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An empirical examination of materiality by factor analysis and cognitive mapping of user and preparer groups

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**AN EMPIRICAL EXAMINATION OF MATERIALITY BY
FACTOR ANALYSIS AND COGNITIVE MAPPING
OF USER AND PREPARER GROUPS**

by

Treba Lilley Marsh, B.B.A., M.B.A., C.P.A.

**A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Business Administration**

**COLLEGE OF ADMINISTRATION AND BUSINESS
LOUISIANA TECH UNIVERSITY**

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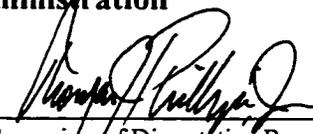
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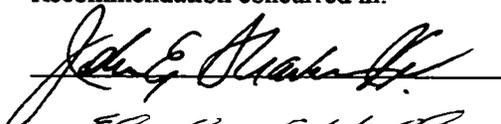
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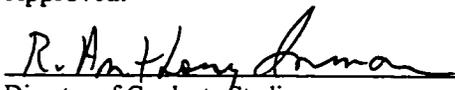

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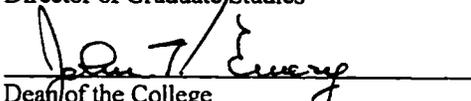
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ABSTRACT

This research primarily has attempted to determine if user-decision perspective (banker) and preparer perspective (CPA) differed in their materiality decisions and materiality cognitive processes. As its second objective the research has sought to determine the factors used in materiality judgments.

The researcher collected the data for the study while attending graduate and undergraduate classes of the American Banking Association's National Commercial Lending School and a training session of a Big Six accounting firm. Factor analysis of the data determined the underlying dimensions of materiality decisions. The accountants identified three relevant sets of factors: ratios, sensitive areas, and unrecorded items; the bankers identified absolute dollar amounts, ratios, and characteristics of the event. The results of factor analyses agreed with prior observations by the FASB and others that materiality has both qualitative and quantitative dimensions.

MANOVA compared the materiality decisions of CPAs with those of bankers. Profession had a very significant effect on materiality decisions, while experience proved only marginally significant. With only one exception, bankers assigned more materiality to each decision than did accountants, and those with more experience considered every case more material than did those with lower experience levels.

This study included an exploratory research effort to explain how the materiality cognitive processes of users differed from those of preparers. The participants provided conceptual maps (spatial representations of the organization of central ideas) of their materiality cognitive process.

MANOVA compared the materiality cognitive process of CPAs with that of bankers. Profession had a significant effect on the materiality cognitive process, while experience did not have a significant effect.

In general, accountants had larger, more developed, and more categorized cognitive maps for materiality decisions than did the bankers. Accountants emphasized those items relating to the business environment and the event or judgment, while bankers emphasized those items concerned with the firm, accounting system, and source of information.

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CHAPTER 1

INTRODUCTION

Materiality judgments have created some of the most frequent and intractable difficulties in the process of applying financial accounting principles. While most other problems in financial reporting have affected only part of the process, materiality has touched every facet of the financial statements. The concept of materiality has influenced decisions regarding the collection, classification, measurement, and summarization of data pertaining to an entity's economic activities. Materiality has also affected decisions concerning data presentation and related disclosures in financial statements.

The concept of materiality has permeated the judgmental auditing process; it has influenced both planning and executing the audit, as well as evaluating the evidence gathered. Materiality has affected decisions relating to matters such as consistency, classification, valuation, and disclosure in financial statements. Those materiality decisions have greatly influenced resource allocations and expenditures of time and money. They have influenced investor and creditor decisions, and they have affected legal and financial responsibilities. In the absence of profession-imposed

guidelines, auditors have based their materiality decisions on their experience and expertise.

Nature of the Problem

The accounting profession has long recognized the importance of the materiality concept. Materiality first appeared in the professional literature by the Committee on Accounting Procedure of the AICPA in its first Accounting Research Bulletin issued in 1939.

The Financial Accounting Standards Board (FASB) assigned a high priority to the topic of materiality and addressed it as one of the original seven agenda issues in 1973. The FASB provided a description of the materiality concept's place in accounting in Discussion Memorandum, Criteria for Determining Materiality (1975 p.3) with the following statement:

The concept of materiality pervades the financial accounting and reporting process. It influences decisions regarding the collection, classification, measurement, and summarization of data concerning the results of an enterprise's economic activities. It also bears on decisions concerning the presentation of that data and the related disclosures in financial statements. As applied by preparers and auditors, the concept of materiality is generally understood ultimately to involve determination of the importance of a matter for financial reporting purposes. While numerous factors are often considered in making materiality decisions affecting financial reporting, many of these decisions appear to be intuitive.

The FASB's objective noted in Discussion Memorandum, Criteria for Determining Materiality (1975 p. 8) was to:

. . . establish materiality criteria, the application of which will result in consistent financial reporting of matters necessary for an understanding of an enterprise's financial activities. It is the Board's intention that the criteria be

capable of practical application to various types of items in varying circumstances.

However, in 1980 the FASB removed the materiality topic from its work agenda.

Definitions of Materiality

Webster's Third New International Dictionary defined materiality as being synonymous with relevant. Hicks (1964, p. 158) defined materiality as "if it doesn't really matter, don't bother with it."

Kohler (1975) in A Dictionary for Accountants defined materiality as:

The relative importance, when measured against a standard of comparison, of any item included in or omitted from books of account or financial statements, or of any procedure or change that conveniently might affect such statements. . . . The characteristic attaching to a statement, fact, or item whereby its disclosure or the method of giving it expression would be likely to influence the judgment of a reasonable person.

The Securities and Exchange Commission (SEC), state and federal courts, and the FASB all have had influential roles in defining the materiality concept.

The SEC's definition of materiality appeared in its Regulation S-X (Rule 1-02) which states:

The term "material," when used to qualify a requirement for the furnishing of information as to any subject, limits the information required to those matters about which an average prudent investor ought reasonably to be informed.

This definition placed the burden of determining materiality on the individual accountant. It provided little guidance or assistance in the determination of "material" omissions or misstatements in accounting information.

The courts, also, have participated in defining the materiality concept by determining materiality in specific cases and implying generalizability to a larger population. The Supreme Court in the TSC Industries v. Northway case in 1976 defined materiality as follows:

An omitted fact is material if there is a substantial likelihood that a reasonable shareholder would consider it important in deciding how to vote. . . . It does not require proof of a substantial likelihood that disclosure of the omitted fact would have caused the reasonable investor to change his vote (Bean and Thomas, 1990, p. 117).

The judiciary have proposed numerous other definitions of materiality. However, their suggestions have often conflicted with other definitions of materiality. Bean and Thomas (1990, p. 121) suggested a judicial test for materiality. They asked "would the average reasonable (or speculative) investor (or layman) consider important (or be influenced by) this information in determining his course of action."

Financial accountants and auditors have used the FASB's definition of materiality--as stated in Accounting Concept Statement No. 2--in the preparation and analysis of financial statements. That statement defined an item as material when:

the magnitude of an omission or misstatement of accounting information that in light of surrounding circumstances, makes it probable that the judgment of a reasonable person relying on the information would have been changed or influenced by the omission or misstatement (FASB, 1980).

The Auditing Standards Board examined the materiality concept in its Statement of Auditing Standard No. 47. That statement, entitled Audit Risk and Materiality in Conducting an Audit and issued in 1983, stated:

The concept of materiality recognizes that some matters, either individually or in the aggregate, are important for fair presentation of financial statements in

conformity with generally accepted accounting principles, while other matters are not important. The phrase "present fairly in conformity with generally accepted accounting principles" implicitly indicates the auditor's belief that the financial statements taken as a whole are not materially misstated

The auditor's consideration of materiality is a matter of professional judgment and is influenced by his perception of the needs of a reasonable person who will rely on the financial statements. The perceived needs of a reasonable person are recognized in the discussion of materiality in Financial Accounting Standards Board Statement of Financial Accounting Concept No. 2, Qualitative Characteristics of Accounting information (AICPA, 1986, p. 231-237).

The definitions of materiality by the SEC, the Supreme Court, and the FASB bore many similarities. They approached the materiality concept from the viewpoint that the accountant who produces the financial statements must determine whether knowledge of the omission or misstatement would have changed the user's decisions or actions.

The FASB has recognized the need to provide more specific guidance in determining materiality levels. However, it has not developed a consensus on overall standards because of the difficulty of taking into account all possible circumstances. As a result of this inability to establish general standards, the profession has continued to rely upon the individual auditor's professional judgment "to play the primary and exclusive role in determining materiality standards in the U.S." (Reckers et al., 1984, p. 22).

The FASB's Discussion Memorandum on the Criteria for Determining Materiality classified the quantitative and qualitative factors considered in materiality judgments into five groups: (1) determinant factors, (2) modifying factors,

(3) characteristics of the firm, (4) characteristics of the event or judgment item, and (5) characteristics of the accounting system or policies in use (Chong, 1992). While the board has not researched all the possible factors that could bear on materiality decisions, it has addressed many of them.

Accountants have encountered great difficulty in determining what quantitative and qualitative factors determined materiality so that they could apply that concept consistently across circumstances. Preparers and auditors have applied materiality through their professional judgments. Innumerable factors, often described in vague and imprecise language, have determined these judgments.

Pattillo and Siebel (1974) attempted to identify the various factors used in materiality judgment. Moriarity and Barron (1979) tried to analyze the relationship of these factors in the materiality decision, and Ward (1976) sought to determine differences in factor importance among situations and auditors. Boatsman and Robertson, (1974) created an empirical model, and Steinbart (1987) developed an expert system in an effort to provide assistance in understanding the materiality judgment process. Nevertheless, no one has yet succeeded in fully explaining the nature of the processes involved in accountants' materiality judgments for financial reporting. Not understanding the key ideas used in materiality judgments has led to a lack of consensus among CPAs and users (Reckers et al., 1984).

Statement of the Problem

The research problem addressed in this study was the lack of a good and consistent definition of materiality and the lack of understanding the cognitive process of financial statement users or preparers.

Research Objectives

This research has attempted to acquire an understanding of materiality decisions from the user-banker perspective and preparer (CPA) perspective. Primarily, this research has sought to determine if users and preparers differed in their concept of materiality. As its second objective, this research has attempted to determine the factors used in materiality judgments.

Significance of the Study

This study differed from other studies on materiality in that it attempted to determine how the concept of materiality differed between users and preparers. In addition, exploratory research efforts in this study sought to explain how the materiality decision cognitive process of users differed from that of preparers. This study employed concept (or cognitive) maps developed by two sets of participants; no previous research had used concept maps in the area of materiality.

T. H. Anderson and his colleagues developed concept mapping in 1978. They originally developed mapping as an education tool; they used the procedure to help learners process information in a way congruous with popular theories of knowledge representation. For example, one simulation involved learning fragments of English

with meanings not assigned to the terms, but rather induced from the context. They and others used cognitive maps to aid in organizing and processing the meanings of the English fragments.

Research Plan

This study accomplished its objectives through statistical analysis of the data. Tests of proportions and analyses of variance determined statistical relationships and tested for significant differences.

The researcher had a particular interest in determining differences in materiality concepts of users and preparers. The data used in determining asymmetry of materiality decisions was derived from vignettes completed by bankers and CPAs. The same data served in factor analysis.

Conceptual maps served in an exploratory research effort to explain how or why the materiality decision cognitive process of users differed from that of preparers. The data--concept maps which individuals used in making materiality decisions--originated in a subset of the sample. The individual CPA concept maps came from a Big Six firm training program. Attendees of two American Banking Association Lending Schools held in the fall and winter of 1995 furnished the individual concept maps of the bankers.

Each participant recorded what constituted his or her idea of the materiality concept on a concept map. The researcher had a particular interest in the categories, mean number, earliest, first-order associations, and depth of the nodes. The study

classified the concept map data into seven categories: (1) determinant factors, (2) characteristics of the environments, (3) characteristics of the firm, (4) characteristics of the event or judgment item, (5) characteristics of the accounting system or policies in use, (6) miscellaneous, and (7) source of the information. As suggested by Pattillo, Morris and Nichols (1983) and Chong (1992), these categories paralleled, in part, the presentation in Appendix B of the FASB's Discussion Memorandum "Criteria for Determining Materiality" (1975). The researcher counted the nodes to determine the number in each individual materiality concept map. In addition, the participants numbered their nodes to allow the researcher to determine each one's earliest node. First-order associations represented nodes directly connected to materiality. Some of the thoughts on materiality may have led to other subsets resulting in a depth or subset of the nodes.

Definition of Terms

Larkin et al. (1980, p. 1336) defined a **chunk** as any stimulus that has become familiar from previous repeated exposure and therefore recognizable as a single unit.

Concept maps provide a general framework that helps one to organize and remember the information relevant to a knowledge domain. Concepts maps help to separate major and subsidiary ideas on a topic to aid in decision making.

The word **map** suggests that information is represented in such a way that its arrangement on the page "reveals something about the structure of interrelationships

inherent in that information" (Horn, 1985, p. 182). **Mapmaking** involves a search for explanations.

Concept maps spatially represent the organization of central ideas. These maps often serve in cognitive psychology. The maps represent the knowledge that subjects themselves use in making decisions. The use of conceptual maps should add depth to the knowledge and understanding of materiality decisions.

Concept maps of materiality decisions may narrow the gap between perception and actual behavior. These maps should provide valuable information about the factors involved in materiality decisions, the depths of these factors, and when these factors enter the decisions.

Mechanistic firms (structured) emphasize standard operating procedures, structured channels of communication, formalized decision-making processes and highly formalized authority structure. In contrast, **organic** firms (unstructured) emphasize delegating more judgmental decisions to those members most responsive to the problem (Carpenter et al., 1994, p. 357).

In concept mapping, **nodes** represent key ideas, concepts, or events (Bougon and Komocar, 1990, p. 144). These nodes may develop internally or externally with some unique to individuals and others common to several persons. Participants, not researchers or theory, define nodes.

Pathways or relationships--positive, negative, or neutral--link the nodes (Lord et al., 1994, p. 660).

"A **schema** is a cognitive structure that consists in part of the representation of some defined stimulus domain" (Choo, 1989, p. 111). Schemas (patterns) provide knowledge structures that index and categorize objects and events quickly, define a set of expectations, and suggest appropriate responses. Many of these schema are the stored results of likely scenarios derived from experience.

Organization of Chapters

Chapter 2 consists of a review of previous literature, including a detailed review of materiality judgment literature and an overview of research related to experience and conceptual mapping. Chapter 3 discusses the research methodology employed and Chapter 4 presents the experimental findings. Chapter 5 presents the summary, results, conclusions, and recommendations of this study.

CHAPTER 2

REVIEW OF LITERATURE

This chapter presents an overview and review of the literature related to the three primary components involved in this research: materiality, experience, and concept maps.

Materiality

So far, accountants have had difficulty in determining what quantitative and qualitative factors determine materiality. Once they make that determination, they can work toward applying materiality consistently across circumstances.

Factors Used in Materiality Judgment

Questionnaire Studies. Woolsey (1954a, 1954b, 1973) conducted some of the first field studies of materiality decision making. As his objective, Woolsey sought to identify the quantitative factor having the greatest influence on the materiality decision. Woolsey concluded that the relationship between the amount of an item and a specified base amount, such as net income, should exert a primary influence on a materiality decision. Dyer (1975) conducted a study that mainly updated Woolsey's research. Again, the event's relationship to net income emerged as

the most relevant factor, though in Dyer's study materiality levels had decreased to a lower percentage of current income. In a study sponsored by the Financial Executives Research Foundation, Pattillo and Siebel (1974) endeavored to discover the factors most important to the materiality judgment process. The Pattillo study concluded that "different types of accounting areas require different materiality thresholds" (1976, p. 12) and that the criteria applied by users generally differed from those employed by preparers.

