THE EFFECT OF COGNITIVE STYLE ON AUDITOR
INTERNAL CONTROL EVALUATION

DISSERTATION

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By

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The present auditing environment involves increasing audit costs and potential legal liability. Increasing audit costs mandate methods to make the audit more efficient, while the credibility of audited financial statements depends on audit effectiveness. Internal accounting control evaluation impacts both the efficiency and effectiveness of the audit process since this judgment establishes a basis for determining the timing, nature and amount of auditing procedures to be performed.

Results of previous research, however, have indicated that variance does exist in auditors' evaluations of internal controls. While individual differences have been given as an explanation of the variance, no research has successfully isolated which individual differences relate to differences in judgment.

This study examined the possibility that cognitive style, defined as the mode of processing which individuals use in their perceptual activities, was an individual difference which could explain some of the variance in internal control judgments. The Myers-Briggs Type Indicator (MBTI) was used to measure the cognitive style of auditors.
A second instrument, an audit judgment case, was prepared by the researcher to elicit (1) an auditor's estimate of the reliability of internal controls in a computerized payroll application, and (2) his assessment of the perceived relevance of case information to his reliability judgment. Ninety auditors attending training sessions held by six Dallas CPA firms completed the MBTI and case description. These instruments were administered by the researcher during the Summer of 1984. The participants were primarily senior-level auditors with three years' experience.

The statistical methods used in this study included the t-test and ANOVA. Results of the study indicated lack of consensus in the internal control reliability estimates of the participants. Differences were noted in the information the sensing and intuitive types identified as important to their reliability estimates. The number of cues identified as important by the participants was not significantly related to their perceptual mode (sensing or intuitive) or to their internal control reliability judgment.
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CHAPTER 1

INTRODUCTION

Auditor judgment constitutes the essence of an audit of financial statements. This judgment is fundamental and intrinsic to the attestation function as documented by Statement on Auditing Standards 31, "Evidential Matter" which states:

Most of the independent auditor's work in forming his opinion on financial statements consists of obtaining and evaluating evidential matter concerning the assertions in such financial statements. The measure of the validity of such evidence for audit purposes lies in the judgment of the auditor; (2, para. 02)

Once thought to be beyond the scope of scientific inquiry, auditor judgment has now become the subject of recent research. One objective of auditor judgment research has been to understand the judgment process in order to provide insights leading to improvement in the quality of decisions made.

Auditor judgment research falls into the broad category of human information processing. Human information processing research examines such variables as the number and importance of cues, the weighting of cues by decision-makers, and the characteristics of the decision process, as classified in Figure 1 (13, p. 8).
I. Information Set (Cues)
   Variables of Interest
   A. Scaling Characteristics of Individual Cues
      1. Level of measurement (nominal, ordinal, etc.)
      2. Discrete or continuous
      3. Deterministic or probabilistic
   B. Statistical Properties of the Information Set
      1. Number of cues
      2. Distributional characteristics
      3. Interrelationships of cues
      4. Underlying dimensionality
   C. Information Content (predictive significance)
      1. Bias (systematic error)

II. Judge (Decision Maker)
    Variables of Interest
    A. Judge Characteristics
       1. Human-Mechanical
       2. Number of judges
       3. Personal characteristics
          a. Intellectual ability
          b. Personality
          c. Cognitive structure
          d. Attitudes
          e. Demographics (e.g., age, sex)
       4. Task related characteristics
          a. Prior experience-stored information
          b. Interest and involvement
    B. Characteristics of Decision Rule
       1. Form (linear, configural, compensatory, etc.)

III. Judgment-Prediction-Decision Variables of Interest
    A. Qualities of the Judgment
       1. Accuracy (validity)
       2. Speed
       3. Reliability
          a. Consistency
          b. Consensus
          c. Convergence
       4. Response Biases
       5. Predictability
    B. Self-Insight
       1. Subjective cue usage
       2. Perceived decision quality
       3. Perceptions of characteristics of information set
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<th>II. Judge (Decision Maker)</th>
<th>III. Judgment-Prediction-Decision Variables of Interest</th>
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1. Format (numerical—graphical—verbal)
2. Sequence
3. Aggregated or disaggregated (precombination of data)

E. Context
1. Physical viewing conditions
2. Instructions
   a. Objective
   b. Costs and rewards
   c. Information about cue attributes
3. Task Characteristics
   a. Type
   b. Response mode
   c. Social influences
   d. Uniformity of information over cases
4. Feedback

Fig. 1—Classification of information processing variables (Libby, 1981)
Audit Judgment

The primary concern in auditing judgment research has related to consensus. A major deterrent in measuring accuracy in auditing research has been that no obviously right or wrong answers exist. A recent study by Alison Hubbard Ashton (5) found a high correlation between consensus and accuracy. Although consensus of opinion does not necessarily denote accuracy, the lack of consensus usually does indicate inaccuracy. When auditor's judgments are placed under scrutiny in a court of law, the decisions made in the audit being examined would hopefully compare favorably to those which would have been made by another auditor in similar circumstances. Therefore, auditor consensus becomes a desired goal. Results of several research studies discussed in Chapter 2, however, have indicated that in certain circumstances auditor consensus appears to be very low. This lack of consensus may create fluctuations in the quality and the cost of an audit.

Differences in the cost of an audit relate to audit efficiency. An audit should be conducted so that the audit objectives can be accomplished with the most efficient use of resources. Variations in auditor judgment may cause the cost of an audit to fluctuate since auditor judgment ultimately determines the specific auditing procedures necessary to afford a reasonable basis for an opinion. "Over-auditing" can be the result of inaccurate judgments.
Even though "overauditing" is inefficient, the more important concern to the auditor and the public is the quality of an audit, or audit effectiveness. Audit effectiveness occurs when the objectives of an audit are met—when sufficient, competent evidential matter has been obtained to afford a reasonable basis for an audit opinion. This audit process is described in Statement on Auditing Standards 31, "Evidential Matter":

The nature, timing, and extent of the procedures to be applied on a particular engagement are a matter of professional judgment to be determined by the auditor, based on specific circumstances. However, the procedures adopted should be adequate to achieve the audit objectives developed by the auditor, and the evidential matter obtained should be sufficient for the auditor to form conclusions concerning the validity of the individual assertions embodied in the components of financial statements. The combination of the auditor's reliance on internal accounting control and on selected substantive tests should provide a reasonable basis for his opinion. (2, para. 13)

Because of the importance of audit effectiveness and audit efficiency, the audit profession has attempted to restrict variance in auditors' judgments through minimum education requirements, professional certification, and training. However, differences in judgment still exist.

Cognition Theory

An understanding of judgment stems from a realization of what judgment actually is. If judgment is defined as the process by which information is perceived and if
conclusions are based on such perceptions, we must understand (1) differences in perception, and (2) differences in combining the perceived information into a judgment. To understand a process such as judgment, a theory of cognition which includes perception and conception by definition) must be used. The theory of Carl G. Jung is used in this study as a basis for understanding variance in auditor judgment.

Carl Gustav Jung (12), a noted personologist, differentiated the perception of information from the combination of the data perceived. He also identified, in an effort to explain individual differences, four psychological functions: sensation, intuition, thinking, and feeling. Sensation and intuition act as opposites, as do thinking and feeling. Even though all four functions are experienced by each individual, Jung hypothesized that one function would be more highly developed in each individual. In addition, each of the four functions varies according to the general attitude of introversion (orientation to subjective factors) or extraversion (orientation to objective factors).

Intuition and sensation are the functions related to perception. Jung states,

... we should speak of sensation when the sense organs are involved, and of intuition if we are dealing with that kind of perception which cannot be traced directly to conscious sensory experience. I have therefore defined sensation as
perception through conscious sensory processes, and intuition as perception by way of unconscious contents and connections. (12, p. 104)

The functions of thinking and feeling are related to evaluation and interpretation of perceptions. Thinking relates to a logical decision-making process, while feeling relates to judgment in terms of values.

Although a thorough understanding of judgment requires an understanding of both differences in perception and differences in evaluation, this study is primarily concerned with differences in the perceptual abilities of auditors. The utilization of both sensory and intuitive perceptions has been described in auditing literature. Intuition provides the major orientation of the auditor in the procedure of "scanning," when he is looking for relationships in financial data, and for insight into potential problem areas. Sensory perception, on the other hand, is the primary tool of the independent auditor since objective evidence is crucial to the auditor's opinion formulation process. If an auditor relies on one type of perception rather than another, the significant question becomes, "Will relevant information be overlooked?"

Statement of the Problem and Its Importance

**Internal Control Evaluation**

The present auditing environment involves increasing audit costs and potential legal liability. Increasing
audit costs mandate methods to make the audit more efficient, while the credibility of audited financial statements depends on audit effectiveness. Internal accounting control evaluation relates to both audit efficiency and effectiveness. Reliance on a client's internal accounting control system can reduce the number of substantive tests which are necessary to afford a reasonable basis for an audit opinion. *Statement on Auditing Standards 39*, "Audit Sampling," states,

The second standard of field work recognizes that the extent of substantive tests required to obtain sufficient evidential matter under the third standard should vary inversely with the auditor's reliance on internal accounting control. These standards taken together imply that the combination of the auditor's reliance on internal accounting control and his reliance on substantive tests should provide a reasonable basis for his opinion, although the portion of reliance from the respective sources may vary. The greater the reliance on internal accounting control or on other substantive tests directed toward the same audit objective, the greater the allowable risk of incorrect acceptance for the substantive tests of details being planned and, thus, the smaller the required sample size for the substantive tests of details. (3, para. 19)

Audit effectiveness is impaired when the auditor places an overreliance on internal accounting control and selects a correspondingly smaller substantive test sample size. Such a sample size may not afford a reasonable basis for an audit opinion.

Studies by Ashton (6), Ashton and Brown (7), and Reckers and Taylor (16) asked auditors to judge the
strength of internal controls as a function of various combinations of internal control indicators. Judgment inconsistency among auditors was found, even in the relatively simple judgment tasks. These studies attributed low consensus among auditors to individual differences. Studies by Dermer (10), Mock, Estrin, and Vasarhelyi (14), and Weber (20) investigated the effects of individual auditor judgment differences such as intolerance to ambiguity, decision approach, dogmatism, risk-taking propensity, and experience on human information processing activity. The results of these studies indicated that these differences did not significantly account for the variance in auditor judgment. Joyce (11) and Sneed (18) investigated the effects of firm affiliation on auditor judgment. Brown (8) indicated that, due to different methods of appraisal and different emphasis on the relevance of internal control factors, the effectiveness of a given system of internal control could be judged quite differently by individual auditors.

Previous research results have indicated that variance does exist in auditors' evaluations of internal controls. While individual differences have been given as an explanation of the variance, no research has been successful in isolating which individual differences relate to differences in judgment. This study was concerned with the possibility that cognitive style, defined as that mode of
processing which individuals use in their perceptual activities, was an individual difference which could explain some of the variance in internal control judgments. More specifically, do differences in cognitive style affect the information perceived to be relevant in an internal control evaluation?

Significance of the Problem

The results of internal control evaluation can affect the entire conduct of the audit. The judgment of the effectiveness of internal control enters into the specification of the nature, timing, and extent of audit tests. Statement on Auditing Standards 39, "Audit Sampling" (4) presents a model illustrating the relationship of risk assessment to audit sample size sufficiency. This model is:

\[ UR = IC \times AR \times TD \]

where:

\( UR \) = The allowable audit risk that monetary errors equal to tolerable error might remain undetected in the account balance or class of transactions after the auditor has completed all audit procedures deemed necessary.

\( IC \) = The auditor's assessment of the risk that, given that errors equal to tolerable error occur, the system of internal accounting control fails to detect them.

\( AR \) = The auditor's assessment of the risk that analytical review procedures and other relevant substantive tests would fail to detect errors equal to tolerable error, given that such errors
occur and are not detected by the system of internal accounting control.

\[ TD = \text{The allowable risk of incorrect acceptance for the substantive test of details, given that errors equal to tolerable error occur and are not detected by the system of internal control or analytical review procedures and other relevant substantive tests.} \]

(4, para. .47 (4))

An auditor might use this model, after specifying the allowable audit risk (UR), the internal control risk (IC), and the analytical review risk (AR) to ascertain the level of the risk of incorrect acceptance for the substantive test of details (TD). Reckers and Taylor (16) illustrated the impact of internal control evaluation on the reliability level required of substantive tests given an audit risk of five percent:

<table>
<thead>
<tr>
<th>Adjudged Adequacy of Internal Control</th>
<th>Resulting Reliability Required of Audit Tests</th>
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<tbody>
<tr>
<td>90%</td>
<td>50%</td>
</tr>
<tr>
<td>80</td>
<td>75</td>
</tr>
<tr>
<td>70</td>
<td>83</td>
</tr>
<tr>
<td>60</td>
<td>87</td>
</tr>
<tr>
<td>50</td>
<td>90</td>
</tr>
<tr>
<td>40</td>
<td>92</td>
</tr>
<tr>
<td>30</td>
<td>93</td>
</tr>
<tr>
<td>0</td>
<td>95</td>
</tr>
</tbody>
</table>

Reliance on internal control relates inversely to the extent of substantive tests. As internal control reliability increases, the reliability level required of substantive tests (and thus the size of the sample, all other factors equal) decreases. The evaluation of internal control affects the efficiency and effectiveness of an audit through
the auditor's decision about the procedures to be performed in an audit.

Most CPA firms do not require their auditors to make a point estimate of internal control reliability but, instead, ask them to indicate the reliability level (or risk level—the complement of reliability) based on several categories. The American Institute of Certified Public Accountant's Audit and Accounting Guide, *Audit Sampling*, (4, p. 124) gives the following guidance:

<table>
<thead>
<tr>
<th>Subjective Evaluation</th>
<th>Risk of Undetected Error Due to Internal Accounting Control Failure</th>
</tr>
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<tbody>
<tr>
<td>Substantial Reliance is Warranted</td>
<td>10%-30%</td>
</tr>
<tr>
<td>Moderate Reliance is Warranted</td>
<td>20%-70%</td>
</tr>
<tr>
<td>Limited or No Reliance is Warranted</td>
<td>60%-100%</td>
</tr>
</tbody>
</table>

Even though categorization should reduce the variance to some extent, it will not entirely control auditor variance. Steps should be taken to understand more fully the causes of auditor judgment variances. Cognitive style provides a potentially fruitful area of research into auditor judgment differences.

Scope of the Study

The current study dealt with the preliminary review phase of internal accounting control. In the preliminary review phase, the auditor tries to gain an understanding of
the accounting system and the control environment. The methods used to gain this understanding are such perceptual activities as inquiry, observation, and reference to procedures documentation. On completion of the preliminary phase of this review, the auditor reaches one of three conclusions:

1. Further study and evaluation of the internal accounting control system will not likely justify any reduction in the substantive tests.

2. The audit effort required to complete the evaluation and test compliance is greater than the audit effort saved by such reliance.

3. Reliance on the internal accounting control system is planned; therefore, the study and evaluation should be completed and the decision made as to whether control procedures are suitably designed for reliance; and, if so, whether the results of compliance tests on those control procedures are satisfactory in order to justify any reduction in substantive testing. (1)

The results of the preliminary review of internal accounting control pervade the conduct of the audit. Planning is impacted in the following ways: (1) if further study and evaluation are deemed nonproductive, the auditor will proceed directly to planning substantive tests; and (2) if, however, reliance on the system is planned, the study and evaluation of internal control would have to be completed, with a decision being made as to whether compliance testing should be planned. These alternatives in
the planning stage of an audit will have an effect on the efficiency of the audit.

In addition to affecting the planning stage of an audit and the efficiency of the audit process, impressions taken from this preliminary review could affect the conduct of the audit and the effectiveness of the audit process. Certain impressions about a client's control system could result in "anchoring." Anchoring and adjustment, concepts discussed by Tversky and Kahneman (19), occur when an individual evaluates new information with reference to the initial estimate (anchor). Adjustments are usually made as additional information is received. In a later study, Slovic and Lichtenstein (17) stated that these adjustments are usually insufficient, given the extent of the new information. Therefore, if an auditor "anchors" on the preliminary evaluation, and adjusts from this evaluation based on new information, the result may be biased. An ineffective audit may result.

The preliminary review phase of internal accounting controls comprises just one phase of the whole audit process. This process, presented in Figure 2, illustrates that many decisions based on auditor judgment are required throughout the audit process. Due to the complexity of an audit, however, only one aspect of the entire process could be studied in the depth desired.
Fig. 2--The audit process according to auditing standards*

The specific area chosen in this study for the preliminary evaluation of internal control was the payroll application. This area was chosen for several reasons. First, this area was studied by Ashton (6), Reckers and Taylor (16), and Danos and Imhoff (9), and, therefore, a substantial body of research information has been gathered which could prove useful for comparison purposes. Secondly, the review of internal accounting controls in the payroll function constitutes a very important aspect of the payroll audit. Third, it is an area in which most auditors have had some exposure. Lastly, the payroll application can be adequately described in a relatively limited number of pages, thereby making the task tractable.

The Decision Task

Internal control evaluation constitutes a complex task with many interacting variables. To make the decision task realistic, one case was prepared which would incorporate as many facts and insights as possible regarding the internal control environment of a particular organization. A single case was utilized for the following reasons: (1) previous research in the human information processing area has been criticized for depicting the decision-making task with a small number of independent factors. One case could overcome this deficiency by including as much information as possible to facilitate the decision; and (2) the cues
present in the control environment of real organizations are interrelated and conflicting, some representing strengths (e.g., good separation of duties, proper authorizations), and others weaknesses (e.g., no control totals, reconciliations). As in a real audit, some weaknesses in the research case had to be derived from the auditor's perception of the environment since some weaknesses were not explicitly stated; (3) In order to study differences in perceptions, the researcher determined that all subjects must have access to the same information. Using one situation with identical information allowed participants to "pick and choose" from all the available information.

