structure in their own firms. The results of multiple linear regression indicate that only one variable (experience in service companies) out of 11 was significantly related to subjects' mean quality scores. This variable represents an increase of 4.28 percent in the explained variance. This may be due to chance because so many variables are included in the analyses.

In summary, the preponderance of evidence from the current study indicates that experience and structure are not significantly related to auditors' hypothesis generation skills. The interpretation of these results is discussed below.

Discussion

In general, the nonsignificant results are surprising. The findings for experience are especially disturbing. Because the experience results are so unexpected, it is appropriate to consider whether there are fundamental problems with aspects of this study that contribute to the nonsignificant results for both experience and structure. Two critical aspects of this study are examined in this section: the application of the theories supporting the hypotheses, and the research design. Research design issues include the experimental instrument and experimental control.

Application of Underlying Theories

One possible explanation for the nonsignificant results is that the hypotheses were inappropriate interpretations of their supporting theories. Therefore, it seems necessary to review the application of those theories.

Hypothesis one, which states that auditors' hypothesis generation skills are positively related to years of experience, appears to be a straightforward interpretation of the supporting theory. According to theoretical speculations, auditors are believed to learn the audit process in an interactive manner. When auditors perform auditing procedures, their experienced based knowledge influences their judgments. These judgments are thought then to influence auditors' experience-based knowledge.

According to hypothesis one, as auditors' acquire more experience they should have better hypothesis generation skills because they would have been exposed to more audit experiences that are presumably added to their experience-based knowledge. Hypothesis one applies the theoretical speculations to a specific decision process (hypothesis generation) in a particular setting (analytical review).

As with hypothesis one, hypothesis two appears to be an appropriate application of the theory. Hypothesis two states that audit methodology structure will be related to auditors' hypothesis generation skills. The theoretical speculations do not specify the type of decisions that could be affected or exactly what the effect might be. Therefore, it is possible that additional refinement in the theory is needed before clear empirical testing is possible.

Hypothesis three appears to be an appropriate interpretation of the combination of theoretical speculations regarding experience and structure in the current state of their development. According to the expectations regarding structure, highly structured decision environments could either enhance or hinder auditors' learning of the audit process. One possibility is that the enhancement of learning may occur early in the learning process while the hindrance may occur later in process. The nature of the interaction effect is unknown so a nondirectional effect was hypothesized. However, further

refinement of the interaction speculations might point the way to directional hypotheses that could be testable in an auditing context.

Although the current results indicate that the auditors' hypothesis generation skills are not related to experience and audit methodology structure, the evidence from the current study alone is not sufficient to refute the theories that these variables are related to auditors' decisions. There is evidence from prior studies with relatively more complex decision settings and tasks that demonstrate experience effects. Further, the theory is relatively general with regard to the influence of experience on auditors' decisions. The theoretical speculations regarding experience and audit methodology structure do not necessarily state that effects will be evident on all decision tasks and in all situations. What decisions and settings are affected appear to be empirical questions. This study provides only one empirical test.

Research Design

A potential problem with the research design is the experimental instrument. Although the setting and decision task are more complex than previous studies finding no experience effects, the inherent nature of the analytical review task may have been problematic for detecting systematic differences among auditors' responses. Most tasks in the auditing process require both accounting and

auditing knowledge, but in many cases the proportion of knowledge (accounting versus auditing) that auditors use is not always clear. Although the current experimental task is intended to elicit auditing knowledge, it may not have.

To explore this idea further, it is necessary to re-examine a basic assumption about the knowledge auditors use to perform analytical review in the planning stage of an audit. This assumption has implications for the absence of both experience and structure effects. Auditors were expected to rely primarily on their past investigations of expected and unexpected relationships among the accounts. If this is true, then the auditors' responses should reflect their experiential knowledge. Further, if structure is a mediating factor affecting auditors' learning of the audit process, then the influence of structure is likely to be reflected in their responses. The assumption regarding the type of knowledge auditors would use was confirmed in discussions with the participants, but in hindsight it may be incorrect. Instead, auditors may use mainly their accounting knowledge to identify hypotheses during the planning stage of the audit. A high level of accounting knowledge is a basic entrance requirement for employment as an auditor. This includes an understanding of the components of financial statement ratios (e.g., the quick ratio). The experimental task requires that subjects list causes for the change in the quick ratio; at a minimum this

requires knowledge of components of the quick ratio (cash, accounts receivable, marketable securities, and current liabilities). If subjects relied more on their accounting knowledge to perform the task, then significant relationships between the independent and the dependent measures are not likely.