The studies that used questionnaires as the method of data collection based the results on observation and not statistical analysis (Holstrum and Messier, 1982). This constituted a major weakness; in addition, the participants indicated the significance of the various factors in the materiality decision. Slovic (1969) analyzed the results of studies examining individuals' insights into their decision making; that analysis indicated that individuals tended to overemphasize the unimportant factors used in their decision making and underemphasize the important factors.

Examination of Financial Statements. Frishkoff (1970) examined annual reports in an attempt to identify the variables that determined the materiality of accounting changes. Frishkoff found that the following variables--in decreasing order of significance--influenced the auditor's opinion: (1) the effect of the change on net income, (2) the size (net worth) of the reporting company, and (3) whether the change represented a financial statement reclassification.

Other researchers (Bernstein, 1967; and Neumann, 1968) examined corporate financial statements in search of criteria used in materiality decision making. These

studies failed to uncover any pattern that would indicate the existence of consistent quantitative criteria for materiality judgments.

To provide evidence on how auditors interpreted the materiality concept Chewning, Pany, and Wheeler (1989) used audit reports of companies that had changed accounting principles. The study's results indicated consistency modifications at much lower income effect levels (4%) than those suggested in the existing laboratory and questionnaire research. Consistent with Messier's (1983) findings, Big Eight partners had higher materiality thresholds than their Non-Big Eight counterparts.

Hofstedt and Hughes (1977) mentioned two of the weaknesses of attempting to judge materiality directly on the basis of published financial statements. First, many factors in addition to materiality could have affected adjustment and disclosure decisions made in preparing financial statements; the researchers did not have the ability to control for other possible effects, and this may have led to the inconclusive results of those studies. Secondly, the results of those studies did little to reveal the process leading to the decision; this could have provided more information than simply the development of rules or standards for use in decision making.

Rose, Beaver, Becker and Sorter (1970) used a laboratory study of students to examine whether a certain percentage of change in earnings per share constituted materiality. The results indicated that a change of about 6.5% resulted in a difference in perceived materiality. Abdel-Khalik (1977) used sensitivity analysis to examine the materiality decisions of five portfolio managers in classifying the market volatility of

common stocks and to determine their decision rules. The results indicated that changes in earnings per share of 20% or greater resulted in a different classification of the stock; however, the managers did not classify a change of 10% or less as material. These findings illustrated some of the difficulties in attempting to generalize such materiality decision factors since the task under examination may have affected changes in mechanical decision rules.

Friedberg, Strawser, and Cassidy (1989) surveyed the audit manuals of "Big Eight" accounting firms in an effort to gain insight into the guidance provided to practicing auditors. Those manuals often mentioned the relationship of a misstatement and its effect on the earnings trend as the factors for auditors to consider in making materiality decisions.

Differences in Factor Importance

Ward (1976) used the Q-sort technique in examining the relative importance of 20 factors to the materiality judgments of individual auditors and between firms of auditors. The item dealing with professional standards ranked first. Ward found professional auditors in significant agreement about the relative importance of various factors considered when making materiality judgments. He also found significant agreement among practitioners in various firms about the relative significance of these factors. However, he also argued that emphasis "must be paid as well to the manner in which individual practitioners relate such factors to their individual perceptions about the uncertain economic consequences of materiality judgements" (1976, p. 152).

Pany and Wheeler (1989) found that--depending upon the method and the industry--sizable differences can occur among the various rules of thumb for calculating materiality.

Relationship of Factors to Materiality Judgments

Boatsman and Robertson (1974) examined the process of materiality judgment formulation in terms of a probabilistic model. These authors found that the relationship of the item to current year net income contributed 73% of the total predictive power. However, the authors concluded that "subjects were in partial disagreement regarding normative standards for materiality" (1974, p. 349). Boatsman and Robertson found no differences in the judgmental processes of CPAs and securities analysts regarding materiality. Libby (1981, p. 137) cautioned that "the lack of power of the statistical tests caused by small sample size may have produced this result."

Firth (1979) conducted an experiment to study and compare the materiality-disclosure judgments of 150 subjects. The sample represented five different groups: professional accountants from three of the Big Eight accounting firms in the United Kingdom, chief accountants in commercial firms, chief accountants in industrial firms, investment analysts, and bank lending officers. Firth presented thirty cases, each with extraordinary items, to the subjects. The results indicated significant differences both between groups and within groups. The users (analysts and lenders) judged disclosure as necessary in the largest number of cases. The chief accountants in industrial and

commercial firms proved least likely to separately disclose extraordinary items. Firth isolated the relationship of the extraordinary item to income before the item as the most important factor in the decision.

Materiality in Audit Judgments

Using cardinal utility theory to assess accountants' attitudes toward risk, Newton (1977) conducted an experiment to determine the role of uncertainty in materiality decision. The study classified 55% of the audit participating partners as risk-averse and 34% as risk-seeking. The audit partners employed a decision process which incorporated the probability that the event would occur. The study results indicated that "the accountants tested were found to react adversely to uncertainty in materiality decisions" (1977, p.97).

Mayper (1982) found evidence that individual differences emerged both in the choice of factors used by auditors to rank materiality of internal accounting control weaknesses and in their materiality thresholds. The study found a moderate degree of consensus (.45) among subjects overall and between firms. A second study by Mayper, Doucet and Warren (1989) found consistent evidence.

Morris and Nichols (1988) found a positive association between audit judgment consensus and the degree of structure in the audit firm. They observed differences between the Big Eight firms, but the materiality decisions of structured CPA firms modeled more successfully. Carpenter and Dirsmith (1992) suggested that the

auditors' own motivations, including the desire for autonomy, play a potentially important role in shaping their judgments, and that those who see structure materiality guidance as a threat to their own autonomy tend to exercise more audit scrutiny in the form of forming stricter materiality judgments (1992, p. 732).

Carpenter, Dirsmith and Gupta (1994) used early debt extinguishments as the subject for their study. They found empirical support for firms' audit culture (mechanistic versus organic orientations) influencing members' materiality judgments. Additionally, the level of experience expressed in ranks as members of a hierarchical organization amplified the effect of firm culture.

Expert System

Steinbart (1987) investigated how different quantitative and qualitative information influenced planning-stage materiality judgments. For this descriptive research, he developed a rule-based expert system (AUDITPLANNER) which made use of if-then rules. McEacharn (1994) modified this system to include additional variables and permit varying degrees of attribute importance by the auditor via fuzzy logic.

Lack of Consensus

Morarity and Barron (1976) investigated whether the lack of consensus in materiality judgment models resulted from the scaling techniques of auditors or the basic decision model form. They chose three variables--net income, earnings trend, and firm size--based on a literature review; they varied these variables factorially in their experiment. The project asked participants to rank order eighteen sets of

financial statements in terms of the materiality of a potential adjustment. Conjoint analysis determined the apparent functional form of the model used by each participant. The results provided evidence of differences in auditor decision models and scaling techniques. Although the results indicated the income factor as the dominant cue for every participant, they failed to produce agreement on the importance of the other factors.

Morarity and Barron (1979) failed to develop a consensus on either the materiality decisions or the relative weights assigned to the five financial variables. Additionally, Hofstede and Hughes (1977) found little consistency from judgment to judgment.

The results of a study by Wright and Taylor (1982) indicated differences between materiality guidelines used in actual practice and those mentioned by CPAs in personal comments. In other words, auditors had difficulty applying their own standards consistently.

Jennings, Kneer, and Reckers (1987) conducted a study of CPAs, judges, corporate attorneys, bank loan officers, Chartered Financial Analysts, and credit managers. They asked the subjects to determine the amount they considered material for various situations such as obsolete inventory, inventory loss, lawsuit, bribe, discontinued product line, and an extraordinary item. The results indicated that the materiality of an item depended upon the context. The lack of consensus found among the various groups supported their previous findings (Jennings, Reckers and Kneer, 1985).

Jennings, Kneer and Reckers (1991) studied attitudes of CPAs, judges, and attorneys about materiality and disclosure. The results of their study showed significant differences.

In an effort to explain inconsistency in materiality judgments, Estes and Reames (1988) examined the effects of personal characteristics on materiality decisions and confidence in those decisions. The findings indicated that external auditing with a public accounting firm and frequency of materiality decisions significantly increased confidence in materiality decisions. They showed no significant education influence. Employment in public accounting and age (older) proved significant in materiality decisions.

A recent study by Raman and Van Daniker (1994) found a lack of consensus among government auditors on an appropriate base for calculating materiality in conducting audits. Use of more than a dozen sliding materiality scales in practice resulted in nonuniformity in practice.

The results of these comparative studies suggested the possibility of significant differences between the materiality judgments of users, auditors, and preparers. These results suggested a lack of symmetry between the materiality decisions of auditors (and preparers) and materiality decisions of users. Since users appeared to have a lower materiality threshold than auditors and preparers, the decision process may not have adequately fulfilled user's needs. In addition, the results suggested a lack of consensus among user groups.

Summary

Table 2.1 provides a summary of materiality research findings. Table 2.2 summarizes materiality thresholds derived from prior research.

As noted by Pattillo and Siebel (1974, p. 44) "probably the biggest puzzle in the materiality dilemma is how the individual and interrelated factors affect the materiality judgments." This research sought to determine what factors entered the materiality judgment and when these factors entered the decision, as well as the depth of elaboration of these factors.

Table 2.1

Materiality

Author(s)	Study Objective	Results
Woolsey, 1954	To identify qualitative factor having greatest influence on materiality decision.	Relationship between amount of item and specified base, such as net income, should be primary factor.
Berstein, 1967 Neumann., 1968	To examine corporate financial statements to identify criteria used in materiality decision making.	Failed to identify any consistent quantitative criteria.
Frishkoff, 1970	To identify from annual reports variables that determine whether a change in accounting was material.	Factors identified: 1. effect of change on net income 2. size of reporting company 3. financial statement reclassification.
Rose, et al., 1970	To examine whether a laboratory study of students considered a certain percentage of change material.	A change of about 6.5% resulted in a difference in perceived materiality.
Boatsman & Robertson, 1974	To examine process of materiality judgment formulation in terms of probabilistic model.	Relationship of item to current year net income contributed 73% of total predictive power.
Pattillo & Siebel, 1974	To discover factors most important to materiality judgment process.	Different types of accounting areas require different materiality thresholds. Criteria of users and preparers differ.
Dyer, 1975	To update Woolsey's research.	Most relative factor was relationship to net income, materiality levels decreased to lower percentage.

Table 2.1 (continued)

Author(s)	Study Objective	Results
Moriarty & Barron, 1976	To determine materiality judgment model used by participants (conjoint analysis)	Income factor was dominant cue, disagreement on importance of other factors.
Ward, 1976	To examine relative importance of 20 factors to materiality decisions (Q-sort technique).	Found significant agreement about relative importance of factors.
Abdel-khalik, 1977	To examine materiality decisions of 5 portfolio managers in classifying market volatility of common stocks (sensitivity analysis).	Illustrates changes in mechanical decision rules may be affected by the task being examined.
Firth, 1979	To study and compare materiality/disclosure judgments among 5 different groups.	Significant differences both between and within groups.
Wright & Taylor, 1982	To study members of Big 8 CPA firms in three cities to discover materiality procedures being applied in practice.	Found differences in materiality guidelines used in actual practice and those mentioned by CPAs in personal comments.
Jennings, et al., 1987	To determine materiality thresholds on six items.	Materiality dependent on context. Lack of consensus among groups.
Estes & Reames, 1988	To examine effect of personal characteristics on materiality decisions and confidence in decisions.	Confidence increased by frequency of decision and external auditing.
Morris & Nichols, 1988	To examine aspects of auditor materiality judgments.	Positive association between audit judgment consensus and degree of audit firm structure.
Chewning, et al., 1989	To use audit reports of companies that have changed accounting principles to provide evidence of how auditors interpret materiality.	Consistency modifications issued at 4% income effect level. Big 8 partners have higher materiality thresholds.
Friedberg, et al., 1989	To survey audit manuals of Big Eight accounting firms to gain insight to guidance provided.	Effect/relationship of misstatement on earnings trend to be considered in making materiality decisions.
Pany & Wheeler, 1989	To test various rules of thumb for calculating materiality.	Found sizable differences depending on method and industry.
Jennings, et al., 1991	To survey judges, attorneys and CPAs with large accounting firm experience.	Significant differences between CPAs, judges, and attorneys about materiality and disclosure.
Carpenter & Dirsmith, 1992	To examine relationship between materiality judgments and the size and nature of early debt extinguishment, client earnings trend, and experience of auditor.	Auditors' own motivations are important in shaping judgments.
Carpenter, et al., 1994	To use early debt extinguishments as subject.	Firms' audit culture influences its members materiality judgments.
Raman & Van Daniker, 1994	To examine government auditors' base for calculating materiality.	Found more than a dozen sliding materiality scales used in practice.

Table 2.2

Materiality Thresholds*

Author(s)	Item Studies	Finding
Neumann, 1968	Change to accelerated depreciation Change in account for investment tax credit	No disclosure by two-thirds of the firms known to have changed. Most opinions qualified when the income effect was between 5% and 10%.
Carmichael, 1969	Discuss cumulative materiality guide	Profit and loss items and/or balance sheet items material if 0.5-5% of gross profit
Frishkoff, 1970	Miscellaneous accounting changes	Cutoff point between modified and unqualified reports was 25% of net income
Rose, et al., 1970	EPS and stock price	Material if EPS changed by more than 6.5%
Woolsey, 1973	Error in determining costs	Effect on income was most important; the average material (immaterial) error was 5.8% (4%) of net income
Boatsman & Robertson, 1974	Gains and losses, accounting changes and uncertainties	Effect on income was most important; subjects recommended disclosure of income effects greater than 4% of current net income
Bremser, 1975	Miscellaneous discretionary accounting changes	Firms making discretionary accounting changes had poorer EPS and ROI patterns than firms disclosing no accounting changes
Moriarity & Barron, 1976	Change in useful life of equipment	Effect on income was most important cue (presented at 5%, 10%, and 20% of income)
Firth, 1980	Miscellaneous uncertainty qualifications	Firms reporting decreasing EPS and share prices received more uncertainty qualifications
Bates, Ingram, & Reckers, 1982	Lawsuit contingency	Effect on income was most important with materiality thresholds ranging from 19% to 41% of net income
Messier, 1983	Inventory writedown	Few partners believed writedowns between 3% and 5% were material
Krogstad, Ettenson, & Shanteau, 1984	Allowance for doubtful accounts	Effect on income was the most important cue (presented at 2.7% and 7.3% of net income)
Chewning, et al., 1989	Audit reports	Modifications issued at 4% of net income

*Parts of table reproduced from Chewning, Pany, and Wheeler (1989), p. 83.

Experience

Experience-based knowledge often provides the structure within which accountants make decisions. Such structure also provides the framework within which the learning process occurs.

Definition

This study treats experience as longevity in a certain position or in performing a particular task. Bedard (1989) defines expertise in terms of knowledge acquired through direct experience (past judgments and feedbacks) and an indirect education process. Knowledge separates into two groups: public knowledge consists of facts and theories found in journals and textbooks; private knowledge comes from an individual's experience, and it includes heuristics and rules of thumb (Colbert, 1989). Johnson (1988) defines expertise as "the possession of a large body of knowledge and procedural skills." Cognitive psychology literature suggests that the quality of decisions improves with experience.

