Symposium on Auditing Research

By an Audit Group at the University of Illinois at Urbana-Champaign

Department of Accountancy
University of Illinois at Urbana-Champaign
## PARTICIPANTS

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<td>A. Rashad Abdel-Khalik</td>
<td>Duke University</td>
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<tr>
<td>Andrew Bailey</td>
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<td>C. Richard Baker</td>
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<td>Michael Barrett</td>
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<td>Douglas R. Carmichael</td>
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<td>John H. Myers</td>
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<td>William E. Perry</td>
<td>Institute of Internal Auditors</td>
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<td>Philip Reckers</td>
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<td>Jack C. Robertson</td>
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### CO-DIRECTORS

- Phillip E. Fess
- Frederick L. Neumann
- Joseph J. Schultz, Jr.
- Belved E. Needles, Jr.
- Soong H. Park
- Richard E. Ziegler

The department is grateful for the financial support provided by the Price Waterhouse & Co. Foundation.
Symposium on Auditing Research

By an Audit Group at the University of Illinois at Urbana-Champaign

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University of Illinois at Urbana-Champaign
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Preface

These papers and discussants’ responses were presented November 11 and 12, 1976, at the second Symposium on Auditing Research held at the University of Illinois at Urbana-Champaign. With society’s increasing demand for accountability, auditors are finding increasing responsibilities and more complex challenges. This has fostered a renewed interest in auditing and, with it, expanded research. The breadth of the topics at Symposium II symbolizes this increasing interest in audit research and reflects its extent.

Moreover, it recognizes the combined concern in this area of academicians and practitioners. Papers and discussants have come from both groups. This provides evidence that joint efforts are possible and needed if this new thrust is to be successful in its efforts to respond to unanswered questions through research.

The symposium consisted of the presentation of five research papers and two papers about research. There were discussants to each of the research presentations and to one of the other papers. Another presentation, which was made by D. R. Carmichael, Director of Research of the American Institute of Certified Public Accountants, with regard to the work of the Commission on Auditors’ Responsibilities, is not included, at his request, as its tentative findings have subsequently been published.
The role of auditing in our society continues to expand and we are again gratified by the sensitivity of the faculty of the Department of Accountancy to this development which has resulted in the second Illinois Symposium on Auditing Research.

As administrators we appreciate the many hours and effort of the Audit group at Illinois in developing and arranging for this discussion at the leading edge of auditing research. The practitioners and academicians who contributed so much to the clarification of issues and examination of innovative proposals provided an organized perspective of the many new developments in the entire field. It is highly appropriate that these symposia be repeated periodically and the support of faculty of the Department of Accountancy for this type of endeavor will do much to bridge the gap between practice and academic thinking and provide for critical evaluations of creative and exploratory research. Such should lead to the orderly and rapid development of both the auditing discipline and the scope of its applicability to solution for the problems arising from an increasingly complex society.

As societies increase in size, develop greater and greater internal interdependencies, and utilize more and more sophisticated physical and social technologies, it seems that the need for auditing
necessarily grows more rapidly as the society seeks to maintain itself on a systematic program of development. Developments in statistical sampling, computer auditing, and performance auditing indicate that auditing has kept pace in the past and the success of symposia such as this suggest that it will keep up with, and contribute to, the future development of a coordinated, efficient, and stable sophisticated society. This opportunity alone provides mute testimony of the relevance of this symposium to human progress. We are pleased to be associated with such a worthy endeavor and honored by association with the leading auditing thinkers gathered together for this Symposium at Illinois.

In particular, we wish to acknowledge the financial support of the Price Waterhouse & Co. Foundation which made this symposium possible.

We are pleased to share the results of this symposium with you.

NortoM M. Bedford, Head
Department of Accountancy

V. K. Zimmerman, Dean
College of Commerce and Business Administration
session

ONE
The Roles for Research and Development in Auditing

ROBERT S. KAPLAN

Interest in auditing research has undergone a dramatic increase in recent years. More academics are working on auditing problems and more practitioners are encouraging and supporting auditing research. Easily observable manifestations of this phenomenon are available from the large number of conferences exclusively devoted to auditing research and the generous program of support. "Research Opportunities in Auditing," recently announced by Peat, Marwick, Mitchell & Co.

Despite this increased activity, there is still a substantial gap between actual audit problems and the research currently under way by academics. Some attribute this gap to the perversity of academics who refuse to work on real world problems and to the reward structure in universities which encourages research of an abstract and irrelevant nature. Academics may respond by pointing out the general lack of financial support for auditing research and the extreme difficulty in accessing data that would be helpful in carrying out a meaningful program of research on audit problems. Fortunately, these problems are becoming less important now than they have been in the past. A sizable and growing number of academics want their research to have an impact on auditing practice. Also, support—including funding,
data availability, and partner time—is finally becoming available. An increasing trend to cooperative research efforts on specific auditing problems is occurring between accounting firms and academics. The recent establishment of an auditing section within the American Accounting Association is additional evidence of the interest in auditing problems.

Nevertheless, as we embark on this golden era of research on auditing problems, I am concerned that this research may not prove to have as many benefits as practitioners now hope or as some academics might be promoting.

In the previous Symposium on Auditing Research at Illinois, Doug Carmichael [1976] introduced us to the “Columbus complex” in characterizing some academic researchers who believe their work is the first serious study of a subject. Updating our explorer metaphor to modern times, my concern may be described as the “Man on the Moon complex” for justifying expenditures on research. The “Man on the Moon complex” originated with politicians who used it as an excuse to throw taxpayers’ money at any perceived problem in the nation. For example, “Any nation that can put a man on the moon should be able to: eradicate poverty, provide decent housing, eliminate hunger, cure cancer, provide transit for the urban masses, rebuild the cities, etc., etc., etc.”

I now detect the “Man on the Moon complex” at work when practitioners ask for research in helping them with auditing problems. The speech goes something like this:

“Boy, do we have problems! It’s not enough that we’re being sued based on the old conception of an audit. But there are signs of increased scope of audits through forecasts, interims, social and environmental measurements, management performance, inflation adjusted statements, and detecting illicit behavior. Not only this, but we have continual pressures to keep our fees down while at the same time using more sophisticated computerized and statistical methods. If research could put a man on the moon then it should be able to solve these auditing problems.”

Let me make clear at this point that I agree with the challenging prospects for the auditing profession that are expressed in the above caricatured and paraphrased speech. Where I have difficulties is in trying to understand how a program of research in auditing is going to ameliorate very many of these problems in the foreseeable future. The problems are real but not many of them are what I would call researchable problems—problems to
which the scientific method can be applied to yield results that will be perceived by the profession as a contribution. I am concerned that if, after a program of support of research on auditing problems of, say, five to ten years, most of the above problems are still around, as I believe they will be, there may be a disenchantment with research and with academics who are not working on the real problems that the profession faces.

This conflict—between a call for more relevant research by practitioners and the types of research that will be carried out by academics—arises because of differing meanings that the two groups apply to the same word: “research.” In what follows, I will attempt to clarify what many academics refer to as research and why this differs from the conception held by many practitioners. To a certain extent, definitional approaches to “good research” are similarly difficult to the problem a U.S. Supreme Court justice had once in describing pornography: “I can’t define it, but I know it when I see it.” While lacking some of the titillating and arousing properties of good pornography, good research is similarly a matter of individual tastes and preferences.

One possibility for defining research is to use definitions adopted by the National Science Foundation to distinguish between research and development:

Research is systematic, intensive study directed toward fuller scientific knowledge of the subjects studied. Such study covers both basic and applied research.

Basic Research is that type of research which is directed toward increase of knowledge in science. It is research in which the primary aim of the investigator is a fuller knowledge or understanding of the subject under study rather than a practical application thereof.

Applied Research represents investigations directed to the discovery of new knowledge having specific commercial objectives.

Development is the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods, including design and development of prototypes and processes. Alternatively, development represents technical activities of a nonroutine nature concerned with translating research findings or other scientific knowledge into products or processes.

Already, we begin to see what the issue is. Academics tend to want to do research as defined above: to develop knowledge and insights into accounting and auditing problems. Practitioners,
however, are more interested in development projects which could improve systems, methods, and procedures. These differences are suppressed when we use just one word to describe both types of activities. Further insight can be gained when we recognize that our "Man on the Moon" project was a development effort and not one that required any significant degree of research, either basic or applied.

Bill Cooper has suggested that the basic versus applied research dichotomy is artificial. He prefers to contrast pure research (knowledge for its own sake) with applied research (knowledge wanted because of its potential usefulness). On another dimension, basic research, dealing with foundations upon which further research is typically built, is contrasted with non-basic research which does not aim at fundamental contributions. With this taxonomy, accounting academics will tend to perform basic applied research whereas practitioners will tend to demand non-basic applied research (referred to as development in the NSF definitions).

Ijiri [1975] provides additional characterizations of research. Ijiri claims that research should be novel, defensible, and available. Novelty invokes the ideas of surprise, non-routine procedures, and creativity as opposed to the routine performance of a task; for example, mailing out a survey to practicing auditors. Defensibility follows from use of the scientific method—logical proofs, empirical verification, and reproducible findings. Defensibility is what differentiates scientific findings from opinions. Novelty and defensibility also help us distinguish research from development since development (or non-basic) work tends to be less surprising, somewhat more predictable, and more difficult to defend as to why a particular approach was taken.

I can illustrate the differences by contrasting work already done on statistical methods in auditing with that performed to develop computerized audit packages. The development and application of statistical sampling techniques for auditing has been the largest success of the interaction between academic research and practice (see Kaplan [1975] for an elaboration of this interaction). The research required for successful implementation of these new techniques is academically respectable and continues to be actively pursued by a number of researchers. While I would classify most of this work as applied research, some work (for example, Scott [1973] and [1975]) falls into the basic research category. (All this work would be classified as basic applied research in the Cooper taxonomy.)
In contrast to these efforts in statistical sampling, I find it hard to describe as research most work involved with developing or improving computerized audit systems. The work is interesting and important but it lacks research characteristics. Much of the work is routine; those aspects which are non-routine involve engineering-like judgments which yield clever and useful results but are not easily defensible vis a vis other procedures which might have been adopted. This engineering rather than scientific approach to the design of computer-based systems is characteristic of the field and not the personnel who work in this field. The research base underlying the development of information systems is so abstract and difficult to apply to real-world situations that the engineering or development approach is the only sensible way to proceed in this area.

Having identified the distinction between research and development, what prospects are there for research (as opposed to development) in auditing? In general, it is much safer for an individual to adopt the "Man on the Moon complex" when talking about research opportunities and indicate the wonderful benefits that will flow from a period of sustained and supported research. To be negative not only invites my clever colleagues to prove me wrong but also may lead to a loss of financial support for research efforts. Researchers, by their very nature, bring diverse disciplines and backgrounds to bear on researchable problems, so that it is dangerous for an individual from his own narrow perspective to make brash predictions about what his colleagues are likely to deliver. Nevertheless, I find it difficult to envision a program of research that will enable us to answer some of the fundamental problems that now confront the auditing profession.

Questions about the optimal scale of auditing in society and whether it is worth extending the attest function to new areas inevitably must start with a benefit-cost analysis of the audit. Costs are difficult to know precisely but reasonable procedures and ballpark estimates are certainly possible. Benefits, however, seem almost impossible to quantify. We can identify the variety of benefits obtainable from auditing activities (e.g., improved decisions and resource allocation because of the increased usefulness of audited information, motivational aspects of an audit—see Research Opportunities in Auditing [1976]), but I am not optimistic about our ability to provide reasonable quantitative estimates of these benefits. For example, one of the principal benefits from an audit
arises from its anticipation by the auditee (Churchill and Cooper [1964]) so that certain actions do not take place and hence are unobservable.

I'm not sure that we could do a good job even if we could design and implement a controlled experiment in the economy, but a minimal condition would appear to be some degree of diversity in audit scope, among otherwise similar companies. With differing degrees of audits, we could at least attempt to measure differences in some dependent variable of interest while holding all other factors constant. It's unlikely, though, that regulatory authorities, the courts, or even the companies themselves would permit such widespread experimentation with audits. George Benston ([1973], [1975], [1976]) has been a leader in attempting to measure the value of SEC mandated disclosure and associated audits by comparing performance in pre- and post-SEC eras in the U.S. and by making cross-national comparisons among countries with differing disclosure and auditing requirements. Even apart from the substantial differences in time periods or across nations which make such evaluations extremely difficult, there is the fundamental problem of distinguishing from among those changes caused by differing disclosure and those caused by the auditing of these disclosed data.

Basically, I believe that research cannot establish the objectives of auditing. I must agree with the speaker at the previous Illinois audit symposium who noted that “the key issues in the field are not easily researchable. Subjective value judgments are still the essence of most policy issues in auditing, and research techniques for dealing with such matters are difficult to develop.” (Burton and Sampson [1976]). Objectives are policy issues, which should be made in light of available research findings, but which still must be settled by the reasoned judgment of informed professionals. It would be presumptuous to think otherwise. Given some well-specified objectives, research can investigate alternative ways of satisfying them and characterizing the properties of alternative procedures.

Where then can we expect to see progress from research in auditing? A variety of special topics arise in auditing which lead to researchable questions. These include statistical methods for sampling and analytic review, models for manpower planning, and models for compliance testing and evaluation of the internal control system. The recently emerging literature on expert judg-
ment and human information processing may yield insights into how auditors aggregate the diverse evidence from an audit. Also, there could be some translation of behavioral science research in organizations to the public accounting form of organization research. I predict that future audit research will most likely be concentrated in these special study areas rather than in a broad integrative framework for the audit process.

It seems difficult to make a central attack on the audit process because so little is known about what actually constitutes a good audit. This suggests that, rather than start with research on normative models in an attempt to improve existing audits, we devote significant resources to developing descriptive models of what auditors are actually doing now (see Ijiri [1975] for a discussion of the differences between descriptive and normative models in accounting research). To avoid being accused of academic amnesia (see Carmichael [1976] for definition), I must acknowledge that this suggestion was made previously by Bob Mautz [1976] who stated, “what we need to do first is to gather a great deal of information or knowledge about what is being done in auditing.” At the present state of the art, auditing is unlike the situation in inventory theory or production planning where we can construct normative models of well-understood processes.

We should now attempt to develop a data base of the allocation of effort and skills among the various tasks in the audit. We need to study the variation in audit techniques across and within CPA firms to identify what aspects of the audit are common and what aspects permit alternative approaches. With such a data base, we could attempt to model the interrelationship among the components of an audit and the influence of environmental factors (e.g., effect of industry or financial stringency) on the scope and performance of an audit. It is important to stress that I am not advocating a program of behavioral research on the activities of auditors (or students) under laboratory conditions or mailing out questionnaires to public accountants asking them to describe how they plan and execute an audit. I would like to see an analysis of actual decisions made by auditors under all the constraints operating during a real-time audit. Preliminary efforts in this direction (for internal audits) are being reported at this conference by Church, Cooper, Govindarajan, Pond, and San Miguel.

One problem with developing an auditing data base is that the initial stages of such an effort would require an enormous amount
of time, little of which could be characterized by the word "research." Therefore, I would not be surprised if most of our talented researchers would find it difficult to work up much enthusiasm for performing this task even though they would be delighted to analyze the data generated from the effort. Data gathering and availability is a necessary condition for good empirical research but it should not be confused with research. Unfortunately, unless the data are collected with their likely end-use in mind, there is a good chance that the data base would not be suitable for further analysis. I leave this knotty incentive and organizational problem unresolved at this time.

In summary, my best prediction for the future of auditing research is a continuation and expansion of efforts in special aspects of audits where we have been able to identify problems that are susceptible to scientific research. At this point, what would be most helpful from practitioners is not a list of auditing problems but a further identification of issues where they believe research could provide specific benefits. The Peat, Marwick proposal, "Research Opportunities in Auditing," is an excellent start in this direction and I would like to see the listing updated as practitioners become more aware of the comparative advantages of research (i.e., versus development) and as researchers become more aware of specific auditing problems. I am not optimistic about developing benefit-cost models for audits or even normative models which integrate the various aspects of the audit that can be used to plan the overall effort and generate audit conclusions. This latter effort might eventually succeed if we pay the price initially of developing an auditing data base and succeed in estimating descriptively valid models.

One loose end remains. I have characterized academics as being interested and rewarded by doing research whereas practitioners are most in need of development efforts. This seemingly interposes a gap between the two groups. The solution, however, is simple. Most academics do not devote their lives exclusively to research and teaching. Most would be happy to work on development projects with CPA firms and attempt to implement current knowledge into practice. Such consulting projects, in addition to offering occasional financial rewards to researchers, also offer the more tantalizing reward of new research ideas and projects as academics discover gaps in the current knowledge needed to solve a particular problem.
REFERENCES


Discussant's Response to "The Roles for Research and Development in Auditing"

KENNETH P. JOHNSON

In reading Mr. Kaplan's descriptions, I was amused by the terms "academic amnesia" and the "Columbus complex." I was also intrigued by the "Man on the Moon complex." The first you'll recognize as sort of lighthearted descriptions of the deficiencies of academics; the latter, of course, is an equally lighthearted description of the views of practitioners. Since I am not a trained researcher, I can only express my appreciation for the research efforts that went into developing these insights.

I am a little uncomfortable because I don't think my observations are novel, or even defensible by scientific methodology, but I did recognize something familiar in the paper—that was the definition of research efforts. A number of years ago, I prepared testimony for a suit in federal court involving inadequate distribution of dividends by a company that was devoted to basic and applied research. I went back carefully over a number of years—15 years, to be exact—and documented the expenditures, and restated the financial statements. I interviewed the research and project directors to try to identify the benefits to the corporation from the money spent in these two relatively narrow efforts. I found that five basic products had developed into substantial profit
contributors in that 15-year period. One of them came from a purchased product—that is, the company bought the patent and did some development work to make it into a product acceptable in a commercial market. One of the products was the development of basic research that was applied in the company’s laboratories, and went all the way into the system for the development of the product. The final three, which were by far the biggest contributors to the company’s long-term profitability, were accidental failouts of an unsuccessful project. That is my background in the area of research, which I will apply to auditing.

I suppose that the results of our research could accidentally produce something that would solve the auditor’s problem. I think I would welcome that. In general, however, I have to agree with Mr. Kaplan’s general thrust: There does appear to be a gap between what the practitioner perceives as a need for research and the products that result from the type of research which academics conduct. It’s reasonably clear to me that the sort of research with which we are now intrigued will not produce resolutions to many of the problems with which practitioners are currently concerned. I believe that Mr. Kaplan and others conclude correctly that most auditing problems are really not researchable. Mr. Kaplan believes that the objectives of an audit are akin to decisions about policy issues, and ultimately are settled by reasoned judgment of what he calls informed professionals, rather than by research. I think there is a tendency to postpone difficult decisions in the hope that some benefit of research will make the task easier. That’s implicit in the shortcomings suggested by the “Man on the Moon complex.”

As Mr. Kaplan points out in the article, this originated from an overly simplistic reasoning process suggesting that the kind of problem-solving that put men on the moon should be equally useful in resolving social problems. I think most of us must now concede that the task of resolving social problems is much more complex, much more difficult to deal with, than tasks based on mechanical technology. The failure of some of our experiments may be attributed to a lack of research or a lack of understanding of the social and economic effects of activities. However, it should be clear that while we may devise techniques to narrow the range of judgment, we can’t eliminate the risk that accompanies, or the criticism that frequently follows, the task of making a judgment on a social policy issue. Of course, we’ve also got to recognize,
as a practical matter, that the social problems are still with us. Our inadequacy in dealing with them doesn't mean that the problems can wait until research suggests a comfortable answer. Some solution to these problems is needed, and we will attempt to find it.

The practical process of auditing has many of the same characteristics. We at Coopers & Lybrand believe that an audit requires certain things—for example, knowledge of the environment and of the entity's accounting system. We achieve these through applying procedures that identify and test the principal internal controls in an accounting system. Our tests are designed to assess the risks of control failures in both the production of account balances and the processing of transactions. Once we have a reasonable degree of assurance that controls are operating properly, we can determine the extent to which recorded balances must be validated. But there is no technique yet for measuring the acceptable degree of error in financial statements. Even if there were such a measurement device, I'm not satisfied that there is a means by which the results of measurement could be adjusted by the people who must ultimately judge the acceptability of the auditor's product. That's particularly important today, when one of the concerns of the Moss Committee is that auditors' reviews of internal controls should eliminate or disclose illegal and improper payments. In fact, the Moss Committee is very upset that the FASB isn't doing something about illegal payments. Since these are the people who will sit in judgment of my product, I am concerned.

The extent of the risk that I'm willing to assume in giving an opinion on a set of financial statements must be based on my particular understanding of the entity's system and the risk inherent in that system and in the business environment in which the entity operates. The problems relate to the extent of acceptable risk and my ability to devise appropriate procedures to satisfy my judgment before I give my opinion. Again, while research may help with the measurement, it can't eliminate the need for judgment in auditing. To the extent that practitioners call for research to cure problems that arise from criticisms of audit judgments, there seems to be an unbridgeable gap. But I don't believe that this should lead to disenchantment with academic research efforts, or that those efforts should as a result be confined to the context of existing auditing procedures. I'm not denying
that practitioners find it intriguing to muse about an indisputable answer that will resolve our worries about audit judgment. But recognizing this doesn't limit the potential for all types of research in the audit area. I don't think that academics should allow the desire to resolve our current problems to constrain research efforts. This might be the effect if we set our sights too low; it could result in misdirected efforts which in the long run would be of little value.

Let me give you a little bit of background. Our auditing technology, basically, has been developed by a handful of rather large accounting firms. In the past 15 years or so, we have been increasingly affected by changing information technology. So far our response has been a piggyback operation—that is, adding new procedures on top of those already existing. We have not altered our basic audit format. Of course, there is a reason for the piggyback operation, which sometimes is difficult for people outside the profession to understand. That is the risk of taking a new path and ultimately being judged deficient. It is a risk that tends to constrain the degree of experimentation that we are willing to undertake in the practice of auditing. Then, I think there is a type of professional inertia, which probably exists in all of us: While we may adopt a new procedure, we don't always surrender the old. And there's the phenomenon that evidenced itself most recently in discussing the joint auditor approach to auditing pension funds where certain assets are held by trustees. The auditors debated what sort of work might be done, or should be done, to satisfy themselves with respect to those investments. Generally, there's a sense of discomfort in recognizing the practical constraints on an auditor's ability to interdict an information system of a trustee bank to satisfy himself as to the existence of certain investments. The auditors nonetheless felt they should do something. However, many of these "somethings" may in fact have the effect of deterring our advancement in the area of developing new techniques.

The computer has had a material effect in the past ten years or so on some auditing concepts in this area. In fact, in my view, it may destroy some of our accepted concepts of testing. We're finding, for example, that it may be easier in some instances to test all items than to test some of them. In this environment, I would like to believe there is a Columbus complex and put it to work in auditing. We could start by assessing whether the
most efficient way to modify auditing, in the light of current and expected information technology, would be to devise new procedures within the existing framework or to look at the auditing process de novo. The first alternative would entail identifying new techniques or approaches that might be adopted. The second would, it seems to me, be to develop a new approach to the auditing process based on expected information processing techniques.

There seems to me to be little reason not to assume that our way of auditing may be archaic. For example, real-time computerized accounting systems, which have no traditional tape or audit trail, upset most of our accepted notions of testing. We are, of course, still worried about the integrity of the system and about the usefulness of the output, regardless of its form. While it may sound curious, it might be possible to audit such an entity by establishing a series of models that predict the expected outcome and comparing them to reported results by analyzing exceptions that result. The development of a broad framework for the audit process might produce both academic satisfaction and, in the long run, practical results. I am suggesting that major benefits may result from a fresh look at the auditor’s task in the new environment in which we will operate.

There are going to be some practical problems associated with broad-gauge endeavors of this type. I believe Mr. Kaplan has put his finger on one. Practitioner interest will be highest where there is a short-term payoff. Another is the practitioner’s receptivity to novel approaches to auditing problems. One needs a certain sense of detachment from the day-to-day problems to accomplish this. At the outset, it seems to me that these practical problems should not be insurmountable. It might be useful to consider what sort of institutional apparatus might encourage such long-term research efforts. These are difficult problems, but they shouldn’t be insurmountable; after all, I’m told, we did put a man on the moon.
session

TWO
Evaluation of Prospective Audit Clients: An Eigenvalue Priority Assignment Model

EDWARD J. LUSK

Service organizations depend upon the number and quality of clients to achieve both economic viability as well as professional stature. For that reason the constituency of an organization's clientele is an important consideration—from a tactical as well as from a long-run perspective.

The public accounting profession, in providing audit services, encounters not only economic and stature pressures but also the possibility of material third-party legal liability, thus making the selection of audit clients a critical facet of the firm's planning program.

In order to make the selection of prospective audit clients a systematic process, most audit firms require (1) some degree of analysis of audit clients on a number of criteria and (2) an attempt to judge the relative importance of the criteria given the prevailing economic and legal environment.¹ We surveyed selected members

¹ We surveyed a number (n = 11) of managing partners and other senior partners in public accounting firms in Chicago, Cleveland, New York, and Philadelphia. All the respondents (n = 9) indicated that the ongoing evaluation of prospective and current audit clients was an important activity, which could reasonably be thought of as requiring evaluation of alternatives on certain criteria. In this paper we shall focus our attention on the evaluation of prospective audit clients, although the prioritization approach is equally appropriate for client-retention decisions.
of the accounting profession in order to ascertain the types of
criteria they used to evaluate prospective audit clients. The results
of that survey yielded the following criteria and the sources from
which this information may be obtained:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrity and competence of the management and owners.</td>
<td>Opinions of partners and managers.</td>
</tr>
<tr>
<td></td>
<td>Opinions of other companies in the same industry.</td>
</tr>
<tr>
<td></td>
<td>Company's legal counsel.</td>
</tr>
<tr>
<td></td>
<td>Dun &amp; Bradstreet</td>
</tr>
<tr>
<td>Financial position and earnings history.</td>
<td>SEC Form 10-K.</td>
</tr>
<tr>
<td></td>
<td>Financial statements.</td>
</tr>
<tr>
<td></td>
<td>Dun &amp; Bradstreet</td>
</tr>
<tr>
<td>Relationship with previous auditors.</td>
<td>Previous auditors.</td>
</tr>
<tr>
<td></td>
<td>SEC Form 10-K.</td>
</tr>
<tr>
<td>Legal status (companies with many pending lawsuits were generally</td>
<td>Company's legal counsel.</td>
</tr>
<tr>
<td>considered to be bad risks).</td>
<td>SEC Form 10-K.</td>
</tr>
<tr>
<td>Ability to pay or ability to be persuaded to pay</td>
<td>Opinions of partners and managers.</td>
</tr>
<tr>
<td></td>
<td>Commercial banks.</td>
</tr>
<tr>
<td>Ability to act independently (accounting firms generally will not</td>
<td>Professional personnel.</td>
</tr>
<tr>
<td>service a client if a professional member of the firm has an</td>
<td></td>
</tr>
<tr>
<td>undivestable interest in the prospective client).</td>
<td></td>
</tr>
<tr>
<td>Prospects for growth (this criteria is closely related to the next two</td>
<td>Opinions of partners and managers.</td>
</tr>
<tr>
<td>criteria and to the ability-to-pay criteria).</td>
<td>Commercial banks.</td>
</tr>
<tr>
<td></td>
<td>Financial statements.</td>
</tr>
</tbody>
</table>

These criteria are merely a compilation of those suggested by the various
respondents. We are not suggesting that these criteria should be used by the
auditors to evaluate prospective clients or to make a client-retention decision.
A list of evaluation criteria for the evaluation of both prospective and current
clients is suggested in SAS No. 4.
Prospects for a continuing relationship (accounting firms generally do not want a client for a single engagement).