The research task involved incorporating cues from which inferences could be made into a realistic case. The objective of the study did not necessitate the presentation of multiple cases as had been done in previous judgment research. In previous studies, judgment was the dependent variable and the cues were the independent variables. Multiple cases were necessary so that internal validity could be achieved—that other plausible variables were not working to affect the judgment of the decision-maker. The objectives of this type of research were to identify different cue weightings by individual auditors and to ascertain which internal controls were considered the most important in an internal accounting control evaluation. The objective of the present study, on the other hand, was primarily
to determine whether cognitive style is related to the information cues deemed relevant by individual auditors. It differed from previous judgment research in that participants were free to consider as cues any information in the case description, not just specific information identified by the researcher.

**Measurement of Cognitive Style**

The *Myers-Briggs Type Indicator* (15) was designed to measure Carl Jung's functions of perception, i.e., sensing and intuition, and his functions of evaluation, thinking and feeling. The combinations of these functions are denoted in this study as cognitive style. Four combinations of cognitive style were possible based on respondents' answers to 126 questions; these combinations are sensing-thinking, sensing-feeling, intuitive-thinking, and intuitive-feeling.

**Statement of Purpose and Research Questions**

The purpose of this study was twofold: (1) to gather descriptive evidence for use in exploring whether auditors' modes of perception relate to the cues external auditors deem relevant in a specific situation; and (2) to gather empirical evidence for use in determining whether auditors' modes of perception and evaluation (cognitive style) affect his consideration of certain amounts of information and his evaluation of internal control reliability.
The research objectives were as follows:

1. To determine if the cue information auditors consider to be most important to their judgment on internal control reliability varies among auditors of different perceptual modes;

2. To determine if the cue information considered to be important to auditors' judgment on internal control reliability varies among auditors affiliated with different firms;

3. To determine if there is a significant relationship between auditors' cognitive styles, as operationalized in this study, and the number of cues auditors consider important to their judgment on internal control reliability;

4. To determine if there is a significant relationship between auditors' cognitive styles, as operationalized in this study, and auditors' evaluations of internal control reliability;

5. To determine if individual auditors from different firms vary significantly in their evaluations of internal control reliability;

6. To determine if there is a significant relationship between certain auditor individual differences and auditors' evaluation of internal control;

7. To determine if there is a significant relationship between the number of cues auditors consider to be important and the judgment on internal control reliability.

Based on the research objectives, the following hypotheses were tested.

H0-1 There is no significant difference between the mean number of cues identified by the sensing types and the intuitive types.

H1 The sensing type individuals will identify more cues than the intuitive type individuals.
H0-2 No significant differences exist between the internal control reliability judgments of the sensing type auditors and the intuitive type auditors.

H2 The internal control reliability judgment of the intuitive type auditors will be lower than the judgment of the sensing type auditors.

H0-3 No significant differences exist in the internal control reliability estimates of auditors from different firms.

H3 The internal control reliability judgments will be different from firm to firm.

H0-4 There are no significant differences between the internal control reliability judgments of auditors with different levels of experience.

H4 Auditors with three years or more experience will give a higher internal control reliability judgment than those auditors with less than three years' experience.

H0-5 There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in computers.

H5 Auditors with computer training will give a higher internal control reliability judgment than those auditors with no computer training.

H0-6 There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in accounting/auditing.

H6 Auditors with accounting/auditing training will give a lower internal control reliability judgment than those auditors with no additional accounting/auditing training.

H0-7 There is no difference in the internal control reliability judgment between auditors identifying few cues and auditors identifying many cues.
H7 Auditors who identify many cues will give a higher reliability judgment than the auditors who identify few cues.

Expected Contribution

As noted in the problem statement, previous auditing research has found that low consensus exists among auditors in their judgments. These judgment inconsistencies have been attributed to individual differences. However, individual differences such as age, experience, and personality traits have not provided sufficient explanations for the variations in judgment.

Therefore, the results of this study should be of interest to researchers in the human information processing area. If cognitive style, as operationalized in this study, can account for some of the variance in reliability estimates and cue utilizations, a step can be made toward a better understanding of the decision process.

This research should be of interest to practitioners to the extent that differences in auditor judgments do affect both audit efficiency and audit effectiveness. With audit costs increasing and legal action expanding, research which could add to the body of knowledge regarding auditor decision-making would be beneficial. An implication for the practitioner includes the current study's impact on the assignment of personnel to particular audit tasks. If the cognitive styles of individual auditors cause them to
perceive different types of information, an audit team should be composed of opposite types to ensure consideration of all relevant information. In the review of audit working papers, the reviewer should exhibit a different cognitive style than the senior in charge of the audit.

Organization

This dissertation is organized to promote an understanding of the scope, relevance, and objectives of the research prior to the discussion of the results of the study.

Chapter I introduces the research study and the statement of the problem and its importance. The significance of the problem and the scope of the study are also presented. Chapter II provides a literature review of the research studies relevant to this research. Chapter III is devoted to a thorough explanation of the research design, a description of the instruments used, and the statistical techniques used for data analysis. Limitations and assumptions of this research are also delineated in this chapter. Chapter IV presents the results of data collection and analysis and includes the conclusions of the study. Finally, Chapter V summarizes the research, gives the major contributions of the study, and relates areas for possible research.
CHAPTER BIBLIOGRAPHY


CHAPTER 2

LITERATURE REVIEW

The research study described in this dissertation clearly falls within the area of human information processing research. The human information processing studies relevant to this research will be reviewed in two primary categories: (1) auditing research in internal accounting control judgments and (2) research in the area of cognitive style.

Internal Accounting Control Judgment Studies

The internal control judgment studies reviewed are organized according to their relationship to the current research on individual and situation factors in judgment tasks. Robert Ashton's study (1) was the first study where participants were asked to evaluate internal controls based on cue information. Other studies (11, 19, 2) extended Ashton's research. Other internal control judgment studies not related to Ashton's research follow in chronological order.

Robert Ashton (1) asked respondents to evaluate internal controls in a payroll system. Ashton constructed 32 cases by one-half fractional replication of six dichotomous cues based on characteristics of sound internal control.
The cases consisted of all possible combinations of yes and no answers on an internal control questionnaire containing six questions (cues). Four questions were based on the plan of organization, including segregation of duties, on the system of authorization and record procedures, and on sound practices. The last two questions were based on the work of internal auditors and the results of the last year's audit. An important cue in the current study—quality of personnel—was not incorporated in Ashton's study because at the time the data was gathered, this characteristic was not part of the professional standards. Ashton found that the segregation of duties cues explained more variance in auditor judgment than the other cues.

Ashton's study is best known for its finding that the judgments of the sixty-three independent auditors studied exhibited a relatively high level of consensus across subjects. However, Ashton did find inconsistency among individual auditors in the responses given to his simple judgment task. He called for additional research to determine why judgments of particular auditors are inconsistent. In his study, consensus differed very little as a function of firm affiliation (he studied four firms—two national, one regional, and one local) or of experience. He suggested that perhaps individual factors, or situational factors, or a combination of both could account for judgment inconsistency.
Joyce (11) extended Ashton's work but focused on the process between the preliminary data collection and audit program planning in the accounts receivable area. Thirty-five external auditors from four CPA firms were asked to estimate the time they would plan for each of five classes of audit procedures based on three dichotomously scaled internal control variables and two accounting ratios. Joyce found that little consensus appeared regarding how much time should be planned; he also found considerable disagreement on how the internal control variables and accounting ratios should be weighted. Joyce found a high variability between subject response both within firms and between firms. Joyce's study provided the impetus for the inclusion of a firm variable in the current research. This study also provided further evidence that auditors' judgments lack consensus.

Reckers and Taylor (19) also extended Ashton's work to the extent that subjects were asked to evaluate internal controls. However, Reckers and Taylor considered that perhaps Ashton's findings were in part a function of the simple experimental task. Therefore, the length of the internal control questionnaire used was expanded to align more with the questionnaires used in large CPA firms. Due to the length of the questionnaire, the researchers reduced the number of cases to five. Five different internal control systems were developed. As in the current study,
neither a very poor internal control system nor a very good internal control system was represented.

Each of the thirty participants were asked to assign a reliability rating on a scale from 0 per cent to 100 per cent to the internal control system. No respondents indicated unfamiliarity or difficulty with this task. An interpretation verification check confirmed that they understood the meaning of their response. Because of this rating method's success in Reckers and Taylor's study and its ability to differentiate judgment responses, this measurement method was chosen to measure internal control reliability in the current study.

The results of Reckers and Taylor's research indicated that a great deal of disagreement prevailed in the evaluation of internal control reliability. While disagreement was found in all five cases presented, two cases yielded two extreme responses. Twenty-five per cent of the respondents estimated eighty to eighty-nine per cent reliability, while twenty-five percent estimated fifty to fifty-nine per cent reliability. Reckers and Taylor indicated that this disparity could result in a major difference in the amount of sampling called for—as much as 250 per cent more for the latter case.

They did examine experience level as a possible explanation for this disparity since experience is said to be very important in the development of professional judgment.
The correlation between those subjects with more than seven years' experience was somewhat higher (.357 vs. .135) than those subjects with less than seven years' experience. They stated that their findings suggested that agreement on the quality of internal control should not be assumed.

Ashton and Brown (2) also modified Ashton's original study by increasing the internal control cues to eight, adding rotation of duties and background check of new employees to the previous six cues. Thirty-three independent auditors were asked to allocate one hundred points across the eight cues to reflect the relative importance placed on each. Findings of the study indicated (1) that the separation of duties cue explains more variance than the other cues, a finding identical to Ashton's earlier work, and (2) more experienced auditors tend to agree more in their judgments than do less experienced auditors. Due to this result and the fact that internal control evaluation decisions are made by more experienced auditors, the current research was designed so that the majority of subjects would have at least three years' experience. The testing of more experienced auditors should control for judgment differences arising from inexperience and unfamiliarity with the task.

Weber (22) examined aspects of external auditors' decision processes in assessing the overall reliability of internal control for a manufacturing company's inventory
system. Forty independent auditors were asked to estimate the dollar error in inventories based on their assessment of overall reliability of internal controls. Weber's findings indicated lack of consensus on the sensitivity of the possible dollar error. He found large, negatively-paired correlations which indicated that two auditors might differ a great deal not only on the size of the error sensitivity but also on the direction of the dollar error. Weber suggested better training as a way to improve auditor's decisions on the cumulative effects of internal control strengths and weaknesses. In the current study, the incorporation of training variables—in both the accounting/auditing area and the computer area—focuses on the effect of training on judgment variance.

Weber (23) investigated the possibility that low consensus among auditors in internal control evaluations is a consequence of low consensus in the ways auditors organize memory through cue clustering. A research methodology based on free recall techniques was used to ascertain the extent of consensus among auditors in clustering internal control cues. He expected that the nature of the work would impact the categories of controls which would be recalled. For example, partners and managers who are involved in review and planning might place more emphasis on management controls, while junior and senior auditors would tend to recall more processing and input/output types.
of controls. Subjects included an experimental group of thirty-one internal and thirty-six external auditors and a control group of ninety-six auditing students. Results of the study indicated that some evidence of consensus did appear among auditors in the ways they organize computer control cues in their decision-making processes. Results revealed that external auditors recalled more controls than internal auditors who, in turn, recalled more controls in each category than the control group (students). However, both internal auditors and external auditors showed low recall on processing controls. If one assumes that the number of controls recalled correlates with the types of controls utilized in decision-making, then processing controls might not be weighted as heavily as management controls. Weber suggested that the major emphasis on management controls recalled was a carry-over from audits of manual systems and the low emphasis on processing controls might indicate a tendency to audit around, rather than through, the computer. The current study included both management controls and computer processing and input/output controls.

Mock and Turner (15) departed from the factorial replication type of design and prepared an extensive case with actual audit workpapers, schedules, and questionnaires. While this study did not require an evaluation of internal controls, it did test the effect of changes in internal
controls on sample size. Over 200 audit seniors or supervisors from 20 offices of a single firm were given two hours to complete their sample size recommendation. Consistent with other studies, this study also found auditor consensus to be low. Attempts to explain differences in sample size recommendations by the analysis of demographic data resulted in only one case where a significant amount of variance could be explained. "Local office effects" were found to be significant with respect to one audit procedure. Other demographic variables (experience, client mix, and training) were not significant determinates of sample size variability. Given the results of Mock and Turner's study, the current study also used the concept of one extensive audit case and the inclusion of a firm variable. Also, the validity of the current study is supported by Mock and Turner's statement that "... the lack of explained variability shows that too little is known about the complex decision process underlying internal control evaluation." (15, p. 122)

Sneed (21) examined the effects of conservatism on sample-size decisions for case situations depicting clients with strong internal control, fair internal control, and weak internal control. Subjects chose preliminary sample sizes for compliance and substantive tests, given the audit manager's evaluation of the internal control system including a listing of certain revenue cycle control strengths
and weaknesses. Even though an evaluation of internal control was not required in Sneed's study, her primary finding was relevant to the current study. An important outcome of the Sneed study was the exhibited influence of firm bias on auditor judgment. The inclusion of a firm variable in the current study directly resulted from the findings of Sneed, Joyce (11), and Mock and Turner (15).

Norris (17) asked thirty MAS and auditing staff members to evaluate combinations of six controls (a total of thirty-six cases). Subjects evaluated, on a six-point scale, the degree to which these controls compensated for a lack of segregation of duties in a hypothetical company. Results of this study indicated that the subjects with audit backgrounds placed different emphasis on the compensating controls in a computerized environment than did the data processing group. The auditing group placed more importance on people-related controls while the data processing group placed more importance on the technical controls. The current study included both technical controls and people-related controls in the case description to ascertain whether different cognitive styles placed more importance on certain types of controls.

In summary, all of the internal control evaluation studies reviewed, with the exception of Ashton's 1974 study, indicated low auditor consensus in the evaluation of internal controls. A closer look at Ashton's 1974 results,
however, shows that individual auditor inconsistencies were found. Audit experience, training, and other variables studied could not account for the judgment differences. Table I summarizes the internal control judgment studies.

### TABLE I

**INTERNAL CONTROL JUDGMENT STUDIES**

| Researcher       | Acctg. Area | Subjects ** ||*** | Task                                                      | Results                                                                 |
|------------------|-------------|--------------|--------|----------------------------------------------------------|------------------------------------------------------------------------|
| Ashton (1974, a,b) | Payroll     | 63-E         | Rate internal control-6 cues | Consensus across subjects Separation of duties important              |
| Joyce (1976)     | Accts. Receivable | 35-E       | Plan hours of audit work-5 internal control cues | Low consensus --subjects & firms                                       |
| Reckers & Taylor (1979) | Payroll     | 30-E         | Assign reliability rating-5 cases | Low consensus between subjects.                                        |
| Ashton & Brown (1980) | Payroll     | 33-E         | Rate internal control-8 cues | Separation of duty most important cue                                 |
| Weber (1978)     | Inventory   | 40-E         | Assess reliability in $ error terms | Lack of consensus                                                      |
| Weber (1980)     | Computer Controls | 31-I  36-E          | Recall and record computer controls | External aud. recalled more than Internal                               |
| Mock & Turner (1981) | Revenue Cycle | 200-E       | Estimate sample size based on internal control eval. | High variability in sample size decisions                              |
TABLE I--Continued

<table>
<thead>
<tr>
<th>Researcher</th>
<th>Acctg. Area</th>
<th>Subjects ***</th>
<th>Task</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sneed (1979)</td>
<td>Revenue Cycle</td>
<td>116-E</td>
<td>Make sample size decisions based on internal control</td>
<td>Firm differences important</td>
</tr>
<tr>
<td>Norris (1983)</td>
<td>Computer Controls</td>
<td>30-E/MAS</td>
<td>Evaluate combinations of 6 controls—rate how they compensate for lack of separation of duties</td>
<td>Audit background—more emphasis on people-related controls; MAS—technical controls</td>
</tr>
</tbody>
</table>

***E-External, independent auditors; I-Internal auditors; S-Students; MAS-Management Advisory Services staff

Cognitive Style Studies

The term "cognitive style" has been used by many researchers to denote several dimensions of the thinking process. Even though the term "cognitive style" has not been used in the accounting area, the issue of cognitive style has been addressed. A review of studies in this area and across several disciplines reveals some basic commonalities. These studies disclose that, while terminology differs in the studies reviewed, basically two different processing modes keep coming to the forefront. These two processing modes are analogous to the cognitive styles discussed in the current study.
Mock, Estrin, and Vasarhelyi (14) used the term "decision approach" instead of cognitive style. They indicated that "decision approach" has the same meaning as "cognitive style" in that it is a concept which recognizes that the same information is processed differently by different decision makers. This variation in information processing can affect the decisions made. Mock, Estrin, and Vasarhelyi operationalized decision style by using Huysmans' classification model. Huysmans (10) classified decision makers who base their decisions on rational analysis as "analytics." Those decision makers who operate by common sense, intuition, and feelings were classified as "heuristics." The classification was derived by a subjective analysis of questionnaire responses. Subjects whose profiles were not clear were classified as "indeterminable" and were not included in the research. The purpose of this study was to investigate the effect of decision approach (heuristic, analytic) and information structure (related to decision time) on decision performance and learning. The participants (forty-seven students and twenty-five businessmen) were asked to reach decisions on advertising levels, production input quantities, and total production quantities for fifteen decision periods. Subjects based their decisions on given price and demand factors. The decision problem was designed so that the analytical approach to its solution would be more effective. Analytics were expected
to and did outperform heuristics in the decision task. The results of the study indicated that decision approach did have a significant effect on the decision problem. This study is related to the current study since the classifications of "decision style" closely approximate the cognitive style classifications of the sensing-thinking type and the intuitive-feeling type.