Another problem with the instrument may be that subjects reacted differently to the task. The task required that subjects list as many causes as possible. This may have been difficult for many auditors because it was an open-ended task that is different from those normally involved in an actual audit. Auditors may be likely to generate a set of the most plausible hypotheses and then proceed to confirm or disconfirm them rather than generate as many as they could. Consequently, auditors' knowledge of auditing may be better demonstrated by a task that mimics those found in an actual audit.

Another possible problem with the experimental instrument was that individual subjects' personal characteristics that might affect their preference for structured and unstructured environments were not measured. A structured environment may help some auditors learn while it hinders others. This factor was not measured in this study, but its examination may be useful for future research investigating the effects of structure.

Another possible explanation for the absence of

structure effects could be the way in which auditors normally perform analytical review. It could be argued that if analytical review is performed in the same manner in both structured and unstructured firms, there would be no structure effects. However, the experimental task differs somewhat from the actual practice of analytical review in that it solicits a list of as many causes as possible. In this manner, the task is designed to permit the evaluation of auditors' accumulated knowledge rather than their singular performance on an auditing task.

Another potential problem with the research design was the lack of control over the experimental conditions. The variability among subjects' responses may have been due to varying conditions under which they completed the task. Although it would have been desirable for the researcher to be present, subjects' work schedules did not allow it. Therefore, the absence of control was necessary to obtain participation of the firms and subjects without long delays in data collection. To compensate for the absence of the researcher during the administration of the study, reasonable steps were taken such as providing explicit written instructions and pilot testing of the effectiveness of the instructions.

Relationship of Current Findings to Other Research

To illustrate the relevance of this research, the current findings must be related to other work investigating

auditor decision making behavior. Although the strength of particular findings lies in their consistent recurrence over many studies with divergent methodologies, inconsistent findings can also be important to the investigation process. This study should be viewed as part of the early stages of evolving research. In general, the current findings should be considered in the context of the relatively short history of the particular research issues -- the effects of audit methodology structure and experience on auditors' decisions. The effects of audit methodology structure are not well understood because few studies have examined this variable in different decision contexts. In regard to experience, early work using simplistic decision settings did not find it to have a significant influence on auditors' decisions; however, more recent studies (Biggs, Mock, and Watkins 1985; Bouwman 1984) involving few subjects in complex decision settings indicated significant differences due to experience. Because there have been so few studies examining experiential effects and factors that may mediate these effects (e.g., audit methodology structure), many aspects of auditors' decision making processes have yet to be investigated.

An important link between past studies and the current one appears to be the type of behavior that the experimental tasks elicited. The mixed results of earlier research indicate that experience effects are not necessarily evident

in all decisions made by auditors. The complexity of the decision setting, the task, and subjects' responses to the task all play an important role in detecting the factors that influence auditors' decisions. Although studies with complex settings have found differences attributable to experience, the complexity of the setting and task may not always insure that auditors use knowledge acquired through audit experience. The task in the current study was intended to elicit auditors' knowledge of the audit process given a moderately complex setting and task. The lack of significant findings, a re-examination of the supporting theories, and a review of the experimental task leads to speculation that accounting knowledge was used by auditors in the hypothesis generation phase of an analytical review procedure. Therefore, a contribution of this study is that the hypotheses generated in analytical review procedures in the planning stage of an audit may not be useful in examining factors affecting auditing knowledge.

Conclusion

The current study provides almost no evidence that audit experience and audit methodology structure affect auditors' hypothesis generation skills. Experience and structure may in fact have more influence on auditors' hypothesis generation skills than is evident from this study. Because of the potential problems with the experimental instrument, the findings of the current study

preclude reaching any definitive conclusions.

Nonetheless, the results of the current study lead to several recommendations for future research examining auditors' decisions. First, it might be worthwhile to develop a taxonomy of tasks performed by auditors, and to identify which ones are believed to require more use of auditing than accounting knowledge. This determination should be based upon both theoretical and practical knowledge of tasks performed. For example, the taxonomy could be based on the tasks used in past research along with an investigation of what experience levels are required to perform the specific tasks in current audit practice.

Second, experience and structure effects might be more effectively examined in the hypothesis testing phase of analytical review. Testing a particular hypothesis involves identifying audit procedures that would confirm or disconfirm the hypothesis. It appears that these procedures would entail more reliance on auditing knowledge than on accounting knowledge. The design of audit programs reflects directly an auditor's knowledge of auditing. To investigate this idea, all auditors could be given all the same hypotheses and requested to design an audit program to test each hypothesis provided. This could be accomplished by extending the current study. For example, the same decision setting and a few of the "highest quality" hypotheses identified by subjects in the current study could be

provided to auditors with a wide range of experience from structured and unstructured firms. As in the current study a panel of "expert" auditors could evaluate the quality of their responses. The quality assessment could incorporate both the effectiveness and efficiency of the programs. Alternatively, the auditors could be given a list of procedures from which to choose to design an audit program. This list would include previously evaluated procedures (from low to high quality). Subjects' responses would then be scored by totaling the quality scores from their list of procedures. Subjects' scores could then be analyzed to investigate the effects of experience and audit methodology structure. This may then be a better way to examine factors affecting auditors' learning of the audit process.