Opinions of partners and managers.

Prospects for offering other services, i.e. tax or management services (usually, companies that will need the other services offered by the firm are desirable prospects).

Opinions of partners and managers.

Maintenance of accounting standards (accounting standards in some companies or industries do not meet the standards required by an accounting firm to render an unqualified opinion).

Partners' and managers' knowledge of industry accounting practices.
Previous auditors.
SEC Form 10-K.

Conflict of interests with existing clients (clients in competitive industries often do not like their auditor to take on another client in the same industry).

Opinions of partners and managers.
Opinions of other audit clients.

Public relations impact (accounting firms are interested in maintaining or improving the public's opinion of the firm).

Opinions of partners and managers.

Timing of audit work (companies with a year ending during the non-busy season are generally considered desirable).

Financial statements.

It is interesting to note that the ability to staff is not listed among the criteria. There may be two reasons that staffing is not an important consideration in the selection process: (1) the personnel in accounting firms are adaptable and the available audit hours can be expanded through overtime and (2) in the current employment market, increasing the professional staff does not present a problem.

Given this information, and the nature of the selection process represented in Exhibit 1, we wish to suggest a prioritization model which may have relevance in facilitating the decision process regarding the firm's client constituency. We shall examine the
basic elements of this model; after the priority weighting model is specified, we shall give an interpretation of the weighting process. This presentation seems to be the most effective way to facilitate an understanding of the potential of the model.

**PRIORITY WEIGHTING: AN EIGENVALUE APPROACH**

The elements required to operationalize the eigenvalue prioritization model are:

1. a delineated set of alternatives (x, y, etc.) must be specified;
2. a set of criteria relevant to the description of the set of alternatives derived; and
3. a judgment scale which has only the following elements [1, 3, 5, 7, 9]. This scale was developed from the work of Saaty [1976] and relates directly to the work of Miller [1956, 1972] and Osgood [1952]. The descriptors of the scale are:

   1 if alternative x and alternative y are of equal importance on a particular criteria.
   3 if x weakly dominates y on a particular criteria.
   5 if x strongly dominates y on a particular criteria.
   7 if x demonstrably dominates y on a particular criteria.
   9 if x absolutely dominates y on a particular criteria.
The eigenvalue prioritization algorithm first requires inter-alternative criteria matrices be developed (one per criterion) as follows:

Assume that we are considering \( n \) audit client alternatives noted as \( \{ a_i : i = 1, \ldots, n \} \) and there are \( m \) criteria used to evaluate the set of audit clients, noted as \( \{ C_j : j = 1, \ldots, m \} \). Given the scale of \( \{ 1, 3, 5, 7, 9 \} \), each audit alternative may be evaluated respecting the others, so that the following square matrix may be formed for the \( j^{th} \) criteria:

\[
[A]_{j}^{kh} = A_{j}^{kh}
\]

where: \( k \) denotes a particular audit alternative which is evaluated as to its dominance relative to the \( h^{th} \) audit alternative on the judgment scale \( \{ 1, 3, 5, 7, 9 \} \).

- For any \( A_{j}^{kh} \) if \( k = h \); then \( A_{j}^{kh} = 1 \).
- If \( A_{j}^{kh} \), then by convention \( A_{j}^{hk} = (A_{j}^{kh})^{-1} \).
- \( j \) denotes a particular criterion, \( 1 \leq j \leq m \).

Therefore, for each criterion a judgment matrix will be developed, noted as:

\[
[A]_{j} = A_{j}^{n \times n}
\]

(Subsequently we shall note \([A]_{j}\) as \( A_{j} \).)

For each \( A_{j} \), the eigenvector associated with the maximal eigenvalue is derived and normalized.\(^5\) The normalized maximal eigenvector will be noted as \( \tilde{c}_{j} \). The iterative algorithm required to identify this normalized eigenvector for the \( j^{th} \) judgment matrix is [Saaty, 1976]:

\[
\tilde{d}_{j} = \begin{bmatrix} A_{j} & \tilde{c} \\ n \times n & n \times 1 \end{bmatrix} \begin{bmatrix} \tilde{c}^T & A_{j} & \tilde{c} \\ 1 \times n & n \times n & n \times 1 \end{bmatrix}^{-1}
\]

\(^5\) The reason we are interested in deriving an eigenvector is that the maximal eigenvector contains the greatest amount of information regarding the judgmental inter-comparisons. For a ratio matrix, the maximal eigenvector contains all the necessary information to replicate the ordering of the objects on the interval scale. For a complete discussion of eigenvalues and their importance in factor analysis see Harman [1976].
\[ \dd_2 = [A_j \cdot \dd_1] \cdot [\dd_r^T \cdot A_j \cdot \dd_1]^{-1} \]

\[ \dd_j \equiv \dd_q = [A_j \cdot \dd_{q-1}] \cdot [\dd_r^T \cdot A_j \cdot \dd_{q-1}]^{-1} \]

where: \( e \) is a unit vector of size nxl.

The procedure stops when \( \dd_q = \dd_{q-1} \) at which point \( \dd_j = \dd_q \).

For example, consider the following judgment matrix for three alternatives:

\[
\begin{bmatrix}
  a_1 & a_2 & a_3 \\
  a_1 & 1 & 1/9 & 9 \\
  a_2 & 9 & 1 & 1/9 \\
  a_3 & 1/9 & 9 & 1 \\
\end{bmatrix}
\]

The maximal eigenvector associated with this matrix is:

**Iteration I:**

\[
\dd_1 = \frac{1}{\begin{bmatrix}
  1 & 1/9 & 9 \\
  9 & 1 & 1/9 \\
  1/9 & 9 & 1 \\
\end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}^T} = \frac{1}{\begin{bmatrix} 91 & 91 & 91 \\ 9 & 9 & 9 \end{bmatrix}^T} = \frac{\begin{bmatrix} 91 \\
 273 \\
\end{bmatrix}}{9} = \frac{91}{273}
\]

**Iteration II:**

\[
\dd_2 = \frac{1}{\begin{bmatrix}
  1 & 1/9 & 9 \\
  9 & 1 & 1/9 \\
  1/9 & 9 & 1 \\
\end{bmatrix} \begin{bmatrix} 1/3 \\ 1/3 \\ 1/3 \end{bmatrix}^T} = \frac{1}{\begin{bmatrix} 91 & 91 & 91 \\ 27 & 27 & 27 \end{bmatrix}^T} = \frac{\begin{bmatrix} 91 \\
 273 \\
\end{bmatrix}}{9} = \frac{91}{273}
\]

Since \( \dd_1 = \dd_2 \), the procedure stops and \( \dd_j = \dd_1 = [1/3, 1/3, 1/3]^T \).
Once the \( m \) eigenvectors have been generated (one for each criteria), the following matrix may be formed:

\[
C_w = [\tilde{c}_1, \tilde{c}_2, \ldots, \tilde{c}_m]
\]

\( n \times m \)

The final step in the procedure is to create a judgment matrix for the pairwise comparisons of the criteria. We shall note the eigenvector of the intercriteria judgment matrix as \( \tilde{c} \). The audit alternative weights may then be determined as follows:

\[
C_w \tilde{c} = i
\]

\( n \times l \)

where: \( C_w \) is a column aligned \( n \times m \) matrix which represents the judgment information as abstracted by the \( m \) eigenvectors,

\( \tilde{c} \) is the \( n \times l \) eigenvector from the judgment matrix created when the criteria are judged one relative to another.

\( i \) is a vector of the priority weights generated utilizing the information given the comparisons of the audit alternatives on each criteria and the judgmental comparisons of the criteria, and

\( \tilde{c} \cdot i = i \).

\( l \times n \)

\( n \times l \)

The weighted set of audit alternatives will then be:

\[
(a_1, a_2, \ldots, a) \cdot i = i^*
\]

It should be noted that (1) the priority weights are established by considering the pairwise judgment of audit alternatives on specific criteria, and the pairwise interrelationship among the criteria (refer to Figure 1) and (2) this information may be inputted to the firm’s audit selection process.

**CONSISTENCY:** **A QUANTIFICATION OF THE EFFECTIVENESS OF THE JUDGMENT PROCESS**

The eigenvalue structure provides an opportunity to ascertain the relative consistency of the pairwise judgments. Consistency
shall be taken to mean: if \( A^j = \lambda \) and \( A^{ih} = \beta \) then \( A^{jh} = \lambda \beta \). For example, if audit alternative \( j \) is considered to slightly dominate audit alternative \( i \) (\( A^i = 3 \)), and audit alternative \( i \) is judged to slightly dominate audit alternative \( h \) (\( A^{ih} = 3 \)), then consistency would exist if \( A^{jh} = 9 \) (i.e. \( A^j \cdot A^{ih} = A^{jh} \)); that is, alternative \( j \) is absolutely preferred to alternative \( h \). Consistency may be thought of as the transitivity of the eigenvalue judgment system. Transitivity in most mathematical studies of decision making is assumed; for example, without operational transitivity, the study of utility theory would be severely restricted. However, transitivity need not be a requisite for rational behavior. Rational people may have judgments which are not transitive. Where we admit intransitive behavior, in our system inconsistent behavior, it is important to develop a measure of inconsistency.

**Consistency**

We shall state a number of results which will be used in the quantification of the inconsistency measure. The following results have been demonstrated [Lusk, 1976] and are an important part of the eigenvalue model development.

1. An \((n \times n)\) ratio matrix is consistent and has only one real non-zero root; noted as \( \lambda_{\text{max}} \). That real root is the maximal eigenvalue and is equal to the number of elements \((n)\) in the main diagonal of the matrix, i.e. \( \text{TR}(A_j) = \lambda_{\text{max}} = n \).

2. A matrix which is inconsistent has a real root which is greater than \( \text{TR}(A_j) \). Therefore, for any square matrix in the scale system \( \lambda_{\text{max}} \geq n \).

3. For any matrix of a particular size there is a maximal inconsistency. Refer to the maximal inconsistency as \( \lambda_{\text{sup}} \). The matrix used to generate \( \lambda_{\text{sup}} \) is:

\[
\beta = \begin{bmatrix}
 1 & \alpha & 1/\alpha & \alpha & 1/\alpha \\
 1/\alpha & 1 & \alpha & 1/\alpha & \alpha \\
 \alpha & 1/\alpha & 1 & \alpha & 1/\alpha \\
 - & - & - & - & - \\
 - & - & - & - & - \\
 - & - & - & - & - \\
 - & - & - & - & - \\
\end{bmatrix}
\]

where: \( \alpha \) represents the largest value in the scale system, and
matrix $\beta$ is of the same size as the matrix for which $\lambda_{\text{max}}$ is defined.

The measure of relative inconsistency which we shall use is:

$$\theta^i_j = \frac{\lambda_{\text{max}} - n}{\lambda_{\text{sup}} - n}$$

where: $\theta^i_j$ represents the inconsistency for individual $i$ which was developed in fixing the pairwise judgments for criterion $j$.

- the range of $\theta^i_j$ is $[0, 1]$. If $\theta^i_j = 0$ the judgment matrix is consistent, that is $\lambda_{\text{max}} = n$. If $\theta^i_j = 1$ the judgment matrix is absolutely inconsistent, that is, $\lambda_{\text{max}} = \lambda_{\text{sup}}$.

For example, consider the following $3 \times 3$ judgment matrix:

$$A_k = \begin{bmatrix} 1 & 1/5 & 3 \\ 5 & 1 & 1/5 \\ 1/3 & 5 & 1 \end{bmatrix}$$

The maximal eigenvector associated with $A_k$ is (derived using the algorithm) $[.27 \ .34 \ .39]$. The $\lambda_{\text{max}}$ for $A_k$ may be found by solving the following equation $(A_k \vec{\xi}_k)/\vec{\xi}_k$:

$$\lambda_{\text{max}} = \frac{A_k [.27 \ .34 \ .39]^T}{[.27 \ .34 \ .39]^T} = 5.44$$

The $3 \times 3$ matrix used to develop $\lambda_{\text{sup}}$ is:

$$A_{\text{sup}} = \begin{bmatrix} 1 & 9 & 1/9 \\ 1/9 & 1 & 9 \\ 9 & 1/9 & 1 \end{bmatrix}$$

$$\lambda_{\text{sup}} = \frac{A_{\text{sup}} [1/3 \ 1/3 \ 1/3]^T}{[1/3 \ 1/3 \ 1/3]^T} = 10.1$$

The value of $\theta^i_k = \frac{5.44 - 3}{10.1 - 3} = .343$.

This value $\theta^i_k$ indicates that the $i^{th}$ individual when making judgments about the set of audit alternatives considering the $k^{th}$ criteria was moderately inconsistent in making those judgments.

It should be noted that where a criterion is to be used for
which interval measures are available, the interval measures should be used and not converted to judgments in the scale system \( \{1, 3, 5, 7, 9\} \). The reason for this is that ratio matrices are consistent; therefore, in converting interval-measured variables to a non-interval scale one would lose information.

**Consistency-Adjusted Priorities**

Since inconsistency may raise questions as to the validity of the judgments, we suggest that one re-weight the derived maximal eigenvectors to account for the relative inconsistency of the judgment matrices. This weighting should have the property that the eigenvectors for consistent matrices are unchanged and the eigenvectors for absolutely inconsistent matrices are factored out of the analysis. A weighting scheme which accomplishes this objective is:

Assume that a scalar is developed from the consistency measure of a particular judgment matrix, call that scalar \( k \) where \( k = 1 - \theta \). Given \( k \), the following eigenvalue adjustments may be made:

\[
\begin{bmatrix}
k_1 \hat{c}_1, k_2 \hat{c}_2, \ldots, k_m \hat{c}_m
\end{bmatrix}
\begin{bmatrix}
c
\end{bmatrix}
= \lambda_i
\]

\[
\begin{bmatrix}
e \cdot \begin{bmatrix}
k_1 \hat{c}_1, k_2 \hat{c}_2, \ldots, k_m \hat{c}_m
\end{bmatrix}
c
\end{bmatrix}
\begin{bmatrix}
lxn
\end{bmatrix}
\]

where: \( e \) is a unit vector,

\( k_h = 1 - \theta_h \).

For example, consider the following judgment matrices generated by an individual on three criteria for three audit alternatives.

\[\begin{bmatrix}
A_1 & B_1 \\
A_2 & B_2
\end{bmatrix}
\lambda
\begin{bmatrix}
c_1 \\
c_2
\end{bmatrix}
= \begin{bmatrix}
A_1 & B_1 \\
A_2 & B_2
\end{bmatrix}
\lambda
\begin{bmatrix}
c_1 \\
c_2
\end{bmatrix}
= i^*
\]

The elements of \( i^* \) are

\[
i^* = \frac{A_1 \lambda c_1 + B_1 \lambda c_2}{A_1 \lambda c_1 + B_1 \lambda c_2 + A_2 \lambda c_1 + B_2 \lambda c_2}
\]

\[
i^*_2 = \frac{A_2 \lambda c_1 + B_2 \lambda c_2}{A_1 \lambda c_1 + B_1 \lambda c_2 + A_2 \lambda c_1 + B_2 \lambda c_2}
\]

Note \( \lambda \) may be factored-out and canceled leaving \( i^* = [i^*_1, i^*_2] \) unaffected. This is simply extendable to the \( n \times n \) case.
<table>
<thead>
<tr>
<th>Criteria 1</th>
<th>Criteria 2</th>
<th>Criteria 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$a_1$</td>
<td>$a_2$</td>
<td>$a_3$</td>
</tr>
<tr>
<td>1</td>
<td>1/5</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>1/7</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>1/3</td>
<td>1/9</td>
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<tr>
<td>1</td>
<td>1/5</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>1/7</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>1/3</td>
</tr>
<tr>
<td>1/3</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>1/3</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>.9</td>
<td>.3</td>
<td>1</td>
</tr>
</tbody>
</table>

The relevant information for these matrices is:

<table>
<thead>
<tr>
<th>Judgment Matrix</th>
<th>Eigenvectors</th>
<th>Eigenvalue</th>
<th>$k$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Criteria 1</td>
<td>[.27 .34 .39]</td>
<td>5.44</td>
<td>.657</td>
</tr>
<tr>
<td>Criteria 2</td>
<td>[.24 .33 .43]</td>
<td>6.46</td>
<td>.513</td>
</tr>
<tr>
<td>Criteria 3</td>
<td>[.08 .25 .67]</td>
<td>3.00</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Assume the eigenvector for the judgment matrix is [.3 .2 .5]; therefore, the reoriented weighting vector will be:

\[
\begin{bmatrix}
.657 \\
.34 \\
.39
\end{bmatrix}
\begin{bmatrix}
.27 \\
.34 \\
.39
\end{bmatrix}
\begin{bmatrix}
.24 \\
.33 \\
.43
\end{bmatrix}
\begin{bmatrix}
.08 \\
.25 \\
.67
\end{bmatrix}
= \begin{bmatrix}
.147 \\
.3 \\
.5
\end{bmatrix}
= \begin{bmatrix}
.280 \\
.573
\end{bmatrix}
\]

\[
\begin{bmatrix}
1 & 1 & 1
\end{bmatrix}
\begin{bmatrix}
.177 \\
.217 \\
.263
\end{bmatrix}
\begin{bmatrix}
.123 \\
.169 \\
.221
\end{bmatrix}
= \begin{bmatrix}
.3 \\
.25 \\
.67
\end{bmatrix}
\]

So that the model's full potential may be examined we wish to discuss the various analytic perspectives of individual and group priority weighting and then present an illustrative example.

**Individual and Group Priority Weighting**

Each individual will develop an inconsistency adjusted prioritization vector $\hat{i}$. Assuming there are $p$ individuals judging the audit alternatives, we may compute the mean weight as follows:

\[
\bar{i} = \frac{1}{p} \sum_{j=1}^{p} \hat{i}_j
\]

This mean prioritization vector may be used as an input to the decision process (Figure 1). Using the mean prioritization, vector $\bar{i}$ will, in effect, weight each individual's vector $\hat{i}$ equally. When the quality of information expertise among the individuals does not vary over the audit alternatives, averaging makes intuitive
sense since the individual's inconsistency \((1 - \theta)\) is taken into account in generating the priority vectors.

When there are, or are expected to be, variances in the quality of informational expertise over the audit alternatives, a more reasonable prioritization input to the firm's decision process may be a group weighting of the audit alternatives. The format of the group weightings would be to have the individuals who are to render judgments meet, consider the alternatives, and generate judgment matrices and one criteria-judgment matrix. The result of this group weighting, one prioritization vector, would then be inputted into the decision process. Since the group process is interactive, that is the individuals discuss each other's analysis so as to formulate an opinion, the group procedure may in fact enable those who are best able to make specific judgments over a limited set of audit alternatives to aid the group in generating a prioritization weighting with minimal inconsistency.\(^5\) For this reason we suggest that in the context of selection of audit alternatives a group procedure be the elicitation mode.

In order to facilitate an undertaking of the algorithm in the context of an audit alternative problem let us consider the following illustrative example.

**AN ILLUSTRATIVE EXAMPLE**

Let us assume there is a group of five individuals evaluating three audit clients. The group is convened and agrees that the following criteria are important in rendering judgments among specific audit clients:

\[C_1: \text{Ability to pay the expected audit fee.}\]

\(^5\)Currently, there is little research on the relationship between the average inconsistency of individual weightings and group inconsistency. One research study [Lusk, 1976] conducted by the author involved giving five individuals three alternatives to be evaluated on ten criteria. The mean and variance of the eigenvalues for this exposure were:

<table>
<thead>
<tr>
<th></th>
<th>Individuals</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.34</td>
<td>3.13</td>
</tr>
<tr>
<td>Variance</td>
<td>.36</td>
<td>.14</td>
</tr>
</tbody>
</table>

If we assume that the group-weighting process better uses information as contrasted with the average of the individual processes, then the magnitude \((3.13 < 3.34)\) is in the expected direction; however, the difference is not statistically significant at any reasonable level of confidence, say .10, or .05.
$C_2$: Legal liability risk of the engagement.
$C_3$: Provision of fruitful audit training possibilities.
$C_4$: Ability of the audit to utilize audit resources during the firm's slack period.

The three audit alternatives \{a_1, a_2, a_3\} are evaluated on each criterion. Let us consider the inter-alternative weighting on the first criterion.

$C_1$: Ability to Pay the Expected Audit Fee

The group engages in some general discussion and then suggests that both $a_1$ and $a_3$ are financially strong companies with a good credit rating. One of the members of the group knows the controller of $a_1$ and indicates confidence in the firm's integrity and financial position. Firms $a_1$ and $a_3$ are rated equally on this criteria. Firm $a_2$, however, is considered to be engaged in potentially disastrous marketing promotions as well as being a newer organization without a well-established credit rating. For this reason $a_1$ and $a_3$ are given a rating of 5 respecting $a_2$. This generates the following matrix:

$$
\begin{bmatrix}
  a_1 & a_2 & a_3 \\
  a_1 & 1 & 5 & 1 \\
  a_2 & 1/5 & 1 & 1/5 \\
  a_3 & 1 & 5 & 1
\end{bmatrix}
$$

The following other three judgment matrices (i.e. for $C_2$, $C_3$, and $C_4$) are also interactively determined by the group; assume them to be:

$$
\begin{bmatrix}
  1 & 1/5 & 1/3 \\
  5 & 1 & 1/5 \\
  3 & 5 & 1
\end{bmatrix}
\begin{bmatrix}
  1 & 1/5 & 3 \\
  5 & 1 & 1/5 \\
  1/3 & 5 & 1
\end{bmatrix}
$$

The eigenvalues and the inconsistency adjustment ($k$) for these four matrices are:

<table>
<thead>
<tr>
<th>Judgment Matrix</th>
<th>Eigenvectors</th>
<th>$k = 1 - \theta$</th>
<th>Eigenvalues</th>
<th>Inconsistency Adjusted Eigenvectors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>[.45 .10 .45]</td>
<td>1.00</td>
<td>3.00</td>
<td>[.45 .10 .45]</td>
</tr>
<tr>
<td>2</td>
<td>[.11 .25 .64]</td>
<td>.93</td>
<td>3.52</td>
<td>[.093 .233 .586]</td>
</tr>
<tr>
<td>3</td>
<td>[.27 .34 .39]</td>
<td>.66</td>
<td>5.44</td>
<td>[.178 .218 .257]</td>
</tr>
<tr>
<td>4</td>
<td>[.08 .20 .72]</td>
<td>.94</td>
<td>3.43</td>
<td>[.066 .179 .677]</td>
</tr>
</tbody>
</table>
The group then considers the pair-wise weighting of the criterion; assume they generate the following criteria-weighting matrix:

\[
\begin{bmatrix}
C_1 & C_2 & C_3 & C_4 \\
C_1 & 1 & 1/3 & 5 & 1/3 \\
C_2 & 3 & 1 & 7 & 3 \\
C_3 & 1/5 & 1/7 & 1 & 9 \\
C_4 & 3 & 1/3 & 1/9 & 1
\end{bmatrix}
\]

The eigenvector for this criteria-judgment matrix is:

\[
[.31, .31, .22, .16]
\]

After considering the interrelationships among the criteria, the derived eigenvector indicates that the individuals involved in the criteria judgment-process considered criterion 1 and criterion 2 equally important, both of which are, appropriately, twice as important as criterion 4. Criterion 3 is placed in the approximate mid-range between criterion 1 and 2 and criterion 4.

With this information, the priority vector used to weight the audit alternatives may be solved for, as follows:

\[
i = \begin{bmatrix}
.247 \\
.203 \\
-.550
\end{bmatrix} = \frac{\begin{bmatrix}
.45 & .093 & .178 & .066 \\
.10 & .233 & .218 & .179 \\
-.45 & .586 & .257 & .677
\end{bmatrix} \begin{bmatrix}
.31 \\
.31 \\
.22 \\
.16
\end{bmatrix}}{\begin{bmatrix}
1 & 1 & 1 \\
.45 & .093 & .178 & .066 \\
.10 & .233 & .218 & .179 \\
-.45 & .586 & .257 & .677
\end{bmatrix} \begin{bmatrix}
.31 \\
.31 \\
.22 \\
.16
\end{bmatrix}}
\]

The group analysis thus yields the highest preference for audit alternative \(a_3\), with approximate indifference between the other two alternatives.

In the group analysis there is no technique to ascertain statistical confidence regarding the separation between the derived preference for audit alternative \(a_1\) contrast \(a_2\) or \(a_3\). In the individual case, of course, where means and standard deviations (as well as higher moments) may be computed, one may test preference
differences for statistically significant separation over the number of individual rendering judgments.

PRIORITIZATION ASSUMPTIONS

The preference analysis of audit alternatives may be performed under two different assumptions:

Assumption 1:

The priority vector is an informational input to subsequent planning.

Under this assumption, various prospective clients are interevaluated at the same point in time and the set of alternatives is partitioned, based upon the preferences, information, and other relevant planning information, e.g. resource availability.

For example, let us consider an integer program in which the priority weights developed in the illustrative example are used to parameterize the following objective function:

$$\max i^* = .247a_1 + .203a_2 + .55a_3$$

subject to:

$$\begin{bmatrix}
3 & 5 & 1 \\
4 & 6 & 8 \\
15 & 10 & 21 \\
29 & 37 & 24
\end{bmatrix}
\begin{bmatrix}
a_1 \\
a_2 \\
a_3
\end{bmatrix}
\leq
\begin{bmatrix}
9 \\
12 \\
25 \\
69
\end{bmatrix}$$

$$4 \times 3 \quad 3 \times 1 \quad 4 \times 1$$

[The usual integer constraints]

where:

- the RHS represents the number of productive audit hours available for the various classes of labor resources.
- $a_{ij}$ represents the estimated use of $i^{th}$ resources by the $j^{th}$ audit client.

The solution of this optimization model is to accept $a_3$ as the audit client.