Bariff and Lusk (3) considered the relevant cognitive style construct in their research to be represented by two categories. The first category, cognitive complexity, relates to integration and differentiation. Cognitive complexity refers to the number of dimensions which are extracted from data and the manner in which data are combined into interrelationships. The second category, field independence-dependence, classifies individuals as perceiving data independently from its context (high-analytic), or within the context (low-analytic). Their research considered the use of the cognitive styles of information users to optimize the design of management information systems. By administering psychological tests to users, the authors implemented a new procedure for designing user reports. The current study used the cognitive style modes of thinking and feeling which correspond to high-analytic and low-analytic, respectively.

McGhee, Shields, and Birnberg (12) and Savich (20) used Driver's Integrative Style Test (7) which delineated
four primary decision styles on the decision criteria of focus and preference for information. The four styles are (1) decisive, a minimal data user concerned with speed and efficiency; (2) flexible, a minimal data user associated with adaptability and intuition; (3) hierarchic, a maximal data user associated with precision, thoroughness, and one solution; and (4) integrative, a maximal data user who will have multiple solutions (8).

The results of McGhee, Shields, and Birnberg's research on the effect of decision style and tolerance for ambiguity indicated that the mean number of alternative solutions considered by students classified as multiple solution and single solution subjects did not differ significantly. Pratt (18) criticized the conclusions of McGhee, Shields, and Birnberg on several counts. First, Pratt criticized the time limitation imposed on the administration of the **Integrative Style Test**; time limitations, according to Pratt, cause non-dominant styles to emerge. The time limit also meant that processing speed constituted a potentially important, but uncontrolled, variable. Another criticism dealt with the study's small sample size (twenty-four MBA students). Such criticisms diminish the degree of reliability on McGhee, Shields, and Birnberg's findings. Thus, the current study attempted to address some threats to internal validity by including and controlling for other variables in addition to cognitive style.
Savich (20) asked 26 senior accounting students to make sell-buy decisions and to allocate 100 percentage points among 8 variables based on the students' perceptions regarding the variables' utility in the decision task. The purpose of the study was to compare the decision models used to the decision style of the participants. Results indicated that only the "decisives," in contrast to the other classifications (flexibles, hierarchics, integratives), showed a significant difference in the average number of variables used in the decision process. No significant differences appeared in the weighting of the variables. One important finding for purposes of this dissertation research was that perceived usage corresponded significantly with actual usage. A correlation coefficient of +.92 indicated that the students were aware of their data-processing method. This high correlation between participants' identification of variables and use of variables provided the basis in the current study for treating the cues "perceived" as important to the participants' reliability judgment as the cues actually used.

Dermer (6) selected the cognitive characteristic of "intolerance to ambiguity" to test his hypothesis. Defining ambiguous situations as those which have insufficient cues, Dermer hypothesized that an individual who is intolerant of ambiguity will tend to perceive more information to be important than will those tolerant of ambiguity.
Those individuals intolerant of ambiguity will also prefer defined and familiar information. Dermer says,

Of particular interest to accountants is the possibility that the cognitive characteristics of an information user may affect his perception of what information is important, and, hence, may affect how information influences his ultimate behavior. (6, p. 511)

Dermer used the Q-sort technique to have 44 subjects (sales supervisors and sales managers) sort 72 job aspects. Subjects scored job aspects by order of importance from one to nine. Based on the results of his study, Dermer concluded that relationships do exist between an individual's cognitive make-up and the amount and type of information perceived to be important. His conclusion that "the utility of a particular type of information cannot be effectively evaluated apart from the users of that information" is an important finding related to the objectives of the current research.

McKenney and Keen (13) developed a model of cognitive style based on the dual premises that modes of thought can be classified along two dimensions: information gathering and information evaluation. Figure 3 is an illustration of their model. Information gathering is defined as the perceptual processes whereby the mind organizes stimuli, while information gathering includes the process of rejecting, summarizing, and categorizing data. McKenney and Keen have carried out experiments to validate their model. They used
Fig. 3—Model of cognitive style.
twelve verbal and visual tests for cognitive factors developed by the Educational Testing Service and they administered these tests to 107 MBA students. They concluded that the results of these twelve tests supported their model and classification methods.

They classified individuals in the information gathering dimension as "preceptive" and "receptive." Preceptive individuals concentrate on relationships among items while receptive individuals concentrate on the detail rather than the relationships. Each of these modes of information gathering has its advantage in a specific situation; however, each mode also includes the risk of overlooking certain types of information.

In the information evaluation dimension, McKenney and Keen classified two types of individuals: "systematic" and "intuitive." Systematic individuals usually approach a problem by structuring it according to some method, while intuitive individuals usually utilize a trial-and-error strategy. McKenney and Keen's ideas are very similar to the theoretical basis for the current study. For example, McKenney and Keen's two dimensions of information gathering and information evaluation correspond to the current study's separation of the judgment process into perception and evaluation. The "preceptive" and "receptive" classifications correspond roughly to the intuitive and sensing dimensions in the current study; the "systematic"
classification relates to the thinking dimension in the present study.

The preceding studies were presented to identify the various aspects of "cognitive style" and their relationships to the current study. An additional consideration in this study is the validity of the instrument used to measure "cognitive style." The following group of cognitive style studies utilized the instrument used in the current research, the Myers-Briggs Type Indicator (16). They are included primarily to reveal the various task abilities which could be differentiated by cognitive style measurement.

The research objective of Henderson and Nutt (9) was to link cognitive style to behavior. In their experiment, experienced decision makers were asked to assess capital expansion projects. The projects were assessed on the basis of their likelihood of adoption and the perception of their risk. The results indicated that cognitive style was an important factor in the adoption decision and in the assessment of risk. The sensation-thinking types saw the highest risk and were reluctant to adopt the projects. The sensation-feeling types behaved in the opposite manner.

Blaylock (5) used the Myers-Briggs Type Indicator to assess the information processing preferences of twenty-eight MBA and senior students in management with at least two years' business experience. The students were asked to
read eight scenarios and to rank them on a seven point risk scale. Results indicated that the decision environment, the decision maker’s cognitive style, and the information conveyed by the decision setting are all necessary when assessing the perception of risk.

Behling, Gifford, and Tolliver (4) used the Myers-Briggs Type Indicator in their research project in evaluating ability of decision-makers to deal with categorized information rather than data point information. Although they did not include the problem as a formal hypotheses, Behling, Gifford, and Tolliver considered the possibility that the sensing-intuition dimension would capture differences in the subjects’ responses to grouping of data. Twenty-five MBA students at The Ohio State University were asked to place bets under different cue groupings. Results indicated that the decision makers tended to bet smaller amounts as the information categorization widened. A clear difference surfaced, however, in the amounts bet by the sensors and intuitives. The mean bet for intuitive decision-makers was thirty cents using exact information and twenty-three cents using data specified in a wide range. Conversely, the sensing decision-makers’ mean bet was twenty-six cents using exact information and nineteen cents using the categorized information.

McKenney and Keen (13) examined the relationship between cognitive style and the dimensions on the
Myers-Briggs Type Indicator still using the main sample of 107 MBA students. They found that "systematic" subjects tended to be the "thinking" type and the "intuitives" tended to be the "feeling" type. Despite similarities between the information gathering mode and Jung's perception dimension, McKenney and Keen did not compare the receptive subjects to the sensors, or the preceptive subjects to the intuitives.

The results of these studies do give support to the notion that cognitive style is a real influence in decision making. Table II summarizes all the cognitive style studies reviewed.
<table>
<thead>
<tr>
<th>Researcher</th>
<th>Construct</th>
<th>Instrument</th>
<th>Subjects</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mock, Estrin, Vasarhelyi (1972)</td>
<td>Decision Approach</td>
<td>Huysman</td>
<td>47 students</td>
<td>Decision approach affected decision performance</td>
</tr>
<tr>
<td></td>
<td>(1) analytic</td>
<td></td>
<td>25 business-men</td>
<td></td>
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<tr>
<td></td>
<td>(2) Heuristic</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Bariff and Lusk (1977)</td>
<td>Cognitive Complexity</td>
<td>Witkin</td>
<td>17 supervisors/</td>
<td>New procedures implemented based on high/low</td>
</tr>
<tr>
<td></td>
<td>(1) Field indep-dep</td>
<td>Bieri</td>
<td>administrators</td>
<td>analytic users</td>
</tr>
<tr>
<td></td>
<td>(2) Differentiation-Integration</td>
<td>Pettigrew</td>
<td></td>
<td></td>
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<tr>
<td>McGhee, Shields, and Birnberg (1978)</td>
<td>Decision Style</td>
<td>Driver</td>
<td>24 MBA students</td>
<td>No difference in number of alternate solutions</td>
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<tr>
<td></td>
<td>(1) decisive</td>
<td></td>
<td></td>
<td>between decision styles</td>
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<td></td>
<td>(2) flexible</td>
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<td></td>
<td>(3) hierachic</td>
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<td></td>
<td>(4) integrative</td>
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<tr>
<td>Savich (1977)</td>
<td>Decision Style</td>
<td>Driver</td>
<td>26 Sr. Accy. students</td>
<td>Significant difference in average number of</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td>variables used</td>
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<tr>
<td>Dermer (1973)</td>
<td>Intolerance to</td>
<td>Budner</td>
<td>44 sales superv/dist. &amp;</td>
<td>Relationship between cognitive</td>
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<tr>
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<td>Ambiguity</td>
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<td>reg. sales mgrs.</td>
<td>makeup/amt. &amp; type of information important</td>
</tr>
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<td>Researcher</td>
<td>Construct</td>
<td>Instrument</td>
<td>Subjects</td>
<td>Results</td>
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<tr>
<td>McKenney and Keen (1974)</td>
<td>Information Gathering</td>
<td>Keen</td>
<td>107 MBAs</td>
<td>Different strategies in information processing emerged</td>
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<tr>
<td></td>
<td>(1) Preceptive</td>
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<td></td>
<td>(2) Receptive</td>
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<tr>
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<td>(1) Systematic</td>
<td>Type Indicator</td>
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<td>(2) Intuitive Perception</td>
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<td></td>
<td>Information Perception</td>
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<td></td>
<td>(1) Intuitive</td>
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<tr>
<td></td>
<td>(2) Sensing</td>
<td></td>
<td></td>
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<tr>
<td>Blaylock (1981)</td>
<td>Information Evaluation/Information Perception</td>
<td>Myers-Briggs</td>
<td>28 MBAs</td>
<td>Decision environment, cognitive style, and decision setting all important</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type Indicator</td>
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<td></td>
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<tr>
<td>Behling, Gifford, Tolliver (1980)</td>
<td>Information Evaluation/Information Perception</td>
<td>Myers-Briggs</td>
<td>25 MBAs</td>
<td>Difference in amt. of bets between intuitives and sensors</td>
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CHAPTER BIBLIOGRAPHY


CHAPTER 3

RESEARCH METHODOLOGY

The purpose of this research study was to provide empirical evidence to determine whether cognitive style, defined as that mode of processing which individuals use in their perceptual activities, is related to cue usage by external auditors and their subsequent judgments. Since prior research in human information processing has indicated that both individual and situation differences are possible explanations for the variance in auditor judgment and cue utilization, the research design of this dissertation was constructed to study several individual differences and their effect on cue utilization and audit judgment.

Because situation differences could account for differences in cue utilization and judgment, one detailed case was used to hold the information set (i.e. situation) constant. Also, the use of one case was designed to overcome the criticism of prior studies' lack of realism in simple case descriptions. The case in the current study described the controls in the payroll application of a savings and loan association. The task included making an evaluation of the reliability of internal control, and indicating the
information considered relevant in making that reliability judgment.

The primary individual difference tested was cognitive style which relates to information perception (cue utilization) and information evaluation (judgment). Other individual differences suggested by previous research were also included for information and control purposes. Differences hypothesized by various research studies to explain variance in auditor judgment include: education, experience, and training. These differences were expanded in this research to include: (1) personal data—age and gender; (2) experience—number of years' audit experience, firm affiliation, whether internal control evaluations are a regular part of an individual's work, and the extent of his/her participation in savings and loan association audits; (3) education—the type and major of his/her undergraduate degree/graduate degree, certification; and (4) training—the approximate number of days' training in accounting/auditing and computer topics.

The Myers-Briggs Type Indicator (MBTI) was the psychological instrument used to measure cognitive style. The MBTI purports to measure the dimension of cognitive style related to perception (sensing or intuitive) and the dimension of cognitive style related to information evaluation (thinking or feeling).
Hypotheses

The following null hypotheses will be tested:

\( H_0-1 \) There is no significant difference between the mean number of cues identified by the sensing types and the intuitive types.

\( H_0-2 \) No significant differences exist between the internal control reliability judgments of the sensing type auditors and the intuitive type auditors.

\( H_0-3 \) No significant differences exist in the internal control reliability estimates of auditors from different firms.

\( H_0-4 \) There are no significant differences between the internal control reliability judgments of auditors with different levels of experience.

\( H_0-5 \) There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in computers.

\( H_0-6 \) There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in accounting/auditing.

\( H_0-7 \) There is no difference in the internal control reliability judgment between auditors identifying few cues and auditors identifying many cues.

Test Instruments

**Myers-Briggs Type Indicator**

The Myers-Briggs Type Indicator (MBTI) was designed to measure Carl Jung's theory of type which explained variation in human behavior in terms of the different ways individuals preferred to use perception and evaluation.
The sensing-intuition (S-N) score in the instrument was designed to measure a person's preferred way of perception, while the thinking-feeling (T-F) score was designed to measure a person's preferred way of evaluating the information perceived. The instrument also evaluates two bi-polar attitudes—introversion/extroversion and judging/perceiving, but this study focused on just the four functions—sensing, intuition, thinking, and feeling.

The functions that an individual uses to "perceive" and the functions that a person uses to "evaluate" what has been perceived are measured by the preference for:

(1) sensing or intuition and (2) thinking or feeling, respectively. Rarely would "pure" types exist, but individuals are classified by their preference to (1) a mode of perception, the S-N index, and (2) a mode of evaluation, the T-F index. The perception and evaluation modes are considered independent of each other.

Within the mode of perception, a preference for sensation would be exhibited in an individual who relies primarily on data received from the senses. The concept of information for the sensation type would include "hard facts" and numbers, for example. Sensation types (hereafter called sensors) perceive objects as they are.

In contrast, within the mode of perception, intuitive type people (hereafter called intuitives) perceive objects as they might be. The concept of information for
intuitives, therefore, could be in the form of future possibilities. As Mason and Mitroff (3) say,

> The virtue of the sensation types is that they are guided by the facts and are careful not to extrapolate them, while the virtue of the intuition types is that they see through the facts and extrapolate beyond them. (3, p. 477)

In the information-evaluation mode, thinking types prefer logical analysis, categorization, and systems. Rule-making characterizes the thinking types. The feeling types focus on evaluation in terms of pleasant/unpleasant, like/dislike. These types use subjective personal values in assessing alternatives. (2, p. 8)

The Myers-Briggs Type Indicator Manual (4) illustrates the results of years of studies with the instrument. Intercorrelations for various academic populations confirm that the sensation-intuition types and thinking-feeling types are virtually independent of each other.

Stricker and Ross (5) with a sample of 1595 students, reported the internal consistency reliability of the continuous scores to range from .64 to .84 using Coefficient Alpha to estimate the reliability. The Spearman-Brown prophecy formula was applied to obtain correlations between halves by Myers (4) and the resulting reliability ranged from .70 to .87 on the S-N Index and from .60 to .86 on the T-F Index. The sample consisted of 727 students ranging from gifted seventh, eighth, and ninth graders to college freshmen at Brown and Penbrooke.
In the test-retest category, Stricker and Ross (5) reported the results of product-moment correlations between the original and continuous scores of forty-one students who were retested after a fourteen month period. Correlations for the S-N scale (.69) were significant at the .01 level.

Stricker and Ross (5) reported correlations with the Strong Vocational Interest Blank scales for 727 male freshmen at Stanford for purposes of examining construct validity. Significant positive correlations were reported between the S-N index and the business detail and business contact groups and a negative correlation between the S-N index and the creative-scientific and technical groups. A positive correlation was reported between the T-F index and the technical group. These findings were consistent with type theory.

Carlyn (1) reported the results of four studies designed to measure the MBTI's ability to predict success in college. While curricula choice predications were substantiated based on the MBTI, predictions involving grade point average and dropout varied with the nature of the sample. The Myers-Briggs Type Indicator is presented as Appendix A.

Case Description

The case constituted a crucial factor in the research design. The research design required a case description
that was sufficiently complex to elicit "real world" responses, but simple enough to be understood in a short amount of time. The case was designed to present data that would distinguish between those individuals whose primary mode of perception is through the senses versus those individuals whose primary mode of perception is through intuition.

The case described the area of employee compensation in a financial institution. The payroll area was chosen since it should be familiar to all auditors, and it is an area where the internal control evaluation may be the most important aspect of the payroll audit. The primary reason for choosing a financial institution for the environment stemmed from such institutions' extensive use of computers in their operations. Since computer controls are specific and detailed, the sensor type of individual should consider these controls more relevant than the intuitive type would. Also, savings and loan institutions are extensively monitored; thus, realistic information from which to create the necessary exhibits, such as financial statements, was easily acquired. The situation of the case involved the preliminary review of the accounting system and the internal accounting controls. At this phase of the audit, the procedures of observation and inquiry are required, and these both constitute perceptual tasks. Cues (information) were introduced in the case to convey a realistic scenario.
The case was designed to present conflicting messages on the reliability of controls in the payroll application. The case did not represent either a poor or an excellent system of internal control. Since the sensor should be more concerned with facts and details, the case attempted to incorporate much specific information on the controls in place (e.g. format checks, completeness and limit checks), and specific computer access controls (e.g. nine-digit passwords, limited inquiry and update capabilities). To introduce cues on which the intuitive would rely, the case needed to present possible problems without stating specific facts. An example of such a presentation would be the introduction of the fact that the internal auditor had been trying to increase the size of his staff from two to five and to hire auditors with computer experience (implying that (1) the internal audit function was understaffed and (2) the function lacked computer expertise).