Business, Accounting and Auditing Studies

Messier (1983) used a lens model to examine the effect of experience and firm type on materiality/ disclosure judgments. Messier asked twenty-nine audit partners from both Big Eight and non-Big Eight firms to determine (1) the materiality of a \$1,000,000 inventory write-down and (2) the probability that the accountant should disclose the write-down in the income statement. The results indicated that they

assigned the greatest importance to net income. Messier found that "less experienced partners had lower materiality and disclosure thresholds than more-experienced partners" (1983, p. 615). In contrast, Carpenter and Dirsmith (1992) found that experienced individuals exhibited stricter materiality standards (lower materiality thresholds) for early debt extinguishment transactions than did less experienced individuals.

Krogstad, Ettenson, and Shanteau (1984) conducted an experimental study of the effect of context and experience on auditors' materiality judgments. The results of this study confirmed the findings of previous studies; auditors used the effect on income as the most important factor and the effect on earnings trend as the second most important. In addition, auditors used "contextual (nonfinancial) information in making the materiality judgments required by the experimental task" (1984, p. 68). In contrast to Messier's (1983) results, Krogstad, Ettenson, and Shanteau found that auditors demonstrated high judgment consistency and consensus. The results also showed that "more experienced auditors tended to be more consistent in their judgments and agree more among themselves" (1984, p. 71).

Danos, Holt, and Imhoff (1984) studied bond rater judgments. They found that professional bond raters had significantly more confidence and higher levels of consensus in their ratings than did students. Kaplan and Reckers (1984) investigated auditors' decisions on the likelihood of material error in accounts receivable at two points in time for a hypothetical client. They found no significance for the experience level factor.

Past research has revealed conflicting results on the importance of experience. Ashton (1982) suggested that experience might exert more influence for ill-structured tasks. Abdolmohammadi and Wright (1987) found that in making financial decisions for a write-down, experienced auditors exhibited higher materiality thresholds than students. Ennis (1988) compared the predictive judgment of sophisticated and unsophisticated investors. Sophisticated investors exhibited consistently superior predictive accuracy and judgment consensus.

Most researchers had assumed that experience led to quicker decisions. The work of Hofstede (1972) confirmed this assumption; it indicated that experts spent less time in information processing than novices. However, Hofstede noted no significant difference in terms of their predictions.

A study by Snowball (1980) investigated the effects of accounting expertise upon predictions of the operating net cash flow. The results indicated that among the three levels of expertise the mean predictions did not differ significantly. However, the higher level of expertise group had a larger dispersion of predictions and placed wider confidence intervals around their predictions.

Bouwman (1982) compared the judgments made by expert and novice financial analysts; novices appeared to follow sequential information searches and to rely on simple trends, while experts appeared to build an overall picture of the firm and to search for contradicting evidence. This coincided with the results found in an auditing study by Biggs and Mock (1983). Experienced auditors tended to rely on information from prior experience to develop an overall picture of the firm. Novices,

however, tended to handle the problems in an ad hoc serial fashion, and they could not develop an overall picture of the firm. Bouwman, Frishkoff and Frishkoff (1987) drew the conclusion that experts primarily employed a direct search method in contrast to the sequential search method employed by novices. The results confirmed the extensive use of checklists (schemas) among experts to guide their search for relevant information.

Weber (1980) searched for evidence among EDP auditors in the way they organized computer controls in their memory. The results indicated that expert EDP auditors recalled more cues, and they clustered cues by categories more than did novices. The results supported the contention that memory organization comprised a relevant dimension of expertise.

Frederick and Libby (1986) examined expert versus novice auditors' judgment performance in predicting financial statement errors related to internal control weaknesses. The findings suggested an interaction between auditors' memory structures and task stimuli to produce judgments; students' knowledge structures stored only causal relationships between the accounts.

Biggs, Mock, and Watkins (1988) investigated the knowledge representations of experienced versus inexperienced auditors. They employed a verbal protocol analysis of how the auditors designed and conducted analytical reviews and revised the audit programs as a consequence of analytical review judgments. The results revealed differences between experts and novices in the areas of information acquisition and information integration. Experts accessed well-developed internal

schemas that allowed them to identify the type of problems involved and to use these schemata to solve the problem. Novices had to constantly refer to instructions because of their less developed schemata. Additionally, experienced auditors identified the more complex and deeper relationships, while the inexperienced auditors reacted to the "surface features" of the problem.

Waller and Felix (1984) proposed a general schematic memory model for the formulation of an audit opinion. They speculated that a number of "macro-template schemata" associated with a number of narrower "procedural and template schemata" organized knowledge. Each of these schema had nodes and pathways.

Gibbins (1984) suggested that the search strategies of experts would differ from the search strategies of novices because experts had well-developed schema. Additionally, Gibbins posited that self-insight into the process of developing response reference would decrease with experience since an expert had more templates to rely on and less need to consciously think through a judgment.

Chunking

Chase and Simon (1973) studied the perceptual structures that chess players observed. Three chess players of varying strength encountered two tasks, one a perception task, and the other a short-term recall task. They found that chess masters could better recall clusters when chess pieces formed a logical configuration. The findings suggested that the stronger players encoded the position of the pieces into larger perceptual chunks which consisted of familiar subconfigurations. In addition,

the findings suggested that chess masters had the ability to take in large chunks of information, recognize problem areas, and respond appropriately. Egan and Schwartz (1979) found the same chunking phenomenon in electronics. Skilled technicians reconstructed according to the functional nature, while novice technicians used spatial proximity to the elements.

Using problem situations in physics, Larkin et al. (1980) found that experts solved the problems with greater accuracy and in less than one-fourth the time required by the novice. The authors suggested that this resulted from complex schemata that could guide a problem's interpretation and solution. McKeithen et al. (1981) compared expert and novice programmers and found that expert programmers organized their recall based on conceptual representations of presented materials. Novices, on the other hand, organized their recall based on functional relationships of presented materials.

Lewis (1981) found that experts often restructured the terms of the original problem (algebra problems in this particular study), but novices did not. Chi and Glaser (1982) tested physicists. They concluded that the schema of the novice included surface features of the problem. However, the schema of the experts represented abstract principles plus conditions that indicated when to apply the principles.

Schoenfeld and Hermann (1982) reached a similar conclusion. Experts' perceptions centered on principles or methods relevant for problem solving ("deep

structure"), while novices focused on words or objects described in the problem statement ("surface structure").

Summary

Experts possessed superior capabilities of absorbing larger chunks of information, encoding more information, and abstracting conceptual representations of incoming stimuli than did novices. Experts solved complex problems faster and more accurately than novices. As compared to novices, experts had more complete knowledge in memory, and they encoded new information more efficiently and completely; they had better crossreferencing, memory organization, and categorization. In addition, experts possessed richer decision strategies and mechanisms (schemata) for relating the appropriate knowledge and course of action to the problems.

Experts tended to focus on the overall principles of the decision task, while novices tended to focus only on surface features. Experts used contextual knowledge indexed around principles, as well as abstractions unapparent in the decision task addressed, but derived from the contextual knowledge. Novices tended to use only contextual knowledge. Table 2.3 provides a summary of the findings of some prior research on experience.

Cognitive research has sought to understand how experts made decisions. This research study has focused on the knowledge base (schema) underlying the behavior of experts and novices in materiality decisions. Specifically, it has focused on what

factors entered into the judgments and when these factors entered the decision process, as well as on the depth of the categorization.

Table 2.3

Experience

Author(s)	Study Objective and Scope of Action	Results
Hofstedt, 1972	Determined if subjects' predictions and information processing differed due to financial sophistication.	Experts spend less time in information procession
Weber, 1980	Studied way EDP auditors organize computer controls in their memory	Experts recalled more cues and clustered cues by category
Bouwman, 1982	Compared judgments made by expert and novice financial analysts	Novices followed a sequential information search and relied on trends, while experts built the overall picture of firm and searched for contradicting evidence
Biggs & Mock, 1983	Used verbal protocol analysis to determine how experienced auditors made decisions.	Experienced auditors developed an overall picture of firm, while novices could not do so.
Messier, 1983	Examined effect of experience and firm type on materiality judgments.	Less experienced partners had lower materiality thresholds than more experienced partners
Danos, Holt, & Imhoff, 1984	Tested expectation that bond raters' training and experience had developed in them attributes of experts in using forecasts.	Professional bond raters are more confident and have higher level of consistency than students.
Kaplan & Reckers, 1984	Investigated auditors' decisions of material error in accounts receivable.	Experience level not found to be a significant factor.
Krogstad, Ettenson & Shanteau, 1984	Experimental study of the effect of context and experience on auditors' materiality judgements	Experienced auditors more consistent in judgments.
Frederick & Libby, 1986	Examined expert versus novice auditors' judgment in prediction of financial statements errors related to internal control weaknesses.	Interaction between auditors' memory structure and task stimuli to produce judgment while novices' store only causal relationships.
Abdolmohammadi & Wright, 1987	To determine if experience effect is significant when task complexity explicitly considered.	Auditors exhibited higher materiality thresholds than students.

Table 2.3 (continued)

Author(s)	Study Objective and Scope of Action	Results
Bouwman, Frishkoff, & Frishkoff, 1987	Examines decision making process of professional financial analysts who are screening prospective investments.	Use of schemas among experts to guide their search for information.
Biggs, Mock, & Watkins, 1988	Investigated the knowledge representations of experienced versus inexperienced auditors using verbal protocol analysis.	Differences between expert and novice in information acquisition and integration.
Carpenter & Dirsmith, 1992	Examined relationship between materiality judgments and the size and nature of early debt extinguishment, client earnings trend, and experience of auditor.	Experienced individuals had lower materiality thresholds than less experienced individuals.

Conceptual Maps

Traditionally, researchers have concerned themselves with observable and measurable phenomena. However, those researchers could observe and measure only some of the effects of materiality judgments. Judgments took place within the subjective world of the individual decision maker. Concept maps offered a window to this subjective world.

Concept maps or cognitive maps have served as metaphors for geographical maps providing useful insights. Those maps have graphically provided frames of reference. These maps exhibited the knowledge and reasoning that subjects used in reflective thinking and problem solving. Concept maps allowed the reader to understand the whole, and they facilitated reduction and analysis by parts.

History

Tolman (1948) first used the term 'cognitive map' in discussions of learning in laboratory animals and human beings. Axelrod (1976) developed methods for representing cognitive maps diagrammatically. Cognitive maps served as descriptive models which explained the way people actually derived explanations of the past, made predictions of the future, and chose then-current policies (Axelrod, 1976, pp. 56-7).

T. H. Anderson and his colleagues developed concept mapping at the Center for the Study of Reading, University of Illinois, in 1978, as a part of a project on studying strategies. Originally developed as educational tools, concept maps assisted learners in processing information methods comparable with prevailing theories of knowledge representation (Anderson, 1987). Armbruster and Anderson (1980) did a study of the effectiveness of mapping as a studying technique for eighth graders. The authors concluded that mapping served best when used as a studying strategy for students mapping only major concepts and relationships.

The concept map spatially represented the organization of central ideas. Its importance lay in effectively organizing existing knowledge and assimilating new information. Concept maps provided an overall framework that helped users to organize and remember the material relevant to a knowledge domain (Alvermann, 1986).

Stewart (1984) posited that in developing science curricula, mapping made the overall organization of content and the extensive relationships among the concepts

very explicit. Stewart suggested that the use of conceptual maps would point out areas in which the expert assumed relationships that the student might not have known.

Concept maps helped experts to separate major and subsidiary ideas on a topic (Larkin et al., 1980). Students have used self-generated concept maps to separate helpful feelings from counterproductive feelings (Holly and Dansereau, 1984).

Users have noted the utility of concept maps in focusing attention and triggering memory (Nelson, 1977). Table 2.4 (Fiol and Huff, 1992) summarizes several direct functions of maps and the associated indirect impacts on decision-making.

Table 2.4

Map Functions

Direct Operation	Decision-making Function
Focuses attention Triggers memory	--> Issue structuring
Reveals gaps	--> Issue closure
Highlights key factors Supplies missing information	--> Creative problem-solving

Fiol & Huff, 1992, p. 275

Thus, in the area of materiality judgments cognitive maps have reminded individuals of past experience in order to reap the benefits of experience. In addition,

when an individual faced too much information, maps should have aided in setting priorities. Cognitive maps have revealed gaps in information or reasoning and the need for more information or attention. Finally, maps have highlighted key factors which made materiality judgments more consistent.

Other Studies

Concept maps have proven useful in studying virtually any question raised about human activities. Reger (1990) found that bank holding company executives used traditional economic and structural positions of firms to mentally cluster their competitors. Experienced executives also provided new dimensions such as growth strategies and management competency.

Lord et al. (1994) used the attitude concept to obtain a spatial display about the cognitive structure of an individual's social policy attitudes. Sekaran (1986) used factor analysis to study mapping of perception and organization of information. Her results indicated that employees in the U.S. and India organized information differently.

Barr, Stimpert and Huff (1992) examined the link between changes in mental models and changes in organizational action. They analyzed the causal assertions made by leaders of two U.S. railroads over a 25-year period.

Klein and Cooper (1982) used individual cognitive maps to examine the behavior and perceptions of seven military officers in two scenarios in a research wargame. Their results indicated that while the perceptions of a common decision-

making environment differed noticeably, the perceptions of individual players displayed remarkable consistency. The differences related to the number of concepts identified and the degree of confidence displayed in ability to achieve goals. They also related to the way in which map alterations elaborated some sections in more detail while deleting other sections from consideration.

Conclusion

Eden (1992) defined cognitive maps "as a picture or visual aid in comprehending the mappers' understanding of particular, and selective, elements of thoughts of an individual, group or organization." Therefore, concept maps generated by accountants and bankers depicted the key ideas and relationships surrounding materiality as seen by the individual mapmaker. These individual concept maps have provided new ways of examining and understanding materiality judgment.

CHAPTER 3

RESEARCH METHODOLOGY

This study has attempted to acquire an understanding of materiality decisions from the user-decision perspective (bankers) and the preparer perspective (CPAs). It had two primary objectives: determining if users and preparers differed in their concept of materiality, and determining the factors used in materiality judgments. It employed individual conceptual maps in an effort to determine how materiality decision cognitive processes of users differed from the materiality decision cognitive processes of preparers. The study also sought to ascertain differences due to experience. This chapter explains the experimental setting and the methods used to collect and analyze the data.

Research Hypotheses

- H₁: Experience and job classification have no significant interaction effects in materiality decisions.
- H₂: The materiality decisions of bankers do not differ significantly from those of CPAs.
- H₃: Experience level does not significantly affect materiality decisions.
- H₄: Experience and job classification have no significant interaction effects in materiality cognitive process.

- H₅: The materiality cognitive processes of bankers do not differ significantly from those of CPAs.
- H₆: Experience level does not significantly affect materiality cognitive process.

Experimental Setting

Bankers attending the American Banking Association's National Commercial Lending School and National Commercial Lending Graduate School in Norman, Oklahoma, in the fall and winter of 1995 furnished individual concept maps and vignette responses. The researcher attended a session of both schools. Of the 98 bankers attending the National Commercial Lending School, 87 (89%) provided usable questionnaires, and 72 (73%) furnished usable concept maps. Of the 55 bankers attending the National Commercial Lending Graduate School, 49 (89%) provided usable questionnaires, and 33 (60%) furnished usable concept maps.

Accountants of a Big Six accounting firm attending a training seminar in the summer of 1996 also provided individual concept maps and vignette responses. Of the 121 accountants attending the seminar, 119 (98%) completed usable questionnaires, and 119 (98%) prepared usable concept maps.

Data

The data used in comparing materiality decisions of CPAs and bankers derived from responses to seventy-five vignettes. These vignettes were developed for several materiality decision areas with amounts at, or very near, the bottom thresholds of materiality. The thresholds of materiality resulted from a review of the literature.

Other factors considered in developing the vignettes included the Foreign Corrupt Practices Act, environmental liabilities, undisclosed liabilities, technological competition, party relationships, human asset accounting, and goodwill. Appendix A includes a copy of the vignettes.