In other circumstances—say for a prioritization of $.45a_1 + .24a_2 + .31a_3$ and a resource configuration which would enable $a_1$ or $a_2$ and $a_3$ to be selected but not $a_1$ and $a_2$ nor $a_1$ and $a_3$—the optimum solution would be to select $a_2$ and $a_3$.

No normative inference is intended from this discussion of
integer programming, although most public accounting firms do have sufficient productivity information to parameterize the constraint set for an integer program [Killough and Souders, 1973]. Our intent was to reinforce the notion suggested under Assumption I, that the prioritization vector is best thought of as an input to the decision process.

Assumption II:
The priority vector is developed in such a way as to directly establish an alternative set partition.

Under this assumption, the set of audit alternatives to be evaluated \( \{a_1, a_2, \ldots, a_n\} \) is augmented by a set of current audit clients \( \{\hat{a}_1, \hat{a}_2, \ldots, \hat{a}_m\} \). The criteria used to determine which current audit clients are included in the augmenting set \( \{\hat{a}_i\} \) is: choose \( \hat{a}_i \) so that (1) if a comparable \( a_i \) develops an equal or greater priority score, \( a_i \) will be deemed as a desirable client; and (2) if a comparable \( a_i \) develops a lesser priority, score \( a_i \) will be deemed as an undesirable client.

For example, assume there are two proposed audit alternatives \( \{a_1, a_2\} \) and the firm selects \( \{\hat{a}_1, \hat{a}_2\} \) as a standard of comparison (\( a_1 \) compared with \( \hat{a}_1 \) and \( a_2 \) compared with \( \hat{a}_2 \) ) and a set of criteria \( \{C_1, C_2, C_3, C_4\} \) to evaluate \( \{a_1, \hat{a}_1\} \) and \( \{a_2, \hat{a}_2\} \). If the priority vectors developed are:

\[
\{a_1, \hat{a}_1\} \rightarrow [.40, .60], \\
\{a_2, \hat{a}_2\} \rightarrow [.70, .30],
\]

the implication would be, select \( a_2 \) since the priority weighting of \( a_2 > \hat{a}_2 \); do not select \( a_1 \) since \( a_1 > \hat{a}_1 \).

Assumption II implies that the audit firm is operating in a free or unconstrained resource environment and/or the timing of the evaluation of prospective clients is such that other prospective clients do not exist during the evaluation of a particular audit alternative.

**SUMMARY**

In this paper we have suggested an audit alternative prioritization modeling approach which does not require extensive judgmental inputs. It should also be noted that it is not assumed that this eigenvalue procedure can be implemented without considerable effort. The procedure is simple and may be accomplished in a model environment relatively free of restrictive assumptions. This
operational simplicity does not guarantee the procedure's serious organizational use. Like any planning process there are information demands, time demands, and confidence biases which limit the model's usefulness and therefore must be dealt with to provide a reasonable environment within which the eigenvalue prioritization model would reach its full potential.

REFERENCES

Discussant's Response to "Evaluation of Prospective Audit Clients: An Eigenvalue Priority Assignment Model"

DANIEL M. GUY

Edward J. Lusk, in his manuscript, "Evaluation of Prospective Audit Clients: An Eigenvalue Priority Assignment Model," develops a mathematical approach to facilitate a CPA firm's decisions regarding client acceptance. The eigenvalue priority assignment model is certainly worthy of consideration in view of the promulgation in December, 1974, of Statement on Auditing Standards No. 4, entitled "Quality Control Considerations for a Firm of Independent Auditors." SAS No. 4 sets forth nine elements of quality control; one of these pertains to acceptance and continuance of audit clients.

My comments on selection of audit clients are classified into two divisions: (1) general notes on client evaluation, and (2) specific comments directed toward the eigenvalue priority assignment model.

GENERAL NOTES

SAS No. 4 (AICPA [1976]) recommends that "... policies and procedures should be established for deciding whether to accept or continue a client in order to minimize the likelihood
of association with a client whose management lacks integrity.” According to SAS No. 4 (AICPA [1976]), these policies and procedures do not imply that the auditor vouches for the integrity or reliability of a client. Instead, development of client quality control policies and procedures is dictated via the concept of due professional care. That is, prudence suggests that the auditor be selective in determining professional relationships.

Examples of policies and procedures for client evaluation enumerated in SAS No. 4 (AICPA [1976]) are:

1. Reviewing financial statements of a proposed client;
2. Inquiring of third parties, such as the proposed client's previous auditors, its banks, legal counsel, and investment bankers and others in the financial and business community as to the reputation of the proposed client;
3. Evaluating its ability to service the client properly with particular reference to industry expertise, size of engagement, and manpower available to staff the engagement; and
4. Reevaluating clients for continuance.

Most major CPA firms have published quality control documents disclosing how they have operationalized the elements of quality control presented in SAS No. 4 (AICPA [1976]). To gain additional insights into criteria employed in client selection, I reviewed the following six documents from the firms indicated:

1. Arthur Andersen & Co., Assuring the Quality of Our Professional Practice (1975);
2. Hurdman & Cranston, Control and Maintenance of Professional Standards (1974);
3. Alexander Grant & Company, Quality Control (1974);
4. Main Lafrentz & Co., Quality Control Document (1975);
5. Peat, Marwick, Mitchell & Co., Professional Practice Standards and Controls (1976); and

Some of the more interesting aspects of client acceptance policies gleaned from these publications are discussed next.

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1SAS No. 7 entitled “Communications Between Predecessor and Successor Auditors” requires that a predecessor auditor communicate with a successor auditor prior to acceptance of a new audit client. (AICPA [1976], AU 315).
Hurdman & Cranston identifies their firm-wide profit pool, in which all partners share, as a condition necessary to promote good client acceptance decisions. A firm-wide profit pool reduces the financial pressures that could develop in a firm if its partners shared only or primarily in the profit of their own offices. Hurdman & Cranston goes on to say that aggressive competition for new clients and overly protective attitudes toward retention of existing clients is destructive of independence.

According to Main Laforentz, when considering acceptance of a client, a study is made of relative risk, ability to serve the client, and potential conflicts or embarrassments. In studying relative risk, consideration is given to:

1. The nature of the business;
2. The nature and the purpose of the audit;
3. The reputation and stability of management;
4. The nature and source of financing used by a company, its financial needs, and its ability to meet those needs; and
5. The system of internal control.

Maintenance of a high quality practice presupposes a careful screening of clientele. Price Waterhouse states that certain types of potential clients by their very nature do not lend themselves to high quality practice. Price Waterhouse singles out—for example—gambling operations and small loan companies. “We find gambling operations to be an unattractive source of an accounting practice and do not as a matter of policy accept clients whose sole or principal business is the operation of a casino.”

Although strictly limited according to a Business Week [1975] article, some Big Eight CPA firms employ detective agencies such as Pinkerton’s, Inc. or Intertel, Inc. to check out executives in companies not well-known to the firm. Henry C. Neville, vice president and director of investigations of Pinkerton’s, states that such practice is done on a routine basis by some CPA firms. Typically, in such an investigation, the chief executive and one or two other top managers are checked along with the chief executive of subsidiaries. Ernst & Ernst; Peat, Marwick, Mitchell; and Arthur Young are cited by Business Week as at least occasionally employing security firms for client investigative work. Arthur Andersen, on the other hand, is critical of using private investigators to screen potential audit clients.
THE EIGENVALUE PRIORITY ASSIGNMENT MODEL

In my opinion, the model developmental phase could have benefited from a review of CPA firm quality control documents and prescribed forms for evaluating prospective clients used by some CPA firms. Rather than devote time to interviews to discover client selection criteria, the aforementioned sources would have produced more relevant criteria. At least, more pointed interview questions could have been raised with knowledge of the quality control documents and prescribed client evaluation forms. Assuming that interviews were not needed, this would have permitted allocation of research time to empirically test the eigenvalue model.

According to Lusk's findings the ability to staff an engagement is not an important consideration in the client selection process. I find this to be in conflict with normative criteria as set forth in the quality control documents published by CPA firms and SAS No. 4. Consider, for example, the following quote from the Main LaFrentz publication:

A judgment is made that expertise in the client's industry exists in the local office, is available from another office within the Firm or will be acquired prior to initiating the engagement. Also a determination is made that adequate personnel exist, both within the local office and other offices that will participate in the audit, to enable the services to be performed in compliance with Firm standards.

Lusk omits from his manuscript discussion as to why an eigenvalue approach to audit client selection is better than positive models currently used by practitioners. In other words, there is little motivation to read the manuscript and to attempt to apply the eigenvalue model to a real situation.

Client selection, of course, has been a long-standing problem. Accounting Series Release No. 19 (December 5, 1940) pertaining to the SEC investigation of McKesson & Robbins warns accountants that new and unknown clients merit some independent investigation prior to undertaking the engagement. More recently, Accounting Series Release No. 196, "In the Matter of Seidman & Seidman et al.," once again reminds the profession of the need to investigate clients, especially those acquired by practice merger. According to ASR No. 196, Seidman & Seidman in their acquisition of a

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2 The author would like to express his appreciation to Professor John Sennetti, Area of Information Systems and Quantitative Sciences, College of Business Administration, Texas Tech University, for his comments concerning the application of eigenvalues to audit-client selection problems.
smaller firm, having Equity Funding Corporation of America as a client, failed to undertake a reasonable investigation prior to combination. It goes without saying that some clients should be without benefit of a CPA.

The eigenvalue approach to audit client selection is shrouded in mathematical complexity. Few accountants have ever heard of an eigenvalue. Consequently, another approach will probably be of benefit to many practitioners, especially small practitioners. A very simplistic evaluation is presented by Grimsley [1975]. He discusses an illustrative model for evaluating existing clients based on five client variables:

1. Value of services rendered (in the client's judgment);
2. Development potential;
3. Client cooperation;
4. Economic stability (ability to pay); and
5. Timeliness of payment.

The variables are ranked via a Likert scale with a rating of five assigned for the best and one assigned the worst.

Now let's turn to some mathematical questions raised by the eigenvalue model. Many of the model inputs (for example, prospects for growth, legal status, ability to pay, etc.) are interactive and oftentimes inseparable. Furthermore, the process of inputting criteria independently does not operate in the human mind. An opinion concerning a potential audit client is a collection of thoughts that bombard an individual or firm as to the acceptability of that client. I believe that practitioners will find the ability to develop noninteractive criteria next to impossible.

In the matrix developed in the priority assignment model, if audit client “x” absolutely dominates audit client “y” (on, say, the ability to pay), “x” is assigned a value of 9 relative to “y,” while “y” relative to “x” is assigned a value of 1/9 by definition. By derivation, however, it appears that —9 should be the value assigned.

Instead of using a discrete judgment value of 1,3,5,7,9, the manuscript indicates that a confidence interval ranking may be employed. To implement this in practice would be rather difficult in that the model could yield confidence interval rankings that overlap. This is a good example not of inconsistency, but of unassuredness—doubt input yields doubt output.
In conclusion, I believe that accounting researchers need to devote substantial attention to the audit client selection problem. Very little is known about the way practitioners currently evaluate potential audit clients. Consequently, much exploratory research needs to be done. Afterwards, an approach such as the eigenvalue model can be improved and experimented with in an empirical setting.

REFERENCES

American Institute of Certified Public Accountants, *Statement on Auditing Standards* No. 4 (American Institute of Certified Public Accountants, 1974).
Client-serving practitioners feel somewhat out of their element in discussing client selection. They are usually more concerned about the basis for selecting an auditor and the means of influencing that judgment!

Recent developments in the profession, however, have made client evaluation, acceptance, and retention integral to our processes of practice management and quality control. Faced with increasing requirements for audit assurances, shortages of qualified supervisory-level professional staff, and higher expectations of the public about our work, we have had to develop ways to strengthen our professional performance and our ability to demonstrate the quality of our audit work and our audit judgments.

In fact, there is no practical way to eliminate all possibility of misleading presentation, or future financial reverses, or errors of fact or judgment which may reflect, fairly or not, on the auditors' involvement with clients' financial statements. Even if it were possible to serve only clients who never have accounting or business problems, and even if this theoretical ideal were socially acceptable, it is, unfortunately, unattainable in practice. Nevertheless, practitioners can reduce the risks by an orderly consideration of the
relative desirability of accepting a specific potential client.

Essential to the proper consideration of relative desirability is a definition of criteria. Professor Lusk has presented some of these in his paper and has suggested sources of information on the potential client for each criterion. He then undertakes to develop some mechanism which will use these criteria to simultaneously compare the relative desirability, as audit clients, of several companies.

Each company is rated with respect to the others on each of several key factors that are meaningful to the auditor. Each factor is also rated according to the auditor's perception of its relative importance. The ratings are then manipulated in some manner to yield a scale of values for each company under consideration. Yet, a decision problem of this type ordinarily involves the consideration of factors that, to say the least, are not readily quantifiable.

After carefully studying the paper presented by Professor Lusk, I quite frankly am unable to assess the reasonableness of the model he has presented. While I understand that eigenvalues are used in a variety of multivariate statistical methods to assess relative importance of a number of variables, the paper does not provide sufficient background with respect to the techniques involved to enable me to make such an assessment.

Unfortunately, as a practitioner who would be expected to employ the model, I find the prescribed solution as fuzzy as it seems the problem is to its presentor. I cannot begin to comment on the reasonableness of this procedure because I simply do not understand it. Professor Lusk has not attempted to render his model comprehensible to the people who are expected to use it. This fault is the most serious criticism I have of this paper. Nor does the paper explain why the approach is reasonable. It is not that I believe the approach to be invalid; insufficient information is presented to render an informed judgment.

Some aspects of his paper, however, do invite informed comment from a practitioner.

First, new clients do not arrive in batches like a crate of melons. Potential clients are considered one at a time. The auditor who can pick from among several potential clients is indeed fortunate.

Second, as I indicated earlier, in my experience the key aspect of the decision to accept a new client is the definition of appropriate criteria for evaluation. The weighting of the differing criteria
is not really a problem, because most of the actual client accept/ reject decisions facing the practitioner do not involve shades of acceptability or a lack of them; rather, they are usually quite clear to a willing viewer. For example, management's integrity and business ethics are either such that you are proud to have your name associated with an entity or you are unwilling to permit the association.

Third, since the new-client acceptance judgment is basically stop or go, it follows that the list of criteria which might be relevant is a long one. Many factors may be quickly dropped from consideration in an individual situation, however, and others consequently assume great importance. In addition, factors differ in their significance from time to time as changes occur in the legal and economic environment. All these variations further complicate the definition of the problem in terms of facilitating a scientific approach to a solution.

Having made these points with regard to the new-client acceptance process, I would like to say that a prioritizing technique may have greater value in considerations of client retention. For example, a practitioner desiring to raise the caliber of his practice may find the prioritizing model useful. A mathematical approach may also be useful to the practitioner who wishes to accept a new client but who must, because of manpower limitations, eliminate one or more existing clients. The latter use, which historically has been a real concern, points out that some factors, such as staffing constraints, are critical. Yet the paper specifically assumes that no such constraints exist. How do resource utilization and the imposition of manpower constraints, very real considerations, affect the viability of the proposed approach? The paper does not say. Next, and perhaps this is a reflection of my ignorance of the subject of fuzzy models, how does this approach compare with simpler judgmental procedures? Has it been tested and found to be significantly more effective than those cruder decision procedures practitioners have relied upon in the past? Or is it simply another academic's plaything?

I believe that client retention evaluation is of greater practical concern to the profession than new client acceptance. Not only are the data on which to base the decision a good deal better, but there is here an opportunity for realistic comparison among the clients being served. Furthermore, as indicated above, the problems of providing adequate amounts and skills of client-serving professionals at the right time to assure quality control are forcing
this type of client evaluation more and more.

Underlining this latter point is the fact that the periodic evaluation of clients for retention is suggested as one requirement in Appendix “A” of the AICPA’s recently-adopted Plan for Voluntary Quality Control Program for CPA Firms. Thus, it is now part of our professional standards. Professor Lusk notes that quality control considerations are not the only ones, and mentions economic viability and professional stature as significant factors in any client selection process. To illustrate more specifically the criteria I think appropriate to an evaluation of existing clients, I would classify them in four areas of concern: assumption of risk, practice objectives, and financial and psychological compensation. A brief discussion of these criteria follows:

ASSUMPTION OF RISK

Virtually every engagement involves certain risks; however, there are many factors which increase or mitigate these risks. After considering these factors, the practitioner should be able to conclude that the client does not present undue or unusually high risk.

*Industry.* Certain industries (e.g., real estate syndications) by their nature or method of operation involve high risk to their investors, creditors, and professional advisors. The practitioner should consider the industry of the client, the problems associated with the industry, the general level of risk to investors, etc., and the degree of regulation.

*Public vs. Non-Public Ownership.* Publicly held companies (including privately held, but with outside financing) in general have a higher degree of risk than those companies with non-public ownership.

*Character of Management.* The character of the client’s management, both in their dealings with us and in their dealings with others, needs assessment. If we have reason to question the truthfulness, willingness to cooperate, and/or their response to our inquiries, or if we have reason to suspect the business ethics or morality of management, we should consider the attendant risks.

*Reputation of Client in Industry/Area/Business Community.* Most firms want to be associated with clients who are respected by others in the business community. If we have reason to question
our client's reputation, we should thoroughly investigate and assess
the situation.

Financial Viability. Many companies have financial problems and
a certain number of clients will, at times, encounter financial
difficulties. We should evaluate the financial status of clients and
be alert to any potential risks attendant to financial bankruptcy,
take-overs, etc.

Ability to Serve. Certain industries require industry expertise and
knowledge to provide the proper level of service. We should assess
this need, our present expertise, and the commitment necessary
to provide the required resources.

Condition of Records. When the client's records are in such condi-
tion that a major effort would be required to straighten them
out, the risk of doing so and then auditing can be high. We
must evaluate the client's commitment to maintain appropriate
records and assess the risk based on this evaluation.

PRACTICE OBJECTIVES

CPA firms, whether international, regional, or local, have dif-
erent practice objectives of growth, industry specialization, and
client composition. Clients also have varied objectives. Although
many companies have plans and high hopes of growing into
substantial entities, the majority do not achieve spectacular growth.
Therefore, the factors which may tend to enhance or inhibit a
company's growth must be considered by the practitioner with
respect to his own firm's objectives.

Industry/Product. The nature of certain industries militates against
significant growth in size of company. The industry and product
line should be assessed for their growth potential.

Management. The practitioner should consider the experience and
capability of the management to determine if they appear to have
the ability to direct and sustain growth of the company.

Financial Capacity. Many small companies do not have the ability
to attract new equity capital and may not be able to secure debt
financing under suitable conditions. We should assess both the
present financial viability and the ability to finance expected growth.

FINANCIAL

One of any practitioner's objectives is to achieve an appropriate
profit. To do this means, among other things, that he must limit
his work where normal profit margins are not achieved. Factors to be considered include the following:

Minimum Fee. Recurring audit engagements of less than some certain amount, depending upon the makeup of the desired practice, generally are considered undesirable, both from the client's and the practitioner's viewpoint. If the practitioner's minimum fee is considered high by the client, the practitioner and the client should evaluate whether the client could be better served by another, usually smaller, firm.

Discount. Where a firm must take a discount on a recurring basis, we should consider the reason, including whether the relationship with the client is proper (i.e., to be sure the discount is not indicative of client discontent). When a practitioner is unable to obtain substantially full fee realization, he should consider the economics of the situation. Normally there should be other positive factors, including opportunities for expanded services in tax and MS areas, for a firm to incur a significant discount.

Billings/Collection. We expect, with all our clients, to be able to render timely bills for our services and receive prompt payment. If this is not possible, the effect is essentially the same as incurring fee discounts, because it incurs significant interest costs.

Mix of Time. Smaller than desired engagements, which require an unusual amount of supervisor time in relation to other staff time or an inordinate amount of partner or manager time in relation to total staff time, place an inordinate burden on the partner-manager group without providing the mix of time that would result in a normal profit contribution. Further, the demands of these clients often result in substantial non-chargeable time being spent by partners and managers in general “hand-holding,” travel time to frequent but short meetings, telephone time, lunches, etc., which could be more effectively utilized. The practitioner should evaluate whether continued service to such clients is desirable.

Busy Season. The financial factors to be considered have the same applicability regardless of the period in which the work is performed. Practitioners, however, are interested in achieving, to the maximum extent, a balanced workload throughout the year. Therefore, if the work occurs at a time other than a firm's busiest periods, this is a positive factor to be considered.
PSYCHOLOGICAL REWARDS

In addition to the foregoing three major categories, there are other factors which should be considered.

Service Scope. Large CPA firms are interested in providing a full range of services to clients, including consultation on a broad spectrum of business problems and opportunities. Publicly held companies are desirable clients for large CPA firms in the sense that they usually provide the maximum in service opportunities. Conversely, large firms should evaluate carefully those clients for whom they do only non-opinion audits or other work of less than full scope.

Contacts. There are many situations where members of the client’s management, their directors, or professional advisors could be valuable sources of additional service opportunities. Some practitioners will want to carefully consider these, as well as any other interrelationships between client managements and directors.

Respect. We expect our professional people to be treated with reasonable respect by client personnel. We should consider the effect on our personnel if they are not so treated.

Challenge. The vast majority of our professional personnel are seeking challenging assignments. We should consider the level of personnel required to complete the assignment, the degree of challenge for personnel assigned, and the personnel development opportunities inherent in the engagement.

Working Conditions/Location. Certain clients do not or cannot provide their auditor’s personnel with satisfactory working facilities commensurate with the engagement needs and the professional status of the personnel. In addition, depending on the practitioner’s geographic location, certain clients are located in undesirable or relatively inaccessible areas which require inordinate amounts of out-of-town or nonchargeable travel time. The practitioner should consider the total economics of the service to these clients and the indirect costs of any adverse impact on the professionals serving these clients.

This is, hopefully, an exhaustive—and, perhaps, an exhausting—list of factors. Inevitably, its application to a client list by a scientific method will require a degree of quantification of each factor that is not realistically attainable and, if attainable, would also add significantly to the complexity of the eigenvalue solution.
All this discussion still does not address the important matter of reaching and implementing the judgment itself. In new client acceptance, the practitioner reaches a stop-or-go decision quickly, because he usually has little time to react to the opportunity. In the retention decision, however, the problem may be greater because of feelings of responsibility for a discontinued client's service needs, the desire to achieve a smooth transitional process, and even some sentiment. Thus, even though an evaluation is made of clients against criteria appropriate to the practice one is seeking to develop and maintain, and even though a "stop" decision is reached, action may be delayed, particularly if the decision has been heavily based on size factors. Obviously, where the decision has been influenced more by risk or financial considerations, extrication is easier.

SUMMARY

The current regulatory and litigious environment of independent audits requires greater care than ever before on the part of auditors in the acceptance and retention of clients. This process, which heretofore has been implicit and highly individual in its application, is now a professional requirement and a genuine need for information and guidance exists. Because so many variable factors may affect the decision to reject or discontinue, however, and because experience indicates that the stop-or-go decisions have generally been easy to reach, it is difficult to comprehend how a scientific prioritization approach can be effectively employed. Such an approach depends on a relatively static and accurate determination of weights for a sizable number of potentially quite important factors; in practice these factors instead appear to exhibit a great deal of dynamism and subjectivity.

The greatest current need in this area is for identification of the factors which may be appropriate to a given judgment and for suggestions for orderly implementation of client discontinuance judgments. These factors may be grouped generally into risks assumed, financial rewards, objectives of the practice, and psychological rewards. An appropriate balancing of these is a highly individual matter, but is essential to assurance of continuing adequate professional performance.
session

THREE
Toward an Extended Use of Statistical Analytical Reviews in the Audit

WM. STEVE ALBRECHT and JAMES C. MCKEOWN

INTRODUCTION

Paragraph .70 of Section 320 of Statement on Auditing Standards No. 1 (SAS No. 1) identifies two general classes of audit procedures required by the third standard of field work. The two classes of procedures are (1) tests of details of transactions and balances and (2) analytical reviews of significant ratios and trends and resulting investigation of unusual fluctuations and questionable items. It is our view that this second type of test, the analytical reviews, has not yet been sufficiently developed in terms of statistical methodology and used by CPA firms and that, if developed in this way, significant economic and pragmatic benefits would accrue to the auditing profession. In particular, we are convinced that these tests of "reasonableness" are very appropriate in the present age of giant conglomerates, multidimensional audits, increased legal liability, decreased audit trails and audit fee conservatism.

As a result of our views, this paper has the following two purposes: (1) to present some of the arguments in favor of developing more extended use of statistical analytical review procedures and (2) to provide an empirical examination of several different statistical

1The one notable exception is the firm of Haskins & Sells. Unlike other CPA firms, they use these kinds of tests extensively in their audit work.
techniques which might be used in the analytical review process. To fulfill these purposes, we have divided the paper into three sections. The first section presents a discussion of the nature of analytical reviews. Included in this section is an examination of the kinds of issues that can be addressed using analytical review procedures as well as several suggestions for possible extensions of the analytical review process. In the next section, we consider the theoretical propriety of several competing statistical methodologies that could possibly be used to perform this audit function. The methodologies examined include ratio analysis, trend analysis, regression analysis, univariate time series analysis, and multivariate time series analysis. Finally, in the third and last section we present the results of some empirical tests where we compare the performance of three of the methods examined in the previous section. We compare the methodologies on the basis of how well they perform in reviewing and fitting some real audit data provided us by Haskins & Sells.

THE NATURE OF AND POSSIBLE EXTENSIONS OF ANALYTICAL REVIEWS

Contrary to tests of details of transactions where the emphasis is on documenting the accuracy and authenticity of the components of an account balance, the major effort in the analytical review process is to obtain an assessment of the "reasonableness" of the overall account balances in the financial statements. With these tests, one seeks to confirm whether or not amounts in current financial statements conform with reasonable expectations based on past statements and other known conditions. In essence, there are really two questions one seeks to answer by using these kinds of tests. They are:

1. Are the current financial statement balances reasonable when considered in light of what one would expect them to be, based on previous years' (months') balances? If not, why not? and
2. Is the relationship between structural variables (accounts) similar in the current audit period to what it was in past audit periods? If not, why not?

Notwithstanding the importance of these questions, we were unable to find any specific audit guidelines even suggesting how or to what extent they must be answered when performing an audit. As a consequence, we expected—and an informal survey of several audit partners confirmed—that there is a wide diversity
in practice regarding the ways in which analytical reviews are performed. We found that at one extreme there was Haskins & Sells which, through their STAR program [Stringer, 1975], have made these statistical analytical reviews a formal part of the audit process. Their audit programs include an analytical review of account balances via regression analysis and an investigation of any unusual fluctuations that are identified as a result of their analysis. On the other hand, there were other firms where analytical reviews were applied only casually, by visually scanning the audited financial statement account balances.