Consideration was given to the possibility of creating two cases—one case where the intuitive cues would be positive and the sensor cues negative and vice versa. However, the nature of the cues hypothesized to be perceived by the intuitive precluded this methodology. If the detailed, explicit controls were negative, education and experience should come into play in the decision leading both the sensor and the intuitive to rate internal control reliability as low.
In the situation of good computer and manual controls, the intuitive should be the one who can infer possibilities and, therefore, anticipate problem areas. Therefore, the case was written so that the computerized controls are excellent, but other control problems are hinted and implied. Since the assumption is that the sensor will not "pick up" on these potential problem areas, the reliability estimate for the sensor types should be higher than the intuitive types' estimations.

The case was reviewed extensively by two professional CPAs from different Big Eight firms. Their suggested revisions were incorporated to make the case description as realistic as possible and to include information that they thought would be perceived by one type and not the other. The case was pre-tested for methodology, readability, and time by twenty-one members of a graduate auditing class at North Texas State University. The case is presented as Appendix B.

**Test/Case Administration**

**The Sample**

Partners from the ten largest CPA firms in Dallas, Texas were contacted in March 1984, to request permission to administer the research materials to their firm's experienced auditors. Due to the nature of the task and the potential relationship between experience level and
performance, auditors at the senior level or above were requested. The most efficient method of administering the test instruments was during a scheduled in-house training session at each firm's location. Most large CPA firms routinely schedule training for their auditors, and summer has traditionally been the optimal period for their senior level staff.

Six of the ten firms set aside one hour during their planned session so that the researcher could administer the task. The training sessions attended were held in the period from June 8, 1984 through July 23, 1984. The various objectives of the training sessions were completely unrelated to the subject of this research.

**TABLE III**

**AGE BY FIRM**

<table>
<thead>
<tr>
<th>Age</th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 or less</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>24</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>25</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>26-28</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>5</td>
<td>28</td>
</tr>
<tr>
<td>Over 28</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>
The participants were not randomly chosen by the researcher but were the senior level auditors selected by their firm to attend the firms' training sessions. Ninety usable responses were obtained. The number of auditors participating from each firm ranged from nine to twenty-one. The average age of the subjects was 26, with over 63 per cent being between the ages of 24 and 26 (Table III). Of the 90 subjects, 57 (63 per cent) were male, and 33 (37 per cent) were female (Table IV).

**TABLE IV**

**GENDER BY FIRM**

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>11</td>
<td>9</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>10</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>

Even though senior auditors were requested, participants in the training sessions ranged from an experience level of one year for staff accountants to an experience level of ten years for the instructors holding the sessions (Table V). The average experience was 3.2 years. Ninety per cent of the subjects had from two to four years of auditing experience. Seventy-seven (86 per cent) of the
subjects made internal control evaluations as a regular part of their work, but only 24 (27 per cent) had participated in savings and loan audits to any extent.

**TABLE V**

**EXPERIENCE BY FIRM**

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>8</td>
<td>5</td>
<td>23 (25.6%)</td>
</tr>
<tr>
<td>2 Years</td>
<td>3</td>
<td>10</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>5</td>
<td>42 (46.7%)</td>
</tr>
<tr>
<td>3 Years</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>(17.8%)</td>
</tr>
<tr>
<td>4 Years</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>16</td>
<td>(17.8%)</td>
</tr>
<tr>
<td>5 Years</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6 (4.4%)</td>
</tr>
<tr>
<td>6 Years</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1 (1.1%)</td>
</tr>
<tr>
<td>10 Years</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>(2.2%)</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90 (100.0%)</td>
</tr>
</tbody>
</table>

The majority of subjects held a baccalaureate degree with a major in accounting. Fourteen participants had a master's degree or had completed post-baccalaureate work. Fifty-one subjects indicated that they were certified public accountants, one subject indicated certification as an internal auditor, and thirty-eight participants did not answer the question. For purposes of this study, blank responses were assumed to indicate no certification.
Fifty-four subjects (60 per cent) indicated that they had received some training beyond initial staff training in the areas of accounting and auditing, and 48 participants (53 per cent) answered that they had received training in the areas of computers. Subjects were asked to approximate the number of "days" training in these two areas. Days were chosen to eliminate possible misinterpretation of "hours." However, there still appeared to be some misinterpretation based on the inconsistency between training responses and the reported years of auditing experience. The nine inconsistent responses were coded as "missing values" for analysis purposes. The largest response categories were ten days (13.3 per cent) and twenty days (10 per cent). The other responses ranged from one day to one

### TABLE VI

**TRAINING BY FIRM-ACCOUNTING AND AUDITING**

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No training</strong></td>
<td>10</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>7</td>
<td>27</td>
</tr>
<tr>
<td><strong>Some training</strong></td>
<td>7</td>
<td>10</td>
<td>7</td>
<td>11</td>
<td>12</td>
<td>7</td>
<td>54</td>
</tr>
<tr>
<td><strong>Missing value</strong></td>
<td>. .</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>
hundred days. Responses were grouped into "no training" and "some training." Tables VI and VII show the number of individuals by firm responding in each category of training.

### TABLE VII

TRAINING BY FIRM-COMPUTERS

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No training</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>11</td>
<td>7</td>
<td>40</td>
</tr>
<tr>
<td>Some training</td>
<td>9</td>
<td>7</td>
<td>4</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>48</td>
</tr>
<tr>
<td>Missing value</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>1</td>
<td>•</td>
<td>•</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>

### The Task

All subjects were given a case description and a psychological test during the test time of one hour. The case study was administered first in five of the groups; the sixth group received the materials in reverse order to permit assessment of any bias from order effects. Due to the general nature of the psychological test, it should not have alerted subjects to the purpose of the study. None of the subjects experienced any difficulty with the one hour
time limit. The completion of the task, rather than the
time spent, was of primary importance. Therefore, no de-
tailed records were kept of each individual's time.

The auditors assembled in their respective training
groups were handed a prenumbered case description and the
Myers-Briggs Type Indicator answer sheet with the same pre-
printed number. They were asked to fill out the personal
data sheet on the first page of the case description.
Names were not required so that confidentiality would help
to elicit their honest responses. Instructions given to
the subjects directed them to read the case study instruc-
tions carefully before they began the task. They were
asked to raise their hand when they had completed the case
task so that the researcher could give them the Myers-
Briggs Type Indicator to complete.

The written instructions asked the participants to
assume the role of the auditor making a preliminary review
evaluation of internal control in the payroll system of a
savings and loan institution. They were to assume that the
information in the case description was the result of their
observation, inquiry, and review of client documentation.
Their task was to make a preliminary judgment on the reliabil-
ity of the internal control in this system, and to ex-
press their judgment of reliability as a percentage from 0
per cent to 100 per cent. These percentages were anchored
in the instructions to prevent misunderstanding. The
instructions stated that 0 per cent meant no control and 100 per cent was perfect control. They were also to read through the case carefully and to circle the information that they considered important in their reliability estimation.

At the end of the case description, after subjects had filled in their percentage estimation in the blank provided, a final written instruction, one which had not been included in the previous instructions, was given. The subjects were instructed to go back through the case and numerically rank the circled information that had influenced their reliability estimation. The lowest numbers indicated information that had the most influence on their reliability estimation. This instruction was written at the end of the case to ensure that they had read and circled information in the case before attempting to rank it.

Measurement of Variables

Cognitive Style

Cognitive style was operationalized by the subject's score on two dimensions measured by the Myers-Briggs Type Indicator (MBTI). The scoring of the instrument is straightforward, with an individual's score computed from the answers given. For each of the two indices, sensing/intuition (S-N), and thinking/feeling (T-F), two keys are required. These keys show the number of points for certain
answers. An individual's preference is determined by comparing the number of points given for sensing with the points for intuition; and comparing the number of points for the thinking dimension with the feeling dimension. The larger score indicates a person's preference. The possible "types" are: sensing-thinking (S-T), intuitive-thinking (N-T), sensing-feeling (S-F), and intuitive-feeling (N-F).

Continuous scores were computed utilizing the following steps.

1. The smaller score (on S-N or T-F) was subtracted from the larger score.

2. A "preference" score was computed based on a formula using the difference obtained.

3. If the preference was N or F, the continuous score was the preference score plus 100; if the preference was S or T, then the preference score was subtracted from 100.

Continuous scores were computed for all subjects since a numerical score is a more precise measurement than type categories. This is particularly important if most of the subjects are the same type since continuous scores can differentiate the strength of preferences. The intuitive preference is estimated to occur in only 25 per cent of the general population (4). Therefore, it was an unexpected result that each of the cognitive styles were represented in the sample. Accordingly, the continuous scores were regrouped to indicate the various "types." There were 35 S-T types, 19 S-F types, 24 N-T types, and 12 N-F types. Table
VIII shows the number of individuals of a particular type in each firm.

**TABLE VIII**

**COGNITIVE STYLE BY FIRM**

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing/Thinking</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>7</td>
<td>35</td>
</tr>
<tr>
<td>Sensing/Feeling</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>19</td>
</tr>
<tr>
<td>Intuitive/Thinking</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>5</td>
<td>24</td>
</tr>
<tr>
<td>Intuitive/Feeling</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>15</td>
<td>90</td>
</tr>
</tbody>
</table>

**Cue Utilization**

As mentioned previously in the case description, the researcher wrote certain information into the case that was hypothesized to be more relevant for one type of perceptual mode (sensing/intuitive) than the other. However, any information in the case was a potential cue--information considered to be important in making the preliminary evaluation of internal control. Therefore, in measuring cue utilization, each sentence was initially considered a potential cue.
Each subject's case description was examined, the sentence was ranked, and the rank assigned was recorded. Subjects were allowed to rank as much information as they considered relevant to their reliability judgment. Twelve subjects ranked only one piece of information (cue). There were also twelve participants who ranked from 15 to 32 pieces of information as important. One of the problems encountered in coding the cue rankings was that some subjects had circled several sentences, and had placed only one ranking. On first coding of the data, each sentence within the circle was given the same rank. This resulted in 69 of the total 71 sentences being recorded as a potential cue.

In order to reduce the number of cues only those sentences ranked from one to five were considered. This lowered the number of cues from 69 to 53. At this point, the ranking was still carried on all sentences circled. Next, an "other" category was created for those cues ranked by fewer than five participants. This step lowered the number of cues to 29. The last step was to review each subject's case description, and when more than one sentence was circled, make a determination of which of the remaining 29 sentences (cues) should be considered ranked. This was a subjective determination, but it was made easier since several sentences in the group had already been eliminated. The ranking was usually closer to one sentence than
another, so proximity of the ranking to the sentence was the criteria used. The final number of sentences (cues) was 22. The cues were coded for each participant by indicating the rank of one, two, three, four, or five. If the cue was not ranked at least five, six was coded to indicate "not ranked." The cue utilization of each subject was represented by the numbers 1-6 on each cue. For analysis purposes, the data was regrouped as a dichotomous variable, either as "important" (any cue ranked from 1-5) or "not important" (any cue coded as a six).

**Reliability Estimation**

The subjects made a preliminary evaluation of the reliability of the internal controls in the payroll application based on the information given in the case description. The written instructions indicated that 0 per cent would designate no control and 100 per cent would represent perfect control. Reliability estimates ranged from 0 per cent to 95 per cent, with an average of 68.9.

**Model Specification**

No evidence exists that reliability estimation is a linear representation of cognitive style and other individual and firm differences. Since the relationship of the variables, rather than the form of the relationship was the primary consideration in the current research, the functional form, rather than the linear form, seemed most
appropriate for the model specifications where:

\[ Y = f(X_1, X_2, X_3, \ldots, X_n) \]

and

\[ Y = \text{reliability estimation} \]

\[ X_1 = \text{cognitive style} \]

\[ X_2 = \text{years audit experience} \]

\[ X_3 = \text{firm affiliation} \]

\[ X_4 = \text{additional accounting/auditing training} \]

\[ X_5 = \text{additional computer training} \]

\[ X_6 = \text{number of cues} \]

\[ X_7 = \text{perception of cues} \]

Statistical Analysis

Analysis of variance (ANOVA) and t-test were the statistical methods chosen to test the hypotheses. The research problem involved the testing of several relationships: (1) the relationship of the perceptual abilities (sensing and intuitive) of the participants and the number of cues identified; (2) the relationship between the perceptual abilities of the participants and their reliability estimation judgment; (3) the relationship between participants' firm affiliation and their reliability estimation judgment; (4) the relationship between experience and reliability judgments and types of training and reliability judgments, and (5) the relationship between the number of cues identified by the participants and their reliability estimation judgment.
The t-test was appropriate for the testing of relationships between two groups, while ANOVA was used to test the relationships between more than two groups. The t-test allows for a comparison of the sample means of two groups by the calculation of Student's t. Since a significant difference was predicted in a certain direction, a one-tailed test of significance was computed. ANOVA was used to assess the relative effect on the dependent variable (internal control reliability judgment in this study) of participants' firm affiliation in one of six firms tested.

The Statistical Package for the Social Sciences (SPSS) package was used in the statistical analysis. The T-TEST command calculates the Student's t, the probability of the t value, the degrees of freedom, the group means, the standard deviation, and the standard error for each variable. The ANOVA command together with the STATISTICS command produces analysis of variance results including the source of variation for main effects, the sum of squares, degrees of freedom, mean square, the F statistic and its significance level.

Limitations

External Validity

External validity is concerned with the impact of the ability to generalize the results of a study across times, setting, or persons. Randomization of subjects is a
primary strategy to improve external validity. The subjects in this study were not chosen randomly by the researcher, but rather the sample was the result of the participant's assignment to a particular training group by their superiors. Whether each senior auditor had an equal chance of being selected for this training is not known or assumed. Therefore, generalizability is limited.

Auditors from the large CPA firms were studied in a particular region. Therefore, the results of this study could not be generalized to auditors from small firms or auditors from other regions. It is suspected, however, that replication of this study would result in very similar findings. In this type of study, it is replication that attempts to overcome the limitations of external validity.

**Internal Validity**

Generally, threats to internal validity arise through the possibility of alternate plausible explanations that are not controlled. The design of this study attempted to address several threats to internal validity. The administration of the instruments in a controlled setting was designed to control for extreme time differences and the possibility of assistance. In one period the test instruments were administered in reverse order. This change was designed to control for differences arising from the order in which the participants completed the instruments.
However, since the time allotted to the researcher ranged from the first day of training to the last day of training and from the first task of the day to the last task of the day, subjects could have given less effort to the completion of the instrument, which in turn could have affected the results.
CHAPTER BIBLIOGRAPHY


CHAPTER 4

RESULTS AND CONCLUSIONS

The ninety participating auditors in this study identified twenty-two pieces of information (cues) as important to their judgment on the reliability of internal controls in the situation depicted in the case. As described in Chapter 3, the criteria for including a cue was at least a ranking of five on a particular sentence by no fewer than five participants. Each of these twenty-two cues are described and the rationale presented as to whether the sensing or the intuitive individuals (as measured by the Myers-Briggs Type Indicator) would consider each cue important. This rationale was developed from the theory of the differences in perceptions of the sensing and intuitive types and was extended to include the types of control information these individuals should consider important. According to the MBTI, two modes of perception, intuition and sensing, exist; and two modes of evaluation, thinking and feeling, exist. Each individual's score indicates a preference for either intuition or sensation and either thinking or feeling. Discussion of the cues will refer to the particular mode of perception (intuitive or sensing). The four cognitive styles which combine the perceptual mode and
the mode of evaluation (thinking or feeling) are intuitive-thinking (N-T), sensing-thinking (S-T), intuitive-feeling (N-F), and sensing-thinking (S-T). Reference to the intuitive types, for example, would include the cognitive styles of both the intuitive-thinking types and the intuitive-feeling types.

The current study, which was somewhat exploratory in nature, sought to identify the impact of cognitive style on cue perceptions and the resulting judgment. The results of this study are presented in descriptive terms as well as in terms of specific hypotheses testing. The theoretical foundation of this research is based on the perceptive and evaluation modes as defined by Carl Jung, and as tested by the MBTI. An a priori designation was made as to perceptive "type" that should consider a particular cue important. This designation was based on the theory that the sensing types prefer detailed, concrete, sensory-type data, and the intuitive types more readily perceive the possibilities and future implications of data.

The cue X1 identified the presence of an on-line master payroll file in the payroll area. Payroll applications are usually not considered for on-line applications because of the confidentiality of the information on these files. Greater risk also exists of unauthorized access to on-line applications. The intuitive type should consider this information important because the potential problems of an
on-line system greatly outweigh the problems of a batch-processed payroll system.

The cue identified as X2 addressed the problem alluded to by X1. Since unauthorized access would be a potential problem in an on-line payroll application, a control was needed which would address this issue. Cue X2 identified the use of a multiple nine-digit password to restrict access to the master payroll file. This cue was included in the case so that technical computer controls would be good. Since computer controls were considered factual information, this kind of information was included for the benefit of the sensing types. Theoretically, the sensing types are drawn to factual, detailed information, and this was the rationale for the prediction that the sensing types should consider this and other computer-related information as important to their reliability judgment. This cue also appeared later in the case and the presence of passwords was reiterated.

The case described a decentralized operation of a savings and loan association which included a main office and several branches. Each branch had a branch manager and at least one computer terminal that tied in with the main office. Cue X3 indicated that while branch managers could submit personnel changes, their entries did not directly update the master payroll file. Assuming that this information was factual and carried with it no future
implications, the sensing types as a whole should consider this cue as an indication of good control and therefore important.

One difficulty with the cue information in a case descriptive form was the inability to separate the influence of one cue on another cue. This was the case for cue X4. Cue X3 stated that branch managers submitted changes to the personnel and payroll files. Cue X4 gave more information when it stated that the internal auditor reviewed all the changes submitted by the branch managers. The presence of a review by the internal auditor could indicate two possibilities: (1) that the internal auditor is part of the internal control system and not outside of it; and (2) the internal auditor may or may not adequately review the transactions. The presence of these possibilities should mean that the intuitive types would consider this information more important.