Data for a portion of this research originated in the individual materiality concept maps of CPAs and bankers. This part of the study primarily addressed categories, mean numbers, number of first-order associations, and depths of nodes.

Categories

The study classified the concept map data into seven categories of nodes: (1) determinant factors, (2) characteristics of the environment, (3) characteristics of the firm, (4) characteristics of the event or judgment item, (5) characteristics of the accounting system or policies in use, (6) miscellaneous, and (7) source of the information. These categories corresponded in part to the presentation in Appendix B of the FASB's Discussion Memorandum "Criteria for Determining Materiality" (1975). Pattillo, Morris and Nichols (1983) and Chong (1992), also, had suggested these categories. Appendix B includes a complete listing.

Pilot Tests

The researcher administered the first set of pilot tests to a graduate quantitative analysis class and to a doctoral communications class at Louisiana Tech University. The researcher gained some experience and insight in explaining conceptual mapmaking as a result of these tests and discussions with several of the participants.

This allowed the researcher to make the conceptual map presentation less technical in nature and more informal. In addition, it facilitated the revision of several vignettes.

The second set of pilot tests involved only the vignettes; two undergraduate accounting classes at Louisiana Tech University participated. No changes in the vignettes resulted from this second pilot test.

Statistical Techniques

MANOVA

A two-way Multivariate Analysis of Variance (MANOVA) compared the materiality decisions of CPAs with those of bankers. The participants' profession and their experience comprised the factors. The two levels of profession consisted of accountants and bankers. The experience factor included three levels: (1) three years or less, (2) more than three years and less than nine, and (3) nine years or more. When the data showed a lack of symmetry, t-tests determined which vignette judgments differed. The dependent variables consisted of individual responses to the 75 vignettes regarding materiality decisions.

The study compared materiality concept maps of CPAs and those of bankers on the basis of categories, number of nodes, first order associations or pathways directly off the central node, and depth of nodes. This process employed a two-way MANOVA, with participant professions at two levels and experiences at three levels. Group differences were determined using t-tests.

The study used a two-way MANOVA as the statistical method because of its principal concern about how the vectors of responses to the seventy-five vignettes differed as a whole across the two factors.

MANOVA required independent observations. Across subjects, a given observation should not have depended on any other observation in any group. In addition, scores on dependent variables should have represented a random sample drawn from the population of interest.

MANOVA also required multivariate normality. In each group, scores on the various dependent variables should have followed multivariate normal distribution.

Finally MANOVA required equality of covariance matrices across groups. This meant that the dependent variable covariance matrix for a given treatment group (level of independent variable) should have equaled the covariance matrix for each of the remaining groups. As the number of groups increased and/or as the number of dependent variables increased, the number of corresponding elements that had to equal increased. For this reason, data used in past research have rarely satisfied the homogeneity of covariance assumption. However, a violation of this assumption had minimal impact if the largest group size divided by smallest group size amounted to less than 1.5 (Hair et al., 1992).

Factor Analysis

As a multivariate technique, factor analysis can address several research problems. It endeavors to identify the relationships among difficult-to-interpret,

correlated variables in terms of a few conceptually meaningful, relatively independent factors. Kim and Muller (1978) identified its most distinctive characteristic as its data-reduction capability. Factor analysis also addresses the problem of analyzing the interrelationships among a set of variables and then explaining these variables in terms of their common underlying factors (Hair et al., 1992).

The present study used factor analysis to summarize the 75 vignettes into their underlying dimensions. The common factor model considered an estimate of the common variance rather than the total variance associated with a set of variables. Therefore, this study utilized the common factor model rather than the principal components factor model. In addition, this procedure has proven appropriate when the research has sought to identify latent dimensions represented by the variables. Exploratory factor analysis identified the number and nature of these latent factors.

The study rotated the initial factor solution through an orthogonal solution process called VARIMAX because of that method's tendency to provide a clearer separation of the factors. VARIMAX had previously demonstrated an ability to simplify the columns of the factor matrix, making as many of the values or loadings in each column as close to zero as possible (Hair et al., 1992). In addition, the rotation achieved a more meaningful patterning of variables for purposes of interpretation. Data summarization facilitated a reduction of a large number of original variables to a smaller number of composite variables.

The researcher anticipated several factors based on prior research:

(1) relationship of amount to underlying base, (2) absolute dollar amount, and

(3) characteristics of the event. This chapter included a discussion of vignette development, experimental setting, and the methods used to collect and analyze the data. Chapter 4 presents results and analysis of the methodology described in this chapter.

CHAPTER 4

ANALYSES AND RESULTS

This chapter presents results of the study. First, it shows demographic information. Then it presents results for a two-way MANOVA used to compare the materiality decisions of CPAS with those of bankers. The next section discusses the results of the factor analysis. Finally, it compares materiality concept maps of CPAS with those of bankers.

Demographic Information

Bankers attending the American Banking Association's fall and winter of 1995 National Commercial Lending School and National Commercial Lending Graduate School in Norman, Oklahoma, provided one of the two major data components for this study. These sessions began with an explanation of concept mapping and continued with the preparation of a practice concept map of the common cold, allowing time for questions.

Next, attending bankers furnished individual materiality concept maps and vignette responses. Of 98 bankers attending the National Commercial Lending School, 87 (88.8%) completed usable questionnaires, and 72 (73.5%) provided usable concept maps; of the 55 bankers attending the National Commercial Lending Graduate

School 49 (89.1%) completed usable questionnaires, and 33 (60.0%) turned in usable concept maps. From a total of 153 bankers attending the two schools, the researcher obtained 136 (88.9%) usable questionnaires and 105 (68.6%) usable concepts maps. However, one of the bankers did not indicate experience level. Therefore, the statistical tests did not include his questionnaire and concept map.

Accountants attending a training seminar of a Big Six Accounting firm during the summer of 1996 provided the other major data component. (As a condition of participation, the firm received assurance that it would remain anonymous.) The study repeated the steps used with the bankers. Those steps included an explaining concept mapping, leading the group in preparing a practice concept map of the common cold, and answering questions regarding concept maps. Of 121 accountants attending the seminar, 119 (98.3%) completed usable questionnaires, and 119 (98.3%) furnished usable concept maps.

Table 4.1 indicates the area of practice for both accountants and bankers. All of the accountants practiced in the audit area. The majority of bankers (110 or 81%) practiced in commercial lending, while 23 or 17% worked in real estate lending.

Table 4.1
Area of Practice

Area of Practice	Accountants	Bankers
Audit	119	2
Commercial Bank Lending		110
Real Estate Lending		23
Credit Card Lending		1

Table 4.2 indicates the highest level of education attained by both professional groups. The majority of both groups--96, or 80.7% of the accountants, and 77, or 56.6% of the bankers--indicated a bachelors degree as the highest level of education.

Table 4.2
Highest Level of Education

Education	Accountants	Bankers
High School		5 (3.7%)
Some College		25 (18.4%)
Bachelors	96 (80.7%)	77 (56.6%)
Masters	23 (19.3%)	28 (20.6%)
Ph.D.		
JD		1 (.7%)

Additionally, the bankers participating in this study attended numerous banking schools. Table 4.3 gives a breakdown of the various schools represented.

Table 4.3

Banking Schools Attended

Banking School or Schools	Number	Percent
American Banking Assoc. (ABA)	43	31.6%
American Institute of Banking (AIB)	7	5.2%
ABA & AIB	31	22.8%
ABA, AIB & State Banker's Assoc. (SBA)	22	16.2%
ABA & SBA	20	14.7%
SBA	4	3.0%
Other	2	1.4%
None	6	4.4%
Not Given	1	.7%

By professional positions, 96 accounting supervisors (or 80.7% of the accountants), two accounting managers, 59 banking vice presidents (or 43.4% of the bankers), and 49 banking loan officers (or 36.0%) participated in the survey. Table 4.4 provides the breakdown of the survey into professional positions.

Table 4.4
Professional Position

Professional Position	Accountants	Bankers
Staff		7
Senior	21	
Supervisor	96	
Manager	2	
Partner		
Lending Officer		49
Department Supervisor		13
Vice President		59
President		4
Other		1
Not Given		3

Years of experience for accountants ranged from less than 2 years to more than 10 years, and for bankers it ranged from less than 1 year to more than 30 years. This study, therefore, grouped years of experience into three categories as indicated by the Table 4.5. The majority of accountants, 74 or 62.2%, had three years or less experience. The majority of the bankers, 89 or 65.4%, had extensive experience in their profession, with nine or more years each.

Table 4.5
Experience of Participants

Years of Experience	Accountants	Bankers
Three years or less	74	15
More than 3 years and less than 9	41	31
Nine years or more	4	89
Not given		1

As indicated in Table 4.6, 118 (or 99.2%) of the accountants and 92 or (67.6%) of the bankers were less than 40 years old.

Table 4.6
Age of Participants

Participant's Age	Accountants	Bankers
20-29	105	22
30-39	13	70
40-49	1	38
50-59		3
60-65		1
Not Given		2

Table 4.7 shows a predominance of males in both groups surveyed. The accountants surveyed included 75 (or 63.0%) males and 44 (or 37.0%) females. The

bankers surveyed consisted of 105 (or 77.2%) males, while females accounted for only 31 (or only 22.8%) of the attendees. The materiality decisions and materiality decision cognitive processes by sex in each professional group proved comparable.

Table 4.7

Sex of Participants

Sex	Accountants	Bankers
Males	75	105
Females	44	31

Table 4.8, which displays state of residence, indicates that the participants represented a national sample. Most of the states had representation, with the state of Texas having the greatest number of the participating accountants (16, or 13.4% of the total) and bankers (10, or 7.4% of the total). New York had the second highest representation of accountants, with 13 respondents. Ten of the attendees, or 8.4% of the accounting respondents, resided in California. In the banking survey, Texas had the greatest representation, followed closely by Colorado and Missouri which each had 9 or 6.6% of the respondents.

Table 4.8
State of Residence

Place of Residence	Accountants	Bankers
Alabama	1	4
Arizona		2
Arkansas		6
California	10	4
Colorado	3	9
Connecticut	6	
Delaware	3	
District of Columbia	2	
Florida	5	1
Georgia	3	1
Hawaii	2	1
Idaho		1
Illinois	5	8
Indiana	2	4
Iowa		8
Kansas		4
Kentucky		2
Louisiana		4
Maine		1
Maryland	1	1

Table 4.8 (continued)

Place of Residence	Accountants	Bankers
Massachusetts	3	
Michigan	2	6
Minnesota	6	2
Mississippi		1
Missouri	4	9
Montana	1	1
Nebraska		3
Nevada		1
New Jersey	3	2
New Mexico		1
New York	13	3
North Carolina	6	
North Dakota		2
Ohio	5	5
Oklahoma		4
Oregon	2	
Pennsylvania	7	1
South Carolina	2	1
South Dakota		2
Tennessee	3	
Texas	16	10

Table 4.8 (continued)

Place of Residence	Accountants	Bankers
Utah	2	1
Virginia		1
Washington	1	2
West Virginia		2
Wisconsin		4
Guam		2
Foreign Country		2
Not Given		7

Subsequently the research assigned the participants to regions of the United States for area comparisons. Those regions corresponded to those used by the Census Bureau. Table 4.9 summarizes that assignment.

Table 4.9**Region of Residence**

Region	Accountants	Bankers
East North Central	14	27
East South Central	4	7
Middle Atlantic	23	6
Mountain	6	16
New England	9	1

Table 4.9 (continued)

Region	Accountants	Bankers
Pacific	15	7
South Atlantic	22	7
West North Central	10	30
West South Central	16	24
Foreign Country		2
US Territory		2
Not Given		7

This section has provided demographic data about the accountants and bankers used in this study. The following section discusses the comparison of CPA materiality decisions with those of bankers.

MANOVA

As its primary research objective, the study sought to determine if bankers and CPAs differed in their concepts of materiality. The study employed a two-way MANOVA to compare the materiality decisions of CPAs with those of bankers. One factor divided respondents by profession, as accountants or as bankers. The second factor divided respondents into three experience levels. Level one represented three years or less experience, level two denoted more than three years and less than nine years of experience, and level three depicted nine years or more of experience.

The study utilized the following mathematical model:

$$Y_{ijk} = \mu + A_i + B_j + (AB)_{ij} + \Sigma_{ijk}$$

where

Y_{ijk} = Dependent variables consisting of responses to the materiality decision vignettes,

μ = Grand mean,

A_i = Profession effect at two levels, accountants and bankers,

B_j = Experience effect at three levels, three years or less, more than three and less than nine years, and nine years or more,

$(AB)_{ij}$ = Interaction effect,

Σ_{ijk} = Multivariate normal error term.

The model offered the following four multivariate test statistics: Wilks' lambda, the Pillai-Barlett trace, the Hotellings-Lawley trace, and Roy's greatest characteristic root. Each statistic offered a reasonable way of combining the information, and each led to a unique test statistic. According to Tabachnick and Fidell (1989), "Wilks' lambda is a likelihood ratio statistic that tests the likelihood of the data under the assumption of equal population mean vectors for all groups against the likelihood under the assumption that population mean vectors are identical to those of the sample mean vectors for the different groups" (1989, p. 398). According to Bray and Maxwell (1985), researchers historically have used Wilks' lambda more widely than the other three approaches. Pillai and Jayachandran (1967) found that with very different populations roots, Hotellings-Lawley trace tended to have highest power, while for equal roots the power of Pillai-Barlett trace had the highest. Pillai

and Jayachandran (1967) also found the power of Roy's greatest characteristic root lowest for the alternatives considered.

Test for Interaction

Table 4.10 shows the MANOVA results concerning the interaction of profession and experience on materiality decisions. Both of the test statistics indicated that interaction of profession and experience did not have significant effect in materiality decisions. Hence, the researcher could not reject the null hypothesis, H_1 , of no interaction effects among experience and profession. The study produced no significant interaction effects among experience and profession in materiality decisions.

Table 4.10

**MANOVA Results on Vignette Responses-Interaction
of Profession and Experience**

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.442	1.1696	150	348	0.1225
Hotellings - Lawley Trace	1.0138	1.1692	150	346	0.1232

Test for Main Effects

With no interaction between experience and profession, the model next tested for main effects. Table 4.11 shows the MANOVA results on profession. With a 0.0001 significance level for each of the tests, the statistics indicated that profession

had a very significant effect in materiality decisions. Therefore, the results led to a rejection of the null hypothesis, H_2 , of no difference in the materiality decisions of bankers and accountants. The study found a significant difference in the materiality decisions of bankers and accountants.

Table 4.11

MANOVA Results on Vignette Responses-Profession

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.4439	2.9062	75	174	0.0001
Hotellings - Lawley Trace	1.2527	2.9062	75	174	0.0001

Table 4.12 presents the MANOVA results concerning experience. One of the test statistics, Wilks' lambda, attributed no significance to experience. The study could not reject the null hypothesis, H_3 , of no difference in the materiality decisions based on the level of experience at the .05 alpha level, but it could reject it at the .10 alpha level. Therefore, at the .10 alpha level the study found a significant difference in the materiality decisions based on experience level.

Table 4.12**MANOVA Results on Vignette Responses-Experience**

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.4237	1.2413	150	348	0.0545
Hotellings - Lawley Trace	1.085	1.2514	150	346	0.0483

Descriptive Statistics
Vignette Responses

Table 4.13 presents the means and standard deviations of the responses of accountants and bankers.