Finally, a means to measure subjects' individual preference for structured versus unstructured environments may also be useful in examining the effects of experience and structure on auditors' decisions. This might be accomplished with a questionnaire designed to assess subjects' preferences for different types of tasks (structured and unstructured).

APPENDIX A

EXPERIMENTAL INSTRUMENT
ERROR DETECTION AND ANALYTICAL REVIEW

This study is aimed at examining the strategies used by auditors to identify and investigate unexpected financial statement relationships through analytical review. In this study the scope is limited to the use of analytical review in initial audit planning.

While a summary of the results of this research will be made available to you, your responses will be held in confidence, and no individual or firm will be identified with the results. It is imperative that you work <u>independently</u>. Please do not consult with others in completing your task. The validity of the research and its contribution to the accounting profession depend upon your cooperation.

General Instructions

You will be asked to respond to an audit case which emphasizes the role of ratio analysis in analytical review. In this case, it was necessary to abstract from many of the complexities of the actual audit environment. This simplification was needed to limit the demands on your time as well as to aid me in interpreting your responses. However, a conscientious effort was made to ensure that the information in the case is representative of similar companies in the hypothetical client's industry and the economic environment for the time period presented.

Assume that you are on the audit of a new client, EAZ Manufacturing Company, performing a preliminary analytical review as part of the audit planning process. EAZ is a publicly held manufacturer of mining equipment.

Please proceed as follows:

(1) Read the client background information and financial statements presented on the following 3 pages.

(2) When you have familiarized yourself with this information, turn to page 6 and follow the instructions for your task.

(3) Complete the short debriefing questionnaire on pages 8 through 11 requesting information about your background and work.

Your cooperation in this study is greatly appreciated.

EAZ MANUFACTURING COMPANY
BACKGROUND INFORMATION

CLIENT DESCRIPTION:

EAZ Manufacturing Company is a large manufacturing entity engaged primarily in the production of underground mining machinery. The company manufactures and sells extraction machines, including continuous miners and components for longwall mining systems, and hauling vehicles, including shuttle cars and locomotives.

The company's customers include the ten largest domestic undergound coal companies. International sales are approximately 16% of the total sales, having grown from 4% of total sales two years ago. No domestic customer accounts for more than 10% of the company's sales, nor do export sales to any one geographic region represent more than 10% of net sales.

The company's executive offices are located in Pittsburgh, Pennsylvania, and its five manufacturing locations in the states of Kentucky, West Virginia, and Pennsylvania. Approximately, 1,600 people are employed by the company.

EAZ has approximately 1,500 shareholders. The company's stock is registered with the New York Stock Exchange and trades under the symbol "EAZ." The chairman and chief executive officer, M. J. White, owns 5% of the outstanding stock. No other officer or director owns more than 1%.

The company's Board of Directors consists of five company officers, five outside directors, and the company's general counsel. Key members of the management team are M. J. White (President and Chairman of the Board), J. Stanford (Senior Vice-President), K. Barnett (Secretary), and C. Laverty (Treasurer).

EAZ's owners and management believe that it will continue to be a leader in the industry because of its entrenched domestic market position and geographic dispersion of international sales. The company has been profitable in the last four years.

<u>Operating Activities</u>

The company is subject to the normal reporting requirements of a publicly-owned manufacturing concern. The accounting function is centralized and located in Pittsburgh. Although each location has order entry capability, the home office processes and records all sales transactions. Documentation of the internal accounting and control procedures prescribed has been prepared. However, as of the present date, no compliance testing of the prescribed procedures has been undertaken. The two prior years' audited statements are presented in condensed form on page 5.

INDUSTRY

The United States (U.S.) mining machinery industry primarily serves metal and mineral mines. Composed of about 350 establishments, the industry manufactures and supplies complete lines of extraction and haulage equipment. The primary types of extraction machines are percussion type rock drills, rotary face drills, blast hole drills, cutting machines, augers, and continuous miners. Haulage of the mined ore to processors is in shuttle cars, loader-hauler-dumper vehicles, mine cars, or conveyors.

With the general economy rebounding modestly during the period presented, shipments by the U.S. mining machinery industry in the current year (19X3) are projected to increase about 3.5 percent from last year (19X2). The projected growth is based primarily on an expansion of U.S. coal production, as well as the need to use more equipment to mine lower grade metal and mineral ores. By the end of the current year, U.S. coal production is expected to reach 870 million tons, a 6 percent increase over last year.