Cue X5 illustrated a unique situation, not commonly practiced by firms. Cue X5 described an "automatic" payroll system. Since most of the employees in the savings and loan institution were salaried, their pay from week to week would not vary unless some change occurred. This cue described the changes which would cause an employee's pay to change. If none of these conditions existed, the payroll file was not updated for these employees. This was a work-saving measure, but the system carried with it a
higher risk that an employee's pay was not changed when it should have been, and that the error would be undetected. Therefore, this cue was considered to be more important to the intuitive types.

Proper authorization is a control that is defined and described in the auditing professional standards as being very important. Cue X6 indicated the authorization source for changes in the payroll files. This is factual information, thought to be important to the sensing types.

Cue X7 was highly related to cue X4 since it was information which further described the review process of the internal auditor on input data received from the branch managers. Cue X7 stated that the internal auditor initialed the summary sheet and submitted it to Mrs. Agee (the payroll manager) for input. Because cue X7 would imply the same possibilities and communicate similar implications as would cue X4, it too should be more important to the intuitive types than to the sensing types.

Cue X8 was purposely included as information that the intuitive types should consider most important. It, too, was related to cues X4 and X7 because it described Mrs. Agee's disposition of the summary sheets submitted by the internal auditor. Cue X8 gave the information that Mrs. Agee, because she was so busy, accumulated the summary sheets for several days before they were entered to update the payroll file. Any time work is postponed for any
reason, a higher probability exists that mistakes will be made. While the case description did not explain why Mrs. Agee was so busy, someone could infer that she did not have enough assistance, or that she was not "up to the task." Other information in the case describing how Mrs. Agee had worked her way up in the association could also imply that she lacked certain qualifications. All the perceptions that could be inferred from this information would indicate that the intuitive types should be more aware of the potential problem area.

Cue X9 described a procedure that required the receipt of an authorization form from the personnel department before any change in pay for a current employee or information on a new employee could be entered by Mrs. Agee. The presence of an authorization procedure represented a factual situation, and therefore, should be of more importance to the sensing types as a whole.

The personnel department was also responsible for sending termination notices to Mrs. Agee, a fact described by cue X10. Also included in X10 was the statement that a staff shortage in the personnel department was responsible for five termination notices not being received in time for input. Unless a change was entered in the system described, an employee would be paid the same amount as the last pay period. Therefore, five former employees would have been erroneously paid. This incident, while in itself
represented the product of control weaknesses, also revealed the potential for other problems. Because of the implications of this cue, the intuitive types as a whole should perceive it as more important than the sensing types.

Cue X11 also carried with it the potential that master file changes would not be made. Cue X11 stated that Mrs. Agee and her assistants worked under time constraints since the EDP department automatically began processing the payroll at certain times, assuming that all changes were made. If any transactions are not input by Mrs. Agee, this automatic processing would result in wrong amounts being paid to some employees. Any situation where time is a problem portends the possibility for mistakes. Therefore, the intuitive types should consider this cue more important than the sensing types.

Cue X12 described the situation of the payroll clerks removing the prenumbered blank checks from the vault and taking them to the EDP department for processing. This lack of separation of functions (access to assets and the related recording function) carried with it implications of potential problems. Therefore, the intuitive types should consider this information important to their reliability estimation.

As previously stated, the researcher considered computerized control as factual-type information which would
be perceived as more important to the sensing types since they prefer detailed, concrete information. Cue X13 was the primary cue designed with this rationale in mind. Cue X13 listed six common input controls—format, completeness, reasonableness, limit, and validity checks, and a check digit routine. The purpose of each control was also presented. These edit routines exist to detect errors at the data entry point, and because of their factual nature, the sensing types should consider this information more important than the intuitive types.

Cue X14 described the presence of a computerized log report that would be generated if the control totals for the transactions and the previous pay period did not reconcile to the new payroll master file. On the surface, the presence of this procedure represented a good control. However, if transactions were omitted, because of time problems or other situations, these totals would still reconcile. Since the intuitive type would probably not consider this an important control procedure for those reasons, the sensing types should consider this cue more important than the intuitive types.

An electronic fund transfer (EFT) system existed for savings and loan personnel whereby their pay could be automatically deposited in their account at the savings and loan association. Cue X15 described the existence of a listing of all payroll payments that were EFT deposits.
which was reviewed by accounting department personnel. This cue represented a control strength in two respects: (1) the listing was generated in the EDP department and (2) the listing was reviewed by accounting department designated employees. This control would fall in the category of separation of duties, and should be more important to the sensing types.

Cue X16 described a reconciliation procedure performed by the accounting department. Cue X16 also included the important point that any discrepancies were immediately investigated. Since cue X16 related factual information about the controls in place, the sensing types as a whole should consider this information more important.

The case description involved a savings and loan association with many branches throughout the state. Cue X17 indicated that the payroll checks for the branches were mailed directly from the EDP department along with the branch copy of the payroll journal report. This direct mailing would leave open the possibility that incorrect or fraudulent information could be entered by a branch manager and go undetected. This would be possible since the branch manager would most likely be the recipient of the payroll journal report. This possibility could be inferred from this information, and, therefore, be considered more important to the intuitive types.
Cue X18 involved separation of duties, but from a negative standpoint. This cue revealed that Mrs. Agee, the payroll manager, reconciled the total amount paid in the payroll period with the master file control total. Separation of duties would be achieved if a designated person in the accounting area was responsible for the reconciliation of all the payroll journal reports to the master payroll file. Since the intuitive would be expected to perceive a better alternative to the present definition of duties, the intuitive types should consider this cue important.

Cue X19 involved the physical security of the data processing center. Cue X19 stated that the data center is located on the second floor (better for physical security) and that entry is restricted to authorized personnel. The physical security of the data processing area is important information, but the sensing types were considered to be the majority who considered it so since it was factual information.

Cue X20 was suggested by a practitioner as being the type of information that the intuitive types would "pick up on." It stated only that the EDP manager has an "open-shop" philosophy in that EDP is responsible for processing only. This information, however, implied that data is not questioned as to its propriety by the EDP department. Because of this philosophy, basic input and output controls would have to be performed by the individual departments.
A control section would be the best alternative since it would be responsible for checking the input for reasonableness before it is processed, and checking the output before it is released to the user departments. The existence of a control section would constitute a much better control environment. The possibilities inferred by cue X20 would make it information considered more important to the intuitive types.

Since the computer controls were good, cue X21 added additional information about the training of EDP personnel and the fact that they had no other duties or responsibility in other departments. Cue X22 is closely related to cue X21 since it states that the duties of computer operators and programmers are separate. Both these cues were "text-book" examples of good internal controls in an EDP environment. Because they represented factual information, they were considered to be important to the sensing types.

Table IX indicates the a priori designation of intuitive (I) and sensing (S) subjects on each cue. This a priori designation by the researcher was based on the theory that the sensing types prefer detailed, concrete, sensory-type data, and the intuitive types more readily perceive the possibilities and future implications of data. The actual frequency and percentage of the sensing and intuitive subjects who considered a particular cue as either "important" or "not important" to their reliability
estimation is also presented. The actual information represented by cues designated X1-X22 is presented in Appendices B and C.

**TABLE IX**

NUMBER AND PERCENTAGE* OF TYPES CONSIDERING PARTICULAR CUES IMPORTANT

<table>
<thead>
<tr>
<th>Cue</th>
<th>Total</th>
<th>Sensing</th>
<th>Intuitive</th>
<th>A Priori Designation**</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>5 (6%)</td>
<td>1 (2%)</td>
<td>4 (11%)</td>
<td>I ***</td>
</tr>
<tr>
<td>X2</td>
<td>42 (47%)</td>
<td>29 (54%)</td>
<td>13 (36%)</td>
<td>S ***</td>
</tr>
<tr>
<td>X3</td>
<td>9 (10%)</td>
<td>5 (9%)</td>
<td>4 (11%)</td>
<td>S</td>
</tr>
<tr>
<td>X4</td>
<td>17 (19%)</td>
<td>10 (19%)</td>
<td>7 (19%)</td>
<td>I</td>
</tr>
<tr>
<td>X5</td>
<td>6 (7%)</td>
<td>3 (6%)</td>
<td>3 (8%)</td>
<td>I</td>
</tr>
<tr>
<td>X6</td>
<td>13 (14%)</td>
<td>7 (13%)</td>
<td>6 (17%)</td>
<td>S</td>
</tr>
<tr>
<td>X7</td>
<td>12 (13%)</td>
<td>5 (9%)</td>
<td>7 (19%)</td>
<td>I ***</td>
</tr>
<tr>
<td>X8</td>
<td>5 (6%)</td>
<td>4 (7%)</td>
<td>1 (3%)</td>
<td>I</td>
</tr>
<tr>
<td>X9</td>
<td>18 (20%)</td>
<td>15 (28%)</td>
<td>3 (8%)</td>
<td>S ***</td>
</tr>
<tr>
<td>X10</td>
<td>19 (21%)</td>
<td>7 (13%)</td>
<td>12 (33%)</td>
<td>I ***</td>
</tr>
<tr>
<td>X11</td>
<td>18 (20%)</td>
<td>13 (24%)</td>
<td>5 (14%)</td>
<td>I</td>
</tr>
<tr>
<td>X12</td>
<td>13 (14%)</td>
<td>8 (15%)</td>
<td>5 (14%)</td>
<td>I</td>
</tr>
<tr>
<td>X13</td>
<td>26 (29%)</td>
<td>14 (26%)</td>
<td>12 (33%)</td>
<td>S ***</td>
</tr>
<tr>
<td>X14</td>
<td>23 (26%)</td>
<td>16 (30%)</td>
<td>7 (19%)</td>
<td>S ***</td>
</tr>
<tr>
<td>X15</td>
<td>6 (7%)</td>
<td>3 (6%)</td>
<td>3 (8%)</td>
<td>S ***</td>
</tr>
<tr>
<td>X16</td>
<td>16 (18%)</td>
<td>10 (19%)</td>
<td>6 (17%)</td>
<td>I ***</td>
</tr>
<tr>
<td>X17</td>
<td>5 (6%)</td>
<td>1 (2%)</td>
<td>4 (11%)</td>
<td>I</td>
</tr>
<tr>
<td>X18</td>
<td>19 (21%)</td>
<td>10 (19%)</td>
<td>9 (25%)</td>
<td>I</td>
</tr>
<tr>
<td>X19</td>
<td>7 (8%)</td>
<td>4 (7%)</td>
<td>3 (8%)</td>
<td>I</td>
</tr>
<tr>
<td>X20</td>
<td>8 (9%)</td>
<td>5 (9%)</td>
<td>3 (8%)</td>
<td>I</td>
</tr>
<tr>
<td>X21</td>
<td>9 (10%)</td>
<td>7 (13%)</td>
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<tr>
<td>X22</td>
<td>16 (18%)</td>
<td>8 (15%)</td>
<td>8 (22%)</td>
<td>S</td>
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</tbody>
</table>

*Percentage of total participants (90), percentage of total sensing types (54), and percentage of total intuitive types (36).

**I-Intuitive; S-Sensing

***Agrees with a priori assumptions (both frequency and percent of type)
Because the sensing types outnumbered the intuitive types, both the actual number of participants should be noted in Table IX as well as the proportion of each type. In many cases, the actual number of participants of a particular type was in the direction expected, when the percentage of each type responding was not. A comparison of the a priori designations with the actual frequencies yields some interesting information. On many cues, the actual frequency of responses for each type was the same (cues X5, X15, and X22), and on other cues, the difference in the number of responses was four or less (cues X1, X3, X4, X6, X7, X8, X12, X13, X16, X17, X18, X19, and X20). The cues that did vary between the two types, however, are discussed in detail.

Over twice as many sensing types as intuitive types considered the information on the use of passwords (cue X2) important. Since passwords represent a specific type of control, the sensing types were expected to consider the use of passwords more important than the intuitive types as a whole.

Twenty-eight per cent of the sensing auditors considered cue X9 important, while only eight percent of the intuitive types considered it so. Since cue X9 represents factual data related to the requirement of an authorization form from the personnel department, the sensing types were expected to consider this information important.
A larger proportion of the intuitive types (33 per cent) considered cue X10 important than did the sensing types (13 per cent). As previously mentioned, the problem of staff shortages related in this cue, can result in the pooling of duties and a greater probability of mistakes. These potential areas of concern were expected to be perceived as more important to the intuitive types.

Cue X14 described the computerized reconciliation procedure of the payroll files, and the fact that an error log report was generated if errors prevented the reconciliation. More than twice as many sensing types (16) as intuitive types (7) considered this information important to their reliability estimation as expected.

Cue X21 related the separation of functions in the EDP department and the training of EDP personnel. This cue was considered to be more important to the sensing types, and seven of the nine responses were from the sensing types.

Cue X11, expected to be perceived as more important to the intuitive types, was, in fact, perceived to be important to more sensing individuals. Cue X11 described the situation of time constraints and the automatic processing of payroll at certain times with the assumption that all changes were made. This cue, considered important by 20 per cent of all the participants, was rated as important to 24 per cent of the sensing types and 14 per cent of the intuitive types. Perhaps the lack of verification that all
transactions were processed in an "automatic" system represented a weakness considered to be more important to the sensing types.

Due to the large number of cues identified and the number of participants, more participants on any one cue considered it "not important" than considered it "important." The largest response on any one cue was on cue X2 (47 per cent), and there were still more subjects (53 per cent) who considered it "not important" to their reliability estimation. This situation, along with the small variance between the sensing respondents and the intuitive respondents on most cues, made statistical testing of the a priori assumptions and the actual frequency of responses an indeterminable process.

Previous studies (3, 4) cited the influence of an auditor's firm on certain responses. Again, because of the larger number of "not important" responses, especially from firms with fewer participants, a formal hypothesis was not tested regarding the influence of firm affiliation on cue perceptions. Table X gives descriptive information on how many individuals from each firm considered a particular cue important.

Cue X2, which described the use of passwords, was considered important to 53 per cent, 58 per cent, and 60 per cent of the participants from firms 1, 2, and 6, respectively. These percentages represented a higher response than
the response of participants as a whole (47 per cent). Individuals from firms 5 and 6 gave eleven of the thirteen responses to cue X6 which dealt with authorization sources.

TABLE X
INDIVIDUAL RESPONSES ON CUE IMPORTANCE BY FIRM

<table>
<thead>
<tr>
<th>Cue (Subjects)</th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>X1</td>
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<td>0</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>5</td>
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<tr>
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<td>2</td>
<td>6</td>
<td>9</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
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<td>0</td>
<td>5</td>
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<td>9</td>
</tr>
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<td>17</td>
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<td>18</td>
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<td>8</td>
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<td>1</td>
<td>4</td>
<td>3</td>
<td>4</td>
<td>16</td>
</tr>
</tbody>
</table>

Forty-one per cent of the participants from firm 1 and fifty-three per cent of participants from firm 6 considered cue X13 important. Cue X13 outlined the computer input controls for the terminals. Respondents from these two
firms represented 58 per cent of the total responses to this particular cue. Clearly, computerized controls were considered important by the participants from all the firms, while the importance of information concerning authorization sources was considered primarily from two firms. These findings would imply that the importance of specific internal controls has shifted in a computerized environment. While separation of duties was considered the most important control information in a manual environment (1, 2), access controls in this study were considered important by a large percentage of participants. Table XI indicates the cue which received the largest response from each of the six firms. This table presents the actual number of respondents and the percentage of the total respondents from each firm.

**TABLE XI**

**CUES RECEIVING THE LARGEST FIRM RESPONSE**

<table>
<thead>
<tr>
<th>Firm</th>
<th>Cue</th>
<th>Number</th>
<th>Percent of Total Firm Response</th>
<th>Percent of Total Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X2</td>
<td>9</td>
<td>53% (17)</td>
<td>21% (42)</td>
</tr>
<tr>
<td>2</td>
<td>X2</td>
<td>7</td>
<td>58% (12)</td>
<td>17% (42)</td>
</tr>
<tr>
<td>3</td>
<td>X13</td>
<td>3</td>
<td>33% (9)</td>
<td>12% (26)</td>
</tr>
<tr>
<td>4</td>
<td>X14</td>
<td>7</td>
<td>44% (16)</td>
<td>30% (23)</td>
</tr>
<tr>
<td>5</td>
<td>X2</td>
<td>9</td>
<td>43% (21)</td>
<td>21% (42)</td>
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<tr>
<td>6</td>
<td>X2</td>
<td>9</td>
<td>60% (15)</td>
<td>21% (42)</td>
</tr>
</tbody>
</table>
Only in firm 3 and firm 4 did more respondents indicate a cue other than X2 as important. The differences in the number of respondents from each firm must be considered when looking at this data. Due to the large number of cues and the fact that in one firm (firm 3) only nine auditors participated, there are a number of cues for which no rating of importance exists. Nevertheless, no visible firm effects were apparent in the choice of relevant cue information.

Number of Cues

The previous discussion was related to the cues perceived as important. Since the case instructions did not specify any particular number of cues to be ranked, the relationship between the number of cues considered to be important to individuals and the individual's perceptual mode (sensing or intuitive) could be tested.

If the sensing types of individuals prefer facts that can be verified by the senses, and intuitive individuals prefer to "look beyond the facts" to possibilities, the sensing types should identify more cues than the intuitive individuals. The perceptions of possibilities can arise from one or a few observations, therefore, Hypothesis 1 is stated as:

\[ H_0: \text{There is no significant difference between the mean number of cues identified by the sensing types and the intuitive types.} \]
The sensing type individuals will identify more cues than the intuitive type individuals.