Table 4.13**Questionnaire Results**

Question	Accountants		Bankers	
	Mean	SD	Mean	SD
Q1	5.03	1.49	5.04	1.42
Q2	4.49	1.75	4.13	1.69
Q3	6.45	1.04	6.69	0.85
Q4	6.7	0.72	6.77	0.67
Q5	2.45	1.19	4.31	1.66
Q6	3.74	1.39	4.97	1.47
Q7	4.11	1.6	4.84	1.46
Q8	4.09	1.41	4.81	1.42

Table 4.13 (continued)

Question	Accountants		Bankers	
Q9	2.99	1.36	4.1	1.55
Q10	1.97	1.15	4.04	1.57
Q11	4.5	1.53	4.71	1.58
Q12	5.17	1.51	5.89	1.31
Q13	4.88	1.25	5.4	1.36
Q14	1.98	1.19	3.41	1.61
Q15	4.78	1.21	5.43	1.12
Q16	5.1	1.6	5.46	1.39
Q17	4.82	1.37	5.27	1.39
Q18	3.16	1.63	4.54	1.51
Q19	3.53	1.35	4.7	1.3
Q20	3.19	1.66	4.22	1.53
Q21	4.93	1.25	4.95	1.48
Q22	5.64	1.49	6.18	1.09
Q23	3.35	1.28	4.3	1.53
Q24	3.42	1.61	4.1	1.39
Q25	5.46	1.23	5.56	1.34
Q26	4.92	1.36	5.28	1.29
Q27	3.53	1.49	4.93	1.4
Q28	5.59	1.65	6.34	1.22
Q29	2.36	1.3	4.34	1.55
Q30	4.19	1.62	4.61	1.29
Q31	4.55	1.57	5.49	1.21

Table 4.13 (continued)

Question	Accountants		Bankers	
Q32	3.86	1.32	4.33	1.35
Q33	4.24	1.38	4.96	1.42
Q34	4.1	1.51	4.81	1.55
Q35	2.99	1.63	4.31	1.6
Q36	3.74	1.49	4.93	1.34
Q37	3.81	1.42	5.07	1.4
Q38	5.11	1.31	5.76	1.06
Q39	4.39	1.8	5.74	1.31
Q40	4.9	1.87	5.45	1.62
Q41	2.48	1.29	3.69	1.65
Q42	2.95	1.47	4.38	1.41
Q43	4.39	1.44	4.91	1.36
Q44	4.25	1.47	4.59	1.39
Q45	4.2	1.52	5.14	1.35
Q46	5.68	1.1	5.74	1.38
Q47	4.16	1.44	5.07	1.33
Q48	2.2	1.28	4.18	1.52
Q49	5.13	1.18	5.6	1.21
Q50	5.91	1.48	5.24	1.36
Q51	2.45	1.39	3.59	1.63
Q52	4.2	1.58	4.7	1.75
Q53	3.92	1.45	4.57	1.27
Q54	3.97	1.26	4.79	1.44

Table 4.13 (continued)

Question	Accountants		Bankers	
Q55	4.67	1.64	4.78	1.4
Q56	3.29	1.53	3.59	1.58
Q57	4.82	1.44	5.21	1.33
Q58	5.97	1.25	6.36	1.05
Q59	3.27	1.19	4	1.41
Q60	4.52	1.39	4.41	1.33
Q61	2.85	1.52	4.24	1.51
Q62	5.97	1.47	5.72	1.41
Q63	4.74	1.43	5.39	1.15
Q64	5.41	1.61	5.86	1.33
Q65	3.98	1.46	4.47	1.39
Q66	4.56	1.31	4.79	1.31
Q67	3.64	1.36	4.66	1.48
Q68	5.64	1.37	6.04	1.08
Q69	4.96	1.38	5.2	1.37
Q70	3.5	1.47	4.59	1.28
Q71	2.64	1.36	4.24	1.47
Q72	3.63	1.47	4.61	1.48
Q73	3	1.4	4.41	1.3
Q74	5.89	1.27	6.04	1.05
Q75	4.87	1.47	5.38	1.15

Professional Differences

Materiality decisions of accountants and bankers differed significantly. Therefore, the model used multiple comparisons to identify the questions on which the professions differed. The model used the Bonferroni method because of pairwise comparisons with unequal sample sizes. It used an alpha level of .05. Table 4.14 indicates the questions associated with significant differences in profession and which profession considered the question more material. All significant profession differences, except one, indicated that bankers assigned more materiality to the item than accountants. The exception, Q50, considered a decrease in working capital to a level of less than that required by loan covenants; accountants found Q50 more material than bankers.

These findings agreed with Firth (1979) who found significant differences in the materiality thresholds of the various groups examined. Firth found that users had a lower threshold of materiality than accountants. However, the current research findings did not agree with those found by Jennings, Kneer, and Reckers (1987). Their findings had indicated that bankers had higher materiality thresholds than accountants, while credit managers and chartered financial analysts had lower materiality thresholds than accountants.

Table 4.14
Significant Differences by Profession
Using Bonferroni Method

Question	Accountants	Bankers
Q3		*
Q5		*
Q6		*
Q7		*
Q8		*
Q9		*
Q10		*
Q12		*
Q13		*
Q14		*
Q15		*
Q17		*
Q18		*
Q19		*
Q20		*
Q22		*
Q23		*
Q24		*
Q26		*
Q27		*
Q28		*
Q29		*

Table 4.14 (continued)

Question	Accountants	Bankers
Q30		*
Q31		*
Q32		*
Q33		*
Q34		*
Q35		*
Q36		*
Q37		*
Q38		*
Q39		*
Q40		*
Q41		*
Q42		*
Q43		*
Q45		*
Q47		*
Q48		*
Q49		*
Q50	*	
Q51		*
Q52		*
Q53		*
Q54		*
Q57		*

Table 4.14 (continued)

Question	Accountants	Bankers
Q58		*
Q59		*
Q61		*
Q63		*
Q64		*
Q65		*
Q67		*
Q68		*
Q70		*
Q71		*
Q72		*
Q73		*
Q75		*

Experience Differences

Experience proved significant at the .05 alpha level with Hotelling-Lawley Trace and significant at the .06 alpha level with Wilks' lambda. The model, therefore, employed Bonferroni's method to identify the questions with significant differences in the materiality decisions by experience level. Group 1 had the least experience, with three years or less. Group 2 had more than three--and less than nine--years of experience. The most experienced group, 3, had nine or more years experience. Table 4.15 indicates the questions with significant pairwise differences ($\alpha = .05$) and where

those differences occurred. For example, all groups differed significantly on their Q5 materiality decisions.

Table 4.15

**Significant Differences by Experience Level
Using Bonferroni Method**

Q	1 & 2	1 & 3	2 & 3	All Differ	Gr. 1 Differ	Gr. 3 Differ
Q5	*	*	*	*		
Q6		*	*			*
Q7		*				
Q8		*				
Q9	*	*			*	
Q10	*	*	*	*		
Q13		*				
Q14	*	*	*	*		
Q15	*	*			*	
Q18		*	*			*
Q19		*				
Q20		*				
Q23		*	*			*
Q24		*	*			*
Q27		*	*			*
Q28		*				
Q29	*	*	*	*		
Q31		*				
Q33	*	*			*	

Table 4.15 (continued)

Q	1 & 2	1 & 3	2 & 3	All Differ	Gr. 1 Differ	Gr. 3 Differ
Q35		*	*			*
Q36		*				
Q37		*	*			*
Q38		*				
Q39		*				
Q41		*				
Q42	*	*			*	
Q45		*				
Q47		*				
Q48	*	*	*	*		
Q49	*	*			*	
Q50		*				
Q51		*				
Q53		*				
Q54		*	*			*
Q59		*	*			*
Q61		*	*			*
Q65		*				
Q66	*					
Q67		*	*			*
Q70	*	*			*	
Q71	*	*	*	*		
Q72		*				
Q73	*	*	*	*		

Table 4.15 (continued)

Q	1 & 2	1 & 3	2 & 3	All Differ	Gr. 1 Differ	Gr. 3 Differ
Q75		*				

All significant experience differences, except one, indicated a difference between the groups with the least and the most experience. The exception, Q66, considered a postponement of a write-down in obsolete inventory. On Q66 the significant experience difference occurred between the group with the least experience and the group with the midlevel of experience. The means differed by .5234, with a confidence interval of -1.0194 to -.0274 or .0274 to 1.0194.

The vignettes with significant differences in experience level indicated the same order of materiality decisions by experience level for all but two of the vignettes. The most experienced group (those with nine or more years experience) considered the items the most material. The least experienced group (those with three years or less experience) deemed the items least material. The mid-level experience group (those with more than three years and less than nine years) had materiality decisions between the other two groups.

Q50, which addressed a decrease in working capital to a level of less than that required by loan covenants, had a different order of experience level. The group with the least experience considered this matter more material, and the group with over nine or more years experience considered this matter least material. Profession may have

caused the difference between experience levels, because group 1 contained the majority of accountants, while group 3 included the majority of bankers.

In addition, the order of experience level differed on Q66. This question evaluated postponing the write down of inventory. The midlevel experience group considered this more material than the other experience groups. Those with three years or less experience considered this question less material than the other two groups.

This section has presented the test results for the first three hypotheses. The following section presents the results of the factor analysis describing the attributes used in materiality judgments.

Factor Analysis

As its second research objective, the study attempted to determine the factors used in materiality judgments. Data reduction and summarization fulfilled the primary purpose of factor analysis. Common factor analysis examined the interrelationships among a large number of variables (vignette responses) and explained these variables in terms of their common underlying, but unobservable, dimensions. The study eliminated variances unique to one variable.

The unrotated factor matrix derived from the initial computation of the correlation matrix. The unrotated factor solution extracted factors in the order of their importance. The first factor accounted for a fairly large amount of the common

variance, and each succeeding factor accounted for progressively smaller amounts of variance.

The study utilized the VARIMAX method to rotate the initial factor solution. The VARIMAX rotation method extracted essentially the same total amount of variance as that obtained in the unrotated factor pattern. However, it redistributed the variance to make factor loading more apparent between factors, and interpretation easier.

Factor analyses employed several criteria to determine the number of factors that could adequately explain the observed correlations among the observed variables. Mainly, the researcher needed to know whether a small number of factors could account for a significant portion of the covariation among a much larger number of variables. Past research studies have used a rule of thumb known as Kaiser, latent root, or eigenvalue criterion to determine the initial factors. With this approach the model retained factors with eigenvalues greater than 1.00.

Another procedure for determining the number of factors has involved retaining a factor that accounted for a specified percentage of variance in the data set. An alternative criterion has involved retaining enough factors so that the cumulative percent of variance accounted for a large portion of the variance. In other words, these criteria questioned the substantive importance of factors which account for only 2% or 3% of the common variance (Hatcher, 1994).

A third procedure has consisted of a scree test or a plot of the eigenvalues associated with each of the factors. It has based the solution on finding a break

between the factors with relatively large eigenvalues and those with small eigenvalues. It has treated factors that appeared before the break as meaningful and retained them for rotation; it has assigned no importance to those appearing after the break, and it has not retained them (Hatcher, 1994).

Perhaps interpretability has served as the most important criterion for determining the number of factors to use. Obviously, interpreting the substantive meaning of the retained factors and verifying that interpretation made sense. Knowledge about the constructs under investigation has assumed paramount importance. The researcher anticipated the following factors based on prior research: (1) relationship of amount to underlying base, (2) absolute dollar amount, and (3) characteristics of the event.

Several guidelines applied. First, the model required at least three variables with significant loadings on each retained factor. Second, it required that variables loaded on a given factor should share some conceptual meaning. Third, the variables that loaded on different factors should measure different constructs. Finally, most of the variables should have relatively high factor loadings on only one factor, and near-zero loadings for the other factors (Hatcher, 1994).

This study defined a communality as a characteristic of an observed variable. Communalities have referred to proportions of the variance in an observed variable attributable to the common factors. Communalities have indicated the amounts of given variables' common variance accounted for by the factor solution. In addition, communalities have assessed the amount of variance in a variable left unaccounted for

by the factors. If a variable demonstrated a large communality, it meant that at least one of the common factors strongly influenced this variable (Hatcher, 1994).

Accountants

Applying the eigenvalue rule of thumb to the correlation matrix for accountants (shown in Table 4.16) indicated that each of 18 factors had an eigenvalue that exceeded 1.00. The results of a scree test suggested that factors 1, 2, and 3 accounted for 38.17% of the total variance. Application of interpretability criteria suggested retention of 3 factors.

Table 4.16

Eigenvalues of the Correlation Matrix-Accountants

Factor	Eigenvalue	Proportion	Cumulative
1	12.01	20.38	20.38
2	5.54	9.39	29.77
3	4.95	8.40	38.17
4	3.66	6.20	44.37
5	2.72	4.61	48.99
6	2.33	3.95	52.94
7	1.92	3.25	56.19
8	1.91	3.24	59.43
9	1.76	2.98	62.41
10	1.72	2.92	65.33

Table 4.16 (continued)

Factor	Eigenvalue	Proportion	Cumulative
11	1.58	2.69	68.02
12	1.46	2.48	70.50
13	1.32	2.24	72.73
14	1.27	2.16	74.89
15	1.23	2.08	76.97
16	1.10	1.87	78.85
17	1.06	1.80	80.64
18	1.02	1.74	82.38
19	0.99	1.67	84.05

Table 4.17 shows the results of the rotated factor solution using the VARIMAX method. This dictated retention of the following three factors: (1) ratio, (2) sensitive areas, and (3) unrecorded items.

Table 4.17**Factor Loadings for Accountants**

Q	Factor 1 Ratio	Factor 2 Sensitive	Factor 3 Unrecorded	Communality
Q8	0.52	0.08	0.06	0.28
Q12	0.42	-0.04	-0.03	0.18
Q17	0.4	0.13	-0.14	0.2
Q18	0.66	0	0.21	0.48

Table 4.17 (continued)

Q	Factor 1 Ratio	Factor 2 Sensitive	Factor 3 Unrecorded	Communality
Q19	0.7	0.14	0.03	0.52
Q24	0.44	0.11	-0.12	0.22
Q26	0.69	0.14	-0.04	0.5
Q31	0.62	-0.03	0.11	0.39
Q34	0.73	0.05	0.05	0.54
Q35	0.5	-0.08	0.09	0.26
Q36	0.56	0.07	-0.08	0.33
Q37	0.65	0.09	-0.16	0.46
Q41	0.44	0.09	0.25	0.27
Q45	0.58	0.24	0.03	0.4
Q51	0.57	-0.02	0.23	0.38
Q52	0.41	0.32	-0.18	0.31
Q55	0.44	0.29	0.02	0.28
Q57	0.76	0.1	-0.09	0.59
Q61	0.64	0.02	0.15	0.44
Q63	0.69	0.19	-0.08	0.52
Q67	0.68	0.22	0.16	0.55
Q72	0.67	0.12	0.05	0.47
Q15	-0.05	0.51	0.2	0.3
Q21	0.08	0.5	0.04	0.26
Q28	0.16	0.44	0.06	0.22

Table 4.17 (continued)

Q	Factor 1 Ratio	Factor 1 Sensitivity	Factor 3 Unrecorded	Communality
Q32	0.15	0.51	0.11	0.3
Q33	0	0.49	0.15	0.27
Q40	0.1	0.41	0.2	0.22
Q42	-0.03	0.48	0.47	0.45
Q43	0.26	0.45	0.11	0.28
Q47	0.1	0.48	0.22	0.29
Q49	-0.09	0.44	0.17	0.23
Q50	0.19	0.49	-0.15	0.3
Q53	0.11	0.53	-0.05	0.29
Q58	0.12	0.5	-0.16	0.29
Q60	0.25	0.58	-0.01	0.41
Q65	0	0.51	0.13	0.27
Q66	-0.08	0.56	0.22	0.37
Q68	0.06	0.45	-0.03	0.21
Q69	0.24	0.59	-0.03	0.4
Q74	0.22	0.49	-0.1	0.3
Q75	0.14	0.48	-0.14	0.27
Q9	-0.08	0.18	0.44	0.24
Q10	0.04	0.03	0.74	0.55
Q14	0.16	0	0.63	0.42
Q20	-0.08	0.28	0.49	0.33

Table 4.17 (continued)

Q	Factor 1 Ratio	Factor 2 Sensitive	Factor 3 Unrecorded	Communality
Q22	0.27	0.22	-0.47	0.34
Q29	0.06	0.05	0.72	0.53
Q48	0.17	0.03	0.71	0.54
Q70	0	0.39	0.54	0.44
Q71	0.03	0.06	0.65	0.43
Eigen.	12.01	5.54	4.95	
Variance Ex-plained	20.38	9.39	8.40	

Factor 1 indicated that ratio analyses greatly influenced accountants in their materiality decisions. The vignettes loading on this factor emphasized the following and changes therein: (1) earnings per share, (2) working capital, (3) net income, (4) current ratio, (5) cash flow, (6) debt to equity, and (7) market share. When making materiality decisions, accountants assigned importance to the comparison of amounts to a total, or base. Factor 1, with an eigenvalue of 12.01, explained 20.38% of the variance.