In addition to domestic markets, foreign mining operations also provide major markets for the U.S. mining machinery industry. This year, U.S. exports of mining machinery were estimated to reach $620 million. The major markets for U.S. mining machinery in order of magnitude are: Mexico, Canada, Australia, Peru, and Saudi Arabia.

During the next five years, the U.S. mining machinery industry is forecast to show a compound annual growth rate of 3.7 percent, adjusted for inflation. The basic need for metals and minerals in durable goods production, agriculture, and construction activity should assure continued growth in the long term for mining machinery. Mining activity is the major source of such vital materials as iron, copper, aluminum, and minerals for fertilizer production.

EAZ Manufacturing Company
Comparative Financial Statements
Prior Years' Audited Values
[000's have been omitted]

	19X2	19X1
INCOME STATEMENT		
Net Sales	$76,014	$75,254
Cost of Goods Sold	56,172	55,610
Gross Margin	19,842	19,644
Operating Expenses		
Selling, General, and Administrative	9,806	9,904
Other Operating Expenses	1,892	1,873
Depreciation	1,500	1,485
Operating Income	$6,644	$6,382
Interest Expense	1,246	1,227
Income before Income Taxes	$5,398	$5,155
BALANCE SHEET		
Cash and Marketable Securities	$ 4,126	$4,076
Receivables (Net)	11,298	11,151
Inventories	19,922	19,730
Other Current Assets	710	701
Current Assets	$36,056	$35,658
Fixed Assets (Net)	12,864	12,697
Other Assets	1,256	1,230
Total Assets	$50,176	$49,585
Notes Payable to Banks	$ 1,024	$1,012
Current Maturities (Long-term debt)	752	750
Accounts Payable (Trade)	7,924	7,845
Accrued Expenses	3,554	3,530
Other Current Liabilities	1,598	1,575
Current Liabilities	$14,852	$14,712
Long-term Debt	$ 9,964	$ 9,850
Other Liabilities	1,048	1,025
Total Liabilities	$25,864	$25,587
Stockholders' Equity	24,312	23,998
Total Liabilities and Stockholders' Equity	$50,176	$49,585

INSTRUCTIONS

Presented below are three sets of financial ratios. The ratios in the first two columns were computed from EAZ Manufacturing's two prior years' audited statements. In the third column are ratios computed from the current year unaudited statements. The difference between the three years' ratios could be the result of normal year-to-year variation and/or an error in the unaudited statements which has a material effect on net income or, if only the balance sheet is affected, is material in relation to total assets or total liabilities. You have no other reason to expect major changes from prior years' financial relationships. After you have reviewed these ratios, turn to page 7 and complete the required task.

FINANCIAL RATIOS

Ratio	19X1 Audited	19X2 Audited	Current Year Unaudited
GROSS MARGIN Gross Margin / Net Sales	26.1%	26.1%	26.3%
CURRENT RATIO Current Assets / Current Liabilities	2.42	2.43	2.72
QUICK RATIO Quick Assets / Current Liabilities	1.04	1.04	1.25

Your tasks are as follows:

(1) List as many specific causes as you can which may have led to the change in the quick ratio (page 6).

(2) List as many procedures as you can which you would perform to confirm or disconfirm each potential cause you identified in task (1).

Although this task requires considerable effort, it is essential that you actually list as many specific causes and procedures as you can. Please perform the task as you would as an auditor for your firm.

Additional space is provided on the the following pages. Once you have finished the task, turn to page 8.

(1) Possible Cause	(2) Procedures to perform
Example -	
1. Current portion of long-term debt is improperly classified as non-current.	1. Review of payments subsequent period. 2. Examination of long-term debt agreements.

If you have finished with the task, indicate so by checking this box.

Now, please go back over the list you have generated and see if there are any other items you wish to add. If there are, please add them. Once you have done so, check this second box and continue with the following questionnaire.

Debriefing Questionnaire

1. What are your total months of auditing experience?_____ months.

2. What is your current position? (i.e. staff, senior, supervisor, etc.)

_____

3. What is the highest level of education that you have attained?
(i.e., bachelors, masters, or other)_____

Do you possess a CPA certificate? Yes or No (Circle one.)

4. Has all of your auditing experience been with your current employer? Yes or No (Circle one.)
If you answered no, with what other accounting firm(s) have you been employed, in what capacity, and for what length of time?

Firm & Capacity	Length of time

5. On how many clients' audits have you worked? (Circle one that best estimates your experience.)

0-10 10-20 20-30 30-40 40-50 50 & above

6. Please put a check beside the industries that you have had audit experience. You may add any industry not included on the list below. In addition, indicate with an asterisk * any industries in which you specialize.