While each of these approaches may be currently acceptable and adequate in many cases, we cannot help but feel that there are several benefits which could accrue to the audit profession if analytical reviews were somewhat better defined and followed as would be the case if statistical analytical reviews were more widely used. These benefits, most of which can be subclassified under the term “greater audit productivity,” are described in the following paragraphs.

A More Efficient Scope Definition

Well-defined analytical review procedures should be able to provide relatively inexpensive and quick indications of where unusual fluctuations exist in the financial statements. If auditors could quickly hone in on “problem areas” at the outset of an audit, valuable staff time and money could be saved. As a result of these tests, minimal audit procedures could be performed on non-problem areas and extended procedures could be directed toward the questionable accounts.

A Better Audit Approach to Multi-Unit Organizations

Auditors are often faced with a choice of which branches, departments, or segments of a business to audit. Well-defined analytical review procedures could provide a quick and relatively inexpensive way to help them make that decision. In particular, if the audit client were, say, a large retail chain, an analytical review should be able to provide evidence in advance of the audit as to which stores’ financial statements appeared more unusual and/or questionable.

Inexpensive Interim Reviews

ASR No. 177 (which was subsequently dropped), SAS No. 10 and SAS No. 13 have provided for “limited reviews” of corporate
interim reports by CPA firms. A well-defined analytical review procedure could almost provide a self-contained review of these quarterly statements. In particular, the analytical review tests would indicate whether or not the quarterly statements are "reasonable" when considered in light of current developments and past quarterly and annual performance.

An Objective Final Review of the Audited Statements

Even if CPA firms were unwilling to use the extended analytical review procedures to help define the scope of an audit, these types of tests could be used as a final, objective, and inexpensive examination of the reasonableness of the audited financial statements. At this point in the audit, the unusual fluctuations identified through the test of transactions procedures should already have been identified and explained.

The identification of the above four possible applications of analytical reviews as part of the audit function is probably not complete. There may be other and maybe even more important applications of which we are not aware. However, it should be stressed that, in each of these four cases, consistent statistical reviews would be objective, practical, and relatively inexpensive.

AVAILABLE METHODOLOGIES

Having explored both the practical and theoretical arguments supporting extension of the use of statistical analytical review procedures, we now turn our attention to the mechanics of performing a statistical analytical review. An auditor is concerned with evaluating the reasonableness of the reported economic situation of the firm. He wants to know if there are any unusual fluctuations in the financial statements that need detailed investigation and/or justification. In order to identify and react to unusual fluctuations, the auditor must:

1. Develop some projection or prediction of what the values during the audit period would have been if past trends, structural relationships, etc. continued during the audit period.
2. Compute the difference between the reported value and the projected value.
3. Determine the (statistical) significance of the difference.
4. Use further statistical methods and/or professional judgment to determine which, if any, further audit actions are appropriate.

The focus of the remainder of this paper is an examination
of the possible usefulness of various statistical methods (trend analysis, ratio analysis, regression analysis, and univariate and bivariate Box-Jenkins time series analysis) in developing the projected values (Step 1 above). Accordingly, we will discuss the advantages and disadvantages of each of these methods and then provide empirical evidence concerning the last three.

**Trend Analysis**

An analysis of trend in an account (for example, sales, etc.) would inform the auditor of whether or not the current year’s (quarter’s, month’s) balances are reasonable when considered in light of past audited balances. A diversity of simple models—such as, “current quarter’s sales are a function of last quarter’s sales,” or “sales in the same quarter of last year could be developed and fit to the data.” In addition, more sophisticated trend models such as exponential smoothing, weighted average, etc. could be tried on the financial statement data.

These models could all be used to predict what the current audit period’s account balances should be. The resulting predictions would be compared with recorded amounts and unusual discrepancies would be investigated. However, there are several weaknesses with using only trend analysis. First, there is no guarantee that a certain trend, even if well-established on the basis of past data, should continue into the current audit period. Second, a trend analysis of a financial statement variable cannot consider a variable’s structural relationship with other variables. For example, even though cost of sales might appear to be significantly lower than we would expect it to be based on trend, it may be justified because of decreased sales activity during the period. Finally, as usually implemented, trend analysis is subjective and somewhat subject to the bias of the auditor. In particular, there are several possible trend models that can be used and little work has been done to provide a means of guaranteeing that the specific trend relationship posited by the investigator is the most appropriate one to use.

**Ratio Analysis**

Financial ratios (i.e., profitability, solvency, and efficiency ratios) can also be used to examine whether or not the financial statements

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2It is true that the statistical method used in Step 1 will affect the determination of the significance of any differences found (Step 3), but this paper does not consider that issue in detail.
in the current period are reasonable when compared with those of the prior periods. One can very easily compare a time series of ratios based on recorded balances and then investigate any unusual differences in magnitude from the previous period’s ratios. Like trend analysis, however, ratio analysis is not really a technique but a way to efficiently combine financial statement data for easy analysis and interpretation. After the current and past ratios are computed, one still needs a statistical model (for example, regression analysis) to relate the time-ordered ratios. Merely to suggest that the ratio in the current period should be equal to that of the prior period ignores the problems of instability over time, non-linearity, and the variable nature of financial statement data. Also, such a naive approach to ratio analysis has the disadvantage of being able to relate only two variables to each other (for example, gross profit to sales).

Regression Analysis

Regression analysis is a statistical technique capable of examining the reasonableness of an account balance on the basis of both structural relationships between financial statement variables and the past audited balances of the dependent variable. This methodology enjoys the flexibility of being able to explore a much richer variety of statistical relationships than is possible with either trend or ratio analysis. (In fact, a linear trend can be developed via regression analysis by using time as the independent variable.) Some of the advantages of regression analysis are: i) it allows for the use of multiple independent variables in the prediction equation, ii) non-linear relationships between financial statement variables can be explored, and iii) it is flexible enough so that it can be adapted to include seasonality parameters, trend parameters, ratios, etc.

Notwithstanding its superiority, there are at least two distinct disadvantages of regression analysis. The first relates to one of the basic assumptions underlying the method which is that, in regression analysis, the adjacent observations are assumed to vary independently. This assumption will often be violated when using time-ordered financial statement data, and a further modeling of the error structure will be necessary. (Our contact with the

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3 There is considerable evidence which indicates that at least earnings observations are not independent over time but, instead, follow a random-walk process. See, for example, Albrecht, Lookabill, and McKeown [1976] or Brealey [1969].
Haskins & Sells approach leads us to believe that their programs have internalized decision rules capable of attacking this autocorrelation problem. The second disadvantage is that selection of the best regression model is dependent upon inclusion of the appropriate independent variables and lags. As a consequence, unless every possible combination of independent variables (including all lead and/or lagged relationships) are tried, the possibility exists that the model chosen is not the most appropriate one.

In summary, however, we consider regression analysis to be an excellent technique which can be used in performing analytical reviews.

Box-Jenkins Time Series Analysis

Unlike regression analysis, the Box-Jenkins (B-J) methods are somewhat unfamiliar to many accountants. Therefore, in this section, in addition to reviewing their theoretical propriety, we also provide a descriptive discussion of the modeling process.

Box-Jenkins time series analysis is a systematic statistical forecasting methodology which has enjoyed considerable success in a variety of forecasting applications. There are basically two types of B-J time series analysis. In its most simple form, (termed univariate or one-variable analysis) the methodology provides forecasts based only on the past history of the variable of interest. In its more complicated form, (multivariate analysis) it combines information contained in the past history of the variable of interest with information contained in a leading indicator to provide even more efficient forecasts. Consider the following example:

Suppose we wish to forecast monthly sales of a corporation. Using B-J analysis, this can be done in two ways:

1. We can forecast future sales based only on past sales. After examining the statistical properties of the historical sales series, we will use existing relationships to predict into the future. Obviously, if past sales are not related in any way to future sales, the methodology has very little to offer. However, if relationships do exist, as determined by the autocorrelations and partial autocorrelations of the series, these relationships can be extrapolated to provide estimates of future values of the series. Possible relationships that can exist in the data—and which are all considered in the B-J univariate analysis—are seasonal models, trend models,

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4 See the appendix for a description of how these relationships are identified.
exponential smoothing models, autoregressive models, moving average models, and many more. Although it may appear rather simplistic to provide forecasts based on only the past history of the sales series, this technique has proved extremely accurate when compared with management forecasts [Lorek, McDonald and Patz, 1976]; and

2. The second and more complex type of B-J analysis is the multivariate method. (Although the general multivariate method is theoretically available, most work done to date in multivariate analysis has been concentrated on the use of only one independent variable. Therefore we will discuss the bivariate methodology only.) Using this form of time series analysis, we search out a good leading indicator (for sales it might be gross national product, industry indicators, or some firm-related variable) and then predict sales based both on past sales and on the leading indicator. Relationships between all possible leads and lags, both between and within the variables, are explored.

Because it is an excellent forecasting methodology, B-J time series analysis appears quite appropriate as a tool that could be used in performing analytical reviews. In particular, the B-J methods could be used to provide forecasts of what the current balances "should be" and then these forecasts could be compared with recorded amounts to reveal any unusual fluctuations in the statements. In principle, the univariate B-J type of analysis could answer the question of whether or not the current account balances are reasonable when compared with past balances, while the bivariate forecasts would provide evidence concerning reasonableness on the basis both of past balances of the same account and of the variable's structural relationship with other accounts. Indeed, there are several advantages to using the B-J methods for this purpose. Some of them are:

1. The methodology is theoretically appropriate for use in studying time series data. It does not require the observations to be independent from each other but, instead, uses the nature of the dependence to build a suitable model;
2. The methodology is comprehensive. The modeling process considers a wide variety of models in searching for an appropriate model for a particular time series. In fact, both regression models and trend models are subsumed under the B-J methodology;
3. The methodology allows the data to "speak for itself." Contrary
to other forecasting techniques, we let the data suggest possible
models instead of hypothesizing likely models and then testing
them. This has the obvious advantage of reducing the bias of
the investigator and insuring that all plausible models are exam-
ined;
4. The methodology is capable of modeling dynamic relationships.
That is, all lead and/or lagged relationships are explored; and
5. Once the system is set up, the forecasts are very inexpensive
to obtain and provide a good benchmark for comparison with
recorded account balances. The methodology provides an excellent
forecast based on the assumption that the future will behave like
the past.

Notwithstanding this theoretical superiority, there are, however,
at least two disadvantages of the B-J procedures. They are:
1. Before the methodology can be very accurate, one needs an
historical time series of at least 30 observations. This constraint
probably limits the kind of data that can be analyzed to monthly
data, but this is not likely to be a problem since most applications
of the regression method use monthly data; and
2. At present, computer programs are available to handle only
one independent variable (other than trend and seasonality param-
eters) in the bivariate (multivariate) case. However, as will be shown
in the next section, this limitation may not be too serious.

AN EMPIRICAL EXAMINATION OF THE PROPOSED METHODOLOGIES

In the preceding section, we reviewed five types of analysis
that had previously been proposed as possible methodologies to
be used in performing statistical analytical reviews.
Although we have thus far treated them as separate methodologies,
they can be easily related to each other in the following ways:
1. Ratio analysis is a data summarization technique that is not
an alternative to the other methods but, instead, prepares the
data in a particular way for use in one of the remaining four
methodologies;
2. Trend analysis is completely subsumed under the univariate
B-J methods. That is, all appropriate trend models will be examined
as part of the univariate modeling process;
3. Univariate B-J time series analysis is one special case of bivariate
B-J time series analysis. That is, it is that case where the values
of the transfer function parameters are essentially zero; and
4. Regression models are one type of equation which can result from the use of bivariate time series analysis. In particular, if—when using the bivariate B-J methods—the data suggest that a regression model is appropriate, such a model will be identified and fit to the data. However, if the data suggest that a more complex model is necessary, the bivariate capabilities go well beyond those of regression analysis.\(^5\)

The above summarization leads to the conclusion that all of the other four techniques can theoretically be subsumed under the comprehensive bivariate B-J time series methods. The one practical exception, however, is regression cases where the dependent variable is a function of more than one exogenous independent variable.

If the above summarization is correct, there should never be a case (except where there are significant multiple structural relationships) where any of the other methods can fit an historical time series better than the bivariate B-J method. To test this hypothesis, we obtained audit data from Haskins & Sells on which to compare regression analysis with univariate and bivariate time series analysis. Although we do not know which audit clients provided the data, it was made available to us for at least 30 periods in each case. The three (completely independent) applications on which we compare the methods are: total operating expense, revenue, and payroll expense. For each of these, we wanted to provide forecasts of what the current audit period’s balances “should be” so that the reasonableness of the recorded amounts could be examined. Since this is the procedure followed by Haskins & Sells in their analytical reviews, we used their regression results on these accounts as a benchmark with which to compare the univariate and bivariate methods. The time series models are derived via a computer program written by McKeown and Albrecht. The final models for all three methods are presented in Exhibit I.

These three applications are especially useful because of the

\(^5\) For an example of this phenomenon, see Albrecht and McKeown (1976). In that paper, the authors examined the relationship between the performance of the economy and Earnings per Share of 75 firms and found that the relationship could best be identified using bivariate Box-Jenkins time series analysis. Of the 75 B-J models identified, eight turned out to be regression models posited by prior researchers.
### Exhibit I. The Fitted Models

<table>
<thead>
<tr>
<th>Model Type</th>
<th>Univariate B-J Model</th>
<th>Regression Model</th>
<th>Bivariate B-J Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y = Operating Expense</td>
<td>( \hat{Y}<em>t = .097 + .13e</em>{t-1} + .83e_{t-2} + .87e_{t-3} - .54e_{t-12} )</td>
<td>( \hat{Y}_t = 327.63 + 8.04X_1 + 1.10X_2 )</td>
<td>( \hat{Y}<em>t = 102.37 + .57X</em>{2t} - .63X_{2t-12} + 1.10Y_{t-12} )</td>
</tr>
<tr>
<td>Y = Revenue</td>
<td>( \hat{Y}<em>t = .0077 - .71e</em>{t-1} - .27e_{t-4} + .58e_{t-5} + .46e_{t-12} )</td>
<td>( \hat{Y}_t = 140.43 + .21X_3 + 2.47X_1 + .03X_4 )</td>
<td>( \hat{Y}<em>t = 31.637 - .84\hat{Y}</em>{t-1} + .127Y_{t-8} + .049\hat{Y}<em>{t-9} - .176Y</em>{t-12} + .117X_{3t-1} - .033X_{2t-8} + .26X_{3t-4} )</td>
</tr>
<tr>
<td>Y = Payroll Expense</td>
<td>( \hat{Y}<em>t = .57e</em>{t-1} + .43e_{t-5} ) (first difference)</td>
<td>( \hat{Y}_t = -664359 + 4.52X_5 + 628.34X_6 + .05S(Dec.) + .038S(July) + .03S(Jan.) + .026S(Nov.) )</td>
<td>( \hat{Y}<em>{3t} = 2296.3 + 1.63Y</em>{t-1} - 4.84X_{2t-7} - .05Y_{t-6} + .23X_{3t-12} - .12e_{t-1} )</td>
</tr>
</tbody>
</table>

where:

- \( X_1 \) = linear time trend
- \( X_2 \) = circulation sales
- \( X_3 \) = raw material cost
- \( X_4 \) = paid circulation
- \( X_5 \) = number of hours worked
- \( X_6 \) = wage index
- \( S(\text{xxx}) \) = \( Y_t \) if \( t \) relates to month \( \text{xxx} \)
- \( Y_t \) = \( 0 \) otherwise

\( e_t, e_{t-1}, \ldots, e_{t-n} \) = error terms

\( \mu \) = mean

\( Y_t = Y_t - \mu \)

\( X_t = X_t - \mu \)

\( Y_t' = Y_t' - Y_{t-1} \)
regression models identified by Haskins & Sells. In particular, the regression model for total operating expense contains only one exogenous variable (sales) plus trend while the regression models for revenue and payroll expense each contain two independent exogenous variables. This variety of applications allows us both to sample-test the theory that the multivariate B-J methods should always fit the data better, and to examine the practical limitation of not being able to include more than one exogenous independent variable in the multivariate B-J models.

There are at least two ways in which we could compare the performance of the three techniques. The first method is to compare the "forecast" accuracy of the various models on each account and choose the model with the lowest absolute "prediction" error. (That is essentially what Kinney [1976] did when he compared univariate B-J time series analysis with regression methods.) However, since the purpose of the analysis is to test the balances reported during the audit period, it seems circular to use "prediction" error (degree of fit in the audit period) as a criterion to compare these statistical techniques. A more appropriate test along these lines (performance in the audit period) would be the degree to which the different techniques identify those balances most appropriate for further investigation. Unfortunately that comparison would require that audit procedures be performed to investigate all balances flagged as unusual by any of the methods. Since this type of data is not currently available (it may be attempted in the future), we have adopted the other criterion: the degree to which the identified model fits the historical time series during the base period. Unfortunately the goodness-of-fit criterion is not without its defects in this study. Specifically, the data used here were "cleaned" by the regression method. By this we mean that the balances during the base period are the result of previous audits which used the regression method to identify unusual balances. These balances were then investigated and adjusted if necessary. In this way, any reporting errors in the base period which resulted in large residuals have presumably been found and corrected. However, the corresponding reporting errors in the base period which might cause the B-J models' residuals to be larger than they should be may not have been found. Therefore, the goodness-of-fit criterion used here is somewhat biased toward the regression method. We have used the criterion in our belief that it is the most appropriate and practical one
available. The results, measured in terms of residual standard error, (unexplained portion) are presented in Exhibit II.

<table>
<thead>
<tr>
<th></th>
<th>Operating Expense</th>
<th>Revenue</th>
<th>Payroll Expense</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1524.78</td>
<td>953.39</td>
<td>435,674</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>173.72</td>
<td>68.47</td>
<td>154,240</td>
</tr>
<tr>
<td>Residual standard error</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regression</td>
<td>96.74</td>
<td>37.12</td>
<td>11,541</td>
</tr>
<tr>
<td>Univariate B-J</td>
<td>65.87</td>
<td>43.65</td>
<td>115,083</td>
</tr>
<tr>
<td>Bivariate B-J</td>
<td>54.98</td>
<td>28.11</td>
<td>11,831</td>
</tr>
</tbody>
</table>

The results appear to be somewhat mixed. In the case of operating expense, where the Haskins & Sells regression model contained only one exogenous variable, the bivariate Box-Jenkins methodology performed best. In the case of circulation sales, again the Box-Jenkins bivariate methodology performed best—even though the Haskins & Sells regression model contained more than one exogenous independent variable (plus trend). However, in the case of payroll expense, where there were again two exogenous independent variables, the Haskins & Sells regression model had the lowest residual standard error. (In most cases the univariate method is not even competitive.) Obviously, there is not enough data and the results are too mixed to draw a firm conclusion at this time. We can, however, tentatively suggest that it does appear that both regression analysis and bivariate Box-Jenkins time series analysis are appropriate techniques which can be used in performing statistical analytical reviews. As to which of these two (or which combination of the two) is most appropriate, we can only say that we are currently conducting a joint examination of these methods with Haskins & Sells in which we are extending this comparison to a sample of 100 accounts. After analyzing this extended sample, we should be in a better position to reach a generalizable conclusion.

SUMMARY

Although this paper is somewhat exploratory in nature, we have attempted to provide both theoretical and empirical support for the following conclusions:

1. There are several immediate possibilities for extending and formalizing the role of statistical analytical reviews in the audit
process. We have argued that, if so extended, these procedures
would not only provide a more objective basis on which to render
an audit opinion, but should also result in increased audit produc-
tivity; and

2. There are several possible statistical methodologies that are
currently available to the auditor with which he can formalize
analytical review procedures in the audit. In this paper we have
reviewed five of these and, on the basis of preliminary empirical
results, suggested that regression analysis and bivariate Box-Jenkins
time series analysis appear to perform quite well. We were unable
to clearly distinguish between these two but have indicated that
we are presently performing an extended analysis which should
aid in determining the best technique.

APPENDIX

Given a series of numbers over time the Box-Jenkins procedure
fits a suitable stochastic model to the series through an iterative
three-step process of identification, estimation and diagnostic
checking. In the following paragraphs, we briefly explain each
of these steps as they relate to the univariate analysis and then
extend our discussion to the more complex multivariate proce-
dures.

Contrary to the common econometrics approaches in which the
user postulates a likely model for the generation process on the
basis of prior theory and then tests the model, the Box-Jenkins
methodology identifies the appropriate form of the model for
the process generating the data on the basis of the statistical
properties of the data and, in particular, on the basis of sample
auto- and partial autocorrelations of the time series. Not until
after the data have suggested models reasonable to be entertained,
need we intuitively consider the nature of the physical process.
This approach offers the obvious advantages of reducing the effect
of bias or prejudice on the part of the researcher, as well as
facilitating the search for possible models. The sample auto-
and partial autocorrelations are used to determine whether the data
have arisen from a stationary or a non-stationary process, and
what classes of models are of detailed consideration.

Once the identification stage has suggested tentative models,
the parameters of the tentative models are then estimated, using
the principle of least squares. This method is approximately
equivalent to finding the maximum likelihood estimates for normal errors.

Finally, once the parameters of the tentative model(s) have been estimated and the model fit to the data, the “goodness of fit” of the model is tested. Since the Box-Jenkins models are devices for transforming observations into uncorrelated residuals (that is, a device for extracting all explainable information from the data), most of the tests of model adequacy are concerned with examining the residuals, which are estimates of the error component, and should be uncorrelated at any lag and approximately normally distributed with mean zero and have a variance that is estimated by the residual mean square. If the residuals satisfy the tests of these assumptions, the model is used to forecast future observations of the series. If the tests are not satisfied, then some misspecification is suggested and the iterative procedure of identification, estimation, and diagnostic checking is repeated.

The three-step iterative procedure is also employed when using the bivariate Box-Jenkins analysis. However, since the forecasts are improved by capitalizing on the relationship between an independent series and the dependent series as well as on the relationship between various observations of the dependent series, the three steps are somewhat expanded. In particular, the identification stage includes an examination of the sample cross correlation between the two series as well as between the sample auto- and partial autocorrelation of the dependent series. The tentative model that is suggested is built on both relationships and includes a transfer function portion (which explains the relationship between the two series) and a noise portion (which explains the relationship between various observations of the dependent series). The diagnostic checking, then, includes both an analysis of the residual cross correlation as well as the autocorrelations. The bivariate methodology can be diagrammed as follows:

\[
\{Y_t\} \rightarrow \begin{blockarray}{c} \text{TRANSFER} \\ \hline \text{FUNCTION} \end{blockarray} \rightarrow \begin{blockarray}{c} \text{Forecasts of } \{Y_t'\} \end{blockarray} \\
\uparrow \{X_t\}
\]

Where \(\{Y_t\}\) are the past and current observations of the dependent series;
{X_t} are the past, current and sometimes even future observations of the independent series; and
{Y_t'} are forecasts of the dependent series.

The resulting class of models will then be of the general type

\[ (1 - B^{S_i})^d j_y Y_t = \gamma + \prod \delta_i^{-1}(B) \prod \omega_k(B) \prod \eta_i \]

\[ \cdot (1 - B^{S_i})^d p x X_{t-b} + \eta_i \]

where

NYDFAC = number of differencing factors required on the dependent (output) series, Y_t, to achieve stationarity;
NOL = number of dependent (output) lag parameters, labeled \delta_i;
NIL = number of independent (input) lag parameters, labeled \omega_i;
\gamma = a deterministic time trend;
B = a backshift operator, so that BY_t = Y_{t-1};
\eta_i = a noise series capable of being modeled (in the traditional univariate Box-Jenkins way) so that \eta_i is reduced to a random noise series;
S = order of seasonal differencing required to achieve stationarity;
d = order of regular differencing required to achieve stationarity; and
NXDFAC = number of differencing factors required on the independent (input) series, X_t, to achieve stationarity.

REFERENCES

Albrecht, W. S. and James C. McKeown, "The Relationship Between Economy-Wide Variables (GNP) and Corporate Performance," Faculty Working Papers, No. 332, College of Commerce and Business Administration (University of Illinois, 1976).
I am delighted to be at the University of Illinois to discuss a paper of such great potential interest. It concerns an extremely complex topic area involving both audit planning and evaluation decisions. Analytical review is complex conceptually and is more complex statistically than many other problems in econometrics.

Thanks are due Haskins & Sells for furnishing the first of 100 cases to the academic community through Professors Albrecht and McKeown. Such sharing will eventually allow many advantages to both scholars and practitioners. Specifically, the sharing, 1) allows a demonstration of the characteristics and validity of the ad hoc stepwise linear regression audit technology by subjecting it to rigorous scientific testing, 2) will encourage the development of better technology by exposing problems faced in audit application of regression to accounting time series, and 3) will aid education by developing student expertise based on how the world is and not on how we professors think it might be with respect

---

1 The interdisciplinary or general systems theory approach was also taken at the recent AICPA/Canadian Institute of Chartered Accountants/American Statistical Association round table in Boston at which statistical applications in other than audit sampling were discussed.
to problems of autocorrelation, appropriate length of base time period, number of independent variables, multicollinearity, etc. Thanks are also due to Jim McKeown for developing an automated ARIMA program for time series analysis. The program may largely remove one barrier to the use of ARIMA models in field application.

Since the paper involves comparing the results of stepwise regression with two time series procedures, my job as discussant is primarily one of considering potential problems with respect to fairness to methods in the three particular accounts for the single year reported. The authors are careful to point out part of the very small sample problem—with 100 cases we can see conditions under which particular models seem to show empirical advantage. (I would prefer 10 firms for 10 years of data with model building on 3 to 5 years, forecasting the next and then repeating 6 to 4 times in order to reduce the cross-sectional and spurious correlation problems).

I will first give a little more background on the nature of the prediction models and the choice problem followed by some specific comments on details of the paper, including the automated program. Finally I will conclude with a discussion of some possible extensions.

THE PREDICTION MODELS AND INFORMATION

In applying analytical review to monthly account balances, the auditor must assess the likely audited account balances based on available information and a prediction model to process the information. If we let $y_t$ denote the time series of audited monthly account balances, the auditor is interested in assessing

$$\hat{y}_T(k) = E(y_{T+k} | \text{Information, Model})$$

where $T$ is the last month of the previous audit period and $k$ varies from 1 to 12. Let $x_t$ denote a particular independent variable series which is potentially related to $y_t$ and $X_t$ be the set of all such series. Note that $X_t$ is potentially available through month $T + 12$ since the audit assessment of $y_c(k)$ is made after month $T + 12$.

One useful way to consider the analytical review model choice problem is from the point of view of the information required for the use of the various models. Such a view will allow us to relate the findings of others in similar situations and also consider the conceptual nature of the specific prediction problem.
The basic ARIMA model requires (or allows) the use of only past \( y_t \)—it does not consider the potentially useful information in any \( x_t \) series. ARIMA can, of course, be used when no \( x_t \) series is economically available and can also be used to model and predict an \( x_t \) series for use in regression for months after \( T \) when, as is often the case, the \( x_t \) series is available only at a lag.