Communalities for the variables on factor 1 ranged from a minimum value of .18 for Q12 to a maximum of .59 for Q57. Therefore, in a three factor analysis, the variable Q12 had a large amount (.82) of unaccounted variance. Conversely, Q19, Q34, Q57, Q63, and Q67 left less than half of their total common variances as

unaccounted variance. This indicated that the three factor solution accounted for a large proportion of the variance in those variables which dealt with ratio analysis. Conversely, those solutions accounted for a small proportion of the variance in variables that dealt with competition.

Accountants used a second factor, sensitive areas, in making materiality decisions. The vignettes loading on this factor included: (1) contingent liabilities, (2) loan covenants, (3) related party transactions, (4) bribes, (5) uncollectible receivables, (6) obsolete inventory, and (7) contingent revenue. Historically, accountants have assigned much importance to informational items which often required disclosure. In addition, these subject areas often have required closer examination. Factor 2 had an eigenvalue of 5.54 and explained 9.39% of the variance. Communalities for variables on factor 2 averaged a little lower than the average communality on factor 1.

Accountants utilized a third factor--unrecorded items--in making their materiality decisions. The vignettes loading on this factor included items similar to those loading on factor 2, but at a much lower threshold. Most of factor 3 items, however, related to smaller, unrecorded amounts. Factor 3 had an eigenvalue of 4.95 that explained 8.40% of the variance. Factor 3 explained more common variance for Q10, Q29, and Q48 according to the communality values.

Only one vignette loaded on two factors. Vignette 42, regarding accrued wages payable as a small percentage of total expense, loaded on both factor 2 (sensitive areas), and factor 3 (unrecorded items).

Accountants identified the anticipated amount-to-underlying base relationship factor. They did not identify the anticipated factors of absolute dollar amount and characteristics of the event.

Bankers

Based on the data in Table 4.18, application of the eigenvalue rule of thumb to the correlation matrix for bankers indicated that 35 factors had values in excess of 1.00. The results of a scree test suggested 3 primary factors--combined factors 1, 2, and 3--that accounted for 36.59% of the total variance. Application of the interpretability criteria suggested retention of 3 factors.

Table 4.18

Eigenvalues of the Correlation Matrix-Bankers

Factor	Eigenvalue	Proportion	Cumulative
1	37.58	25.66	25.66
2	8.25	5.64	31.29
3	7.75	5.29	36.59
4	5.87	4.01	40.60
5	4.66	3.18	43.78
6	4.37	2.98	46.76
7	4.14	2.83	49.59
8	3.93	2.68	52.27
9	3.54	2.42	54.69

Table 4.18 (continued)

Factor	Eigenvalue	Proportion	Cumulative
10	3.34	2.28	56.97
11	3.26	2.22	59.19
12	3.03	2.07	61.26
13	2.86	1.95	63.22
14	2.63	1.80	65.02
15	2.48	1.69	66.71
16	2.41	1.65	68.35
17	2.26	1.54	69.90
18	2.11	1.44	71.34
19	2.05	1.40	72.74
20	1.94	1.32	74.06
21	1.85	1.26	75.32
22	1.80	1.23	76.56
23	1.71	1.17	77.73
24	1.68	1.14	78.87
25	1.60	1.09	79.96
26	1.57	1.07	81.03
27	1.49	1.02	82.05
28	1.38	.94	82.99
29	1.32	.90	83.89
30	1.28	.87	84.77

Table 4.18 (continued)

Factor	Eigenvalue	Proportion	Cumulative
31	1.21	.83	85.59
32	1.16	.80	86.38
33	1.09	.75	87.14
34	1.03	.70	87.84
35	1.00	.68	88.52
36	.97	.66	89.18

Table 4.19 reports the results of the rotated factor solution using the VARIMAX method. The study retained three factors: (1) absolute dollar amount, (2) ratio, and (3) characteristics of the event.

Table 4.19**Factor Loadings for Bankers**

Question	Factor 1 Absolute	Factor 2 Ratio	Factor 3 Char.	Communality
Q5	.48	.03	-.11	.24
Q10	.50	.33	.11	.37
Q14	.52	.19	-.11	.32
Q15	.42	.15	.29	.28
Q20	.66	.20	-.03	.48
Q21	.47	-.03	.36	.35
Q23	.48	.17	.01	.26

Table 4.19 (continued)

Question	Factor 1 Absolute	Factor 2 Ratio	Factor 3 Char.	Communality
Q29	.60	.22	.05	.41
Q32	.61	.10	.11	.39
Q33	.61	.25	.22	.48
Q34	.42	.67	.09	.64
Q41	.44	.41	-.15	.39
Q42	.63	.22	.03	.44
Q44	.47	.18	.31	.35
Q47	.55	.22	.37	.49
Q48	.68	.16	.02	.48
Q53	.55	.18	.36	.46
Q54	.44	.30	.26	.35
Q59	.64	.25	.11	.48
Q60	.46	.13	.54	.52
Q65	.49	.17	.18	.31
Q66	.63	.17	.16	.46
Q70	.61	.31	.32	.57
Q71	.62	.19	.29	.50
Q73	.68	.09	.26	.54
Q7	-.03	.51	-.16	.29
Q8	.26	.60	-.08	.43
Q12	-.09	.52	.35	.40

Table 4.19 (continued)

Question	Factor 1 Absolute	Factor 2 Ratio	Factor 3 Char.	Communality
Q16	.05	.43	.28	.27
Q17	.08	.60	.04	.37
Q18	.31	.56	-.01	.41
Q19	.29	.70	.00	.58
Q26	.16	.74	.20	.61
Q27	.24	.55	.13	.38
Q31	.04	.49	.25	.31
Q35	.35	.44	.09	.32
Q36	.11	.65	.05	.43
Q37	.29	.66	.13	.54
Q45	.25	.62	.25	.51
Q50	.15	.43	.18	.24
Q55	.16	.44	.38	.36
Q57	.13	.68	.35	.60
Q61	.34	.52	.05	.39
Q63	.07	.67	.36	.58
Q67	.27	.63	.23	.53
Q72	.32	.63	.29	.58
Q1	-.07	-.03	.41	.17
Q22	.05	.16	.52	.29
Q25	.22	.30	.42	.31

Table 4.19 (continued)

Question	Factor 1 Absolute	Factor 2 Ratio	Factor 3 Char.	Communality
Q38	.14	.21	.47	.28
Q39	.14	.21	.42	.27
Q46	.19	.22	.50	.34
Q49	.36	.28	.43	.39
Q58	.03	-.07	.66	.45
Q62	.23	.15	.52	.35
Q64	-.03	.10	.54	.31
Q68	.17	.13	.62	.43
Q69	.05	.31	.46	.31
Q74	.02	.23	.61	.43
Q75	.26	.22	.52	.39
Eigen.	37.58	8.25	7.75	
Variance Explained	25.66	5.64	5.29	

Factor 1 indicated that bankers' major concerns in making materiality decisions involved the absolute dollar amount under consideration. The vignettes loading on this factor emphasized the following: (1) uncollectible receivables, (2) undervalued assets, and (3) errors in accruals and deferrals which resulted in an error in the amount of net income reported. In other words, bankers assigned much importance to absolute dollar amount when making their materiality decisions. In addition, the assumption

that financial statements accurately reflected results of operations clearly influenced bankers in making their materiality decisions. Factor 1, with an eigenvalue of 37.58, explained 25.66% of the variance.

Communalities for the variables on factor 1 ranged from a minimum value of .24 for Q5 to a maximum of .64 for Q34. Therefore, in a three factor analysis, the variable Q5 had a large amount (.76) of unexplained variance. Conversely, Q34, Q60, Q70, Q71, and Q73 accounted for more than half of their total common variances. This indicated that the three factor solution accounted for the variance in some variables better than in others.

Bankers used a second factor--ratio analysis--in making materiality decisions. The vignettes loading on this factor emphasized the following and changes therein: (1) current ratio, (2) earnings per share, (3) working capital, (4) market share, (5) efficiency in production, (6) debt to equity ratio, and (7) cash flow. Bankers' judgments clearly reflected concern with liquidity and the ability of current and potential creditors to repay their loans. In addition, any changes in the ability of creditors to meet financial obligations influenced bankers' materiality decisions. Factor 2 had an eigenvalue of 8.25 and explained 5.64% of the variance. Communalities for variables on factor 2, on average, approximately equaled the average communality on factor 1.

Bankers used a third factor--characteristics of the event--in making their materiality decisions. The vignettes which loaded on this factor involved (1) contingent liabilities, (2) contingent revenues, (3) related party transactions,

(4) auditor changes, and (5) intentional errors which resulted in an overstatement of net income. Factor 3, with an eigenvalue of 7.75, explained 5.29% of the variance. Communalities for variables averaged approximately 10% less on factor 3 than on factors 1 and 2.

Three of the vignettes loaded on two factors. Vignette 34 (regarding a decrease in earnings per share) loaded on both factor 1 (absolute dollar amount) and factor 2 (ratio analysis). Vignette 41, which included a debt to equity ratio less than the industry average, also loaded on both factors 1 and 2. Vignette 60, considering related party transactions as a percentage of net income, loaded on both factor 1 (absolute dollar amount) and factor 3 (characteristics of the event). Bankers identified the anticipated factors of the relationship of amount to underlying base, absolute dollar amount, and characteristics of the event.

In summary, factor analyses did achieve the objective of data reduction and summarization. Accountants and bankers reduced the 75 original variables under consideration to three variables that influenced their decision-making processes. The results of these factor analyses showed consistency with prior observations by FASB and others--such as Pattillo and Siebel (1974) and Krogstad, Ettenson and Shanteau (1984)--that materiality had both qualitative and quantitative dimensions. The results provided insight into the respondents' perceptions of materiality decisions; additionally, they indicated that bankers and accountants used different factors in their materiality decisions. These findings agreed with Pattillo and Siebel (1974) who

indicated that criteria generally applied by users differed from those applied by preparers. The final section of this chapter presents the results of concept map use.

Concept Maps

As final research objective this study used individual conceptual maps to determine if materiality decision cognitive processes of users differed from those of preparers. Additionally, the study sought to determine whether experience exerted any influence over the process.

Prior conceptual map research by Lord et al. (1994) in the area of psychology influenced the study design. This study compared the concept maps of preparers and users on the basis of number of nodes, depth of nodes, number of first order associations, and categories.

The model assigned nodes from the individual conceptual maps to one of the following categories: (1) determinant factors, (2) characteristics of the environment, (3) characteristics of the firm, (4) characteristics of the event or judgment item, (5) characteristics of the accounting system or policies in use, (6) miscellaneous, and (7) source of the information. Categories one through five, in part, reflected the presentation in Appendix B of the FASB's Discussion Memorandum "Criteria for Determining Materiality" (1975) and that suggested by Pattillo, Morris and Nichols (1983) and Chong (1992). Category six included those participant-defined nodes which did not relate to the other categories. Some examples of items coded as category 6 included "planning, "losing license," "I'm canned," "why needed,"

“confusing language,” “stress,” and “lack of understanding.” The study added Category 7 because many of the bankers indicated that they regarded the source of the information as very material. The bankers expressed concern about who did the work, their reputation, and audit extent.

Appendix C contains an example of the concept maps used in this research. This map identified 28 nodes, with a maximum depth of three nodes (1, risk; 2, embarrassment risk; and 3, client perception). The research identified eight first order associations as follows: (1) risk, (2) nature of the client, (3) engagement personalities, (4) audit relevance, (5) technical literature, (6) audience, (7) client's definition of materiality, and (8) time constraints. The “1” written by risk indicates that risk was the first item written on the map. An item classified in this study as risk category 4 (characteristics of the event or judgment) had a first order association of four.

The study sorted the items indicated on the concept map into the seven categories explained above as follows. Only one item, financial assertions, qualified as a determinant factor. Characteristics of the environment included industry norms, guidelines, FASB, SEC, Reg S-X, audience, client perceptions, and client definition. Nature of client, internal controls, continuity of staff, credentials of client personnel, solvency, cost benefit, and industry trend served as characteristics of the firm. Characteristics of the event or judgment item consisted of audit areas, audit relevance, risk, time constraints, adequate staffing, financial statement risk, and embarrassment risk. The "other" category covered engagement personalities, team education, team experience, and years on the job. No items from this particular map qualified as

characteristics of the accounting system or policies in use and source. These coding classifications applied to all other concept maps.

A graduate assistant at Louisiana Tech University performed accuracy and consistency checks on the researcher's coding of nodes into these categories. The same graduate assistant checked the coding of nodes for both accountants and bankers. This process resolved the few inconsistencies noted in the coding.

Descriptive Statistics **Concept Maps**

Table 4.20 provides a summary of the concept maps of accountants. Table 4.21 provides a summary of the concept maps of bankers.

Table 4.20

Concept Maps of Accountants

Measure	Means	SD
Mean Nodes in Map	16.56	7.42
Number of First- Order Associations	5.05	3.48
Depth of Nodes	2.32	0.87
First-Order Association	1.04	1.43
Determinant	4.30	3.09
Characteristics of Environment	3.00	3.38
Characteristics of Firm	1.68	2.45
Event or Judgment	5.48	3.47
Accounting System	0.5	0.95

Table 4.20 (continued)

Measure	Means	SD
Miscellaneous	0.99	1.53
Source of Information	0.61	1.13

Table 4.21**Concept Maps of Bankers**

Measure	Means	SD
Mean Nodes in Map	14.13	8.93
Number of First-Order Associations	3.88	1.6
Depth of Nodes	2.45	1.05
First-Order Association	2.22	2.36
Determinant	4.76	6.31
Characteristic of Environment	0.21	0.55
Characteristic of Firm	2.79	2.86
Event or Judgment	0.98	1.36
Accounting System	1.01	1.71
Miscellaneous	2.4	4.5
Source of Information	1.97	2.67

MANOVA

MANOVA compared the materiality concept maps of CPAs with those of bankers. It employed the following mathematical model:

$$Y_{ijk} = \mu + A_i + B_j + (AB)_{ij} + \Sigma_{ijk}$$

where

Y_{ijk} = Dependent variables (categories, number of nodes, number of first order associations, and depth of nodes),

μ = Grand mean,

A_i = Profession effect at two levels, accountants and bankers,

B_j = Experience effect at three levels, three years or less, more than three and less than nine years, and nine years or more,

$(AB)_{ij}$ = Interaction effect,

and

Σ_{ijk} = Multivariate normal error term.