The statistical method chosen to test this hypothesis was the t-test, which compares sample means and tests the significance of the difference between the means. Since the alternate hypothesis predicted that the differences would be in a given direction, the one-tailed test was appropriate. The Statistical Package for the Social Sciences (X version) was the statistical software used to perform the test. The results were as follows:

**TABLE XII**

SIGNIFICANCE OF NUMBER OF CUES IDENTIFIED

<table>
<thead>
<tr>
<th></th>
<th>Number of Cases</th>
<th>Mean Number of Cues</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>54</td>
<td>9.093</td>
<td>6.600</td>
<td>.898</td>
<td>.58</td>
<td>.280</td>
</tr>
<tr>
<td>Intuitive</td>
<td>36</td>
<td>8.278</td>
<td>6.282</td>
<td>1.047</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There was no significant difference between the mean number of cues identified by the sensing type individuals and the intuitive type individuals, therefore, null hypothesis 1 was not rejected. While there were twelve participants who identified only one cue as important to their reliability estimation, and four participants who did not
identify any cues, fifty per cent of the subjects identified from two to ten cues.

Internal Control Reliability

The subjects were asked to make a preliminary evaluation of the reliability of the internal controls in the payroll application based on the information given in the case description. The written instructions indicated that zero per cent would designate no control and one hundred per cent would represent perfect control. Reliability estimates ranged from zero per cent to ninety-five per cent. Twenty-one per cent of the respondents considered the internal control system in the payroll area described to be fifty per cent or less, while twenty per cent considered the system described at least eighty-five per cent reliable. Table XIII illustrates the number of individuals in each firm who gave a particular reliability estimation, the average estimate per firm, and the average for all participants.

Even with the wide individual variances, the averages per firm vary very little. The small variance among firms can be deceiving since the preliminary judgment is not a pooled judgment of many auditors, but an individual judgment in most cases. Averaging conceals the wide variances in the individual judgments.
TABLE XIII

RELIABILITY ESTIMATES BY FIRM

<table>
<thead>
<tr>
<th></th>
<th>Firm 1</th>
<th>Firm 2</th>
<th>Firm 3</th>
<th>Firm 4</th>
<th>Firm 5</th>
<th>Firm 6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>..</td>
<td>1</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>..</td>
<td>2</td>
</tr>
<tr>
<td>20%</td>
<td>1</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25%</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
</tr>
<tr>
<td>30%</td>
<td>1</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
</tr>
<tr>
<td>40%</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>50%</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>..</td>
<td>10</td>
</tr>
<tr>
<td>60%</td>
<td>1</td>
<td>1</td>
<td>..</td>
<td>2</td>
<td>..</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>65%</td>
<td>1</td>
<td>1</td>
<td>..</td>
<td>3</td>
<td>2</td>
<td>..</td>
<td>4</td>
</tr>
<tr>
<td>70%</td>
<td>2</td>
<td>3</td>
<td>..</td>
<td>..</td>
<td>3</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>75%</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>80%</td>
<td>3</td>
<td>..</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>85%</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>90%</td>
<td>2</td>
<td>3</td>
<td>..</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>95%</td>
<td>..</td>
<td>1</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>..</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>14*</td>
<td>89*</td>
</tr>
<tr>
<td>Average</td>
<td>68.24</td>
<td>68.75</td>
<td>63.33</td>
<td>73.13</td>
<td>66.90</td>
<td>71.43</td>
<td>68.88</td>
</tr>
</tbody>
</table>

*1 missing response

Hypotheses 2, 3, 4, and 5 are all related since they involve testing for relationships between internal control judgments and the variables of cognitive style, firm affiliation, the individual differences of experience and training, and the number of cues utilized. The variables of firm affiliation, experience, and training have been considered by previous researchers as possible explanations for lack of consensus in internal control reliability judgments.
Cognitive Style

As previously stated, judgment is a two-stage process—perception of information and evaluation of what has been perceived. The research design of the current study could relate the perception of information to the case description. A judgment was elicited from the participants, but the process of evaluation was an unknown. Therefore, the testing of hypotheses relating to cognitive style and judgment were limited to the perceptual modes (sensing and intuition).

The case description was designed with very good computer controls. The detailed, specific information on computerized, technical controls was expected to be perceived more readily by the sensing types. Because these controls were good, the resulting judgment on internal control reliability should be fairly high. Other information was placed in the case which inferred weaknesses. These inferences were expected to be considered as more important to the intuitive types and, therefore, result in a lower reliability judgment. Therefore, Hypothesis 2 is stated as:

\[ H_{0.2} \] No significant differences exist between the internal control reliability judgments of the sensing type auditors and the intuitive type auditors.

\[ H_2 \] The internal control reliability judgment of the intuitive type auditors will be lower than the judgment of the sensing type auditors.
A t-test was performed to test the significance of the differences in the reliability estimates of the sensing and intuitive individuals. It was hypothesized that the intuitive types' reliability estimation would be significantly lower than the sensing types' estimation. However, the sensing group's average was significantly lower (one-tailed probability .059) as shown:

\[
\text{TABLE XIV}
\]
\[\text{SIGNIFICANCE OF RELIABILITY ESTIMATES}\]

<table>
<thead>
<tr>
<th></th>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing</td>
<td>53</td>
<td>66.23</td>
<td>19.829</td>
<td>2.724</td>
<td>-1.58</td>
<td>.059</td>
</tr>
<tr>
<td>Intuitive</td>
<td>36</td>
<td>72.78</td>
<td>18.065</td>
<td>3.011</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Therefore, null hypothesis 2 was not rejected. Perhaps other uncontrolled factors came into play in the evaluation of the perceptions. For example, aversion to risk and conservatism could be possible variables which would affect the final reliability judgment.

**Firm Affiliation**

CPA firms have individual approaches to conducting an audit engagement. Many firms have standardized audit programs, unique approaches to statistical sampling, and guidelines for performing certain audit procedures. CPA firms
also conduct in-house training for their audit staff, and certain areas could be emphasized in particular firms. Because of differences in "audit approach" certain information could be stressed as more important to some firms than others. Because of criteria used in hiring, certain "types" of individuals could be more prevalent in some firms. To assess the individual effects of firm affiliation and the interaction of firm affiliation with cognitive style on internal control reliability judgment, ANOVA was the statistical method chosen to test Hypothesis 3.

Hypothesis 3 was stated as:

H₀₃ No significant differences exist in the internal control reliability estimates of auditors from different firms.

H₃ The internal control reliability judgments will be different from firm to firm.

### TABLE XV

**ANALYSIS OF VARIANCE**

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Effects:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>2490.811</td>
<td>8</td>
<td>311.351</td>
<td>0.922</td>
<td>0.504</td>
</tr>
<tr>
<td>Firm</td>
<td>1745.468</td>
<td>3</td>
<td>581.823</td>
<td>1.723</td>
<td>0.171</td>
</tr>
<tr>
<td></td>
<td>838.797</td>
<td>5</td>
<td>167.759</td>
<td>0.497</td>
<td>0.778</td>
</tr>
<tr>
<td>Two-Way Interactions:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS x Firm</td>
<td>7674.666</td>
<td>13</td>
<td>590.359</td>
<td>1.748</td>
<td>0.071</td>
</tr>
<tr>
<td></td>
<td>7674.666</td>
<td>13</td>
<td>590.359</td>
<td>1.748</td>
<td>0.071</td>
</tr>
<tr>
<td>Explained</td>
<td>10165.478</td>
<td>21</td>
<td>484.070</td>
<td>1.434</td>
<td>0.135</td>
</tr>
</tbody>
</table>
Firm affiliation did not represent a significant main effect in internal control reliability estimation. Null hypothesis 3 was not rejected. The internal control reliability averages per firm were as follows:

1. Firm 1 - 68.24
2. Firm 2 - 68.75
3. Firm 3 - 63.33
4. Firm 4 - 73.13
5. Firm 5 - 66.90
6. Firm 6 - 71.43

There was a marginal interaction effect (.07 significance) between cognitive style and firm affiliation as they affected internal control reliability judgment. Perhaps certain "types" of individuals are hired by different CPA firms.

Other Individual Differences

Certain individual factors could also affect the reliability judgments of auditors. Auditors with more experience, because they are further removed from the theoretical emphasis of academia, would possibly give a higher reliability estimation. This higher estimation could result because their basis of comparison would be the internal control systems of other (imperfect) companies. A more recent graduate's basis of comparison, however, would be the normative theory of what an internal control system
should be. Three years was chosen as the cut-off to divide the auditors into two groups: those auditors with less than three years' experience and those auditors with three years or more of audit experience.

Training could also affect the reliability estimations of auditors. Information on two types of training were gathered for this study—training in accounting/auditing and training in computers. Because the case depicted very good computer controls, the auditors who indicated training in computers would be expected to give a higher reliability estimation than the auditors who did not indicate additional computer training. Recent training more readily brings to mind the need for good input, output, and processing controls. Auditors with more accounting/auditing training, on the other hand could be expected to give a lower reliability estimation than those auditors without additional training in these areas. Additional training in accounting/ auditing reacquaint the auditor with the normative ideas of what "should be" in these areas, and, therefore, give the auditors a higher level of comparison which would result in a lower reliability estimation. Hypotheses 4, 5, and 6 are stated as:

\[ H_0 \] There are no significant differences between the internal control reliability judgments of auditors with different levels of experience.

\[ H_1 \] Auditors with three years or more experience will give a higher internal control
reliability judgment than those auditors with less than three years' experience.

H0-5 There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in computers.

H5 Auditors with computer training will give a higher internal control reliability judgment than those auditors with no computer training.

H0-6 There are no significant differences between the internal control reliability judgment of auditors with some or no additional training in accounting/auditing.

H6 Auditors with accounting/auditing training will give a lower internal control reliability judgment than those auditors with no additional accounting/auditing training.

Hypotheses 4, 5, and 6 were tested separately by a t-test which would test the significances of the differences between the reliability judgments of the various groups. The results of the three t-tests are shown in Table XVI.

The mean estimate for the more experienced auditors was higher than the mean estimate of the less-experienced auditor, but the significance level was marginal. Therefore, null hypothesis 4 was not rejected. Training in computers was significant and in the direction hypothesized. Therefore, null hypothesis 5 was rejected. Training in Accounting/Auditing, however, did not differentiate the internal control reliability judgments of auditors, and null hypothesis 6 was not rejected.
The final relationship tested was the relationship between the number of cues identified by the participants and their resulting reliability estimate. Because there were many strengths in the internal control system depicted in the case, auditors who identified many pieces of information (cues) as important to their reliability estimation could be confirming the reliability of the system. Auditors who indicated few pieces of information, on the other hand, could have focused on a particular weakness, and therefore, based a lower reliability estimate on less
information. Two groups were defined: auditors who identified more than ten cues, and auditors who identified ten cues or less. The number ten was chosen because it was close to the average number of cues identified by all the participants and one-half of the participants chose from two to ten cues. Thus Hypothesis 7 is stated as:

\[ H_0-7 \text{ There is no difference in the internal control reliability judgment between auditors identifying few cues and auditors identifying many cues.} \]

\[ H_7 \text{ Auditors who identify many cues will give a higher reliability judgment than the auditors who identify few cues.} \]

A t-test was chosen to test the significance of the mean difference of the two groups on the reliability estimates. The results are shown in Table XVII.

The mean reliability estimates were not significantly different for auditors who used more than ten cues than those who used less. Therefore, null hypothesis 7 was not rejected.

**TABLE XVII**

**SIGNIFICANCE OF MEAN DIFFERENCE ON RELIABILITY ESTIMATES**

<table>
<thead>
<tr>
<th>Number of Cases</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>T</th>
<th>Signif.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ten or less</td>
<td>60</td>
<td>68.75</td>
<td>19.542</td>
<td>2.523</td>
<td>-.09</td>
</tr>
<tr>
<td>More than 10</td>
<td>29</td>
<td>69.14</td>
<td>19.136</td>
<td>3.554</td>
<td>.47</td>
</tr>
</tbody>
</table>
The results of the current research indicated that computerized controls (passwords, edit routines, and log report) were perceived by the largest per cent of participants to be important to their internal control reliability judgments. Participants' firm affiliation had no visible effect on their perceptions of cue importance, but a marginal interaction effect was noted between cognitive style and firm affiliation on internal control reliability judgments.

The number of cues identified as important by the participants was not significantly related to their perceptual mode (sensing or intuitive) or to their internal control reliability judgment. Training in computers was the only variable tested that was significantly related to the internal control reliability judgment below the .05 level. Chapter 5 summarizes the current study and discusses the implications of the results of this study.
CHAPTER BIBLIOGRAPHY


CHAPTER 5

SUMMARY AND IMPLICATIONS

This study was designed to assess the effects of cognitive style, firm differences, certain individual differences, and number of cues identified on internal control reliability estimation. Results of previous research have suggested that experience, training, and firm affiliation provide possible explanations for variance in internal control judgments. These factors, however, have not significantly explained the lack of consensus in auditors' internal control judgments. Cognitive style suggested a possible individual difference which could contribute to the understanding of consistently differing auditors' judgments. The separation of judgment into the perception of information and the evaluation of information perceived, allowed the perception of information to be separately studied.

Two instruments were chosen for this study. The Myers-Briggs Type Indicator (MBTI) was used to measure the perceptual and evaluation modes (cognitive style) of auditors. A second instrument, an audit judgment case, was prepared to elicit (1) an auditor's preliminary estimate of the reliability of internal controls in a computerized payroll
application, and (2) his assessment of the perceived relevance of the internal controls to his reliability judgment.

Ninety auditors attending training sessions held by six large CPA firms in Dallas, Texas, completed the MBTI and the case description. These instruments were administered by the researcher in June and July, 1984. The participants were primarily senior-level auditors with at least three years' experience. All combinations of the perceptual modes (sensing and intuitive) and evaluative modes (thinking and feeling) were represented in the sample. The cognitive styles were: sensing-thinking (S-T), sensing-feeling (S-F), intuitive-thinking (N-T), and intuitive-feeling (N-F).

The judgment to be made was a preliminary estimate of internal control reliability of the payroll application of a savings and loan association. Each auditor expressed his reliability estimate as a percentage within a range of zero per cent to one hundred per cent. Subjects were also asked to circle and rank the information in the case description that they considered relevant to their reliability estimation. Twenty-two pieces of information (cues) were ranked by at least five participants as being important to their reliability estimate. Participants also completed an information form included in the case regarding their audit experience, accounting/auditing training, and computer training. Firm affiliation was coded on the research
instruments. This information was collected for both analysis and control purposes.

Analysis of Variance (ANOVA) and the t-test were the statistical methods used to compare the cognitive style and other individual and firm differences to the number of cues utilized and reliability estimation. The students t-test was chosen for its ability to compare two sample means and to test the probability associated with the null hypotheses. ANOVA was chosen for its ability to test the relationship among greater than two groups as well as interaction effects.

Results

The current study added more evidence that auditors' judgments express wide individual variances. Based on the same case description, reliability estimates ranged from zero to ninety-five per cent. Twenty-one per cent of the participants considered the internal accounting controls no more than fifty per cent reliable, while twenty per cent considered the system described to be at least eighty-five per cent reliable. The testing of firm affiliation, experience, number of cues identified, and training in accounting/auditing revealed no significant relationships to explain the variance in internal accounting control judgment.

Differences were also noted in participants' identification of cues relevant to their judgment on internal
accounting control reliability. While the largest percentages of participants considered computer controls important, differences were noted in the cues identified by the sensing and intuitive types. No visible firm effects emerged concerning the types of information perceived as important by the participants.

While the average reliability estimates per firm were not significantly different from each other, an interaction effect was marginally significant at the .07 level between firm affiliation and cognitive style. This could indicate that reliability judgments are affected by both the firm influence on the individual and the individual's cognitive style (perceptual and evaluative modes).

The mean reliability estimate of auditors who indicated some training in computers was significantly (.02 level) higher than those who indicated no computer training. The case description described "good" controls so this result was expected. However, other cues not related to the computer controls represented weaknesses. Future research should examine the relationship between computer training and internal control judgments in computerized environments.

Implications

Most firms do not require a numerical evaluation on internal control reliability. Instead, internal control
reliability is categorized into ranges which may be labeled as substantial, moderate, limited, or no reliance. The specification of a range of values, by its nature, disguises individual differences. However, the results of this study disclosed differences of the magnitude to significantly affect the extent of subsequent testing in an audit. These differences can affect both the efficiency and effectiveness of an audit.

The cognitive style dimension has important implications as a tool for balancing judgments and for the better utilization of the contribution of the various cognitive styles in the profession. If the intuitive types and the sensing types perceive different kinds of information, then a combination of perceptions from two different types would be more valuable than the perceptions of two similar types who are apt to perceive basically the same data.

The audit involves teamwork, and most judgments in an audit are jointly conceived. The preliminary evaluation of internal control reliability in a particular area, however, is usually the result of the judgment of the individual who made the inquiries and observations.

Suggestions for Future Research

Auditors did vary in the information they considered important to their reliability estimates. Differences were
noted between the information considered important by the sensing type individuals and the intuitive type individuals. These differences should be more rigorously tested in future research with large sample sizes to ascertain whether significant differences do exist between information perceived and cognitive style.

The identification of cognitive style differences should lead to expanded exploration of varied applications. While all cognitive styles can positively contribute to the auditing profession, certain cognitive styles may remain with CPA firms for longer periods of time, and advance more rapidly. Research could be conducted to ascertain whether partners in CPA firms, sole practitioners in local firms, and staff accountants at various levels in the firm tend to be of primarily one cognitive style. Do successful people in the auditing profession manifest the same or a different cognitive style? The nature of auditing has dramatically changed with the expanded use of computers by both clients and the auditors themselves. Research could address the possibility that individuals with particular cognitive styles are being attracted to the auditing profession today. If so, what are the implications?

Analytical review procedures are rapidly becoming a very important part of the evidence-gathering process. The interpretation of the results of these procedures are crucial to the determination of subsequent audit testing.
Do different cognitive styles interpret the results of analytical review procedures differently? Research in the area of analytical review procedures could have potential benefits, especially if differences in the interpretation of results of these procedures are found.
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Read each question carefully and mark your answer on the separate answer sheet. Make no marks on the question booklet. Do not think too long about any question. If you cannot decide on a question, skip it but be careful that the next space you mark on the answer sheet has the same number as the question you are then answering.