The univariate transfer function uses one \( x_t \) (through \( T + 12 \)) in addition to \( y_t \) (through \( T \)) and should in special cases dominate in predictive power since it can incorporate the features of both ARIMA and regression.

Regression potentially uses all \( x_t \) in \( X_t \) through \( T + 12 \). Regression can be applied in the ad hoc stepwise addition of variables method of Haskins & Sells or through the development of a theoretical “structural” model based on a theory of firm performance. To apply the first, one must simply list all \( x_t \) which are “logically related” (Stringer, [1975]) to \( y_t \) and let the stepwise regression program determine the model form, estimate its parameters and make predictions.\(^2\) To apply the second, one must develop a theoretical model of firm performance which, in turn, indicates the variables affecting \( y_t \) and the form of the relationships. The regression program then estimates the parameters of the postulated model which can be tested for significance and used to make predictions. The second form clearly involves more model development cost but should be less subject to errors due to spurious correlations in the base period.

We can summarize the information requirements as follows:

\[
\hat{y}_T(k) = E(y_{T+k}|y_1, y_2, \ldots, y_T) \text{ ARIMA} \\
\hat{y}_T(k) = E(y_{T+k}|y_1, y_2, \ldots, y_T, x_1, x_9, \ldots x_{T+12}) \text{ UTF} \\
\hat{y}_T(k) = E(y_{T+k}|y_1, y_2, \ldots, y_T, X_{1,1}, \ldots, X_{1,T+12}, X_{2,1} \ldots X_{m,T+12}) \text{ REG}
\]

Since information is not costless the auditor is concerned with predictive accuracy at a price and therefore ARIMA will have a considerable information cost edge if we restrict the length of the series to 30 months as the authors have. Such a restriction presents a problem in comparing predictive power of methods as discussed in the extensions section below. A priori we would expect that transfer functions and regression should do well in

\(^2\)“Logically related” \( x_t \) and \( y_t \) and a complete theoretical model of firm behavior is of course one of degree. However, an auditor in the field's casual inclusion of many \( x_t \), which are conceivably associated in some way with \( y_t \), is far from the latter.
certain prediction situations since they can use information which has just become available on booms, fads, strikes, war, elections, GNP, etc., which is not available to ARIMA. In turn, ARIMA is expected to do relatively well when the predicted $x_t$ are pretty much like base period $x_t$. Therefore, it is important to test relatively, predictive power over several years. For example, payroll expense varies greatly as hours worked varies, and hours worked is quite important information in predicting total wages—the regression model using current hours worked (and indeed, average current wage rates) would be expected to predict total wages very well. Alternatively, ARIMA might do very well in cases in which the underlying structural model is much more complex and the process generating the series less well-known.

Details of the Paper

Since the results are available only for three series for one time period each, I hope that more descriptive statistics and data can be added in the final version of the paper. The raw data, the predictions and Theil statistics, etc. would be helpful to the reader in assessing the nature of the problem and the proposed solutions.

Comments will be made on two major aspects of the details of the paper. The first will be the criteria for making comparisons of the methods and the second will concern the automated ARIMA program developed by Professor McKeown.

I agree that a complete type I (investigating when monthly audited value is equal to book value) and type II (not investigating when book value contains a "material" error) error analysis with respect to the predictions is desirable for complete testing. I also agree that it is impracticable since it requires a complete analysis of all observations. The authors and I disagree as to the next best alternative criteria.

I argue for prediction achievement. That is, pick the method which has best predicted audited values under similar conditions in the past. The test procedure would be to develop the form of the ARIMA, transfer function and regression model which best describes the base period (as an auditor in practice might do) then see how well each of the three models would have predicted the object of interest. If, say, a particular form of ARIMA seems to fit the data in the base period well, and year after year predicts well, then use it. Similar procedures can apply to a particular industry or type of year.

The authors choose base period explanation which is often danger-
ous and especially so when no previously developed theory is available. *Ad hoc* stepwise regression is particularly dangerous with respect to explaining the past, since, if one includes enough variables, one can get high explanatory power in the base period by chance. Such results are developed and reported in an econometrics setting in an article entitled, “Spurious Regressions in Econometrics” (Granger and Newbold [1974]). As a trivial example, if one allows the fitting of a quadratic term to a sample of three observations one will get a *perfect* fit to the base data—however, if there is no quadratic-based theory the predictions will likely be poor. The same problem exists for ARIMA in that large spikes may occur in the sample autocorrelation function for the base time period, by chance. However, tests over time may show that “significant” spikes beyond, say, lags 13 or 24 are rarely useful in predictions. Structural models suffer less from such spurious relationships in the base period since the auditor uses a previously developed theory to determine which independent variables to include as well as the model form. Regression is used to confirm the model specified and, if confirmed, to predict the object of interest.

Perhaps the major contribution reported in the paper is the development and use of the automated ARIMA program. It takes considerable knowledge, skill and judgment to fit ARIMA models. McKeown offers an improvement in technology by automating the process. Such automation makes field application in auditing potentially possible and allows more experimentation and testing of many series. However, there is no fixed single criteria for model superiority in ARIMA (as examples, one may consider the Q statistics, residual standard deviation, number of turning points predicted, % or random walk, and Theil statistics). The McKeown program minimizes the single criterion of the residual standard deviation and satisfies other dimensions as constraints. Thus, the automated program may overlook a model which gains much in one dimension and loses only a little in another dimension. Using judgment one can consider the best combination without constraint and therefore allow a broader search.

To illustrate the difference consider the time series of monthly operating revenue for the Chicago, Rock Island and Pacific Railroad for 1959-68. The 10-year pattern is a “shallow dish” shape with revenues in the last year at about the same level as the first but with a dip in between. The first difference, first
Exhibit 1. CRI & P 1959–68 Oper. Revenue

Models:

Automated: \[(1 - \phi_1 B)w_t = (1 - \theta_2 B^2 - \theta_4 B^4 - \theta_7 B^7 - \theta_{10} B^{10} - \theta_{13} B^{13} - \theta_{19} B^{19})(1 - \theta_{24} B^{24})a_t + \delta\]

Judgmental: \[(1 - \phi_1 B - \phi_2 B^2 - \phi_4 B^4)w_t = (1 - \theta_{12} B^{12})a_t \left[ w_t = (1 - B)(1 - B^{12})Y_t = (y_t - y_{t-1}) - (y_{t-12} - y_{t-13}) \right] \]

Summary Statistics:

<table>
<thead>
<tr>
<th></th>
<th>Base Period</th>
<th>Predictions (1969) ((y_t - \hat{y}_t)/\bar{y}_t)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Q</td>
<td>ME     SD     MAE    SD</td>
</tr>
<tr>
<td>Lag, Q, df, RSD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automated (MCK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12, 10.8, 3, 762</td>
<td>-.033</td>
<td>.046</td>
</tr>
<tr>
<td>24, 17.8, 15</td>
<td>-.034</td>
<td>.042</td>
</tr>
<tr>
<td>Judgmental</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12, 12.2, 8, 786</td>
<td>.077</td>
<td>.043</td>
</tr>
<tr>
<td>24, 22.3, 20</td>
<td>.011</td>
<td>.076</td>
</tr>
<tr>
<td>Martingale</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>.077</td>
</tr>
<tr>
<td>Submartingale</td>
<td></td>
<td>.011</td>
</tr>
</tbody>
</table>

*RSD = residual standard deviation
ME = mean error
MAE = mean absolute error
SD = standard deviation
seasonally difference series was approximately stationary and I judgmentally identified the generating process as having three nonseasonal autoregressive terms (at lags 1, 2 and 4) and one seasonal moving average term (at lag 12). Jim was kind enough to process the same series with the automated program and sent me the parameters and forecasts to compare results. The program accepted the first difference, first seasonally difference series as approximately stationary and identified a model with nonseasonal autoregressive, six nonseasonal moving average, one seasonal moving average terms and a constant. The models appear much different, as the first frame of Exhibit 1 shows.

Summary statistics for the base period and prediction errors for 1969 are presented in the lower frame of Exhibit 1 and plots

Exhibit 2. Plots of Predictions
are presented in Exhibit 2. The prediction errors and absolute prediction errors are essentially the same for the two models. However, the differences may not be negligible when the difference in modeling cost is considered since I spent several hours identifying and diagnostically checking the final form of the model. Also, in fairness to the program, it was developed for use on shorter series and may require further "fine tuning" to achieve its full potential on longer series. I would like to see further experimentation and testing of the program since it offers such great potential benefits.

For completeness, I have included predictions which an auditor without the use of a computer might make, using just past audited values from the current work paper file. The first is a martingale or last year's actual for month k (\(\hat{y}_T(k) = y_{T-12+k}(k)\)) and the second is a submartingale or last year plus the change between last year and the previous year (\(\hat{y}_T(k) = y_{T-12+k}(k) + (y_{T-12+k}(k) - y_{T-24+k}(k))\)). The results might be considered as a standard by which to judge the statistical models.

**SOME EXTENSIONS**

With respect to extension of the present paper, there are three areas which should be explored to make sure the analyses are "fair" to each method. These will be discussed in turn.

With respect to ARIMA, my major concern is whether 30 observations provides a reasonable test of the predictive power of the model—I think not. Box and Jenkins (p. 18) suggest at least 50 observations of a series, and seasonal model proponents say that many more than 50 are needed for seasonal models. Due to the apparent power of the seasonal form for monthly accounting series, to restrict the analysis to so short a period as 30 months greatly reduces the predictive conclusions which can be drawn.

As to whether Albrecht and McKeown (and indeed Haskins & Sells) have been fair to regression in using the single equation ad hoc stepwise regression, three extentions might be considered. The first is whether the single equation methods are appropriate for estimating a process in which the balances are so clearly interdependent (e.g., sales, accounts receivable, cost of goods sold and inventory). Under such conditions simultaneous estimation methods should provide superior predictions as discussed in Chapter 13 of Johnston [1972]. Thus simultaneous equation
methods and a previously determined theoretical model might be profitably applied to the available data. Second, different forms of the present data might be tried. One likely beneficial form is the seasonal difference which may get much of the predictive power of the seasonal ARIMA model and still be able to use several \( x_t \) series in the subsequent regression. Third, since first differencing often overcorrects for positive autocorrelation, the Cochrane-Orcutt iterative procedure (see Johnston [1972] pp. 262–265) might be applied to the series to get an estimate of the autoregressive parameter.

Finally, the authors have probably been unfair to the univariate transfer function since the analyses have been based on the 30-month series. Again, Box and Jenkins (p. 374) suggest at least 50 observations to fit a transfer function. Even with a longer series, however, it is not clear which method should dominate. The development of optimal forecasts is the subject of much current research in econometrics (e.g., see Zellner and Palm [1974], and Pierce [1975]). Experience with longer monthly time series will help resolve the issue if the data can be made available.

SUMMARY

In summary the 97 cases to follow will likely allow an adequate assessment of the empirical characteristics of the stepwise linear regression approach to analytical review in auditing. Evaluation of the relative predictive power of ARIMA and univariate transfer functions is potentially less clear. If stepwise regression yields better predictions, then the proponents of ARIMA and transfer functions will argue that the result is to be expected with so short a base series. The information cost considerations will also require resolution since in the current formulation ARIMA requires much less data than does regression and similarly for transfer functions.

I feel that the present paper can provide a good start but we will be much better informed when the results of all 100 cases can be reported and perhaps the analysis extended. Again, the value of the research can be increased if the 100 cases were for 10 firms for 10 years each rather than 100 different firms for perhaps a single year.

REFERENCES

Materiality in Auditing (Some of the Issues)

DONALD A. LESLIE

Background

Would you tell me please, what number should I consider material?
That depends a good deal on what you want to use this number for, said the cat.
Oh, I don't want to use it for anything, I just want to know what it is.
Then it doesn't much matter what the number is, said the cat.

(with apologies to C. L. Dodgson)

In March of 1975, the FASB released the discussion memorandum, "An Analysis of Issues Related to Criteria for Determining Materiality." This memorandum is probably the most exhaustive treatment of the subject to date and it makes reference to virtually all studies completed throughout the English-speaking world over several decades. Unfortunately, like all but one other study (the 1965 CICA study, "Materiality in Auditing"), it seems to concentrate entirely on how materiality should be determined and applied in an accounting context.

In April of 1976, many of the audit issues related to materiality were set out in a letter submitted to the FASB by eleven interested auditors (who are members of the AICPA statistical sampling subcommittee and recognized as leaders in the field of auditing). To my knowledge, this letter contains the first public exposure
of a number of extremely critical audit issues related to materiality. Since these issues go right to the very heart of auditing, the letter has been included as an Appendix.

The motivation for this paper resulted from a review of the letter sent by the "group of eleven" to the FASB. While I share a number of the views and sentiments expressed in the letter, I have a number of reservations about some of the recommendations. The purposes of this paper are to (i) further explore some of the points raised by the "group of eleven," (ii), expose a number of other areas where materiality has (or should have) a direct impact on the work of the auditor, (iii) describe areas that require immediate research and decisions within the profession, and (iv) generate discussion of the issues by practitioners and academics. If there is to be a common objective in auditing, these issues must be resolved.

The opinions and views expressed in this paper are not necessarily those of my associates.

**MATERIALITY IN ACCOUNTING AND AUDITING**

*We have two kinds of "materiality" side by side: one which we preach but do not practice, and another which we practice but seldom preach.*

(Bertrand Russell—almost)

Materiality in accounting might be described as the materiality decisions which relate to accounting matters such as consistency, classification, valuation, and disclosure in financial statements. The main concern is with the point at which errors and distortions in a set of financial statements are serious enough to destroy fairness of presentation.

Materiality in auditing might be described as the materiality decisions related to planning, executing, and evaluating an audit with a view to determining the extent of audit evidence to be gathered. The main concern is with the point at which audit procedures may be curtailed and the audit objectives considered achieved.

I believe the level of materiality for auditing is the same as the level of accounting materiality for known errors. It seems both logical and reasonable that if an auditor would insist on an auditee adjustment when known income errors accumulate to $X (the alternative being a qualified report) he would also plan his extents of testing to provide a reasonable degree of
assurance of detecting errors of the same magnitude. (Of course, the amount of assurance he will require that an $X$ error does not exist will be affected by the prior probability of such error existing. However, favorable prior probabilities do not increase the amount that would be considered material.) While materiality defines the threshold at which the auditor must insist on an adjustment, he will usually press for corrections or provisions long before errors reach this magnitude. Otherwise, the amount left for undetected errors could be unrealistically low.

Prior to the introduction of mathematical techniques to auditing, very little interest was shown towards the audit implications of materiality. It is easy to understand the priority given to accounting issues since users of financial statements can identify problems from analysis of the statements. Audit problems such as inadequate extents of verification are not visible and thus do not attract attention. It is only when an auditor fails to detect a material error as a result of an inadequate extent of work—and such error is subsequently discovered (a joint risk situation)—that attention is focused on the problem.

**ERROR CLASSIFICATION BY DEGREE OF CERTAINTY**

*If we begin with certainties, we shall end in doubts; but if we begin with doubts and are patient with them, we shall end in certainties.*

(Francis Bacon)

Throughout this paper, specific terms have been used to describe errors which have varying degrees of certainty. In order to avoid any confusion over their meaning they are described below. As used in this paper, most likely errors include, but extend beyond, known errors; possible errors include, but extend beyond, most likely errors.

**Known errors:** These are errors actually encountered in the audit and the term is considered self-evident.

**Most Likely Errors:** The most common example arises in the projection of test results: the most likely errors in a population of accounting data being the same proportion as found to be in error in a representative sample drawn therefrom. Non-testing

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1This section of the paper has been taken from the manuscript of a forthcoming book, *The External Audit*, by R. J. Anderson, F.C.A., Volume 1, Concepts and Techniques; Volume 2, Organization and Procedures. We are grateful to Pitman Publishing for the permission to include this portion here.
examples, however, can occur as well, as in the following illustration:

In a finance company, unearned finance charges have been computed individually on 5,000 individual finance contracts. Even a cursory audit review, however, reveals numerous computational errors. The auditor then estimates the most likely error in total reported unearned finance charges by making a global calculation using other audit evidence as to the total finance paper outstanding, the average term left to run, and the average interest rate charged by major contract class. His estimate will not be exact (because of the average used) but it will not likely be seriously out. The difference between his estimate and the book figure will represent the most likely total error. (Alternatively, he might have estimated the most likely error by checking a representative sample drawn from the 5,000 individual calculations, but this might have been a more costly procedure in this particular instance; more costly yet would have been a detailed checking of all 5,000 calculations.)

Possible Errors: The concept of possible errors also requires some explanation. Almost any magnitude of error could be argued to be faintly possible if one were to imagine remote enough circumstances. But it would not be of social utility for organizations to be charged with the cost of chasing down the most far-fetched possibilities. Nonetheless, the reader of the financial statements needs something more than the mere assertion that the statements are probably acceptable (in the sense of there being barely better than 50:50 odds that a material error is not present). The reader needs, and the audit report implies, an appropriate degree of assurance that a material error is not present. The concept of degree of assurance can alternatively be viewed in terms of its complement: the risk of undetected misstatements remaining after the audit. Thus, assuming risks could be quantified (which, except for the specific element of sampling risk, they cannot) a 90% desired degree of assurance would correspond to a 10% permissible risk of undetected misstatements. The question then is: at this 10% permissible risk level, what errors are 'possible'? If the auditor concludes that more than a material total of error is possible at this risk level, then obviously he is not in a position to give a clear audit opinion with the required degree of assurance; he must first obtain more audit evidence to confirm or deny the reasonable possibility of these 'possible errors' being present.

Possible errors, in the sense used above, must therefore be understood to mean not every remotely conceivable error but rather errors whose existence is possible within the constraints of the level of assurance desired. A common example of such
possible errors arises in the projection of statistical sampling results: the possible errors in a population of accounting data (upper error limit) being the highest proportion that could be in error, subject to the specified sampling confidence, in view of the lower error proportion actually found in a representative sample drawn therefrom.

Except for possible errors related to the sampling risk in statistical sampling applications, it is not possible for the auditor to quantify possible errors in any precise manner. Nonetheless, the concept of possible errors (exceeding the known and most likely errors) exists with respect to every verification step which the auditor performs. Possible errors exist with respect to the sampling risk in non-statistical tests and with respect to non-sampling risks in all auditing procedures (including non-sampling risks in statistical sampling applications). Even though no precise quantification is possible (except related to the sampling risk in statistical sampling applications), the auditor must use his professional judgment to satisfy himself that possible errors, within the constraints of an appropriate level of assurance, do not exceed materiality before he issues a clear opinion on the financial statements.

Indeed, were this not true, we would have the anomaly of statistical tests serving completely different objectives from non-statistical tests (rather than merely providing a different means of achieving the same objectives). For example, if it were valid to accept the results of all judgmental tests which project a most likely error of less than materiality, unmindful of the possibility of yet higher frequencies of error in the population, why then would any auditor accept the additional constraint of “upper precision limits for errors” imposed by statistical sampling? Logically, all audit verification must deal conceptually with upper error limits—it is only that statistical tests provide a means of quantification.

**MATERIALITY AND ACCOUNTING ESTIMATES**

*Truth has a way of shifting under pressure.*

(Curtis Bok)

Turning to the subject of accounting estimates, I agree with the comments of the group of eleven as they apply to the items listed under A on page 1 of the Appendix. Even if the FASB intended a materiality standard to apply to such items, it would
be meaningless. For example, consider item 2, “allowance for inventory obsolescence based on predictions of future sales prices and volumes.”

In the real world the situation facing the auditor and the auditee is shown below.

```
<table>
<thead>
<tr>
<th>Auditee</th>
<th>Inherent</th>
<th>Truth</th>
</tr>
</thead>
<tbody>
<tr>
<td>best estimate</td>
<td>misstatement</td>
<td>(unknown)</td>
</tr>
</tbody>
</table>

$ value
```

In this diagram the broken vertical line represents the true unknown value for obsolescence (and often the true amount will never be known). The auditee estimate (the solid vertical line) is usually based on his best judgment and all of the information available at the time. The difference between truth and the auditee estimate is an inherent measurement error in the financial statement process and no criteria for determining materiality can eliminate it. However, this so-called error is not inconsistent with GAAP and, in fact, some accountants would probably suggest that ‘error’ is a poor term to use. The auditor would seem to discharge his responsibility if he is satisfied that the item can be subjected to reasonable estimation and that the auditee’s estimate is based on the best information available at the time, applied on a basis consistent with the previous year. If this is not the case he must determine how unreasonable the auditee’s estimate may be.

There are really two different situations considered in the items listed under B on page 2 of the Appendix and it is difficult to see why materiality should not apply to both. The first situation involves estimating “hard” numbers (e.g., inventory quantities) and the second involves estimating “soft” numbers (allowance for uncollectible receivables). Hard numbers can be determined exactly by applying an accounting procedure 100%, whereas soft numbers cannot be precise even with a 100% effort (the determination of quantities does not involve judgment whereas the allowance required for a specific item usually does). However, “soft” numbers can be determined with consistency by applying reasonable criteria from year to year.

In the case of hard numbers the auditee’s best estimate (when
the accounting process is applied 100% coincides with truth and there is no inherent inaccuracy. For soft numbers, the situation is depicted in the diagram above. When the accounting process involves the use of statistical sampling to estimate a hard or soft number a further dimension is added to the issue as illustrated below.

![Diagram showing hard numbers and truth with sampling distribution and precision]

Here, if the accounting process is applied 100% it will (subject to unintentional clerical errors and/or intentional errors) produce a value equal to truth. However, once statistical sampling is implemented the estimate will be subjected to sample bounce within the confidence interval.

For soft numbers the situation is similar, except that the final result is a combination of sampling error and inherent measurement inaccuracy.

![Diagram showing soft numbers and truth with sampling distribution and precision]
Assuming a symmetrical distribution as shown, at least 50% of the estimates will produce a final error greater than the inherent inaccuracy (the cases where the sample estimate is to the left of center). Depending where truth lies, the remaining 50% could actually reduce inherent inaccuracy, although if truth and the auditee estimate based on 100% work are close, a substantial portion of the remaining 50% would also increase the final error.

Clearly, the points at issue in both cases are "the precision and confidence appropriate for accounting estimates" and "whether or not precision should be related to accounting and auditing materiality." The audit manual of a large international firm provides its staff with the following guidance in this area:

If sampling results are to be used to estimate the value of an account where no reliable value exists, it is often believed that one can tolerate a sampling precision greater than one-half materiality because the value to be recorded is the point estimate from the sample (which is midway between the confidence limits). In using the results of a statistical sample to record a balance, however, one should realize that he is not operating under the same circumstances as when the auditor is verifying a balance. In verifying a balance, an auditor places reliance upon the protective features of the client's system of internal control. When the book value lies within the confidence interval of his estimate, he will usually conclude that the book value is fairly stated. In fact, when his sampling results indicate that there may be only a few, if any, differences in the balance, he will probably conclude that the balance is substantially correct even if it falls near the outer limits of his estimate.

If statistical sampling has been used for the purpose of establishing an account balance, one should keep in mind that the sample estimate might have been selected from any point in the sampling distribution and may in itself be far from the true value. This will be true even if he uses a high confidence level, which he should in this case. It is the value of his sampling precision from which he can determine the probable amount of the difference.

Since the sample estimate generally will be different from the true value, the auditor, in evaluating the results of such a sampling plan, will want to be sure that there is not too large a difference. If he knew the actual difference, he would take the amount into consideration when evaluating all other potential adjustments.

If a test provides only the assurance that the value recorded is not wrong by more than a material amount, one may have no margin for similar errors in other accounts. Therefore, when the results of a statistical sample are to be used as the basis for establishing an account balance, the sampling precision should be small enough to provide assurance that the amount recorded is a reasonable value and the estimate should be made at a high confidence level.
When the book value has no support in the accounting system or when there is no book value and the sampling results are being used to establish a value, an adjustment to the point estimate is justified. In such cases, the sampling precision should be small, i.e., generally no greater than one-half materiality and preferably less.

I believe this is very sound advice. Precision must be related to normal audit materiality or sample bounce will create inconsistencies from year to year which *will* result in real material misstatements. The question that remains, however, is just how tight precision should be and how this precision should be blended into the overall audit evaluation. This will be discussed later.

*When we do not know the truth of a matter, it is well that there should be a common error to fix the spirits of men.*

(Pascal)

**METHODS OF MEASURING ERRORS IN INCOME**

You cannot ask us to take sides against arithmetic. You cannot ask us to take sides against the obvious facts of the situation.

(Winston Churchill)

While there are many divergent opinions on how materiality should be determined and applied in auditing, there are also two significantly different views on how errors in income should be measured. This problem is referred to on page 5 of the Appendix where the impact of errors in the opening and closing balance sheets is discussed.

The first, and perhaps most commonly used, method (herein referred to as method A) considers only the errors in the closing balance sheet as errors in income. The second method (herein referred to as method B) considers errors in the opening and closing balance sheets and their directions when determining their impact on income of the current year.

Exhibit 1 demonstrates the actual effect of opening and closing inventory errors on the current year’s reported income (method B). An opening inventory overstatement results in an overstatement of the current year’s cost of goods sold and thus an understatement of income (Case 1). Conversely, an opening inventory understatement results in an overstatement of income (Case 2). A closing inventory overstatement results in an understatement of cost of goods sold and thus an overstatement of income (Case 3). Conversely, closing inventory understatements result in income being understated (Case 4). Therefore, the misstatement in income as
Exhibit 1. Effect of Opening and Closing Most Likely Inventory Errors on Current Year's Reported Income

<table>
<thead>
<tr>
<th>Errors in opening or closing only</th>
<th>No change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 1</strong></td>
<td><strong>Case 2</strong></td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in opening inventory</td>
<td>10,000</td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in closing inventory</td>
<td>0</td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in current year's income</td>
<td>(10,000)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Same amount but change in direction</th>
<th>Change in amount but same direction</th>
<th>Change in amount and direction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case 7</strong></td>
<td><strong>Case 8</strong></td>
<td><strong>Case 9</strong></td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in opening inventory</td>
<td>10,000</td>
<td>(10,000)</td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in closing inventory</td>
<td>(10,000)</td>
<td>10,000</td>
</tr>
<tr>
<td>Net overstatement or (understate-ment) in current year's income</td>
<td>(20,000)</td>
<td>20,000</td>
</tr>
</tbody>
</table>

A result of inventory errors will depend upon the magnitude and direction of the errors, if any, in the opening and closing balances. Cases 5 to 12 are additional illustrations of the various combinations of opening and closing errors that can exist and their effect on income.