Test For Interaction

Table 4.22 shows MANOVA results on the interaction of profession and experience in the materiality cognitive process. Both of the test statistics indicated that the interaction of profession and experience did not have significant effects on the materiality cognitive process. Therefore, the study did not reject the null hypothesis, H_4 , of no significant interaction effects among experience and job classification in materiality cognitive process.

Table 4.22**MANOVA Results on Conceptual Maps-Interaction
of Profession and Experience**

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.9084	1.0235	20	416	0.4325
Hotellings - Lawley Trace	0.0991	1.0262	20	414	0.4293

Test for Main Effects

Upon finding no interaction, the model then tested for main effects. Table 4.23 shows the MANOVA results on profession. Both test statistics indicated that profession had a significant effect, at the .0001 level, on the materiality cognitive process. Therefore, the study rejected the null hypothesis, H_0 , of no significant difference in the materiality cognitive processes of bankers and accountants.

Table 4.23**MANOVA Results on Conceptual Maps-Profession**

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.6593	10.7499	10	208	0.0001
Hotellings - Lawley Trace	0.5168	10.7499	10	208	0.0001

Table 4.24 presents the MANOVA results on experience. Both of the test statistics indicated that experience did not have a significant effect on the materiality

cognitive process. Therefore, the null hypothesis, H_0 , that experience level does not significantly affect materiality cognitive process, is not rejected.

Table 4.24

MANOVA Results on Conceptual Maps-Experience

Test Name	Value	F	Num DF	Den DF	Pr > F
Wilks' lambda	0.9137	0.9605	20	416	0.5099
Hotellings - Lawley Trace	0.0926	0.958	20	414	0.5131

Differences on Concept Maps

Table 4.25 displays the areas of statistically significant differences--as indicated by the Bonferroni method--between the concept maps of accountants and bankers at an alpha level of .05.

Table 4.25

Analysis of Concept Maps of Accountants and Bankers Using Bonferroni Method

Measure	Accountants	Bankers
Mean Nodes in Map	*	
Number First-Order Assoc.	*	
First-Order Associations		*
Characteristics of Env.	*	
Characteristics of Firm		*

Table 4.25 (continued)

Measure	Accountants	Bankers
Event or Judgment	*	
Accounting System		*
Miscellaneous		*
Source of Information		*

Cognitive maps differed in appearance. Conceptual maps of accountants included a significantly larger number of nodes. Accountants indicated a mean number of 16.56 nodes on their maps, while bankers noted a mean number of 14.13 nodes. These results suggested that accountants considered more items than bankers in their cognitive process of determining materiality decisions.

In addition, the accountants noted significantly more first order associations. First order associations represented the first divisions of knowledge structures used to index and categorize objects and events quickly, define a set of expectations, and suggest appropriate responses. The accountants used a mean of 5.05 first order associations in depicting their materiality cognitive process, while bankers used only a mean of 3.88. These findings suggested that accountants employed a larger, more developed, and more categorized schema than did bankers in their cognitive process of determining materiality decisions.

Bankers exhibited a mean depth of 2.45 nodes, while accountants had a mean depth of only 2.32 nodes. The results indicated that even though bankers had slightly more depth to their maps, the depth of the nodes did not differ significantly.

The first order associations (or the first categories) that the professions used in developing their concept maps differed significantly. However, this difference did not completely lend itself to interpretation. The study assigned numbers one through seven to the categories. The first nodes indicated on each map had code numbers corresponding to those particular categories. The means of 1.04 for accountants and 2.22 for bankers indicated that accountants noted determinant factors as their first thought more frequently than did bankers.

The study found significant differences in classification of nodes into categories. Additionally, it found no significant difference between the professions in the use of the determinant factors category. This category included the dollar amount of the judgment item or the judgment item as a percentage of some base. Bankers indicated a mean number of 4.76 determinant factors, while accountants indicated a mean number of only 4.30. These results suggested that although accountants employed the determinant factors earlier in the materiality cognitive process, bankers employed a larger number of determinant factors in their materiality cognitive process.

The study found a significant difference in the characteristics of the environment category. This category included political, economic, industrial, regulatory, and needs (and expectations) of financial statement users. As expected, accountants had a significantly larger mean (3.00) than did the bankers (0.21).

Accountants' cognitive materiality decisions reflected concern for the needs and expectations of financial statement users. Our litigious society had enhanced this concern.

Characteristics of the firm included competitive situation, age, ownership interests, public image, management's capabilities, liquidity, and solvency. The professions significantly differed in use of the firm characteristics category. Bankers indicated a mean number of 2.79 firm characteristic nodes, while accountants indicated a mean number of only 1.68. In making materiality decisions, bankers concerned themselves with a particular firm and its characteristics.

Professions differed significantly in their cognitive maps for characteristics of the event or judgment item. This category included items such as timing, discretionary or nondiscretionary actions of management, related parties, illegal acts, and mathematical errors. This category occurred a mean number of 5.48 times on the accountants' conceptual maps of materiality decisions and only a mean number of 0.98 times on the bankers'. This suggested that accountants concerned themselves more than bankers with characteristics of the event or judgment item in making their cognitive materiality decisions.

Characteristics of the accounting system and policies used included such items as variations from generally accepted accounting principles, consistency, comparability, and disclosure of accounting policies in use. Bankers had a mean number of 1.01 nodes, and accountants had a mean number of only 0.50 nodes. The results indicated a statistically significant difference in the professions on the category

characteristics of the accounting system. This suggested that bankers concerned themselves more than accountants with the accounting system and policies used when making their cognitive materiality decisions.

The miscellaneous category represented nodes from the materiality concept maps of accountants and bankers which could not be coded into any other category. Although the results indicated a statistically significant difference in the concept maps of the professions, this difference did not lend itself to interpretation.

The of source of information category accommodated emphasis by bankers on that item's importance to their materiality decisions. Bankers indicated a mean of 1.97 nodes; this differed significantly from the mean of 0.61 nodes indicated by accountants. Bankers considered the source of information an important component in their cognitive materiality decisions.

Table 4.26 indicates the homogeneity of the professions regarding thought. The table shows by profession the frequency of the categories shown on the conceptual maps. In addition, it indicates the percentage of each profession that noted each category on its maps. Accountants noted the category dealing with the event or judgment most frequently. One hundred thirteen (or 95%) of the accountants include this category on their maps, while only 50 (or 48.1%) of the bankers included this category on their maps. The category noted most frequently--81 times--by the bankers concerned the determinant. Accountants also deemed the determinant category important, because 110 (or 92.4%) of them included this category on their conceptual maps.

Table 4.26
Categories by Profession

Category	Accountants	Bankers
Determinant	110 92.4%	81 77.9%
Characteristics of Environment	87 73.1%	16 15.4%
Characteristics of Firm	68 57.1%	78 75.0%
Event or Judgment	113 95.0%	50 48.1%
Accounting system	37 31.1%	50 48.1%
Miscellaneous	56 47.1%	54 51.9%
Source of Information	37 31.1%	60 57.7%

Chapter 5 discusses conclusions drawn from this research. It also analyzes implications and contributions of the research, and it suggests areas for future research.

CHAPTER 5

DISCUSSION AND IMPLICATIONS OF FINDINGS

Materiality judgment constitutes a central concept in the application of accounting principles. Yet, no one has yet developed a clear definition of materiality. This research has examined factors which one group of accountants and two groups of bankers used in their materiality decisions.

Accountants have often attempted to place themselves in the position of the financial information user in order to judge whether a item passed over the threshold of materiality. This research has presented evidence that bankers and accountants differed in their materiality decisions, the factors used in those materiality decisions, and materiality cognitive processes. This chapter summarizes and discusses the results of that research. It also presents implications of the findings, limitations of the research, contributions of the research, and suggestions for future research.

Summary and Discussion of the Findings

As its primary objective, this research has attempted to determine if users and preparers differed in their concepts of materiality. As its second objective, it has sought to determine the factors used in materiality judgments. The researcher collected the data while attending a graduate and undergraduate class of the American

Banking Association's National Commercial Lending School and a training session of one of the Big Six accounting firms.

The study found that profession had a very significant effect on materiality decisions. In all cases but one, bankers assigned more materiality than did accountants to every vignette. The single exception concerned a decrease in working capital to a level of less than that required by loan covenants.

Experience proved to have had only marginal significance in materiality decisions. With only one exception, however, those with more experience considered every item to be more material than did those at other experience levels. The exception concerned a postponement of an obsolete inventory write-down. On this particular vignette the significant experience difference occurred between the group with the least experience and the group with the midlevel of experience. This indicated that the group with the most experience had the lowest threshold of materiality, while the group with the least experience had the highest threshold of materiality.

Factor analyses achieved the objective of data reduction and summarization by reducing the number of factors from the 75 original variables to 3 for both accountants and bankers. However, the two groups did not use the same factors. Accountants identified the following critical factors: (1) ratio, (2) sensitive areas, and (3) unrecorded items. When making materiality decisions, accountants expressed concern about comparisons of amounts to a total or base, important items which required disclosure, and unrecorded items.

Bankers identified the following key factors: (1) absolute dollar amount, (2) ratio, and (3) characteristics of the event. When making materiality decisions, bankers showed concern for absolute dollar amounts, ability of clients to repay loans, and specific characteristics of the event.

The factor analyses results agreed with prior observations by FASB and others that materiality had both qualitative and quantitative dimensions. In addition, the results may have indicated that bankers used different factors in making their materiality decisions than did accountants.

Profession had a significant effect on the materiality cognitive process. Accountants used a cognitive process with more nodes and significantly more first order associations. In other words, accountants had larger, more developed, and more categorized cognitive maps for materiality decisions than did bankers. In addition, accountants had significantly higher emphasis on items included in characteristics of the environment and characteristics of the event or judgment. Alternatively, bankers showed more concern with characteristics of the firm, characteristics of the accounting system, and source of information. Experience did not prove to have a significant effect on the materiality cognitive process.

Implications of the Findings

Accountants appeared to have a greater depth of understanding relative to materiality as evidenced by their larger, more developed, and more categorized cognitive maps. Bankers tended to concentrate on fewer items and those of a more

determinant nature. In addition, bankers exhibited much concern about the source of the data. Bankers seemed to follow more specific or learned procedures in making materiality decisions; accountants appeared more concerned with the situation that caused the materiality decision.

Factor analysis revealed that bankers tended more toward superficiality in their materiality decisions; bankers seemed to focus on the absolute, the way things were. Because of this rule-based materiality decision-making, bankers had a lower threshold of materiality than accountants. Accountants appeared to focus on the cause of the materiality decision, regardless of the manner of information presentation.

The results indicated that bankers had lower materiality thresholds than accountants. In making their materiality decisions, however, bankers used financial statements provided by accountants and based on the accountants' higher threshold of materiality. Since users appeared to have a lower materiality threshold than preparers, financial statements may not have adequately fulfilled their needs. This difference in materiality thresholds could lead to future problems in interpreting and comparing financial statements, especially if financial statement users do not understand the very subjective nature of determination.

Financial statement preparers and users need to communicate better with each other. One banker participant suggested that accountants should "prepare statements with meaningful information for the banker." Several other bankers commented on the "confusing language" or the "new language used each year." One banker suggested that accountants "should walk a mile in my shoes."

Currently, except in rare cases, no authoritative standards guide the determination of materiality for disclosure purposes. The definition of materiality by the SEC, the Supreme Court, and the FASB have one flaw in common; they all approach materiality from the viewpoint that accountants who produce financial statements can determine what would change the users' decisions or actions.

Accountants often have a higher threshold of materiality than users; they may need some guidance in the form of materiality standards to increase the usefulness of financial statements and adequately fulfill users' needs. This materiality guidance might or might not take the form of explicit and rigid materiality standards. A universal definition of materiality, or guidelines for disclosure of materiality levels used, however, certainly could have an impact on the profession.

Limitations of the Research

The sample of accountants and bankers chosen to participate in this study may or may not have truly represented their respective universes. However, both professional groups represented a national survey as indicated by the demographic data. Additionally, age differentials between accountants (mostly 20 to 29 years old) and bankers (mostly 30 to 39 years old) may have limited the validity of the research.

Participant experience differentials may have imposed a further limitation. The majority of the accountants had three years or less experience, while the majority of the bankers had nine or more years experience.

As yet another limitation, the model did not explain everything; it covered only seven categories. One of those categories, "miscellaneous," did not lend itself to interpretation. In addition, the first order association posed interpretation difficulties.

The questionnaire of vignettes concerning materiality decisions possibly caused a methodological limitation. With no proven materiality decision measurement instrument available, the researcher developed the questionnaire specifically to elicit information for this research. These vignettes addressed several materiality decision areas with amounts at, or very near, the bottom thresholds of materiality. Those thresholds resulted from a review of the literature. Other factors that affected vignette development included the Foreign Corrupt Practices Act, environmental liabilities, undisclosed liabilities, technological competition, related party relationships, human asset accounting, and goodwill.

Finally, the subjects did not make actual decisions; rather, they responded to a questionnaire. Their actual materiality decisions under real world conditions might differ from their questionnaire responses.

Contributions of the Research

A comparison of the maps may serve usefully in explaining differences due to varying levels of professional experience. Hopefully they will furnish insights into where and how professional judgment develops. Cognitive research seeks to understand the transfer of expert knowledge to novices, and it attempts to develop decision aids that will help novices perform like experts. Understanding the

differences in knowledge organization between experts and novices should assist researchers in accomplishing these goals. In addition, the comparison may indicate areas of incomplete education.

The comparison of the concept maps of CPAs with the concept maps of bankers should provide insight into the causes of the difference in materiality decisions. This study should provide a better understanding of the materiality decisions made by both groups; this could lead to better and more meaningful communication in this area.

In simple terms, this research does not try to establish materiality thresholds. However, this research should provide additional insight into the factors affecting materiality decisions; these factors may prove useful in training inexperienced accountants in materiality decisions. This research has extended existing information on materiality decisions. It has reported the factors used by accountants and bankers in making their materiality decisions. In addition, it has reported on the cognitive materiality decision making process.

As a profession, accountants have largely side-stepped the issue of materiality. In fact, accountants have yet to develop a basic concept of materiality as it relates to disclosures. However, materiality makes a difference in terms of how others view the usefulness of accounting information. In addition, materiality makes a difference from a legal standpoint.

Previously, accountants and bankers have not treated materiality as a behavioral problem. This study suggests that they should.

This research introduced attitude concept maps as a technique for obtaining valuable information about the cognitive structure of an individual's attitude toward materiality decisions. It offered insights into several aspects of the materiality decision making process, those insights included the number of nodes devoted to specific topics and the depth of elaboration in the map; they might contribute toward determining attitude-behavior consistency or the likelihood of attitude change in the future.

The results indicated that bankers had a lower threshold of materiality than accountants. This suggests a need to emphasize materiality decisions in instruction. In addition, the study results indicated a need for accountants to adequately communicate--in a concise and timely manner--the information required by bankers for their materiality decision making.

Suggestions for Future Research

This research utilized personnel of one of the Big Six accounting firms. Future research might extend an understanding of materiality by including personnel of other Big Six and medium-to-smaller sized accounting firms.

Other professions frequently have concerns with materiality decisions and the results thereof. Future research might extend knowledge in the materiality area to other professional groups such as judges, lawyers, and financial analysts.

This research has represented an exploratory effort in the field of conceptual maps used in cognitive materiality decisions. A follow-up study with a more detailed

coding of responses from the individual conceptual maps should enhance research in cognitive materiality decisions.

APPENDIX A

SURVEY INSTRUMENT

DEMOGRAPHICS

Which one item most accurately describes your area of practice?

1. Audit
 2. Tax
 3. MAS
 4. Other

_____ Years in profession

_____ Sex

Please indicate the highest level of education attained.

1. Some college
 2. Bachelors
 3. Masters
 4. Ph.D
 5. JD

_____ Age

_____ State of residence

Please fill the circle next to the one item that most accurately describes your professional position.