	No Experience	Some Experience	Extensive Experience	Specialist
Financial Institutions				
Manufacturing Firms				
Insurance Industry				
Non-Profit Organizations				
Service Industry				
Retail Firms				
Agriculture Industry				
Mining Industry				

7. Analytical review can be defined as (i) a systematic comparison of current financial information with that anticipated for the current period, with that of the immediately preceding interim period, and with that of the corresponding interim period of the previous fiscal year and (ii) a study of the interrelationships of elements of financial information that would be expected to conform to a predictable pattern based on the entity's experience. In accordance with the definition given above, how often have you performed analytical review procedures? (Circle the range of incidences that best estimates your experience.)

0-10 10-20 20-30 30-40 40-50 50 & above

8. Have you had responsibility planning an audit? Yes or No (Circle one.) If you answered yes, estimate how many times. (Circle the range of times that best estimates your experience.)

0-10 10-20 20-30 30-40 40-50 50 & above

9. Approximately how long has it taken you to complete this project? _____

Did you encounter any interruptions during this period? Yes or No. (Circle one.) If you answered yes, please indicate how many times._____

Your responses to the following questions will help me to analyze and understand the answers given on the analytical review task.

Below is a group of statements which describe circumstances that could occur at work. Indicate your extent of agreement with each of the statements as they relate to your work environment. Remember, I am interested in the actual situation, not how you would like the situation to be.

	Strongly Disagree	Inclined To Disagree	Neither Agree Nor Disagree	Inclined To Agree	Strongly Agree
1. My duties, authority, and accountability are documented in policies, procedures, or job descriptions.	1	2	3	4	5
2. The organization works to a written law.	1	2	3	4	5
3. Performance appraisals are based on written performance standards or criteria.	1	2	3	4	5
4. I must get approval for certain decisions which I should be able to make alone.	1	2	3	4	5
5. Firm rules or guidelines to direct efforts are very clear.	1	2	3	4	5
6. Too many people have to be consulted before you can do anything around here.	1	2	3	4	5
7. Standards of performance and control systems have been established in writing.	1	2	3	4	5
8. Written procedures and guides are readily available.	1	2	3	4	5
9. I have enough authority to handle emergency situations adequately.	1	2	3	4	5

	Strongly Disagree	Inclined To Disagree	Neither Agree Nor Disagree	Inclined To Agree	Strongly Agree
10. Schedules, programs, or engagement specifications are used to guide work.	1	2	3	4	5
11. I should be allowed to make some decisions that are now being made at a higher level.	1	2	3	4	5
12. I have enough authority to handle to problems that come up.	1	2	3	4	5
13. Written documents (such as budgets, schedules, project specifications, program plans, job descriptions, etc.) are used as an integral part of the job.	1	2	3	4	5

Please indicate the extent to which each statement below describes your work.

		To a Very Little Extent	To a Little Extent	To Some Extent	To a Great Extent	To a Very Great Extent
14.	My normal work activities are guided by standard procedures, rules, etc.	1	2	3	4	5
15.	To do my work well, knowing a lot of standard practices and procedures is needed.	1	2	3	4	5
16.	In carrying out my audit tasks, an understandable sequence of steps can be followed.	1	2	3	4	5
17.	The work is routine.	1	2	3	4	5
18.	I actually rely on established procedures and practices in doing my work.	1	2	3	4	5
19.	Established materials (audit manuals, industry guides, and the like) cover my work.	1	2	3	4	5

APPENDIX B

PRESENTATION TO PANEL OF EXPERTS

Instructions

You are participating in the final phases of a study that examines auditors' decision making processes - specifically, factors that affect their problem solving skills. In the first phase of the study, approximately 90 auditors responded to the analytical review task described in the attached pages. Please read those pages to familiarize yourself with the task that those auditors performed.

Because of your expertise, you have been selected to evaluate the quality of their responses; consequently, your judgment is extremely important to the results of this study. After reading the attached study materials, your task is to rate on a seven point scale the overall quality or "richness" of each response as a cause of the increase in the quick ratio given the information about the company in the study materials. This rating should be based on the following considerations:

(a) the appropriateness or correctness of the response,
(b) the auditor's understanding of the underlying accounting process,
(c) the auditor's appreciation for factors that can cause specific accounts to change, and
(d) the auditor's appreciation for any special risks related to specific accounts or conditions.

Instructions for Rating Task

You will sort 103 cards, which contain auditors' responses, into 7 piles representing the seven points on a seven point scale. Based upon the results of pretesting with other auditors, this task is best done without interruptions. Here are some important items to think about as you are sorting: (a) sort the cards across all 7 piles if possible; (b) cards with responses of equal quality should be put in the same pile; (c) the piles can be different sizes, and (d) some of the cards could be incorrect responses and should be classified as having the lowest quality. Please use the following steps to facilitate your task:

1. Read the study materials which were given to the

auditors.