If method A is employed, the evaluation would consider only the closing inventory errors as the misstatement in current year's income. In cases 3 and 4 the evaluations would be identical (since there are no opening errors); however, in all other cases, there
### Exhibit 2. Summarized Financial Statements

<table>
<thead>
<tr>
<th></th>
<th>ABC</th>
<th>XYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>$300,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>5,000,000</td>
<td>4,500,000</td>
</tr>
<tr>
<td>Inventory</td>
<td>7,000,000</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Other (miscellaneous current items, equipment and warehouses)</td>
<td>3,300,000</td>
<td>2,700,000</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td><strong>$15,600,000</strong></td>
<td><strong>$12,900,000</strong></td>
</tr>
<tr>
<td><strong>Liabilities and equity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank loans</td>
<td>$2,700,000</td>
<td>$2,100,000</td>
</tr>
<tr>
<td>Accounts payable</td>
<td>3,100,000</td>
<td>2,400,000</td>
</tr>
<tr>
<td>Other current liabilities</td>
<td>800,000</td>
<td>600,000</td>
</tr>
<tr>
<td>Long-term debt</td>
<td>2,500,000</td>
<td>1,300,000</td>
</tr>
<tr>
<td>Equity</td>
<td>6,500,000</td>
<td>6,500,000</td>
</tr>
<tr>
<td><strong>Total liabilities and equity</strong></td>
<td><strong>$15,600,000</strong></td>
<td><strong>$12,900,000</strong></td>
</tr>
<tr>
<td><strong>Operating results</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales</td>
<td>$34,000,000</td>
<td>$20,000,000</td>
</tr>
<tr>
<td>Cost of sales</td>
<td>25,700,000</td>
<td>13,200,000</td>
</tr>
<tr>
<td>Gross profit</td>
<td>8,300,000</td>
<td>6,800,000</td>
</tr>
<tr>
<td>Expenses</td>
<td>7,000,000</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Income before tax</td>
<td>1,300,000</td>
<td>1,300,000</td>
</tr>
<tr>
<td>Tax</td>
<td>650,000</td>
<td>650,000</td>
</tr>
<tr>
<td><strong>Net income</strong></td>
<td><strong>$650,000</strong></td>
<td><strong>$650,000</strong></td>
</tr>
<tr>
<td><strong>Threshold of materiality, say</strong></td>
<td>$100,000</td>
<td>$100,000</td>
</tr>
</tbody>
</table>

would be a significant difference between methods A and B.

Proponents of method A believe that once an unqualified report on the previous year's financial statements is given, errors therein should not affect subsequent periods. On the other hand, proponents of Method B believe that it reflects "truth" and accordingly is the appropriate method for determining the magnitude of clear-cut error which should be compared with materiality when determining the fairness of the financial statements. I confess to being a proponent of method B.

**THE RELATIONSHIP BETWEEN MATERIALITY AND THE EXTENT OF COMPLIANCE TESTING**

*Where there's smoke there's fire. Also danger of cancer, heart disease and emphysema.*

(Leonard L. Levinson)
Although no statistics are available, I am inclined to believe that the vast majority of auditors do not consciously consider materiality when deciding on an appropriate extent of compliance testing. Is this practice in accordance with the intent of section 320 of SAS No. 1? Consider the following statements in 320.68 and 320A.22:

"... The procedures and compliance should be considered satisfactory if the auditor's review and tests disclose no condition he believes to be a material weakness for his purpose. In this context, a material weakness means a condition in which the auditor believes the prescribed procedures or the degree of compliance with them does not provide reasonable assurance that errors or irregularities in amounts that would be material in the financial statements being audited would be prevented or detected within a timely period by employees in the normal course of performing their assigned functions. ...

"... The committee believes that samples taken for this purpose should be evaluated in terms of the frequency and nature of deviations from any procedures the auditor considers essential in his preliminary evaluation of internal control, and that their influence on his final evaluation of internal control should be based on his judgment as to the effect of such deviations on the risk of material errors in the financial statements. ...

While these paragraphs seem to explicitly relate compliance testing extents to materiality, some practitioners point to the following paragraph of 320B to support the use of fixed upper precision limits which are not related to materiality:

B.22 "... Based on consideration of the general matters discussed in paragraphs .19 through .21 and of the specific factors mentioned in this paragraph, an auditor may decide, for example, that an upper precision limit of 10 percent for compliance tests would be reasonable; if substantial reliance is to be placed upon the procedures, he may decide, for example, that a limit of 5 percent or possibly lower would be reasonable.

When the 10% or 5% upper limits of non-compliance are mated with the 95% and 90% reliability levels quoted as examples in 320B.24, a number of fixed sample sizes for compliance testing result. The most frequently quoted minimum compliance sample size is 60 (based on 95% reliability, a 5% upper limit and zero expected critical compliance deviations). Is this reasonable and consistent with 320? Or should the sample size relate to materiality and thus vary with the size of the population, the maximum tolerable ratio of compliance deviations to monetary errors, and the frequency of compliance deviations expected in the sample?

One possible method of relating compliance testing to materiality
was suggested by R. J. Anderson in his paper, "The Interrelationship of Compliance and Substantive Verification in Auditing," presented at the Symposium on "Frontiers of Auditing Research" at the University of Texas at Austin, April 1, 1976. This method is also outlined in the manuscript mentioned in footnote 1. Anderson’s suggestion seems to be entirely consistent with paragraph 19 of 320B of SAS No. 1 which states:

While procedural deviations increase the risk of material errors and irregularities in the accounting records, such errors and irregularities do not necessarily result from procedural deviations. For example, a disbursement that does not show evidence of required approval may nevertheless be a valid transaction that was properly recorded. Procedural deviations would result in errors or irregularities remaining undetected in the accounting records to be audited only if the procedural deviations and the errors or irregularities occurred on the same transactions. Consequently, procedural deviations of any given percentage ordinarily would not be expected to result in substantive errors or irregularities of the same magnitude in the accounting records."

Anderson relates compliance deviations and monetary errors to smoke and fire respectively. The rationale is that it is cheaper to look for more frequent smoke (compliance deviations) with smoke detectors than to search for fire (monetary errors) with a thermometer. In addition to suggesting a smoke/fire ratio of three to one, he also suggests a confidence (reliability) level of 80% since “some assurance is already provided by the auditor’s review and evaluation procedures together with such compliance procedures (observation, inquiry, scrutiny, limited review tests) as are or can be combined as an integral part of the review process” and “the result of reliance on internal control is not the elimination of substantive tests but only a reduction in their extent.”

Exhibit 3 provides some compliance sample sizes for the two methods referred to above, based on the hypothetical summarized financial statements shown in Exhibit 2. ABC and XYZ are wholesalers in different product lines and both companies are “normal” in the sense that their returns on equity, gross profit percentages, rates of return on sales, etc., are in line with their individual industry averages. A materiality of $100,000 has been used for purposes of this illustration. Also, the systems of internal control are identical.

Exhibit 3 demonstrates the inherent deficiency in method Y. Why should the compliance sample sizes be the same for ABC and XYZ? After all, ABC’s system is required to be more effective
<table>
<thead>
<tr>
<th>Compliance samples for cost of sales of</th>
<th>ABC</th>
<th>XYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>X - 0</td>
<td>$25,700,000</td>
<td>$13,200,000</td>
</tr>
<tr>
<td>Y - 0</td>
<td>137</td>
<td>70</td>
</tr>
<tr>
<td>X - 1</td>
<td>257</td>
<td>132</td>
</tr>
<tr>
<td>Y - 1</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>X - 2</td>
<td>366</td>
<td>188</td>
</tr>
<tr>
<td>Y - 2</td>
<td>126</td>
<td>126</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compliance samples for expenses of</th>
<th>ABC</th>
<th>XYZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>X - 0</td>
<td>$7,000,000</td>
<td>$5,500,000</td>
</tr>
<tr>
<td>Y - 0</td>
<td>37</td>
<td>29</td>
</tr>
<tr>
<td>X - 1</td>
<td>70</td>
<td>55</td>
</tr>
<tr>
<td>Y - 1</td>
<td>95</td>
<td>95</td>
</tr>
<tr>
<td>X - 2</td>
<td>100</td>
<td>78</td>
</tr>
<tr>
<td>Y - 2</td>
<td>126</td>
<td>126</td>
</tr>
</tbody>
</table>

Method X—based on Anderson's suggestions of 80% reliability and an upper limit of three times materiality.
Method Y—based on 95% reliability and a 5% upper limit.
0, 1, 2—indicate sample sizes which would result in acceptance based on finding no more than 0, 1 or 2 critical compliance deviations respectively.

than XYZ's since its objective is to prevent and/or detect a $100,000 error in a cost of sales population almost twice as large ($25,700,000 versus $13,200,000). Thus, it can afford to permit about half the rate of error as XYZ's. Also, why is the same sample size appropriate for the expenses of $7,000,000? Is a fixed sample size (or table of sizes which vary solely for expected rate of deviations anticipated) appropriate and does it comply with the intent of 320?

A related question concerns the type of sample that is appropriate for compliance testing. Should it be neutral (selection without regard to the size of item or the amount of error it could contain) or value oriented (selection based on the size or potential error an item could contain)? Advocates of method Y believe neutral selection is appropriate while proponents of X believe it should be value oriented. Exhibit 4 provides an illustration of the average
### Exhibit 4. A Comparison of Value Oriented and Neutral Selection For Compliance Testing

<table>
<thead>
<tr>
<th>Upper stratum boundary (000)</th>
<th>Number of items</th>
<th>Stratum value (000)</th>
<th>Average Sample Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>257</td>
</tr>
<tr>
<td>$100</td>
<td>4</td>
<td>$300</td>
<td>3}</td>
</tr>
<tr>
<td>75</td>
<td>25</td>
<td>500</td>
<td>5}</td>
</tr>
<tr>
<td>50</td>
<td>85</td>
<td>1,100</td>
<td>11}</td>
</tr>
<tr>
<td>25</td>
<td>190</td>
<td>2,200</td>
<td>22}</td>
</tr>
<tr>
<td>20</td>
<td>255</td>
<td>2,700</td>
<td>27}</td>
</tr>
<tr>
<td>15</td>
<td>380</td>
<td>2,600</td>
<td>26}</td>
</tr>
<tr>
<td>10</td>
<td>357</td>
<td>2,500</td>
<td>25}</td>
</tr>
<tr>
<td>5</td>
<td>655</td>
<td>2,900</td>
<td>29}</td>
</tr>
<tr>
<td>4</td>
<td>795</td>
<td>2,700</td>
<td>27}</td>
</tr>
<tr>
<td>3</td>
<td>1,230</td>
<td>3,200</td>
<td>32}</td>
</tr>
<tr>
<td>2</td>
<td>1,360</td>
<td>1,900</td>
<td>19}</td>
</tr>
<tr>
<td>1</td>
<td>2,150</td>
<td>1,700</td>
<td>17}</td>
</tr>
<tr>
<td>.5</td>
<td>5,825</td>
<td>1,400</td>
<td>14}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>257</td>
</tr>
</tbody>
</table>

DUS 257—select 1 dollar unit out of every $100,000 on average
PUS 257—select 1 physical unit out of every 51.79 on average
DUS 95—select 1 dollar unit out of every $270,526 on average
PUS 95—select 1 physical unit out of every 150.12 on average

allocation of sample items based on a hypothetical profile of the $25,700,000 cost of sales. The two methods of selection illustrated are dollar-unit sampling (DUS) and physical-unit or simple random sampling (PUS). Another alternative would be to use a stratified variables plan which would also produce a value oriented selection. Stratified attributes could also be considered although DUS is the equivalent of infinite stratification.

This illustration demonstrates the importance of using a method of value oriented selection (where the maximum amount of error in an item is related to its book value) regardless of the compliance testing philosophy employed. I believe most auditors would prefer to formulate their opinions on internal control based on value oriented samples. In a number of instances, groups of auditors have been asked to select samples from populations on a "judgmental representative" basis. Analysis of these samples indicates that the average judgmental allocation is very close to the DUS average allocation and is in no way similar to the PUS average allocation.
allocation. Thus, some auditors use judgmental value oriented selection in preference to physical-unit or simple random selection when the cost of selecting a value oriented probability sample is not warranted by the added objectivity it provides.

**OVERALL AUDIT EVALUATION**

*Get your facts straight first, and then you can distort them as much as you please.*

(Mark Twain)

There are two major views on the “cumulative financial effect of matters” and they are reported in paragraph 239 of the FASB memorandum.

Some preparers and auditors are of the opinion that only the effect of individual items, transactions, or situations should be considered in determining materiality. Others believe that the determination of materiality should involve consideration of the cumulative effect of matters not adjudged material individually. Among those who believe that the cumulative effect should be considered are some who believe that only similar items should be aggregated and others who believe that both similar and dissimilar items should be aggregated. In addition, some preparers and auditors in each of these groups believe that items should be netted if they have opposite effects, while others believe that they should not.

Statistics are not available with respect to the proportion of practitioners who use the cumulative method or the piecemeal method. However, based on my own experience and discussions with numerous practitioners over the past five years, I would venture a guess that in excess of 50% use the piecemeal method. If this is the situation, is it in accordance with the expectations of financial statement users? My view is that users expect the cumulative method to be used and they would seem to be supported by authoritative pronouncements. For example, paragraph 240 of the FASB memorandum states:

The Accounting Principles Board concluded in Opinion No. 20 that the materiality of accounting changes should be considered in relation both to the effects of each change separately and to the combined effects of all changes. In Opinion No. 30, the Board concluded that extraordinary items should be considered individually while similar unusual items and similar infrequent items should be considered individually and in the aggregate.”

Also, under the heading “Precision for Substantive Tests,” paragraph 27 of section 320B of SAS No. 1 states:
The upper precision limit for errors in an individual substantive test should be established so as to be consistent with the overall audit objective to obtain reasonable assurance that the financial statements taken as a whole are not materially in error. Since materiality is an accounting as well as an auditing concept and is beyond the scope of section 320, the committee expresses no further views on that subject at this time.

Further, the SEC has issued numerous warnings as to the danger of dismissing errors and misstatements on a piecemeal basis when the cumulative effect would have given the auditor reason to believe the financial statements as a whole were not fairly presented.

In their recently published book, Auditing: An Integrated Approach, Arens and Loebbecke stated:

3. The combined errors are more important than errors in individual accounts. It is not sufficient for the auditor to consider the materiality of the errors in just a particular account. The auditor must ultimately decide whether all the errors combined are sufficient to make the overall financial statements misleading. It is possible for individual errors to be immaterial when they are considered separately and for the overall effect. Evaluation of the reliability of the overall financial statements becomes especially difficult because the auditor, having only sampled the population, does not know the exact extent of all errors.

(The Arens and Loebbecke book also contains an interesting discussion of the need for auditors to "strive for approximately the same level of assurance for all clients operating under similar circumstances." Although materiality and assurance are "statistically inseparable," for convenience this paper assumes a common level of assurance. It is recognized that the establishment of a standard posterior assurance level throughout the profession is fraught with as many problems as the establishment of standard materiality guidelines.)

If the cumulative method is the appropriate method for overall evaluation of an audit (and while there are good arguments for both sides I feel the cumulative method is more logical), what is the appropriate framework for the evaluation? I would suggest consideration be given to the two-stage evaluation method described below.

Step 1. Carry out separate evaluations of (a) clear-cut (outright) errors, and (b) doubts about management’s accounting estimates.
Step 2. Combine the conclusions in (a) and (b) to reach a conclusion on the fairness of the financial statements.

These two sources of error or distortion are discussed in
paragraph 214 of the FASB memorandum:

Because the extent of departure from generally accepted accounting practices is at times unclear, judgment often is important in the identification of material departures. Several of the auditors interviewed indicated that they tend to apply a very strict test of materiality in situations involving outright errors but, in situations in which judgment is involved, they often seek to assess management's motives before determining the materiality of the matter in question. If management's motives do not appear inappropriate, auditors may be hesitant to substitute their judgment for that of management in situations which fall into a "gray" area. However, if an auditor suspects that management is attempting to "manage" earnings (e.g., through the arbitrary reduction of an allowance which has been thought to have been overstated for some time), he would tend to apply a strict materiality test. Because of management's intimate knowledge of an enterprise and the extent of judgment involved, auditors may not question management's choice among generally accepted practices unless the selection is unreasonable in the circumstances."

_Evaluation of Clear-Cut Errors:_ This step involves accumulating errors based on their degree of certainty (as discussed earlier).

---

**Exhibit 5. Evaluation of Known and Most Likely Clear-Cut Errors**

<table>
<thead>
<tr>
<th>Errors in closing equity</th>
<th>Overstatement (understatement) of current year's pre-tax income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Known errors</td>
</tr>
<tr>
<td>1. Populations subjected to 100% audit</td>
<td>k</td>
</tr>
<tr>
<td>2. Populations subjected to key item selection</td>
<td>k</td>
</tr>
<tr>
<td>3. Populations subjected to judgmental representative testing</td>
<td>k</td>
</tr>
<tr>
<td>4. Populations subjected to statistical sampling</td>
<td>k</td>
</tr>
<tr>
<td>5. Total errors in closing equity before corrections (1 + 2 + 3 + 4)</td>
<td>K</td>
</tr>
<tr>
<td>6. Less auditee corrections and/or provisions</td>
<td>(k)</td>
</tr>
<tr>
<td>7. Uncorrected clear-cut errors in closing equity</td>
<td>K_c</td>
</tr>
<tr>
<td>8. Uncorrected clear-cut errors in opening equity (line 7 previous year but in opposite direction)</td>
<td>K_o</td>
</tr>
<tr>
<td>9. Total clear-cut errors in current year's pre-tax income (7 + 8)</td>
<td>K_f</td>
</tr>
</tbody>
</table>
A suggested format for accumulating known and most likely errors is outlined in Exhibit 5. When the total known and most likely errors have been determined it is also necessary to assess how much worse the actual situation might be at an acceptable level of audit assurance. While this is a simple procedure where statistical sampling is used it is certainly not a simple procedure for judgmental tests—but as R. K. Elliott and J. R. Rogers pointed out when discussing the overall audit evaluation and the combining of precision in “Relating Statistical Sampling to Audit Objectives” (Journal of Accountancy, July 1972):

The one assumption which fails is the quantifiability of sampling error in all accounts, because almost certainly never would all accounts be audited statistically. However, the auditor should estimate the total uncertainty remaining in the accounts not audited statistically. He should review the potential problem areas and estimate the probable outside limit of possible error for all these accounts. This total must always be less than $M_0$ for otherwise he would not have done sufficient work to give an unqualified opinion. Let this estimated total amount be $M_{est}$.

The auditor would normally have a direction in mind for this possible error; therefore, it cannot be considered independent of the statistical sampling errors. If the materiality of the $i$th statistically audited account is $M_i$, the statistical tests must then meet the following criterion:

$$\sqrt{\sum M_i^2} < M_0 - M_{est}$$

In determining $M_{est}$, the auditor should consider the nature of the accounts not statistically audited. If, for example, they were capital stock, additional paid-in capital and long-term debt, not much allowance for error would ordinarily be assumed, because each of these accounts could theoretically be audited to achieve a highly accurate result. On the other hand, if the accounts not audited statistically included receivables, inventories or accounts payable, a rather larger allowance for error would ordinarily be assumed.

Application of these guidelines to determine $M$ is admittedly not easy, but will at least result in a rational determination of $M$, which will meet overall audit objectives at a reasonable cost.”

$M_0$ is materiality for financial statements as a whole (based on income)

$M_i$ is materiality allocated to the $i$th statistical sample

When the determination of precision has been made the upper error limit (upper precision limit) for errors in income can be determined by adding the combined precisions for statistical and judgmental samples to the most likely error (MLE). Unfortunately, there is another dimension to this problem. In theory, the auditor should consider both the opening and closing precisions. Consider the following simple example:
Last year's audit and this year's audit of ABC's inventory produced the following results based on statistical samples—

<table>
<thead>
<tr>
<th></th>
<th>Balance O/S (U/S)</th>
<th>Effect on current year's income O/S (U/S)</th>
<th>Precision achieved (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last year</td>
<td>(30,000)</td>
<td>30,000</td>
<td>30,000</td>
</tr>
<tr>
<td>This year</td>
<td>40,000</td>
<td>40,000</td>
<td>25,000</td>
</tr>
<tr>
<td>Combined</td>
<td></td>
<td>70,000</td>
<td>39,050&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

The combining of the two samples provides a proper estimate of the most likely error in income and the true precision around the estimate. In fact, the auditor could theoretically have sampled the opening and closing inventories as one population and projected errors based on their impact on current year's income. The result would have been a single most likely estimate and a single precision replacing the combined figures.

When the combining of all clear-cut errors has been completed, the known, most likely and upper error limits are compared with materiality. If either the known or the most likely errors exceed materiality the situation would generally be considered unacceptable. If only the upper limit exceeds materiality while the known and most likely are small, the problem is probably one of inadequate evidence, and perhaps additional audit work will reduce the precision to an acceptable level. (While not discussed here, the auditor would investigate the nature and causes of the errors and he would not just consider their possible extent in isolation.) However, where the most likely error is close to materiality, the cost of achieving a total precision that is small enough to bring the upper limit down to materiality is usually high enough to make the related audit extents impractical. This dilemma was discussed by Anderson in his Texas paper referred to earlier and he suggested a combined precision of one-half of materiality as a reasonable floor to achieve on a cost/benefit basis. The reader should refer to Anderson's paper for a more detailed discussion of the issue.

<sup>2</sup>Based on the formula \( P_{(A+B)} = \sqrt{P_A^2 + P_B^2} \). This would be appropriate where variables methods are used. For dollar-unit and similar type sampling plans (CMA, PPS, SAS, etc.) the formula is more complex and beyond the scope of this paper.
**Evaluation of Accounting Estimates:** Is it necessary to combine the evaluation of accounting estimates with those of clear-cut errors when reaching a final conclusion on the income statement? If the answer to this question is "yes," presumably the materiality constraints discussed above for clear-cut errors would apply to the sum of clear-cut errors and reservations in accounting estimates. If the answer is "no," what precision should be achieved and how should the conclusions on clear-cut errors be affected by disagreements with the auditee over accounting estimates? Also, are the answers different for hard numbers and soft numbers?

The earlier quote on precision for accounting estimates would seem to be an appropriate target for soft numbers and perhaps hard numbers as well. Reductions to less than one-half materiality would depend upon the cost to achieve such reductions and the fuzziness of the items being estimated. Also, the factors mentioned in paragraph 214 of the FASB memorandum should be considered along with the importance of consistency mentioned in paragraph 215.

Exhibits 6(a) and 6(b) contain eight (of many possible) illustrations involving four soft accounting estimates (provision for warranty claims, allowance for doubtful accounts receivable, provision for inventory obsolescence, provision for volume discounts). The solid vertical line represents the auditor's best guess or estimate and the brackets represent the boundaries of his zone of reasonableness around this best estimate. These boundaries may represent confidence limits (where statistical sampling is employed) or simple "gut feeling" maxima and minima, based on all information available at the time and his experience in prior periods.

In Exhibit 6(a) the auditee's estimates in Case A are close to the auditor's estimates. In Case B the auditee's estimates are not close to the auditor's estimates; however, the differences seem to offset. Case C contains one auditee estimate that is outside of the zone of reasonableness. It would not seem unreasonable to consider (at least) the differences between the zone boundary and the auditee estimate in C4 as the equivalent of a "known error," since the zone boundary represents the point beyond which the auditor feels the true value is very unlikely to lie. In D, these known errors offset.

Exhibit 6(b) reflects another dimension of the accounting estimate problem—swings from one side of the zone to the other. In E the auditee's estimates are pushing the left side of the zone
### Exhibit 6(a). Evaluation of Accounting Estimates

<table>
<thead>
<tr>
<th>Auditee estimate</th>
<th>Auditor's best guess</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td></td>
</tr>
<tr>
<td>A1 (X)</td>
<td></td>
</tr>
<tr>
<td>A2 (X)</td>
<td></td>
</tr>
<tr>
<td>A3 (X)</td>
<td></td>
</tr>
<tr>
<td>A4 (X)</td>
<td></td>
</tr>
<tr>
<td>B1 (X)</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>(X)</td>
</tr>
<tr>
<td>B3 (X)</td>
<td></td>
</tr>
<tr>
<td>B4 (X)</td>
<td></td>
</tr>
<tr>
<td>C1 (X)</td>
<td></td>
</tr>
<tr>
<td>C2 (X)</td>
<td></td>
</tr>
<tr>
<td>C3 (X)</td>
<td>↔ X</td>
</tr>
<tr>
<td>C4</td>
<td>↔ X</td>
</tr>
<tr>
<td>D1 (X)</td>
<td></td>
</tr>
<tr>
<td>D2 (X)</td>
<td>↔ (X)</td>
</tr>
<tr>
<td>D3 (X)</td>
<td></td>
</tr>
<tr>
<td>D4 (X)</td>
<td>↔ (X)</td>
</tr>
</tbody>
</table>

( ) Boundaries of auditor's zone of reasonableness.
X Auditee estimate (book value)—values to the left and the right of the auditor's best guess would result in errors of overstatement and understatement respectively if the auditor's estimate is correct.
↔ Equivalent of a "known error.”

and in F they have moved to the right side. Suppose the estimates in E were made at the end of year one and those in F at the end of year two. Even if the individual situations in E and F were marginally acceptable, auditors subscribing to error measurement method B discussed earlier would evaluate the swings between years when determining the effect on income in year two. Cases G and H are similar except that the swings are not as large. Of course, the seriousness of these swings would depend upon (i) the sizes of the zones compared to materiality, (ii) potential management motives (e.g., low profits in year one and high profits in year two) and (iii) the fuzziness of the estimates.

In some cases the fuzziness can be reduced by additional work by the auditor and/or the auditee. Where statistical or judgmental samples are used as the basis of the estimates, expanded samples


<table>
<thead>
<tr>
<th>Auditee estimate No.</th>
<th>Auditor's best guess</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>(X</td>
</tr>
<tr>
<td>E2</td>
<td>(X</td>
</tr>
<tr>
<td>E3</td>
<td>(X</td>
</tr>
<tr>
<td>E4</td>
<td>(X</td>
</tr>
<tr>
<td>F1</td>
<td>(X</td>
</tr>
<tr>
<td>F2</td>
<td>(X</td>
</tr>
<tr>
<td>F3</td>
<td>(X</td>
</tr>
<tr>
<td>F4</td>
<td>(X</td>
</tr>
<tr>
<td>G1</td>
<td>(X</td>
</tr>
<tr>
<td>G2</td>
<td>(X</td>
</tr>
<tr>
<td>G3</td>
<td>(X</td>
</tr>
<tr>
<td>G4</td>
<td>(X</td>
</tr>
<tr>
<td>H1</td>
<td>(X</td>
</tr>
<tr>
<td>H2</td>
<td>(X</td>
</tr>
<tr>
<td>H3</td>
<td>(X</td>
</tr>
<tr>
<td>H4</td>
<td>(X</td>
</tr>
</tbody>
</table>

( ) Boundaries of auditor's zone of reasonableness.
X Auditee estimate (book value)—values to the left and the right of the auditor's best guess would result in errors of overstatement and understatement respectively if the auditor's estimate is correct.
<> Equivalent of a "known error."

will narrow the zone and perhaps change the estimate (of course, on average, the estimate will not change but the possibility of sample bounce cannot be ignored when precision is large).