Read the directions on your answer sheet, fill in your name and any other facts asked for and, unless you are told to stop at some point, work through until you have answered all the questions you can.
PART I. Which Answer Comes Closer to Telling How You Usually Feel or Act?

1. When you go somewhere for the day, would you rather
   (A) plan what you will do and when, or
   (B) just go?

2. If you were a teacher, would you rather teach
   (A) fact courses, or
   (B) courses involving theory?

3. Are you usually
   (A) a "good mixer," or
   (B) rather quiet and reserved?

4. Do you prefer to
   (A) arrange dates, parties, etc., well in advance, or
   (B) be free to do whatever looks like fun when the time comes?

5. Do you usually get along better with
   (A) imaginative people, or
   (B) realistic people?

6. Do you more often let
   (A) your heart rule your head, or
   (B) your head rule your heart?

7. When you are with a group of people, would you usually rather
   (A) join in the talk of the group, or
   (B) talk with one person at a time?

8. Are you more successful
   (A) at dealing with the unexpected and seeing quickly what should be done, or
   (B) at following a carefully worked out plan?

9. Would you rather be considered
   (A) a practical person, or
   (B) an ingenious person?

10. In a large group, do you more often
    (A) introduce others, or
    (B) get introduced?

11. Do you admire more the people who are
    (A) conventional enough never to make themselves conspicuous, or
    (B) too original and individual to care whether they are conspicuous or not?

12. Does following a schedule
    (A) appeal to you, or
    (B) cramp you?

13. Do you tend to have
    (A) deep friendships with a very few people, or
    (B) broad friendships with many different people?

14. Does the idea of making a list of what you should get done over a weekend
    (A) appeal to you, or
    (B) leave you cold, or
    (C) positively depress you?

15. Is it a higher compliment to be called
    (A) a person of real feeling, or
    (B) a consistently reasonable person?

16. Among your friends, are you
    (A) one of the last to hear what is going on, or
    (B) full of news about everybody?

17. In your daily work, do you
    (A) rather enjoy an emergency that makes you work against time, or
    (B) hate to work under pressure, or
    (C) usually plan your work so you won't need to work under pressure?

18. Would you rather have as a friend
    (A) someone who is always coming up with new ideas, or
    (B) someone who has both feet on the ground?
19. Do you
   (A) talk easily to almost anyone for as long as you have to, or
   (B) find a lot to say only to certain people or under certain conditions?

20. When you have a special job to do, do you like to
   (A) organize it carefully before you start, or
   (B) find out what is necessary as you go along?

21. Do you usually
   (A) value sentiment more than logic, or
   (B) value logic more than sentiment?

22. In reading for pleasure, do you
   (A) enjoy odd or original ways of saying things, or
   (B) like writers to say exactly what they mean?

23. Can the new people you meet tell what you are interested in
   (A) right away, or
   (B) only after they really get to know you?

24. When it is settled well in advance that you will do a certain thing at a certain time, do you find it
   (A) nice to be able to plan accordingly, or
   (B) a little unpleasant to be tied down?

25. In doing something that many other people do, does it appeal to you more to
   (A) do it in the accepted way, or
   (B) invent a way of your own?

26. Do you usually
   (A) show your feelings freely, or
   (B) keep your feelings to yourself?

   Go on to Part II.
PART II. Which Word in Each Pair Appeals to You More?
Think what the words mean, not how they look or how they sound.

27. (A) scheduled  unplanned  (B)
28. (A) gentle  firm  (B)
29. (A) facts  ideas  (B)
30. (A) thinking  feeling  (B)
31. (A) hearty  quiet  (B)
32. (A) convincing  touching  (B)
33. (A) statement  concept  (B)
34. (A) analyze  sympathize  (B)
35. (A) systematic  spontaneous  (B)
36. (A) justice  mercy  (B)
37. (A) reserved  talkative  (B)
38. (A) compassion  foresight  (B)
39. (A) systematic  casual  (B)
40. (A) calm  lively  (B)
41. (A) benefits  blessings  (B)
42. (A) theory  certainty  (B)
43. (A) determined  devoted  (B)
44. (A) literal  figurative  (B)
45. (A) firm-minded  warm-hearted  (B)
46. (A) imaginative  matter-of-fact  (B)
47. (A) peacemaker  judge  (B)
48. (A) make  create  (B)
49. (A) soft  hard  (B)
50. (A) sensible  fascinating  (B)
51. (A) forgive  tolerate  (B)
52. (A) production  design  (B)
53. (A) impulse  decision  (B)
54. (A) who  what  (B)
55. (A) speak  write  (B)
56. (A) uncritical  critical  (B)
57. (A) punctual  leisurely  (B)
58. (A) concrete  abstract  (B)
59. (A) changing  permanent  (B)
60. (A) wary  trustful  (B)
61. (A) build  invent  (B)
62. (A) orderly  easygoing  (B)
63. (A) foundation  spire  (B)
64. (A) quick  careful  (B)
65. (A) theory  experience  (B)
66. (A) sociable  detached  (B)
67. (A) sign  symbol  (B)
68. (A) party  theater  (B)
69. (A) accept  change  (B)
70. (A) agree  discuss  (B)
71. (A) known  unknown  (B)

Go on to Part III.
PART III. Which Answer Comes Closer to Telling How
You Usually Feel or Act?

72. Would you say you
(A) get more enthusiastic about things
    than the average person, or
(B) get less excited about things than
    the average person?

73. Do you feel it is a worse fault to be
(A) unsympathetic, or
(B) unreasonable?

74. Do you
(A) rather prefer to do things at the last
    minute, or
(B) find doing things at the last minute
    hard on the nerves?

75. At parties, do you
(A) sometimes get bored, or
(B) always have fun?

76. Do you think that having a daily routine is
(A) a comfortable way to get things done,
    or
(B) painful even when necessary?

77. When something new starts to be the
    fashion, are you usually
(A) one of the first to try it, or
(B) not much interested?

78. When you think of some little thing you
    should do or buy, do you
(A) often forget it till much later, or
(B) usually get it down on paper to
    remind yourself, or
(C) always carry through on it without
    reminders?

79. Are you
(A) easy to get to know, or
(B) hard to get to know?

80. In your way of living, do you prefer to be
(A) original, or
(B) conventional?

81. When you are in an embarrassing spot, do
    you usually
(A) change the subject, or
(B) turn it into a joke, or
(C) days later, think of what you should
    have said?

82. Is it harder for you to adapt to
(A) routine, or
(B) constant change?

83. Is it higher praise to say someone has
(A) vision, or
(B) common sense?

84. When you start a big project that is due in a
    week, do you
(A) take time to list the separate things to
    be done and the order of doing them, or
(B) plunge in?

85. Do you think it more important to be able
    to see the possibilities in a situation, or
    to adjust to the facts as they are?

86. Do you think the people close to you know
    how you feel
(A) about most things, or
(B) only when you have had some special
    reason to tell them?

87. Would you rather work under someone
    who is
(A) always kind, or
(B) always fair?

88. In getting a job done, do you depend on
(A) starting early, so as to finish with
    time to spare, or
(B) the extra speed you develop at the
    last minute?

89. Do you feel it is a worse fault
(A) to show too much warmth, or
(B) not to have warmth enough?

90. When you are at a party, do you like to
(A) help get things going, or
(B) let the others have fun in their
    own way?

91. Would you rather
(A) support the established methods of
    doing good, or
(B) analyze what is still wrong and
    attack unsolved problems?
92. Are you more careful about
   (A) people's feelings, or
   (B) their rights?

93. If you were asked on a Saturday morning what you were going to do that day, would you
   (A) be able to tell pretty well, or
   (B) list twice too many things, or
   (C) have to wait and see?

94. In deciding something important, do you
   (A) find you can trust your feeling about what is best to do, or
   (B) think you should do the logical thing, no matter how you feel about it?

95. Do you find the more routine parts of your day
   (A) restful, or
   (B) boring?

96. Does the importance of doing well on a test make it generally
   (A) easier for you to concentrate and do your best, or
   (B) harder for you to concentrate and do yourself justice?

97. Are you
   (A) inclined to enjoy deciding things, or
   (B) just as glad to have circumstances decide a matter for you?

98. In listening to a new idea, are you more anxious to
   (A) find out all about it, or
   (B) judge whether it is right or wrong?

99. In any of the ordinary emergencies of everyday life, would you rather
   (A) take orders and be helpful, or
   (B) give orders and be responsible?

100. After being with superstitious people, have you
    (A) found yourself slightly affected by their superstitions, or
    (B) remained entirely unaffected?

101. Are you more likely to speak up in
    (A) praise, or
    (B) blame?

102. When you have a decision to make, do you usually
    (A) make it right away, or
    (B) wait as long as you reasonably can before deciding?

103. At the time in your life when things piled up on you the worst, did you find
    (A) that you had gotten into an impossible situation, or
    (B) that by doing only the necessary things you could work your way out?

104. Out of all the good resolutions you may have made, are there
    (A) some you have kept to this day, or
    (B) none that have really lasted?

105. In solving a personal problem, do you
    (A) feel more confident about it if you have asked other people's advice, or
    (B) feel that nobody else is in as good a position to judge as you are?

106. When a new situation comes up which conflicts with your plans, do you try first to
    (A) change your plans to fit the situation, or
    (B) change the situation to fit your plans?

107. Are such emotional "ups and downs" as you may feel
    (A) very marked, or
    (B) rather moderate?

108. In your personal beliefs, do you
    (A) cherish faith in things that cannot be proved, or
    (B) believe only those things that can be proved?

109. In your home life, when you come to the end of some undertaking, are you
    (A) clear as to what comes next and ready to tackle it, or
    (B) glad to relax until the next inspiration hits you?

110. When you have a chance to do something interesting, do you
    (A) decide about it fairly quickly, or
    (B) sometimes miss out through taking too long to make up your mind?
111. If a breakdown or mix-up halted a job on which you and a lot of others were working, would your impulse be to
(A) enjoy the breathing spell, or
(B) look for some part of the work where you could still make progress, or
(C) join the “trouble-shooters” in wrestling with the difficulty?

112. When you don’t agree with what has just been said, do you usually
(A) let it go, or
(B) put up an argument?

113. On most matters, do you
(A) have a pretty definite opinion, or
(B) like to keep an open mind?

114. Would you rather have
(A) an opportunity that may lead to bigger things, or
(B) an experience that you are sure to enjoy?

115. In managing your life, do you tend to
(A) undertake too much and get into a tight spot, or
(B) hold yourself down to what you can comfortably handle?

116. When playing cards, do you enjoy most
(A) the sociability, or
(B) the excitement of winning, or
(C) the problem of getting the most out of each hand,
(D) or don’t you enjoy playing cards?

117. When the truth would not be polite, are you more likely to tell
(A) a polite lie, or
(B) the impolite truth?

118. Would you be more willing to take on a heavy load of extra work for the sake of
(A) extra comforts and luxuries, or
(B) a chance to achieve something important?

119. When you don’t approve of the way a friend is acting, do you
(A) wait and see what happens, or
(B) do or say something about it?

120. Has it been your experience that you
(A) often fall in love with a notion or project that turns out to be a disappointment—so that you “go up like a rocket and come down like the stick”, or do you
(B) use enough judgment on your enthusiasms so that they do not let you down?

121. When you have a serious choice to make, do you
(A) almost always come to a clear-cut decision, or
(B) sometimes find it so hard to decide that you do not wholeheartedly follow up either choice?

122. Do you usually
(A) enjoy the present moment and make the most of it, or
(B) feel that something just ahead is more important?

123. When you are helping in a group undertaking, are you more often struck by
(A) the cooperation, or
(B) the inefficiency,
(C) or don’t you get involved in group undertakings?

124. When you run into an unexpected difficulty in something you are doing, do you feel it to be
(A) a piece of bad luck, or
(B) a nuisance, or
(C) all in the day’s work?

125. Which mistake would be more natural for you:
(A) to drift from one thing to another all your life, or
(B) to stay in a rut that didn’t suit you?

126. Would you have liked to argue the meaning of
(A) a lot of these questions, or
(B) only a few?
PERSONAL DATA

CONFIDENTIAL

AGE ___________ SEX _______ NUMBER OF YEARS WITH PRESENT FIRM _________

PRESENT POSITION ___________________ NUMBER OF YEARS OF AUDIT EXPERIENCE ______

IDENTIFY ANY SPECIALTY AREA(S) STRESSED ________________________________________

UNDERGRADUATE DEGREE ___________ MAJOR ___________ MINOR ___________

SEMMESTER HOURS BEYOND UNDERGRADUATE DEGREE ___________

GRADUATE DEGREE ___________ CERTIFICATION ___________ (CPA, CMA, CIA, CISA)

APPROXIMATE SEMESTER HOURS OF COMPUTER COURSES __________

APPROXIMATE NUMBER OF DAYS TRAINING BEYOND BASIC STAFF TRAINING IN THE AREAS OF:

ACCOUNTING/AUDITING ___________ COMPUTERS ___________

I MAKE INTERNAL CONTROL EVALUATIONS AS A REGULAR PART OF MY WORK ______ (YES/NO)

I HAVE PARTICIPATED IN SAVINGS AND LOAN AUDITS (CIRCLE ONE)

A. TO A LARGE EXTENT  B. ON A LIMITED BASIS  C. NEVER
CENTRAL SAVINGS AND LOAN ASSOCIATION

Central Savings and Loan Association is a stock savings and loan association established in 1958 under state charter. Since 1958 it has expanded to 30 locations throughout the state. Exhibit 1 is an organization chart of the association. Each of the 30 locations has at least one Datapoint terminal which transmits data into the main computer facility located in the main office building.

Employee Compensation

Number of personnel varies by branch depending upon size, but each branch has at least seven employees. Each branch has a branch manager, tellers and counselors; and the larger branches have an operations supervisor who assists the branch manager. For the association, there are 45 salaried employees, 260 hourly employees and from 15 to 35 part-time hourly employees at any given time. Salaried workers are paid on the last day of the month, while all hourly employees are paid every other Friday. Payroll is processed in the main computer facility.

The payroll system is designed so all the basic information on each employee (see Exhibit 2 for master file detail) is maintained on an on-line master payroll file in the main office. Access to this file for both inquiry and update is strictly limited to employees in the payroll department through the use of multiple nine-digit passwords. Branch managers do have the capability to submit personnel and payroll changes through their terminals, but their entries do not update the master file directly. The internal auditor reviews all changes to payroll submitted by the branch managers. Mr. Thompson, the internal auditor, is amazed with how the association has grown in the eight years he has been with the savings and loan. He is trying to get the association to increase the size of his staff from two to five so he can hire auditors with computer experience.

During a pay cycle, changes of the following nature may be made:
1. An employee is hired/terminated
2. A change in salary/pay rate occurs
3. A change in deduction occurs
4. For hourly workers -- when more or less than 40 hours are worked

If none of the preceding conditions exists, an employee will be paid the same amount as the previous pay period. The only exception is in the case of temporary part-time employees. Their pay rate and hours worked must be entered each pay cycle.

Central Savings and Loan Association initiated a direct deposit program in 1981, and to date almost 60 percent of all employees participate. Branch employees must have a checking account with Central in order to participate in the program. Main office
EMPLOYEES MAY HAVE CHECKING ACCOUNTS WITH ANY OF THE FOUR PARTICIPATING BANKS IN THE CITY OR WITH CENTRAL TO PARTICIPATE IN THE DIRECT DEPOSIT PROGRAM. OF ALL THE PARTICIPANTS, ONE-HALF HAVE CHECKING ACCOUNTS WITH CENTRAL. THE DIRECT DEPOSIT OF PAYROLL AMOUNTS IS ACCOMPLISHED BY ELECTRONIC FUND TRANSFER.

**PAYROLL DEPARTMENT**

THE PAYROLL DEPARTMENT IS LOCATED IN THE MAIN OFFICE. THE PAYROLL MANAGER, MRS. AGEE, HAS BEEN IN THAT POSITION FOR ALMOST FOUR YEARS. SHE WORKED HER WAY UP TO THAT POSITION, HAVING HELD OTHER POSITIONS IN THE ASSOCIATION FOR THE PAST TWELVE YEARS. WORKING WITH MRS. AGEE ARE HER TWO ASSISTANTS, CONNIE BELL AND MARK THOMAS. MISS BELL BEGAN WORKING FOR THE ASSOCIATION TWO MONTHS AGO, AND MR. THOMAS HAS BEEN IN HIS POSITION AS PAYROLL CLERK FOR ALMOST ONE YEAR.

DURING THE MONTH, THE PAYROLL DEPARTMENT IS RESPONSIBLE FOR UPDATING THE MASTER PAYROLL FILE FOR ANY CHANGES AFFECTING BOTH MAIN OFFICE AND BRANCH PERSONNEL. ALL INFORMATION IS ENTERED VIA THE TERMINAL LOCATED IN THE PAYROLL DEPARTMENT.\(^7\) THE FOLLOWING TABLE INDICATES THE INFORMATION AND AUTHORIZATION SOURCE FOR MAIN OFFICE EMPLOYEES:

<table>
<thead>
<tr>
<th>AUTHORIZATION CHANGES</th>
<th>PERSONNEL DEPARTMENT</th>
<th>EMPLOYEE</th>
<th>DEPARTMENT HEAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEW EMPLOYEE</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>TERMINATION</td>
<td>X</td>
<td></td>
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<tr>
<td>MORE/LESS THAN 40 HOURS (HOURLY EMPLOYEES ONLY)</td>
<td></td>
<td>X</td>
<td></td>
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<tr>
<td>CHANGE IN DEDUCTION</td>
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</table>

\(^7\) AFTER THE INTERNAL AUDITOR HAS REVIEWED THE PAYROLL INPUT DATA FROM THE BRANCH MANAGERS, HE INITIALS THE SUMMARY SHEET AND SUBMITS IT TO MRS. AGEE.\(^8\) SINCE MRS. AGEE IS USUALLY QUITE BUSY, SHE ACCUMULATES THESE SUMMARY SHEETS FOR SEVERAL DAYS BEFORE SHE ENTERS THE INFORMATION TO UPDATE THE MASTER PAYROLL FILE.\(^9\) MRS. AGEE MUST HAVE AN AUTHORIZATION FORM FROM THE PERSONNEL MANAGER BEFORE ANY CHANGE IN PAY FOR A CURRENT EMPLOYEE OR INFORMATION ON A NEW EMPLOYEE CAN BE ENTERED.\(^1\) A TERMINATION NOTICE IS ALSO SENT FROM THE PERSONNEL DEPARTMENT BUT, DUE TO A STAFF SHORTAGE IN THE PERSONNEL DEPARTMENT, FIVE TERMINATION NOTICES IN THE LAST THREE MONTHS WERE NOT RECEIVED IN TIME. IN ALL FIVE CASES, THE FORMER EMPLOYEES RETURNED THEIR CHECKS.