1. Staff
 2. Senior
 3. Supervisor
 4. Manager
 5. Partner (shareholder)

DEMOGRAPHICS

Which one item most accurately describes your area of practice?

1. Commercial Bank Lending
 2. Real Estate Lending
 3. Credit Card Lending

Please indicate all banking schools attended.

1. American Bankers Assoc.
 2. American Institute of Banking
 3. Others (please list)

_____ Years in profession

_____ Sex

Please indicate the highest level of education attained.

1. High School
 2. Some College
 3. Bachelors
 4. Masters
 5. Ph.D
 6. JD

Please fill in circle next to the one item that most accurately describes your professional position.

1. Staff
 2. Lending Officer
 3. Department Supervisor
 4. Vice President
 5. President

_____ Age

_____ State of residence

QUESTIONNAIRE

Please indicate your opinion on the seven point scale by filling in the appropriate circle. Complete the questionnaire quickly with the responses that first come to mind.

Very Immaterial		Very Material	
⊖	⊖	⊖	1. Changed auditors.
⊖	⊖	⊖	2. Company provides janitorial services to an affiliated company at no charge. The value of these services is estimated to be 9% of net income.
⊖	⊖	⊖	3. Contingent liability related to an illegal act.
⊖	⊖	⊖	4. Auditors discovered that sales were intentionally overstated.
⊖	⊖	⊖	5. Unearned revenues representing 1% of net income are not booked.
⊖	⊖	⊖	6. Earnings changed by 5% same year that we changed auditors.
⊖	⊖	⊖	7. Current ratio of .95: 1.
⊖	⊖	⊖	8. Earnings per share increased by 5%.
⊖	⊖	⊖	9. A \$5,000 account receivable from a customer is deemed to be uncollectible. The balance in accounts receivable is \$110,000.
⊖	⊖	⊖	10. \$2,500 of accrued wages payable was not booked.
⊖	⊖	⊖	11. A close relative of company president is a company officer of a major customer.
⊖	⊖	⊖	12. Competitor has developed a more efficient method which reduces production cost by 20%.
⊖	⊖	⊖	13. Contingent liability in the amount of \$100,000.
⊖	⊖	⊖	14. An operational asset with a cost of \$4,500 and an estimated useful life of 5 years was expensed when purchased.
⊖	⊖	⊖	15. Accrued wages payable, equal to 8% of total liabilities, were not booked.
⊖	⊖	⊖	16. Loan covenants require a working capital of \$1 million.
⊖	⊖	⊖	17. Current ratio of .95: 1. Last year was .5: 1.
⊖	⊖	⊖	18. Net income decreased 5% from last year; economy decreased 3%.
⊖	⊖	⊖	19. Working capital increased 6%.
⊖	⊖	⊖	20. \$2,500 of accrued wages payable not booked. Net income is \$60,000.
⊖	⊖	⊖	21. Write-down of obsolete inventory, representing 8% of inventory, was postponed until next year.
⊖	⊖	⊖	22. Contingent revenue in the amount of \$1,000,000.
⊖	⊖	⊖	23. Undervalued asset.
⊖	⊖	⊖	24. Company recently purchased new computer system.
⊖	⊖	⊖	25. A close relative of company president is a company officer of a major customer. The customer has a \$1,000,000 line of credit.

Very Immaterial	Very Material	
① ② ③ ④ ⑤ ⑥ ⑦		26. Earnings per share increased 10% over last year.
① ② ③ ④ ⑤ ⑥ ⑦		27. Current ratio of 2: 1.
① ② ③ ④ ⑤ ⑥ ⑦		28. Bribe to a foreign official of \$100,000 (which is less than 1% of net income) was made.
① ② ③ ④ ⑤ ⑥ ⑦		29. \$4,000 inventory write-down due to obsolescence was postponed until next year.
① ② ③ ④ ⑤ ⑥ ⑦		30. Company purchases 20% of its supplies from a single source.
① ② ③ ④ ⑤ ⑥ ⑦		31. Competitor has developed a more efficient method of production.
① ② ③ ④ ⑤ ⑥ ⑦		32. Related party transactions in which the amounts are 4% of related balance sheet accounts.
① ② ③ ④ ⑤ ⑥ ⑦		33. An account receivable, which totals 4% of net income, is deemed to be uncollectible.
① ② ③ ④ ⑤ ⑥ ⑦		34. Earnings per share decreased by 5%.
① ② ③ ④ ⑤ ⑥ ⑦		35. Human assets, not currently recognized on financial statements, increased 10% this year.
① ② ③ ④ ⑤ ⑥ ⑦		36. Current ratio of .95: 1. Last year was 1.2: 1.
① ② ③ ④ ⑤ ⑥ ⑦		37. Cash flow per share increased 10% over last year.
① ② ③ ④ ⑤ ⑥ ⑦		38. Related party transactions in the amount of \$500,000.
① ② ③ ④ ⑤ ⑥ ⑦		39. Contingency in which the corporation is suing another corporation for patent infringement, and the probability of winning the suit is very high.
① ② ③ ④ ⑤ ⑥ ⑦		40. Auditors discovered that sales were intentionally overstated by 1%.
① ② ③ ④ ⑤ ⑥ ⑦		41. Debt to equity ratio of .55. Industry average is .6.
① ② ③ ④ ⑤ ⑥ ⑦		42. Accrued wages payable, equal to 2% of total expenses, are not booked.
① ② ③ ④ ⑤ ⑥ ⑦		43. Company purchases 20% of its supplies from a single source. Company does not require competitive bidding for purchases.
① ② ③ ④ ⑤ ⑥ ⑦		44. Contingent revenue.
① ② ③ ④ ⑤ ⑥ ⑦		45. Competitor takes 5% of our market share (this equates to a 1.5% drop in net income).
① ② ③ ④ ⑤ ⑥ ⑦		46. Contingent liability related to the environment.
① ② ③ ④ ⑤ ⑥ ⑦		47. An account receivable, which totals 4.5% of total accounts receivable, is deemed to be uncollectible.
① ② ③ ④ ⑤ ⑥ ⑦		48. \$4,000 of unearned revenues not booked.
① ② ③ ④ ⑤ ⑥ ⑦		49. \$54,000 inventory write-down due to obsolescence was postponed until next year. Inventory was \$550,000.
① ② ③ ④ ⑤ ⑥ ⑦		50. Loan covenants require a working capital of \$1 million. Working capital at the end of year was \$990,000 as compared to \$1,200,000 at end of last year.

Very Immaterial		Very Material	
①	②	③	④
⑤	⑥	⑦	
			51. Current ratio of .95: 1. Industry average is .9: 1.
①	②	③	④
⑤	⑥	⑦	
			52. Nonpurchased (unrecorded) goodwill in the amount of \$500,000 which is 5% of total assets.
①	②	③	④
⑤	⑥	⑦	
			53. Contingent revenue in an amount equal to 4% of net sales.
①	②	③	④
⑤	⑥	⑦	
			54. Assets undervalued by \$175,000.
①	②	③	④
⑤	⑥	⑦	
			55. Company purchased new computer system. On the next day major technological changes in the computer industry were announced.
①	②	③	④
⑤	⑥	⑦	
			56. Company provides janitorial services to an affiliated company at no charge.
①	②	③	④
⑤	⑥	⑦	
			57. Earnings per share decreased 10% over last year.
①	②	③	④
⑤	⑥	⑦	
			58. Contingent liability in the amount of \$100,000 related to illegal act.
①	②	③	④
⑤	⑥	⑦	
			59. Asset undervalued by 4%.
①	②	③	④
⑤	⑥	⑦	
			60. Related party transactions which total 5% of net income.
①	②	③	④
⑤	⑥	⑦	
			61. Working capital is \$2,500,000. Industry average is \$2,200,000.
①	②	③	④
⑤	⑥	⑦	
			62. Auditors discovered that sales were intentionally overstated by 1%. Company decides to change auditors due to differences of opinion.
①	②	③	④
⑤	⑥	⑦	
			63. Company increased its market share by 10%. (This equates to a 4% increase in net income).
①	②	③	④
⑤	⑥	⑦	
			64. Auditor changed, due to lack of cooperation on last year's audit.
①	②	③	④
⑤	⑥	⑦	
			65. An operational asset (representing 3.5% of total assets) and having an estimated useful life of 5 years was expensed as incurred.
①	②	③	④
⑤	⑥	⑦	
			66. Obsolete inventory write-down, representing 4% of net income, was postponed until next year.
①	②	③	④
⑤	⑥	⑦	
			67. Debt to equity ratio increased by 4% over last year.
①	②	③	④
⑤	⑥	⑦	
			68. Auditors discovered that sales were intentionally overstated by \$100,000.
①	②	③	④
⑤	⑥	⑦	
			69. Company purchases 20% of its supplies from a single source. The supplier is run by a close relative of the owner of company.
①	②	③	④
⑤	⑥	⑦	
			70. \$2,500 of accrued wages payable not booked. \$2,500 is 4.2% of net income.
①	②	③	④
⑤	⑥	⑦	
			71. A \$5,000 account receivable from a customer is deemed to be uncollectible.
①	②	③	④
⑤	⑥	⑦	
			72. Cash flow per share decreased by 5%.
①	②	③	④
⑤	⑥	⑦	
			73. Unearned revenues representing 2% of total sales are not booked.
①	②	③	④
⑤	⑥	⑦	
			74. A close relative of company president is a company officer of a major customer. Customer account balance represents 40% of accounts receivable.
①	②	③	④
⑤	⑥	⑦	
			75. Contingent revenue in the amount of \$100,000, or 6% of net income.

APPENDIX B

MATERIALITY DECISION CATEGORIES

Determinant Factors

1. Dollar amount of the judgment item
2. Judgment item as a percentage of sales
3. Judgment item as a percentage of gross margin
4. Judgment item as a percentage of income before extraordinary items
5. Judgment item as a percentage of net income
6. Judgment item as a percentage of assets
7. Judgment item as a percentage of liabilities
8. Judgment item as a percentage of stockholder's equity
9. Judgment item as a percentage of its account total
10. Judgment item as a percentage of its category total
11. Judgment item as a percentage of its classification total

Characteristics of the Environment

1. Political - nation and world
2. Economic - nation and world
3. Industrial - nation and world
4. Firm's position in its industry
5. Business practices and customs
6. Regulatory requirements
7. Income tax considerations
8. Needs and expectations of users of financial statements

Characteristics of the Firm

1. Age and maturity of the firm
2. Capitalization structure
3. Seasonal nature of its operations
4. Competitive situation
5. Geographical dispersion of operations
6. Integrated nature of the operations
7. Diversity of suppliers and customers
8. Ownership interests and diversity
9. Cost of gathering and presenting data compared to the relative benefit
10. Public image of the firm
11. Management's capabilities and public credibility
12. Liquidity - short run and long run
13. Solvency - short run and long run
14. Profitability - short run and long run, and trends
15. Profitability - prospects for the future
16. Organizational structure

Characteristics of the Event or Judgment Item

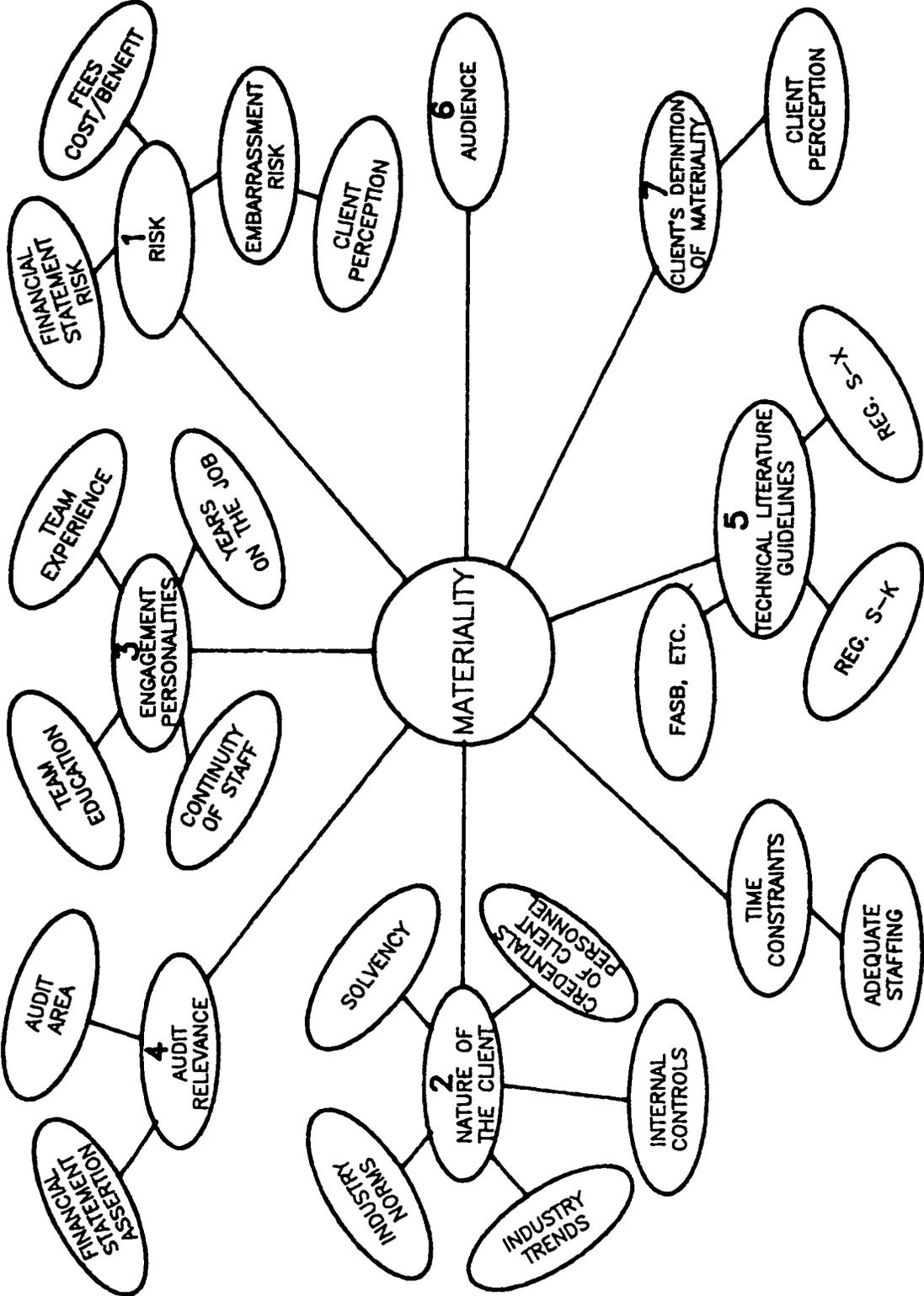
1. Timing - current effect of future effect
2. Timing - onetime effect or continual effect
3. Result of discretionary or nondiscretionary action of management
4. Result of temporary or permanent condition
5. Related-party or arm's length transaction
6. Potential for violation of certain agreements
7. Potential for violation of certain laws
8. Result of mathematical error or actual event
9. Nature of the event or judgment item
10. Potential for manipulation of earnings
11. Relationship to normal operations
12. Certainty with respect to ultimate realization of assets or liquidation of liabilities
13. Effect of the existence of other similar judgment items
14. Effect of the existence of other dissimilar judgment items

Characteristics of the Accounting System of Policies Used

1. Selection of "liberal" or "conservative" accounting policies
2. Extent of variation from general accepted accounting principles
3. Extent of variation from accepted industry practice
4. Consistency of application of policies
5. Comparability of resulting information
6. Effect of subsequent events
7. Extent and specificity of disclosure of accounting policies in use

APPENDIX C

EXAMPLE OF CONCEPT MAP



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