**Combining Conclusions on Clear-Cut Errors and Accounting Estimates:**

The auditor's conclusion on the fairness of the accounting estimates should not be made in isolation. If clear-cut errors are significant the auditor will not be able to tolerate differences in accounting estimates to the extent he could if clear-cut errors were trivial. The final combined evaluation is a blend of statistical and judgmental audit evidence where the auditor is required to use his professional judgment to determine if "in his opinion the results of operations are presented fairly." If his judgment is poor he will accept situations which should not be accepted and he will be exposed to the consequences of such decisions.

Unfortunately, auditors with equal competence and judgment can reach entirely different conclusions on identical situations.
because of the fundamental differences in the various methods of measuring errors in income (opening ± closing errors versus closing errors, and combined evaluation versus piecemeal evaluations).

THE RELATIONSHIP BETWEEN MATERIALITY AND THE EXTENT OF SUBSTANTIVE TESTS

The relative audit time spent on any item on the financial statements will be in inverse proportion to the sum involved.

(a slight restatement of Parkinson's Law of Triviality)

The purpose of substantive procedures has been defined as:

"To provide an appropriate assurance of detecting, should it exist, a material total of monetary error misstating the financial statements being examined."  

I feel reasonably certain that most members of the auditing profession would not dispute this definition. It follows from this that auditors should (i) establish the level of materiality before considering the extent of a substantive test, and (ii) explicitly use that level of materiality to establish the extent of such test. How common are these practices?

The "Extent of Testing" Study Group of the CICA is in the process of conducting a survey of 622 practicing members to determine the answers to these and many other testing-related questions. In addition to 80 testing questions, the survey contains four case studies which consist of sample populations and testing criteria (materiality, strength of internal control, anticipated errors, etc.). Respondents are being asked to provide their sample sizes and other related information. The Study Group believes that this survey will provide a useful look at testing practices as they are actually applied in day-to-day field work rather than as they are set out in firm manuals. If successful, this survey will provide a base for the entire "Extent of Testing Research Study" by demonstrating that guidelines are badly needed if greater uniformity of testing extents in identical audit situations can be considered a reasonable objective for the profession.

While the concept of using materiality to determine substantive

---

3 Paragraph 320.70 of SAS No. 1 defines the purpose of substantive procedures as "to obtain evidence as to the validity and the propriety of accounting treatment of transactions and balances, or conversely, of error and irregularities therein." The linkage between these two definitions is set out in Anderson's Texas paper referred to earlier.
statistical sample sizes is not disputed, the variations in its usage are considerable. Proper sample planning requires the auditor to make an estimate of the true underlying error condition. However, we have seen that this estimate of error depends upon the basis used to evaluate the sample and the overall audit results. The auditor could be using one of the four bases shown in the following table:

<table>
<thead>
<tr>
<th>Two Methods</th>
<th>Two Approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. The measurement of error in the current year's income is based solely on errors in closing equity</td>
<td>I Cumulative</td>
</tr>
<tr>
<td></td>
<td>IA</td>
</tr>
<tr>
<td>B. The measurement of error in the current year's income is based on opening and closing equity errors</td>
<td>IB</td>
</tr>
</tbody>
</table>

What impact can the choice of approach have on the audit sample size? It depends on the actual and anticipated error situation. Two illustrations are set out in Exhibits 7, 8 and 9. For simplicity, statistical sampling has been considered in isolation and the question of the previous year's audit precision has been ignored (however, this issue will be raised again later when the impact of changing levels of materiality is discussed). Exhibits 7 and 8 provide the opening and closing errors, the calculation of errors in income based on methods A and B and the desired final precisions. The description “final” has been used since the planned precision might well be less, depending on a risk planning. Planning for a risk is discussed in the “Elliott and Rogers” and “Roberts” articles referred to earlier.

Exhibit 9 demonstrates the variability in sample sizes for five approaches. In addition to the four approaches defined above the approach recommended by the “group of eleven” (G11) on page 5 of the Appendix has been included. It would seem that five auditors could select different evaluation approaches, carry out the audit extents shown in Exhibit 9 and then each one would feel it is reasonable to state:

"... our examination was made in accordance with generally accepted auditing standards ..."

"In our opinion the results of operations are presented fairly ..."

---

4See the Elliott and Rogers article referred to earlier and “A Statistical Interpretation of SAP No. 54” by Donald M. Roberts, The Journal of Accountancy, March, 1974, for a detailed discussion of $\alpha$ and $\beta$ risks.
### Exhibit 7. Illustration A

**Two Methods of Estimating Clear-Cut Errors**

<table>
<thead>
<tr>
<th></th>
<th>Accounts receivable</th>
<th>Inventory</th>
<th>Total effect on income of current year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effect on current year's income</strong></td>
<td>Amount of O/S (U/S)</td>
<td>Amount of O/S (U/S)</td>
<td></td>
</tr>
<tr>
<td>Most likely error in previous year's closing (current year's opening)</td>
<td>20,000</td>
<td>(20,000)</td>
<td>15,000</td>
</tr>
<tr>
<td>Estimate of error in current year's closing</td>
<td>0</td>
<td>0</td>
<td>(25,000)</td>
</tr>
<tr>
<td>Estimate of misstatement of current year's income based on Method A</td>
<td>0</td>
<td>(25,000)</td>
<td></td>
</tr>
<tr>
<td>Method A</td>
<td>(20,000)</td>
<td>(40,000)</td>
<td>(60,000)</td>
</tr>
</tbody>
</table>

**Desired final precision**

<table>
<thead>
<tr>
<th>Desires final precision</th>
<th>Combined limitation (*precision)</th>
<th>Upper limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>IA</td>
<td>53,000</td>
<td>75,000</td>
</tr>
<tr>
<td>IB</td>
<td>28,300</td>
<td>40,000</td>
</tr>
<tr>
<td>IIA</td>
<td>100,000</td>
<td>125,000**</td>
</tr>
<tr>
<td>IIIB</td>
<td>80,000</td>
<td>100,000**</td>
</tr>
</tbody>
</table>

\*Based on the combining formula referred to earlier.

**Where the piecemeal approach is used, these figures would not be calculated by the auditor.**

†Based on the assumption that Method B provides the true error.

Materiality is $100,000. Desired precision for accounts receivable and inventory were arbitrarily set equal.
### Exhibit 8. Illustration B
Two Methods of Estimating Clear-Cut Errors

<table>
<thead>
<tr>
<th>Accounts receivable</th>
<th>Inventory</th>
<th>Total effect on income of current year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effect on current year's income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amount of O/S (U/S)</td>
<td>Amount of O/S (U/S)</td>
<td></td>
</tr>
<tr>
<td>20,000</td>
<td>15,000</td>
<td>(35,000)</td>
</tr>
</tbody>
</table>

Most likely error in previous year's closing (current year's opening):

20,000 (20,000) 15,000 (15,000) (35,000)

Estimate of error in current year's closing:

20,000 20,000 15,000 15,000 35,000

Estimate of misstatement of current year's income based on Method A:

20,000 15,000 35,000

<table>
<thead>
<tr>
<th>Desired final precision</th>
<th>Combined *precision Upper limit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned</td>
</tr>
<tr>
<td>IA</td>
<td>46,000</td>
</tr>
<tr>
<td>IB</td>
<td>70,800</td>
</tr>
<tr>
<td>IA</td>
<td>80,000</td>
</tr>
<tr>
<td>IB</td>
<td>100,000</td>
</tr>
</tbody>
</table>

*Based on the combining formula referred to earlier.
**Where the piecemeal approach is used, these figures would not be calculated by the auditor.
†Based on the assumption that Method B provides the true error.
Materiality is $100,000. Desired precision for accounts receivable and inventory were arbitrarily set equal.
### Exhibit 9. Comparison of Sample Extents

<table>
<thead>
<tr>
<th>Evaluation Approach</th>
<th>IA</th>
<th>IB</th>
<th>IIa</th>
<th>IIb</th>
<th>G11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Illustration A</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>356</td>
<td>1,249</td>
<td>100</td>
<td>156</td>
<td>100</td>
</tr>
<tr>
<td>Inventory</td>
<td>200</td>
<td>703</td>
<td>100</td>
<td>156</td>
<td>56</td>
</tr>
<tr>
<td><strong>Illustration B</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>302</td>
<td>128</td>
<td>100</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Inventory</td>
<td>341</td>
<td>144</td>
<td>100</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

The formula on page 5 of the Appendix was used to compute these figures. Approach IIa was set at 100 and used as the base. For DUS and similar sampling plans, the variations in sample extent would usually be less extreme but still as significant.

Are all five conclusions really acceptable under generally accepted auditing standards? If the answer to this question is “no,” then which approach(es) is (are) in accordance with GAAS?

As stated above, these are simple illustrations. The real world model is more complex and involves allowing for clear-cut errors (known and most likely) in areas of the audit where statistical sampling is not used. Also, it is necessary to anticipate the final evaluation of accounting estimates in order to determine if error allowances should be made for inadequate provisions. While these procedures are not always easy, they should be carried out in the process of determining if the income statement does, in fact, “present fairly.”

The recommendations of the group of eleven with respect to the relationship of the extent of tests to materiality and the effect known errors should have on the calculation of precision (page 5 of their letter) are the ones which I find difficult to accept since they do not seem intuitive. In the simplest case, if the auditor is aware of an error equal to one-quarter of materiality (which the auditee refuses to correct) when he is planning his audit, surely his objective should be to seek reasonable assurance that additional errors do not exceed three-quarters of materiality. If this is not the objective, the concepts of possible error (see earlier discussion) and reasonable assurance would seem to be meaningless.

### Adjustments for Errors Found in Samples

*The great tragedy of science—the slaying of a beautiful hypothesis by an ugly fact.*

(Thomas Huxley)
This topic is, of course, directly related to the extent of substantive testing and the overall evaluation of the financial statements.

When the overall audit evaluation is not acceptable as a result of the discovery of errors in excess of the amount anticipated, auditors may look to auditee adjustments to cure the problem. The issue here is, "What adjustment should be requested (or tolerated)?"

The following three policies would seem to be in use by accounting firms:

(i) Correction to the most likely value (point estimate) since it is the auditor's best guess of the true underlying condition.
(ii) Correction to the most likely or some lesser amount which will lower the upper limit to a tolerable figure.
(iii) Correction to the nearest confidence interval when the auditee book value is outside the interval (no correction being permitted when the book value is inside the interval).

The selection of one of these three methods and its effectiveness may well depend on the approach used in the overall evaluation of the audit. Exhibit 10 contains an illustration of the three error provision policies and the related evaluations. This simple illustration involves three statistical sampling applications in the auditee's first year of operation. Here the cumulative evaluation approaches (1A and 1B) produce indeterminate results compared with acceptable results under the piecemeal approaches. (The term indeterminate has been used to describe the situation in which the most likely error is less than materiality and the upper limit exceeds materiality. In such situations it is theoretically possible—although often impractical—to expand the sample and reduce the precision so that the upper limit is equal to or less than materiality. Where the most likely error approaches or exceeds materiality the situation would be unacceptable rather than indeterminate unless special decision rules were used in such instances. One such rule was suggested by Anderson and described earlier).

At the end of the second year the evaluation becomes more complex. The actual error in income in year 2 is a function of the errors at the end of years 1 and 2. Suppose the conditions at the end of year 2 were identical to year 1 except that the errors were understatements instead of overstatements. The error in income in year 2 would be an understatement of $130,000 ($2 × $65,000) less any year 1 and year 2 auditee provisions. Unless total provisions of at least $30,000 were made in year 1 and/or
### Exhibit 10. Overall Evaluation Before and After Provision for Errors

<table>
<thead>
<tr>
<th>Application</th>
<th>Lower limit</th>
<th>Most likely error</th>
<th>Upper limit</th>
<th>Achieved precision</th>
<th>IA</th>
<th>IB</th>
<th>IIA</th>
<th>IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation before auditee provision</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>-20,000</td>
<td>+20,000</td>
<td>+60,000</td>
<td>40,000</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>B</td>
<td>+5,000</td>
<td>+35,000</td>
<td>+65,000</td>
<td>30,000</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>C</td>
<td>-40,000</td>
<td>+10,000</td>
<td>+60,000</td>
<td>50,000</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Combined</td>
<td>-5,000</td>
<td>+65,000</td>
<td>+135,000</td>
<td>70,000</td>
<td>X</td>
<td>X</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

(i) Combined evaluation after auditee provision for most likely error

-70,000 0 +70,000 70,000 ✔ ✔ ✔ ✔

(ii) Combined evaluation after auditee provision of $35,000

-40,000 +30,000 +100,000 70,000 ✔ ✔ ✔ ✔

(iii) Combined evaluation after auditee provision to nearest limit for Application B

-10,000 +60,000 +130,000 70,000 X X ✔ ✔

Materiality = $100,000
year 2, the most likely error in income in year 2 would exceed materiality. In fact, unless auditee provisions of considerably more than $30,000 were made it would be impossible to achieve an acceptable upper limit.

When we reach a consensus as to which approach (IA, IB, IIA, or IIB) is the correct one, the appropriate adjustment strategy will automatically be decided.

REDUCTIONS IN MATERIALITY BETWEEN AUDIT DATES

The truth would become more popular if it were not always stating ugly facts.

(Henry S. Haskins)

If materiality with respect to the income statement is to be based on income of the current year or the average of recent years, what happens to materiality when income (or the average income) declines between year ends? Should audit materiality be reduced as well? Can audit materiality be reduced? Identical questions arise when an audit is being conducted on a period of less than one year. In the latter case the auditor's initial reaction is to use a portion of the year's materiality which corresponds to the portion being audited (e.g., for 3 months use 25%).

Whether or not the auditor can achieve the reduced materiality objective depends upon the overall evaluation approach used. If overall evaluation approach IB or IIB is used the auditor will often find that he cannot achieve his audit test objectives if he establishes a materiality that is lower than the previous year. Consider the simplest situation:

In year one the auditor believes the accounts are very clean and he does not expect to find any errors in his samples. He decides to use sample extents that will produce upper error limits equal to materiality (say, $100,000) if no errors are found. He selects his samples, finds no errors, and has an acceptable situation since he has obtained reasonable assurance (say a sampling β risk of 10% and a posterior β of 1%) that a material error does not exit.

In year two, profits become depressed and the auditor decides that $50,000 is now material. The accounts are still very clean and he once again determines his sample extents based on finding no errors. If he finds no errors in his samples what can he conclude? First, he can conclude that the upper limit of errors in the balance sheet is $50,000, regardless of the approach he uses. Second, if he uses approach IA or IIA, he

\[ \text{See Australian guidelines summarized in paragraphs 99 to 103 of the FASB memorandum.} \]
can conclude that he has reasonable assurance that errors in the income statement do not exceed $50,000. However, if he uses approach IB or IIB he can only conclude that he has reasonable assurance that income errors do not exceed $100,000 (double the year 2 materiality). There would be a 1% posterior β that the opening figures contained a $100,000 error and 1% posterior β that the closing figures contained a $50,000 error. If those errors were in opposite directions the impact on income in year 2 would be $150,000. Fortunately, the β risks for this situation existing and not being detected would be 1% for the sampling risk (.10^2 since the risks are independent) and .01% for the posterior (.01^2). These risks are far less than desired by the auditor. But what can he conclude at his desired β of 10% and 1% for sampling and posterior risks? Since the two situations cannot reasonably exist at the same time it is possible (at the desired β risks) that a $100,000 error existed at the end of year 1 and thus there is the same risk that income in year 2 is misstated by this amount.

The situation described above is the simplest case involving no errors. Suppose the samples in year 1 produced a most likely error of $60,000, precision of $40,000 and an upper limit of $100,000. Unless the $60,000 in error remains uncorrected at the end of year 2, auditors employing evaluation approaches IB and IIB will have a most likely error in income in excess of materiality before they start their audits. On the other hand, if the error does remain uncorrected, auditors using approaches IA and IIA could not reach a satisfactory conclusion even though the current year’s income did not in reality contain a material error. Is it possible that auditors using approaches IA and IIA switch to IB and IIB in these situations? Surely, this would be like having one’s cake and eating it at the same time.

It would appear that materiality should only be reduced when it is possible to reduce the upper limit at the end of the previous year. The only other way the auditor can achieve a materiality reduction is by using a crystal ball in year 1 to set materiality for the audit of the year 1 closing balances at income materiality for year 2. Otherwise, there will be a one-year delay before such reductions have any impact on the final audit conclusion on the fairness of reported income (usually the most stringent materiality).

A number of guidelines seems to imply that materiality can be reduced between years. While this may be possible insofar as the application of accounting principles and known errors are

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^For example, see paragraph 77 of the FASB memorandum which cites proposed SEC Rule 3-08.
concerned, it is not feasible for the concepts of most likely and possible errors.

**OTHER MATERIALITY-RELATED PROBLEMS**

*Basic research is when I’m doing what I don’t know I’m doing.*

(Wernher Von Braun)

The following areas require audit decisions that should be influenced by materiality.

*Branch Audits:* Auditors are frequently confronted with large branch operations (often involving hundreds of locations) which may not have centralized accounting and controls. A very puzzling and unanswered question is, "How many locations should be visited?" Although it would seem logical for materiality to influence this decision, quantitative approaches often imply that almost all branches should be audited (unless there are numerous very small locations). Since this is not feasible, the selection is usually based on "gut feel" which in turn is probably influenced by the audit fee. Is there a solution to this problem (which also applies to areas such as selecting cycles for accounts receivable)? One method used to cope with this problem in practice requires the auditor to make an assumption about the amount of error that could exist in a branch before it would be detected by other means (such as management’s review of branch operating statistics). Once this assumption has been made the auditor can compute the number of branches that would have to contain this magnitude of error to create a material error. This allows him to determine the number of branches to audit. Of course, if his error magnitude assumption is unreasonable he will not obtain the degree of assurance desired at his stated materiality level (or vice versa). Some auditors are likely to feel uncomfortable when they make such assumptions; however, we must remember that auditing is full of assumptions that require the use of professional judgment—and this will never change. In any event, it can be argued that wherever less than 100% of the branches are audited, such an assumption is implicit.

When this two-stage selection (stage one being the branch selection and stage two the item selection within a branch) is modelled, some unusual results are produced. If the branch selection is made based on the size of the branches (all other aspects being equal, branch one will get twice the chance of selection as branch two if it is twice as large), the allocation of the overall
sample to the selected branches is even (regardless of their size) if an unbiased estimator is desired. If Bayesian analysis is employed explicitly this might change. Also, the use of regression analysis to provide a further weighting for the selection of branches requires investigation. Clearly the whole area needs extensive research.

_Segmented Reporting:_ Should each segment be subjected to audit based on the materiality of (i) the consolidated operation, or (ii) the segment itself? This decision has a significant impact on the extent of testing.

_Minimum Review and Unverified Items:_ In most audits there are a number of account balances or items which are individually less than materiality and for this reason they may be ignored completely. On the other hand, they may be subjected to “minimum review procedures.” The CICA Study “Materiality in Auditing” describes this procedure as follows.

(i) learn what the item represents;
(ii) decide that it appears reasonable;
(iii) check the amount to the general ledger and scrutinize the relevant account;
(iv) decide that in comparison to similar items for the previous year it is reasonable;
(v) decide that there are no special circumstances that would render material this otherwise immaterial item.

The five review steps above must themselves be applied with a reasonable sense of perspective. Some items will be so insignificant that even scrutiny of the account and comparison with the previous year must not be dwelt on at length. On the other hand, items just below the materiality limit must be reviewed with care. In some cases the review will itself lead to the discovery of some error or incorrect valuation or it may raise serious doubts which will require resolution through the use of more intensive verification procedures.

Is there a limit to the value of items that can be left unverified or subjected to a minimum review? Should such limit relate to materiality? Some auditors find it easier to avoid the problem by combining all such individually immaterial items and sampling them as one population. If this is not done the auditor is forced to make assumptions as to the amount of error such items might contain and then limit the total of such items based on such amount. Should this amount be contained by materiality itself or materiality less most likely errors projected for the audit as a whole? (Of course, this problem is not relevant if piecemeal evaluation is appropriate.)
Peer Review: I feel certain that most auditors would question the relationship of materiality to peer review. Depending on the purpose of peer review this could be a non-issue. However, if peer review contemplates an assessment of adherence to GAAS and whether or not the financial statements issued do, in fact, "present fairly," it would seem to be a relevant issue.

Can an auditor who interprets GAAS as requiring evaluation approach IB carry out a peer review of an auditor who believes IIA is also consistent with GAAS? If the reviewer is prepared to accept IIA, why would he charge his own clients for a more expensive audit (usually required under IB—see Exhibit 9)?

Financial Institutions: The group of eleven raised the audit materiality problem as it relates to financial institutions (see Appendix A, page 6). This has been a very frustrating area for auditors of such institutions. When statistical sampling is employed, a "normal materiality" and a "reasonable β risk" often produce enormous sample sizes (5,000, 8,000, 13,000, etc.). In practice, extents of this nature are rarely carried out on the basis that the benefits do not warrant the cost. There may be no other answer to this problem. (Some auditors have suggested that the level of materiality used in these situations be based on normal materiality plus the amount of the auditee's fidelity bond. Although this would usually result in a considerable sample size reduction there is no support for such procedure in the literature at the present time.)

Errors Which May Not Be Errors: The easiest way to describe this situation is with a couple of illustrations.

Suppose, in his audit of purchases for the year, the auditor finds that the auditee has overpaid a supplier. When the auditor discusses such overpayment with the auditee he may find that the auditee has no desire to look for other such overpayments. The auditee may state that he believes such instances are not significant and that in any event the cost of finding such overpayments would exceed any recoveries. Thus, even though an error had been discovered, it would not really be an error and the financial statements would present fairly what had taken place. One might argue that if such overpayments were exceedingly large, a classification error would exist in the financial statements. On the other hand, the level of detail provided in the income statement of most corporations is usually minimal and the category "overpayment for purchases" would probably be combined with cost of goods sold.

A similar problem exists with respect to the shipment of goods and the failure to bill customers. While the auditor may find one or more examples of such instances, he cannot force the auditee to conduct a thorough
search for other like items. As in the case of overpayments for purchases, he may be able to make a projection from his sample, but a provision for such items would not be appropriate unless the client decided to make a search for them. Once again, it can be argued that the statements present fairly what has actually taken place.

If the auditor believes that the auditee will not be receptive to searching for like items, how hard should he look for them? Should his audit tests be based on a normal level of materiality or some other higher figure? One auditor has suggested that the level of materiality in such cases is a lower figure since items of this nature result in real losses to the auditee rather than in timing differences. Where the auditee states in advance that he will not look for like items even if the auditor finds examples in his sample, is it reasonable for the auditor to obtain such a statement in writing and then leave out the audit test on the basis that it may serve no useful purpose? The problem is more complicated when the auditor finds that the auditee has underpaid a supplier or overbilled a customer. Here, the question of a provision for such a liability might be a problem—particularly if past experience is that a portion of such items are claimed by suppliers or customers and the balance written off to income.

**WHERE DO WE GO FROM HERE?**

*What is research, but a blind date with knowledge.*

(Will Henry)

*He that will not apply new remedies must expect new evils, for time is the greatest innovator.*

(Francis Bacon)

It is not pretended that the issues raised in this paper constitute an exhaustive list of all audit materiality problems. One of the express purposes of this paper (like that of the letter sent by the group of eleven to the FASB) is to generate discussion and debate of these issues.

Lee Seidler, when developing the theory that the auditor’s report is a symbol in his paper on “Improving Communication In The Auditor’s Standard Report” (Auditing Symposium III, University of Kansas, 1976), stated:

*The answer, of course, is obvious. You know the words in the auditor’s report; indeed, if you are a practitioner or a teacher of accounting you probably know them by heart. You also know what you believe the words mean, although some searching would demonstrate that there are wide*
variations in the perceptions of that meaning, even among ‘experts.’ Only if the auditor’s report looks ‘different,’ that is, if it contains an exception, will you devote any significant time to studying it. The auditor’s report, at least in its most common form—a clean opinion—is a symbol.

In light of the issues discussed in this paper, I am not sure what the “symbol” really means. What are auditors’ responsibilities in these areas? Do we hold out false hopes if we think the report of “The Commission on Auditor’s Responsibilities” will deal with these issues and make definitive recommendations? The “Statement of Issues” prepared by the Commission continually uses the word “materiality” or discusses concepts requiring the use of materiality. However, one of the few expressed “issues,” which, if resolved, would shed some light on the materiality dilemma outlined in this paper, does not even use the word materiality. In 1-2 “Clarifying the Responsibility for Detection of Fraud” the Commission states:

A specification, as a part of professional standards, of a general standard of care that the auditor should exercise in an ordinary examination that could serve as a criterion for judging responsibility for detecting fraud. What should such a standard specify with respect to

(d) The level of attention that, from a cost-benefit viewpoint, the auditor should give to sources of possible misstatements in the financial statements, including not only fraud but also other possible sources such as (1) clerical errors, (2) inappropriate selection of accounting principles, (3) inadequate disclosure, and (4) failure to reasonably estimate the outcome of future events?

Perhaps the words “cost-benefit” are very significant. Is it possible that a decision theory approach should be used and auditing curtailed when the benefits no longer equal or exceed the costs—regardless of the relationship of the upper precision limit (at an appropriate level of assurance) to materiality? What would this mean to the users? How would the standard auditor’s report inform the user about his decision to curtail the audit at a point which implies a level of materiality which might be many times that of the least stringent user of the financial statements?

I can think of only one answer to these questions and it is to state the level of materiality used (or achieved) right in the audit report. Although this approach would probably create a few new short-term problems, it could well resolve many of the current problems which may otherwise be unsolvable.

This approach would require the auditor to discuss and agree upon a level of audit materiality with the auditee in advance of carrying out the audit. While this might be distasteful to some
auditors, one wonders why we are not doing this now. When the auditor offers his professional services to the auditee one would think that there would be an understanding as to what the transaction involves. After all, would an engineer build a bridge without a written contract setting forth specifications as to height, width, length, location, material content, completion date, etc.? Why should an auditor undertake an audit without knowing what levels of materiality and assurance the auditee believes he is purchasing? If the auditee desires a lower materiality or a higher level of assurance the auditor can respond with the cost. (One wonders how an auditee can realistically evaluate proposals from several auditors without explicitly considering these areas.)