AUTHORIZATION FOR UPDATING THE MASTER PAYROLL FILE FOR PART-TIME EMPLOYEES IN THE MAIN OFFICE IS IN THE FORM OF A PART-TIME EMPLOYEE DOCUMENT PREPARED AND SENT BY THE PERSONNEL DEPARTMENT. PART-TIME CLASSIFICATION IS FOR EMPLOYEES WHO WORK LESS THAN 40 HOURS PER WEEK FOR A PERIOD OF TIME LESS THAN A YEAR.
All information on part-time employees at the branches is included in the input information sent via terminal by the branch managers.

For a typical pay period, Mrs. Agee and her assistants will enter all the information received from the Personnel Department and the branch managers to update the master payroll file. They work under time constraints since the EDP Department automatically begins processing the payroll at certain times with the assumption that all changes have been made. While Mrs. Agee is entering the data, Mark or Cindy, payroll clerks, will remove the prenumbered checks from the vault and take them to the EDP Department. The Accounting Department takes the signature plate from the vault and an authorized person takes it to the EDP Department. After the payroll is processed, Mark or Cindy pick up any unused or voided checks and take them back to the vault.

Application Controls - Payroll

Access to all on-line applications is limited to personnel with multiple nine-digit passwords. The following controls are present for all entry from terminals, main office and branches:

<table>
<thead>
<tr>
<th>CONTROL</th>
<th>PURPOSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FORMAT CHECK</td>
<td>DATA ENTERED IN PROPER MODE</td>
</tr>
<tr>
<td>2. COMPLETENESS CHECK</td>
<td>DATA IN FIELDS THAT CANNOT BE PROCESSED WITH BLANKS</td>
</tr>
<tr>
<td>3. REASONABLENESS CHECK</td>
<td>NUMBER OF HOURS AND PAY AMOUNT IN LINE</td>
</tr>
<tr>
<td>4. LIMIT CHECK</td>
<td>AMOUNT OF PAY DOES NOT EXCEED SPECIFIED AMOUNT</td>
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<tr>
<td>5. VALIDITY CHECK</td>
<td>EMPLOYEE NUMBER ON PERSONNEL FILE</td>
</tr>
<tr>
<td>6. EDIT ROUTINE</td>
<td>SELF-CHECKING DIGIT ON EMPLOYEE NUMBER</td>
</tr>
</tbody>
</table>

The control total for the payroll transactions entered and the control total from the previous pay period must reconcile to the new payroll master file each pay period or an error code and log is generated. Before any electronic fund transfers can be made or any checks printed, all control totals must balance. If an error situation occurs, Mrs. Agee must review the transaction logs and isolate the error. If the error transaction originated in a branch, Mrs. Agee must contact the branch manager to try and rectify the error.

A listing of all payments by electronic fund transfer is generated each payroll period and reviewed by designated personnel in the Accounting Department. Bank reconciliations are prepared on a timely basis in the Accounting Department and any discrepancies immediately investigated.

A payroll journal report is generated to supply current and year-to-date entries to the general ledger. The journal report indicates the total funds expended by source and by disposition. The report is itemized by department. A copy of this report is for use by the Accounting Department. An additional copy is picked up by a representative of the Accounting Department when all the main office checks are picked up at the EDP Department. When each department's representative comes by the accounting office to pick up their checks, they also receive their copy of the payroll journal report.
PAYROLL checks for the branches are mailed directly from the EDP Department along with the branch copy of their payroll journal report.

The Payroll Department picks up its copy of the payroll journal report and Mrs. Agee reconciles the total amount paid in the payroll period with the control total for the payroll master file. At the present time, the Payroll Department must prepare the required quarterly reports manually. Programs are currently being developed and tested to accumulate the required information by computer.

GENERAL CONTROLS

Central Savings and Loan Association's computer data processing is centralized in the main location. The data center is located on the second floor of the main office building and entry is restricted to authorized personnel. The EDP manager has an open shop philosophy in that EDP is responsible for processing only. Users have the responsibility to initiate proper controls.

All EDP personnel are given basic and refresher training on new and existing applications and are excluded from duties, authorization, and responsibility in other departments. Computer operators may not participate in the programming function, and programmers may not operate equipment. There is an EDP librarian, and the system's software programming function is separated from the applications programming function.

Last year's audited financial statements are presented as Exhibits 3 and 4.

Based on the information given, your judgment of the potential reliance to be placed on the internal accounting controls for the payroll application is ________.

As a final step, go back through the case and rank the information you have circled, with 1 (one) indicating the information you consider to have the most influence on your reliability estimate.
ORGANIZATION CHART

CHAIRMAN OF THE BOARD

PRESIDENT

INTERNAL AUDIT

EXECUTIVE VICE PRESIDENT LOANS

EXECUTIVE VICE PRESIDENT FINANCE

EXECUTIVE VICE PRESIDENT INVESTMENTS

EXECUTIVE VICE PRESIDENT OPERATIONS

EXECUTIVE VICE PRESIDENT HUMAN RESOURCES

ACCOUNTING

EDP

PERSONNEL

PAYROLL

PROGRAMMING

OPERATIONS

SYSTEMS

DATA PREPARATION

COMPUTER OPERATIONS

LIBRARY
PAYROLL MASTER FILE

<table>
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<tr>
<th>Record Code</th>
<th>Employee Number (Social Security Number)</th>
<th>Employee Code (Department/Permanent or Temporary/Hourly or Salary)</th>
<th>Employee Name</th>
<th>Address</th>
<th>Number of Tax Exemptions</th>
<th>Salary or Wage</th>
<th>Overtime Rate</th>
<th>Current Gross Pay</th>
<th>Current Federal Tax</th>
<th>Current State Tax</th>
<th>Current Social Security</th>
<th>Current Voluntary Deductions</th>
<th>Current Net Pay</th>
<th>Current Regular Hours</th>
<th>Current Overtime Hours</th>
<th>Gross Pay Year-to-Date</th>
<th>YTD Federal Tax</th>
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<th>YTD Social Security</th>
<th>YTD Voluntary Deductions</th>
<th>YTD Net Pay</th>
<th>YTD Hours (Regular and Overtime)</th>
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<td>ALL OTHER LOANS</td>
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<td>LOANS AND CONTRACTS MADE TO FACILITATE SALE OF REAL ESTATE</td>
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</tr>
<tr>
<td>STOCK IN FEDERAL HOME LOAN BANK</td>
<td>11,500</td>
<td></td>
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<tr>
<td>CASH ON HAND AND IN BANKS</td>
<td>20,500</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>INVESTMENTS AND SECURITIES</td>
<td>96,000</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FIXED ASSETS (LESS DEPRECIATION)</td>
<td>16,500</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>LAND PURCHASED FOR DEVELOPMENT</td>
<td>10,000</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>INVESTMENT IN SUBSIDIARIES</td>
<td>2,500</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>DEFERRED CHARGES AND OTHER ASSETS</td>
<td>45,000</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TOTAL ASSETS</td>
<td>$1,585,000</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAPITAL AND LIABILITIES</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAVINGS ACCOUNTS</td>
<td>$1,175,000</td>
</tr>
<tr>
<td>ADVANCES FROM FEDERAL HOME LOAN BANK</td>
<td>135,000</td>
</tr>
<tr>
<td>OTHER BORROWED MONEY</td>
<td>140,000</td>
</tr>
<tr>
<td>LOANS IN PROCESS</td>
<td>30,000</td>
</tr>
<tr>
<td>OTHER LIABILITIES</td>
<td>45,000</td>
</tr>
<tr>
<td>SPECIFIC RESERVES</td>
<td>500</td>
</tr>
<tr>
<td>CAPITAL STOCK</td>
<td>700</td>
</tr>
<tr>
<td>PAID-IN SURPLUS</td>
<td>26,000</td>
</tr>
<tr>
<td>GENERAL RESERVES:</td>
<td></td>
</tr>
<tr>
<td>LEGAL RESERVE AND/OR FEDERAL INSURANCE RESERVE</td>
<td>$35,000,000</td>
</tr>
<tr>
<td>OTHER RESERVES</td>
<td>1,000,000</td>
</tr>
<tr>
<td>UNDIVIDED PROFITS</td>
<td>(3,200)</td>
</tr>
<tr>
<td>TOTAL CAPITAL AND LIABILITIES</td>
<td>$1,585,000</td>
</tr>
</tbody>
</table>
## CENTRAL SAVINGS AND LOAN ASSOCIATION

**STATEMENT OF INCOME AND EXPENSE**

**FOR THE YEAR ENDED 12/31/82**

### INCOME

<table>
<thead>
<tr>
<th>Income Description</th>
<th>Amount (000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPERATING INCOME</strong></td>
<td></td>
</tr>
<tr>
<td>Interest on mortgage loans and contracts</td>
<td>$15,400,000</td>
</tr>
<tr>
<td>Discounts on mortgage loans purchased</td>
<td>$315,000</td>
</tr>
<tr>
<td>Interest on mortgage participations</td>
<td>$1,410,000</td>
</tr>
<tr>
<td>Interest on other loans</td>
<td>$770,000</td>
</tr>
<tr>
<td>Interest/dividends on investments and deposits</td>
<td>$2,460,000</td>
</tr>
<tr>
<td>Loan fees</td>
<td>$525,000</td>
</tr>
<tr>
<td>Fees and charges</td>
<td>$415,000</td>
</tr>
<tr>
<td>Miscellaneous operating income</td>
<td>$385,000</td>
</tr>
<tr>
<td><strong>NON-OPERATING INCOME</strong></td>
<td></td>
</tr>
<tr>
<td>Profit on sales of real estate, investments, securities and loans</td>
<td>$990,000</td>
</tr>
<tr>
<td>Miscellaneous non-operating income</td>
<td>$280,000</td>
</tr>
<tr>
<td><strong>TOTAL INCOME</strong></td>
<td>$22,950,000</td>
</tr>
</tbody>
</table>

### EXPENSE

<table>
<thead>
<tr>
<th>Expense Description</th>
<th>Amount (000s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OPERATING EXPENSE</strong></td>
<td></td>
</tr>
<tr>
<td>Directors fees</td>
<td>$32,700</td>
</tr>
<tr>
<td>Officers and employees compensation</td>
<td>$1,125,000</td>
</tr>
<tr>
<td>Pension plan costs</td>
<td>$59,500</td>
</tr>
<tr>
<td>Other employee benefits</td>
<td>$170,200</td>
</tr>
<tr>
<td>Legal expense</td>
<td>$27,300</td>
</tr>
<tr>
<td>Directors, officers and employees expense</td>
<td>$30,100</td>
</tr>
<tr>
<td>Office occupancy expense</td>
<td>$354,000</td>
</tr>
<tr>
<td>Furniture, fixtures, auto expense</td>
<td>$327,900</td>
</tr>
<tr>
<td>Advertising</td>
<td>$220,800</td>
</tr>
<tr>
<td>Commissions paid for savings accounts</td>
<td>$10,300</td>
</tr>
<tr>
<td>Insurance and surety bond premiums</td>
<td>$25,000</td>
</tr>
<tr>
<td>Federal insurance premium</td>
<td>$128,000</td>
</tr>
<tr>
<td>Independent audit expense</td>
<td>$27,900</td>
</tr>
<tr>
<td>Tax and accounting services</td>
<td>$5,400</td>
</tr>
<tr>
<td>Supervisory examinations</td>
<td>$9,300</td>
</tr>
<tr>
<td>Consultant and management fees</td>
<td>$22,900</td>
</tr>
<tr>
<td>Loan expenses</td>
<td>$41,100</td>
</tr>
<tr>
<td>Contributions</td>
<td>$6,000</td>
</tr>
<tr>
<td>Service fees on loans purchased</td>
<td>$13,500</td>
</tr>
<tr>
<td>Expense on real estate held for development</td>
<td>$9,800</td>
</tr>
<tr>
<td>Real estate owned expense</td>
<td>$28,500</td>
</tr>
<tr>
<td>Other operating expenses</td>
<td>$384,000</td>
</tr>
<tr>
<td><strong>DIVIDEND/INTEREST CHARGES</strong></td>
<td></td>
</tr>
<tr>
<td>Deposit accounts</td>
<td>$17,750,000</td>
</tr>
<tr>
<td>Borrowed money</td>
<td>$3,530,000</td>
</tr>
<tr>
<td><strong>NON-OPERATING EXPENSES</strong></td>
<td></td>
</tr>
<tr>
<td>Provision for losses on real estate, investments and loans</td>
<td>$251,000</td>
</tr>
<tr>
<td>Other non-operating expenses</td>
<td>$120,300</td>
</tr>
<tr>
<td>Income taxes</td>
<td>$(484,200)</td>
</tr>
<tr>
<td><strong>TOTAL EXPENSES</strong></td>
<td>$24,226,900</td>
</tr>
<tr>
<td><strong>NET INCOME (LOSS)</strong></td>
<td>$(1,276,000)</td>
</tr>
</tbody>
</table>
APPENDIX C

CUES CONSIDERED RELEVANT BY THE PARTICIPANTS

X1 The payroll system is designed so all the basic information on each employee is maintained on an on-line master payroll file in the main office.

X2 Access to this file for both inquiry and update is strictly limited to employees in the payroll department through the use of multiple nine-digit passwords.

X3 Branch managers do have the capability to submit personnel and payroll changes through their terminals, but their entries do not update the master file directly.

X4 The internal auditor reviews all changes to payroll submitted by the branch managers.

X5 If none of the preceding conditions (an employee is hired/terminated; a change in salary/pay occurs; a change in deduction occurs; or more or less than 40 hours are worked by the hourly workers) exists, an employee will be paid the same amount as the previous pay period.

X6 The following indicates the information and authorization source for main office employees:
<table>
<thead>
<tr>
<th>Authorization Changes</th>
<th>Personnel Department</th>
<th>Employee</th>
<th>Department Head</th>
</tr>
</thead>
<tbody>
<tr>
<td>New employee</td>
<td>X</td>
<td>.</td>
<td>X</td>
</tr>
<tr>
<td>Termination</td>
<td>X</td>
<td>.</td>
<td>X</td>
</tr>
<tr>
<td>More/Less 40 Hours</td>
<td>.</td>
<td>.</td>
<td>X</td>
</tr>
<tr>
<td>Change in deduction</td>
<td>.</td>
<td>X</td>
<td>.</td>
</tr>
</tbody>
</table>

X7 After the internal auditor has reviewed the payroll input data from the branch managers, he initials the summary sheet and submits it to Mrs. Agee.

X8 Since Mrs. Agee is usually quite busy, she accumulates these summary sheets for several days before she enters the information to update the master payroll file.

X9 Mrs. Agee must have an authorization form from the personnel manager before any change in pay for a current employee or information on a new employee can be entered.

X10 A termination notice is also sent from the personnel department, but, due to a staff shortage in the personnel department, five termination notices in the last three months were not received in time.

X11 They (Mrs. Agee and her assistants) work under time constraints since the EDP department automatically begins processing the payroll at certain times with the assumption that all changes have been made.
While Mrs. Agee is entering the data, Mark or Cindy, payroll clerks, will remove the prenumbered checks from the vault and take them to the EDP department.

The following controls are present for all entry from terminals, main office and branches:

<table>
<thead>
<tr>
<th>Control</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Format Check</td>
<td>Data entered in proper mode.</td>
</tr>
<tr>
<td>2. Completeness check</td>
<td>Data in fields that cannot be processed with blanks.</td>
</tr>
<tr>
<td>3. Reasonableness check</td>
<td>Number of hours and pay amount in line.</td>
</tr>
<tr>
<td>4. Limit check</td>
<td>Amount of pay does not exceed specified amount.</td>
</tr>
<tr>
<td>5. Validity check</td>
<td>Employee number on personnel file.</td>
</tr>
<tr>
<td>6. Edit routine</td>
<td>Self-checking digit on employee number.</td>
</tr>
</tbody>
</table>

The control total for the payroll transactions entered and the control total from the previous pay period must reconcile to the new payroll master file each pay period or an error code and log is generated.

Bank reconciliations are prepared on a timely basis in the accounting department, and any discrepancies are immediately investigated.

Payroll checks for the branches are mailed directly from the EDP department along with the branch copy of their payroll journal report.
The payroll department picks up its copy of the payroll journal report, and Mrs. Agee reconciles the total amount paid in the payroll period with the control total for the payroll master file.

The data center is located on the second floor of the main office building, and entry is restricted to authorized personnel.

The EDP manager has an open shop philosophy in that EDP is responsible for processing only.

All EDP personnel are given basic and refresher training on new and existing applications and are excluded from duties, authorization, and responsibility in other departments.

Computer operators may not participate in the programming function, and programmers may not operate equipment.
BIBLIOGRAPHY

Books


**Articles**


Publications of Professional Organizations


Symposiums


Unpublished Materials