2. Spread the four foot scale with the scale points across your desk.

3. Read and sort the cards based upon their quality into piles on the scale.

4. When all the cards have been sorted, it is essential that you go back through each pile to insure consistency within your classifications. After you have completed the task, place each of the seven piles into a corresponding, numbered envelope. For example, the cards in pile one should be placed in envelope #1, those in pile two should be placed in envelope #2, etc.

5. Place all seven envelopes and study materials into a large envelope, write your name on the envelope, and return it to the person in your firm who gave you the materials.

Thank you very much for your cooperation. Results of this study will be made available upon request.

This page and the following ones are the instructions and analytical review task presented to auditors who participated in the first phase of the study.

ERROR DETECTION AND ANALYTICAL REVIEW

This study is aimed at examining the strategies used by auditors to identify and investigate unexpected financial statement relationships through analytical review. In this study the scope is limited to the use of analytical review in initial audit planning.

While a summary of the results of this research will be made available to you, your responses will be held in confidence, and no individual or firm will be identified with the results. It is imperative that you work <u>independently</u>. Please do not consult with others in completing your task. The validity of the research and its contribution to the accounting profession depend upon your cooperation.

General Instructions

You will be asked to respond to an audit case which emphasizes the role of ratio analysis in analytical review. In this case, it was necessary to abstract from many of the complexities of the actual audit environment. This simplification was needed to limit the demands on your time as well as to aid me in interpreting your responses. However, a conscientious effort was made to ensure that the information in the case is representative of similar companies in the hypothetical client's industry and the economic environment for the time period presented.

Assume that you are on the audit of a new client, EAZ Manufacturing Company, performing a preliminary analytical review as part of the audit planning process. EAZ is a publicly held manufacturer of mining equipment.

Please proceed as follows:

(1) Read the client background information and financial statements presented on the following 3 pages.

(2) When you have familiarized yourself with this information, turn to page 6 and follow the instructions for your task.

(3) Complete the short debriefing questionnaire on pages 8 through 11 requesting information about your background and work.

Your cooperation in this study is greatly appreciated.

EAZ MANUFACTURING COMPANY
BACKGROUND INFORMATION

CLIENT DESCRIPTION:

EAZ Manufacturing Company is a large manufacturing entity engaged primarily in the production of underground mining machinery. The company manufactures and sells extraction machines, including continuous miners and components for longwall mining systems, and hauling vehicles, including shuttle cars and locomotives.

The company's customers include the ten largest domestic undergound coal companies. International sales are approximately 16% of the total sales, having grown from 4% of total sales two years ago. No domestic customer accounts for more than 10% of the company's sales, nor do export sales to any one geographic region represent more than 10% of net sales.

The company's executive offices are located in Pittsburgh, Pennsylvania, and its five manufacturing locations in the states of Kentucky, West Virginia, and Pennsylvania. Approximately, 1,600 people are employed by the company.

EAZ has approximately 1,500 shareholders. The company's stock is registered with the New York Stock Exchange and trades under the symbol "EAZ." The chairman and chief executive officer, M. J. White, owns 5% of the outstanding stock. No other officer or director owns more than 1%.

The company's Board of Directors consists of five company officers, five outside directors, and the company's general counsel. Key members of the management team are M. J. White (President and Chairman of the Board), J. Stanford (Senior Vice-President), K. Barnett (Secretary), and C. Laverty (Treasurer).

EAZ's owners and management believe that it will continue to be a leader in the industry because of its entrenched domestic market position and geographic dispersion of international sales. The company has been profitable in the last four years.

Operating Activities

The company is subject to the normal reporting requirements of a publicly-owned manufacturing concern. The accounting function is centralized and located in Pittsburgh. Although each location has order entry capability, the home office processes and records all sales transactions. Documentation of the internal accounting and control procedures prescribed has been prepared. However, as of the present date, no compliance testing of the prescribed procedures has been undertaken. The two prior years' audited statements are presented in condensed form on page 5.

INDUSTRY

The United States (U.S.) mining machinery industry primarily serves metal and mineral mines. Composed of about 350 establishments, the industry manufactures and supplies complete lines of extraction and haulage equipment. The primary types of extraction machines are percussion type rock drills, rotary face drills, blast hole drills, cutting machines, augers, and continuous miners. Haulage of the mined ore to processors is in shuttle cars, loader-hauler-dumper vehicles, mine cars, or conveyors.

With the general economy rebounding modestly during the period presented, shipments by the U.S. mining machinery industry in the current year (19X3) are projected to increase about 3.5 percent from last year (19X2). The projected growth is based primarily on an expansion of U.S. coal production, as well as the need to use more equipment to mine lower grade metal and mineral ores. By the end of the current year, U.S. coal production is expected to reach 870 million tons, a 6 percent increase over last year.

In addition to domestic markets, foreign mining operations also provide major markets for the U.S. mining machinery industry. This year, U.S. exports of mining machinery were estimated to reach $620 million. The major markets for U.S. mining machinery in order of magnitude are: Mexico, Canada, Australia, Peru, and Saudi Arabia.

During the next five years, the U.S. mining machinery industry is forecast to show a compound annual growth rate of 3.7 percent, adjusted for inflation. The basic need for metals and minerals in durable goods production, agriculture, and construction activity should assure continued growth in the long term for mining machinery. Mining activity is the major source of such vital materials as iron, copper, aluminum, and minerals for fertilizer production.

EAZ Manufacturing Company
Comparative Financial Statements
Prior Years' Audited Values
[000's have been omitted]

	19X2	19X1
INCOME STATEMENT		
Net Sales	$76,014	$75,254
Cost of Goods Sold	56,172	55,610
Gross Margin	19,842	19,644
Operating Expenses		
Selling, General, and Administrative	9,806	9,904
Other Operating Expenses	1,892	1,873
Depreciation	1,500	1,485
Operating Income	$6,644	$6,382
Interest Expense	1,246	1,227
Income before Income Taxes	$5,398	$5,155
BALANCE SHEET		
Cash and Marketable Securities	$ 4,126	$4,076
Receivables (Net)	11,298	11,151
Inventories	19,922	19,730
Other Current Assets	710	701
Current Assets	$36,056	$35,658
Fixed Assets (Net)	12,864	12,697
Other Assets	1,256	1,230
Total Assets	$50,176	$49,585
Notes Payable to Banks	$ 1,024	$1,012
Current Maturities (Long-term debt)	752	750
Accounts Payable (Trade)	7,924	7,845
Accrued Expenses	3,554	3,530
Other Current Liabilities	1,598	1,575
Current Liabilities	$14,852	$14,712
Long-term Debt	$ 9,964	$ 9,850
Other Liabilities	1,048	1,025
Total Liabilities	$25,864	$25,587
Stockholders' Equity	24,312	23,998
Total Liabilities and Stockholders' Equity	$50,176	$49,585

INSTRUCTIONS

Presented below are three sets of financial ratios. The ratios in the first two columns were computed from EAZ Manufacturing's two prior years' audited statements. In the third column are ratios computed from the current year unaudited statements. The difference between the three years' ratios could be the result of normal year-to-year variation and/or an error in the unaudited statements which has a material effect on net income or, if only the balance sheet is affected, is material in relation to total assets or total liabilities. You have no other reason to expect major changes from prior years' financial relationships. After you have reviewed these ratios, turn to page 7 and complete the required task.

FINANCIAL RATIOS

Ratio	19X1 Audited	19X2 Audited	Current Year Unaudited
GROSS MARGIN Gross Margin / Net Sales	26.1%	26.1%	26.3%
CURRENT RATIO Current Assets / Current Liabilities	2.42	2.43	2.72
QUICK RATIO Quick Assets / Current Liabilities	1.04	1.04	1.25

Your tasks are as follows:

(1) List as many specific causes as you can which may have led to the change in the quick ratio (page 6).

Composite List of Hypotheses

Cash and Marketable Securities

Increased cash flows may have been provided through cost cutting procedures.

Cash and marketable securities balances may have increased due to additional funds invested in marketable securities.

Client may have excess cash and marketable securities on hand because dividends were not paid or funds were not invested in fixed assets.

Cash and marketable securities increased.

There was a permanent increase in the market value of marketable securities.

Cash and marketable securities have increased because of liquidation of long-term assets.

Equity offering increased capital and cash.

Cash increased due to operations.

Cash has increased significantly because of successful investment results on marketable securities.

Cash and marketable securities may have increased as a result of a noncurrent transaction.

There was an increase in cash or marketable securities balances due to additional sale of common stock, long-term debt, preferred stock, settlement of litigation, liquidation of overfunded pension plan, etc.

Cash and marketable securities are overstated.

Foreign currency balances (cash/receivables) are overstated.

Accrued interest receivable is overstated.

Other assets are improperly classified as cash and marketable securities.

An increase in cash was caused by improprieties.

Client reduced long-term debt but did not reduce cash.

Cash balances may be overstated by double booking of deposits in transit.

Accounts Receivable

Accounts receivable has increased because of a change in the method of computing the allowance for uncollectibles.

Accounts receivable has increased significantly because of extended credit terms.

Increase in accounts receivable was brought on by increase in pricing.

Company changed shipping terms.

Accounts receivable (net) increased.

Doing business with foreign governments may increase collection period and potential bad debt problems.

Accounts receivable has increased significantly because of increased sales
volume.

An unusual receivable was recorded for nonrecurring event.

Allowance for doubtful accounts may not be sufficient for increased receivables.

Accounts receivable are misstated.

Receivables could be overstated because they are misclassified.

Allowance for sales returns and allowances is misstated.

An increase in accounts receivable was caused by improprieties.

Receivables may be overstated from not applying cash properly.

Receivable allowance has not been adjusted.

Intercompany receivables may be included in the accounts receivable balance and the corresponding liability may be included in a balance other than current liabilities if these balances were not eliminated.

Client failed to ratably record a bad debt expense and sales return.

Sales (accounts receivable) are increased by duplicate invoices.

The accounts receivable balance is incorrect due to calculation errors involving the allowance for doubtful accounts.

The client forced reconciliation between the accounts receivable trial balance and the general ledger.

Accounts receivable turnover has improved resulting in quicker cash receipts.

Current portion of a long-term receivable (such as an annuity) is improperly classified as "other assets."

Assets Other than Quick Assets

Inventory has increased significantly because they are building levels for future sales increase.

Inventory has increased significantly because of reversal of obsolescence reserves.

Inventory has increased significantly because of a change in capitalization and overhead policy.

Inventory reserve is understated.

Recorded inventory balances may be overstated due to poor physical count, obsolescence, lower of cost or market considerations, poor cut-off.

During 19X3 a period of declation existed which resulted in lower cost for goods.

There are new accounts not previously included in cost of goods sold.

There was a reduction of inventories from last year due to an increased number of shipments (i.e., inventory is excluded from quick ratio).

Other current assets increased.

Other current assets and long-term assets are improperly classified.

Prepaid assets may be overstated.

Current Liabilities

Accrued expenses may have decreased due to cancellation of some or all of the client's insurance coverage due to rising premiums.

There was a reduction in accrued expenses through a change in accrual assumptions.

There was a reduction in other current liabilities as a result of items reclassified to non current.

Client changed inventory purchasing from current debt to long-term financing.

Accrued expenses may be down due to a change during the year due to the termination of pension plan or nonfunding due to implementation of FASB 87 (if overfunded).

Notes payable to banks were decreased.

Other current liabilities were reduced.

Accrued expenses actually decreased.

Accounts payable were reduced.

There was a decrease in the interest rate on floating rate debt.

There was a reduction in accounts payable as a result of decreased cost of various materials and purchased parts.

Trade payables and notes payable may be paid more currently with cash generated from increased sales.

There was a repayment of the current portion of some debt outstanding.

The majority of EAZ's trade accounts payable were paid in 19X3 just prior to year end.

Accrual and other expense decreased because of pay off of previous reserve (restructuring costs, plant disposal, etc.).

Accrued expenses may be down due to change during the year because of windup of continuing litigation and absence of attorneys fees and/or settlement costs.

Accrued expenses have decreased significantly because of reversal of reserves.

Accrued expenses have decreased significantly because of claims on existing product liability reserve.

Client has purchased less thereby decreasing accounts payable.

Notes payable and current maturities of long-term debt were reduced through refinancing of debt.

Notes payable and current maturities of long-term debt decreased because less debt matured in current year.

Accrued expenses are misstated.

Liability for new debt is unrecorded.

Other current liabilities are misstated.

Current liabilities (accounts payable and notes payable) are understated.

Notes payable to banks are understated.

Contingencies may be unrecorded.

Notes payable balance understated by improper cut-off of monthly payments.

Current liabilities understated because of inappropriate cut-off of accounts payable and any other liability.

Liabilities are classified incorrectly.

A significant decrease in other current liabilities was caused by incorrect accounting procedures in the current year.

Payables decrease by forced reconciliation between accounts payable trial balance and the general ledger.

Total current liabilities does not add.

The client recently ran a "check run" and had made disbursements to major vendors. Differences in the timing of checks from year to year could result in large fluctuation in current liability balances.

Accounts payable turnover has declined due to extension of credit and late payments.

There was an increase in trade payables.

Profit and Loss

Working capital increased because profits increased during the year.

Industry has improved over the past year.

General

There are additional compensating balances agreements.

There was a change in the makeup of quick assets or current liabilities.

There is a logical, rational explanation.

Other assets and liabilities are misclassified.

Manipulation of financial statements by management caused the change in the quick ratio.

Fraud/incompetence on part of client staff caused the change in the quick ratio.

Trial balance does not balance.

There is an error incomputing the quick ratio.

There is an improper rollup of general ledger balances in the balance sheet line items.

There are general ledger posting errors.

General problems have caused the quick ratio to change.

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