Thus, one of the main users would start the cost-benefit ball rolling. If other users found they could not agree with the level of materiality employed it would be up to them to pressure the auditee for a change. This would, of course, mean that the user "without clout" would be unable to initiate such changes. On the other hand, he would at least know the level of materiality used and he could take it into consideration in the process of analyzing the financial statements.

This possible solution to the materiality dilemma would still require the profession to resolve the issues of "cumulative versus piecemeal error evaluations" and "opening ± closing versus closing only error determinations."

I hope it is obvious to the reader that the auditing profession must make several critical decisions. Hopefully, these decisions will be based on solid research. Funds are now available to academics for realistic research projects in this area. I am sure that many practitioners would welcome the opportunity to assist academics in worthwhile materiality research projects.

CONCLUSION

The reader should not infer from this paper that I am advocating identical audit procedures and extents in similar circumstances. While it may be necessary to reduce the number of alternatives in accounting in order to make financial statements more comparable, this is not appropriate for auditing. Different audit strategies are desirable and help to avoid stagnation. Thus, it is healthy

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7 See paragraph 246 of the FASB memorandum.
8 See, for example, Research Opportunities in Auditing; Peat, Marwick, Mitchell & Co., pages 29-30.
to have auditors obtaining their reliance from the three sources (internal control, tests of detail and analytical review) in different proportions in similar situations. Further, even when the same amount of assurance is being sought from "tests of detail," sample sizes will vary with the plans used. "For any given set of conditions there will usually be several possible plans, all valid, but differing in speed, simplicity, and cost." However, it seems reasonable to suggest that where identical opinions are expressed in similar circumstances the auditors should be achieving the same final objectives.

APPENDIX. AUDIT ASPECTS OF MATERIALITY

Materiality is generally thought to be an accounting issue. However, there are also important related auditing issues. As practicing auditors, we are interested in these issues and hope, through this memorandum, to be able to express our audit concerns to the FASB.

Scope of Our Comments

The concept of materiality can be applied to a number of distinct decision processes related to financial accounting, including (1) the level of aggregation (or disaggregation) at which financial data are presented, (2) the nature and extent of supplementary disclosure (notes to financial statements), and (3) precision or accuracy of the data presented. Although the first two items are important to preparers, auditors, and users of financial statements, and must be dealt with by the FASB, our comments in this memorandum are directed solely to the third matter—the precision or accuracy of reported accounting data.

Recommendation

If the FASB decides to issue a statement on materiality, we recommend that imprecision inherent in the accounting or auditing process should not be governed by any quantitative materiality criteria established in the materiality standard (because it cannot be so governed).

In order to meet this recommendation, the FASB could include language similar to the following in a statement on materiality:

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The quantitative materiality criteria set forth in this statement are not intended to govern the degree of imprecision inherent in the basic accounting process. The following illustrate some (but not all) types of inherent imprecision not governed by this statement:\(^{(1)}\):

A. Use of estimates based on predictions of future occurrences—for example:
   1. allowance for uncollectible receivables based on predictions of amount and timing of future cash collections on receivables
   2. allowance for inventory obsolescence based on predictions of future sales prices and volumes
   3. allowance for depreciation based on predictions of useful life and future salvage value of fixed assets
   4. reserves for future warranty claims
   5. recognition of revenue based on predicted costs to complete and percentage of completion for long-term contracts
   6. accrual of loss contingencies based on "probable" future events and reasonable estimates of loss incurred

B. Use of sample information to develop accounting data—for example:
   1. inventory quantities
   2. inventory—retail method
   3. inventory—dollar value LIFO method
   4. allowance for uncollectible receivables
   5. loan reserves
   6. interline settlements (railroads and airlines)

C. Other—for example:
   1. degree of imprecision inherent in design of reasonable systems of internal accounting control.
   2. reasonable accounting practices such as expensing minor additions of fixed assets or use of sum-of-months digits to amortize deferred finance income.
   3. use of dates close to, but not identical with, the financial statement date in consolidating subsidiaries, applying the equity method of accounting, or translating foreign financial statements.

Also, the quantitative materiality criteria set forth in this statement are not intended to govern the degree of imprecision inherent in audit procedures.

The remainder of this memorandum explores the reasons for these recommendations in further detail.

Imprecision in Reported Accounting Data

There are a number of reasons that reported accounting data are not precise (i.e., have errors of amount, classification, or timing).

\(^{(1)}\)Obviously, the remainder of the statement would define what is governed by the statement. Since that is not the subject of this memorandum, we omit any recommendations on this point.
These reasons include the following:

• **Imperfect Systems of Internal Control.** The degree of internal accounting control concerned with the safeguarding of assets and the reliability of financial records is governed by the relative costs and benefits involved. For example, *Statement on Auditing Standards No. 1*, section 320.32 states:

The definition of accounting control comprehends reasonable, but not absolute, assurance that the objectives expressed in it will be accomplished by the system. The concept of reasonable assurance recognizes that the cost of internal control should not exceed the benefits expected to be derived.

As a result of this cost/benefit relationship, every practical system will stop short of perfection. Therefore, some events might not be captured in the books and records. Also, although captured correctly, data may be processed erroneously. In either case, the result is imprecision in the reported data. Generally, the imprecision inherent in imperfect systems of internal accounting control (there are no “perfect” systems) is unmeasurable.

• **Development of Accounting Data by Statistical Methods.** Frequently, books and records are kept on a day-to-day basis in a way that is at variance from the accounting principles used by an entity in its periodic reporting. Thus a conversion process must take place prior to releasing financial statements. Examples include the conversion of FIFO to LIFO inventory and the computation of imputed interest on installment contracts. To the extent that price-level adjusted and/or current value accounting data may also require periodic disclosure in the future, many other similar conversions may be required. Preparers of financial statements frequently use statistical sampling methods to make such conversions; in this way, the sampling error can be measured and controlled. However, if statistical sampling is not used in the conversion, the contribution to accounting imprecision cannot be measured.

• **Use of Expedient Accounting Practices.** Certain accounting practices are used when they can reduce costs or improve timeliness with only minor losses in precision. Examples include (1) the use of standard inventory costs rather than actual, (2) expensing of minor fixed asset additions, and (3) consolidation of foreign operations as of a date close to, but not the same as, the balance sheet date. Generally the degree of imprecision introduced by such practices
cannot be measured without expending the cost (or time) they were designed to save.

*Uncertainty about the Future.* Virtually all items on the balance sheet have some degree of uncertainty with respect to their ultimate realization or liquidation. As a result, nearly all reported balances have some estimated component that is based on predictions of future occurrences. To the extent that the predictions are not realized, imprecision is introduced. All preparers of financial statements are well aware of the importance of estimation in determining, for example, the allowances for uncollectible receivables and inventory obsolescence, the estimated useful life of fixed assets, the required accruals for future warranties, claims, and other loss contingencies.

*Inadvertent Errors.* In spite of the diligence of preparers, the process of preparing financial statements may be so complex that inadvertent errors are unavoidable. Since internal accounting controls at the financial statement preparation level are scarce, such errors may not be prevented or detected.

*Deliberate Errors.* Some deliberate errors are of the notorious type familiar as a result of recent lawsuits. However, deliberate errors are usually much less dramatic and obvious. These might result from management instructions to be a little more optimistic or pessimistic than usual in evaluating reserves and allowances, for example. Such biases, applied over large numbers of individual decisions, can create great imprecision. Note that these errors may arise through management override of internal controls, which cannot, therefore, be relied upon to prevent or correct them.

Since most of the above sources of imprecision are unmeasurable (or unmeasured) at the time financial statements are prepared, they should not be governed by any quantitative materiality criteria established by the FASB. Even those sources for which the potential imprecision can be measured (e.g., with statistical methods) should not be governed by any quantitative materiality criteria. Were such imprecision governed, the FASB statement would have to establish not only a material amount but also a means of determining an appropriate confidence level. Even if this could be done, and, for example, the FASB promulgated a standard that an error in reported net income of 5% or more is material and a 95% confidence level applies, the following anomalous situation could
develop: one company uses statistical methods to estimate ending inventory and calculates that, at 95% confidence, the maximum income error from the sampling procedure would not exceed 3% of income; to confine the total potential income error to 5%, therefore, all other errors being considered as to their materiality could not exceed 2% of income. Meanwhile, another company uses a similar method to estimate inventory but does not (or cannot) measure the potential effect on income, and therefore has the entire 5% of income to work with in relation to other types of errors. Because this result does not seem reasonable, the imprecision inherent in accounting data should not be governed by any FASB criteria.

Imprecision in the Audit Process

Auditors seldom reprocess accounting data completely, but virtually always form their conclusions through a sampling process. Accordingly, there is some imprecision inherent in the auditing process, but this imprecision does not add to the accounting imprecision described above. For example, if an auditor is examining a set of financial statements which misstate net income by 1% and the auditor has an inherent audit imprecision such that an error in net income of up to 5% may not be found, the net income as reported is still in error by only 1%—the auditor does not increase the error.

Note that certain types of imprecision may not be overcome by the auditing process regardless of the costs incurred. No amount of auditing can compensate completely for (1) a system that does not capture the relevant events, (2) uncertainty about the future, nor (3) certain types of deliberate error.

All auditors use sampling procedures and therefore have some level of inherent imprecision. Auditors using statistical sampling procedures can measure the probable degree of such imprecision. (In fact, the imprecision due to sampling error is the only imprecision that can be measured in the sense that measurement is used in this memorandum. Statistical and judgment sampling procedures are fundamentally similar except for the ability to measure imprecision in one case but not the other.)

Consider an auditor who conducts an examination based on an inherent imprecision of 5% of net income (assuming, again, that the FASB decreed this amount to be material) and who locates an outright, easily measurable accounting error affecting income
by 2%. Would such an amount, even though less than 5%, require adjustment because—when added to the possible but unknown error of 5%—the total could be 7%?

It may be tempting simply to tell the auditor to reduce the level of inherent audit imprecision to 3% so the total of potential and known error does not exceed 5%. However, the cost of auditing
can vary significantly, based on relatively small reductions in precision. In fact, sample sizes in auditing vary by the square of the change in precision\(^{(2)}\) as a ratio. Thus a reduction in audit imprecision from 5% to 3% would, in general, require sample sizes nearly three\(^{(3)}\) times as large\(^{(4)}\). Exhibit 1 illustrates the rapidity with which audit sample sizes rise with decreasing levels of audit imprecision. (This figure shows the relationship for a specific, hypothetical account balance being audited. Other facts would result in different sample sizes, but the same shaped curve would result.)

If any FASB quantitative materiality criteria are to govern audit imprecision, therefore, (1) audit costs will be significantly increased, and (2) virtually all known accounting errors will require correction (which would both be impractical results).

Therefore, we recommend that any FASB statement on materiality criteria explicitly state that its guidelines are not intended to govern the level of audit imprecision in reaching materiality judgments with respect to known errors.

**Achievable Levels of Precision**

As indicated above, very tight precision is not generally achieved (or achievable) in the accounting process. It is worth noting that the various sources of imprecision may cumulate to fairly large numbers.

For example, assume the FASB promulgates a materiality standard that permits known errors up to 5% of net income to be considered immaterial and specifically excludes inherent accounting imprecision from this criterion. Then the following results could easily be imagined. The inherent imprecision in the accounting process could easily be such that income could be misstated up to 5%. On top of this, errors located during the audit could aggregate 5% of net income and be considered immaterial. In total, therefore, errors (known and potential) on the ending balance sheet may cause income to be misstated by up to 10%. However, the same conditions could apply at the beginning of the period also, and those errors would also affect the current year's income.

\(^{(2)}\) As long as the sample size is not already close to 100% of the items to be examined \n\n\[
\left(\frac{5\%}{3\%}\right)^2 = 2.78
\n\]

\(^{(3)}\) These figures apply to statistical samples, but the same concepts apply equally to nonstatistical samples.
If all such errors are at the maximum magnitude and affect income in the same direction, therefore, income may be misstated by up to 20%. Many users may not be aware that errors of this magnitude are possible within the present accounting-auditing process. The reader can substitute any other values considered more realistic; the main point is that errors can build up to a large magnitude, despite the apparent confines of any materiality standard.

The above illustration is based on the assumption that the level of inherent accounting or auditing imprecision can be confined to 5% of net income. However, certain industries have very large amounts of assets and liabilities relative to income. These include banks, finance companies, savings and loan associations, insurance companies, and supermarket chains. In these and similar cases, it may be economically impractical to achieve the same levels of precision as in other types of companies. For example, certain of these industries have net incomes approximating 1% of assets. Assuming a 50% marginal tax rate, therefore, assets would have to be stated within .1% for net income to be stated within 5%. Any such level of precision is highly unlikely to be feasible. Therefore, the income error potential in these industries could exceed even the 20% illustrated above.

Also, certain types of industries cannot achieve precise reporting because of inherent levels of uncertainty about the valuation of their assets and liabilities. These include real estate investment trusts and casualty insurance companies. No expenditure for improved accounting and auditing will eliminate the high degree of uncertainty about the future that applies to these industries.

Relative Costs of Improving Precision

When considering the cost-benefit aspect of materiality policymaking, the FASB may wish to recognize that reduction or elimination of the inherent imprecision of the accounting-auditing process would be very expensive, if possible at all. Conversely, the correction of known errors would generally be less expensive.

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(5) Most errors affecting income would have a tax effect because taxes are principally determined on the basis of reported financial income.
Discussant's Response to "Materiality in Auditing (Some of the Issues)"

ROBERT K. ELLIOTT

Donald A. Leslie took as his point of departure for his paper a letter on audit aspects of materiality sent to the Financial Accounting Standards Board (FASB) by a "group of eleven" concerned auditors. As one of that group,¹ I was invited to respond to Leslie's paper on the theory, I suppose, that the participants in this Symposium would be treated to a lively disagreement. Unfortunately (for the participants) I must agree with most of what Leslie says. His paper is a true and fair view of the materiality problems faced by auditors.

Before discussing Leslie's paper, I would like to touch briefly on the concerns that motivated the "group of eleven's" response to the FASB.

We do not have a very precise idea about the decision models of users of financial statements. But it seems reasonable to assume that, regardless of the models they are using, users would benefit from reduction of errors in financial statements. By "errors" I

¹In addition to me, the group included James L. Craig, Jr., Richard W. Cutting, Daniel M. Horowitz, Robert B. Ilderton, LaVern O. Johnson, William R. Kinney, Jr., Herbert B. Klein, James M. Kusko, James K. Loebbecke, and Robert W. Moss.
do not mean errors in generally accepted accounting principles (such as use of cost instead of market for marketable securities) but, rather, erroneous data, given the accounting principles to be used. Such errors arise from, among other things,

- intentional and unintentional errors in the entry or processing of accounting data,
- inherent weaknesses in internal control,
- sampling error, where accounting data are estimated from samples,
- expediencies forced by cost and time considerations, and
- uncertainty about future outcomes.

If the FASB's materiality project is to benefit users, it must result in an overall improvement in financial statement precision and/or more information about the precision actually achieved in financial statements.

It seems reasonable to assume that, within limits, users would be more concerned about the magnitude of errors in financial statements than their source. For example, users would be quite interested to learn that income was overstated by $1,000,000, but would presumably be indifferent as to whether the cause was (1) a difference between inventory at standard and at FIFO, (2) an erroneous, but well-intentioned, estimate of the inventory obsolescence allowance, (3) determination of the inventory quantities by a sample, (4) human error in counting inventory, or (5) shrinkage of inventory since the physical count two months before the balance sheet date. Of course, if the source of the error were a deliberate overstatement by management, users would ordinarily be interested in that fact—but principally because it would reflect on the integrity of management.

The FASB's Discussion Memorandum on materiality centers mainly on the accounting treatment of known errors. Yet there are many other errors in typical financial statements besides those that are known. If the FASB should issue a statement limiting one component of financial statement error (known error) and ignoring other components (including most likely error and possible error), they will have done little for users, who are concerned with aggregate errors regardless of source.

In fact, an FASB statement on known errors could well be misleading to users. Suppose the FASB issued a pronouncement
limiting known errors to 5% of net income. Users could be forgiven for assuming that published income figures were accurate to within ±5%, whereas aggregate error could easily be many times that figure (considering most likely and possible errors, as well as reversal of the income effects of beginning-of-year errors).

Again, assuming the FASB limited known error to 5% of net income, where does that leave the auditor who must design an audit with a certain level of imprecision? How much error can the auditor tolerate—known, most likely, and possible?

The "group of eleven" did not expect the FASB to solve this audit problem, but merely wished to alert the FASB to certain materiality concerns that have been insufficiently discussed and that do affect the achieved precision of financial statements. Also, the "group of eleven" wanted to point out, in a rough way, the costs of possible strategies to improve the precision of financial statements:

- it would be very costly to reduce the errors inherent in the accounting-auditing process, and
- it would be very cheap to correct known errors.

Therefore, the most cost-effective way to improve financial statement precision would be to require correction of all known, nontrivial errors.

Further, the "group of eleven" wished to stress that certain types of enterprise could not hope to meet tight overall precision standards for income. For example,

- certain industries are affected by a higher than average degree of uncertainty about the future, such that precise accounting determinations are impossible. These include casualty insurance companies and real estate investment trusts, among others.
- certain industries have such high assets-to-income ratios (e.g., banks) that a very slight error in assets translates to a very large error in income.

With that background on the "group of eleven's" concerns, I would like to turn to Leslie's paper. His two main concerns are:

- how the auditor plans an audit in consideration of sampling error in audit procedures, known errors, most likely errors, possible errors, beginning-of-year errors, multifacility audits, and a high ratio of assets to income, and
how the auditor selects an opinion in consideration of the audit evidence and all the types of imprecision and uncertainty noted above.

Leslie states, quite correctly, that auditors do not agree on the basic measure of materiality, the treatment of beginning-of-year versus end-of-year errors, treatment of known versus most likely versus possible errors, and aggregate versus piecemeal consideration of errors.

As a result, there are large variations in audit extent, which Leslie illustrates by a not-too-improbable example of a 12.5 to 1 disparity in sample sizes. Further, he correctly points out that there are significant variations in the audit opinions expressed: for example, one auditor will insist on adjustment of the financial statements or qualify the report while another will issue an unqualified opinion without adjustments.

Two of the points Leslie makes in his paper must be questioned. First, he states his belief that the auditor’s measure of materiality should cover the sampling error inherent when the client estimates certain accounting data statistically. The effect of this would be to leave less imprecision to the auditor, who would then be forced to use larger sample sizes. This does not seem fair to the client who measures sampling error (and receives a large audit bill) vis a vis the client who fails to measure the sampling error inherent in its accounting determinations. Further, this would be a disincentive for clients to measure the imprecision of their accounting process. And in any case, the sampling error might be less than the nonsampling error if the client did a 100% census instead of sampling.

The second point to be questioned is the determination of materiality as it affects compliance tests. A basic premise of section 320B of Statement on Auditing Standards No. 1 is that good internal controls lower the probability of a material error in financial statements. However, no one has ever established a rigorous quantitative linkage between system strength and the probability of a material error in financial statements. Therefore, to argue about the extent of compliance testing based on materiality seems premature at best, and probably futile.

There are two auditor materiality concerns not addressed by Leslie that should also be considered. The first has to do with the planning of complex (i.e., multi-office, multi-national or multi-
firm) audit engagements. How, in the planning phase, should materiality be allocated among the various offices and/or firms to achieve a satisfactory overall audit extent? And how should known, most likely, and possible errors be aggregated over the audit network to reach a final opinion, all within tight time schedules, and a heterogeneity of national auditing standards?

The second auditor materiality problem not discussed relates to the materiality of fraudulent errors. The auditor can plan the precision of the audit relative to nonfraudulent errors ("errors") but not fraudulent errors ("irregularities"). The detection probability of irregularities is much less, due to collusion, concealment, and so forth. The question of how irregularities should be factored into audit materiality decisions should be addressed.

On balance, Leslie’s paper is an accurate reflection of the materiality dilemmas faced by auditors—both as to audit extent and opinion formation—and of the nonuniformity of practice. If an auditor is faced with a situation in which known errors are immaterial, but known plus most likely plus possible errors are material, he or she is hard-pressed to qualify the opinion because of knowledge that most other auditors would not do so. The result is high levels of imprecision in financial statements.

Ultimately, there may be sophisticated solutions to the materiality problem, but in the short term, Leslie’s suggested palliative—disclosure of the level of materiality—might serve to alert users to the degree of imprecision, if not actually to reduce it.

If the materiality figure were to be disclosed, there would be difficulties in determining it (i.e., aggregating the various sources) as well as biases in reporting it. The company and the auditor might both wish to inflate the figure so it would cover a wider range of future realizations. Offsetting this bias to some extent would be user pressures and a desire to reduce capital costs (a large imprecision in financial data might well be converted by users into a higher risk factor, such that they would demand a higher return on capital).

Also, companies and auditors might resist disclosure of achieved precision because they are sensitive to decreasing credibility of financial statements and might fear that such disclosure would further erode credibility—especially when the magnitude of achievable precision became known. But we accountants cannot have it both ways: we cannot both claim that we are held to too tight a standard of precision and also refuse to give objective
information on the achievable degree of precision.

Leslie concludes by calling for decisions and research on materiality. First, though, it will be necessary to get practitioners to face up to the problem—which there is little evidence they have done. Most auditors do not understand: (1) The effect of audit sample sizes on achieved precision; (2) The concept or implications of an upper precision limit on error; or (3) The way in which errors combine. I hope that Leslie's paper will do more than just stimulate research on materiality, but will also alert practicing auditors as to the serious materiality problems they face.
Discussant's Response to "Materiality in Auditing (Some of the Issues)"

WILLIAM L. FELIX, JR.

INTRODUCTION

I basically agree with the letter in this paper's appendix. Quantitative standards for materiality as an accounting concept should not be the same as, or include materiality as it relates to, an auditing decision. Nor should materiality standards attempt to compensate for the uncertainty inherent in both accounting estimates and auditing decisions.

The decision theory orientation in Don's paper may be one means of emphasizing a distinction between the accounting concept of materiality (a management perception of the significance of qualitative and quantitative disclosures in the financial statements) and the auditing concept of materiality (an auditor's perception of the quality of management's materiality decisions conditioned in some way by the auditor-uncertainty regarding additional errors or omissions that should have been subjected to materiality decisions). Conceptually, the auditor will be making a large number of interrelated evidence-collection and evaluation decisions based on ex ante beliefs about the distribution of all kinds of errors in the accounting systems and in the financial statements. In this setting, the accounting concept of materiality will be in continual use by the auditor, but only as a part of the decision process.

There would seem to be a role for guidance in materiality
decisions involving known quantities which would be of help to both management and auditors. But, given the current differences in audit strategies in the face of uncertain errors and omissions, such quantitative guidelines are likely to be a hindrance rather than help. Don's suggestion of the disclosure in the opinion of a negotiated materiality number is interesting. In a sense, it represents a partial disclosure of the auditor's loss function for a particular client. I suspect it also represents another risk—given its potential to be used against the auditor where qualitative or very large errors escape detection.

A most troublesome issue in reading Don's paper is that it is confusing. In all fairness, this confusion is due primarily to Don's objective, at least implied, to present a smorgasbord of materiality-related issues. I missed this objective on the first reading of the paper and, knowing what was in its appendix, expected to see a treatise covering what he believed to be the deficiencies of that letter. On this point I expected:

1. the drawing of a clear distinction between materiality as an accounting principle and materiality in an auditing setting. I am not satisfied with the discussion in the letter, Don's definition, or my attempts here; and

2. an explanation of what aspects of materiality in one or both arenas ought to be the subject of standards or guidelines.

Instead, Don's paper seems to focus on the impact of materiality on a number of specific audit decisions and also tosses in additional topics. The paper develops as a compendium of problem areas in which Don suspects that auditors have not been as careful as they should be in considering materiality.

The issues raised by Don are important. However, I perceive the basic issue raised as not being materiality, per se, but being the need for improved communication and discussion among auditors about the details of their decision methods. The benefits of such discussion should be to improve both the actual quality of the profession's decision process (with respect to materiality if you wish) and the appearance of quality to outsiders.

**Comments of a More Detailed Nature**

The discussion of "error classification by degree of certainty" seemed quite cumbersome to me. This reaction is probably due to my perception that for each transaction cycle and financial statement balance, the auditor develops subjective probability distributions on the occurrence and amount of errors. These
distributions rather succinctly disclose the expected value of errors (including both "known" and "most likely" errors) and the likelihood of variation around this expected value (the range of "possible" errors). In addition, there is a strong implication that subjective probability or risks cannot be quantified. This, of course, is not true. The elicitation or assessment of subjective probabilities is not well-developed in accounting, but techniques and concepts, however tenuous, do exist.

I am mystified by the statements that materiality as an accounting standard should apply to "soft" numbers—such as an allowance for uncollectible receivables—and should not apply to estimates of the future. I would argue that materiality is an issue for all estimates, but that standards of materiality are unlikely to work here because of the varying impact of uncertainty. Both management and the auditors are going to develop such estimates. If they differ, the auditor will have to consider both the materiality of the difference and the relative quality of the estimates. There may be no objective basis for comparison.

I can’t accept the statement that, "In the case of hard numbers the auditor’s best estimates coincide with truth and there is no inherent inaccuracy." I am sure that Don believes that measurement error can exist in balances even where no "softness" is introduced by accounting allocations or estimates; so I suspect this illustration must be based on the unstated assumption that the only sources of errors are allocations and "sample bounce." The statement in parenthesis under the "hard numbers" illustration supports this suspicion.

I am convinced that auditors in many non-critical circumstances make decisions based on conventions or "rules of thumb" rather than careful review of the possible errors and their materiality. Viewed in this light, the observation that "... auditors do not consciously consider materiality when deciding on an appropriate extent for compliance testing" may partially describe an acceptable situation. Relying on convention in deciding acceptable precision may mean that within some constraints the auditor believes that acceptable results (in a cost benefit sense) are likely without a detail consideration of materiality. Only when outside of the constraints (for example, internal control weak, high business uncertainty) would this auditor believe that a more detailed analysis is worthwhile. I may be too generous, but both views should be considered in the context of Don’s remarks.

While I tend to be a proponent of probabilities proportional
to size (pps) methods in many circumstances, Don's discussion was not particularly convincing. By the time I reached the conclusion that the importance of value oriented selection had been demonstrated, I found myself disagreeing. Such a demonstration ought to be possible since importance is not nearly as imposing a condition as superiority. But the illustration, which merely shows a difference, will not convince anyone. It seems to me that if audit objectives are purely compliance or internal control reliability oriented, then there is little to recommend pps methods. In fact, they may be detrimental in the sense that they do not lend themselves to estimating population error rates based on the occurrence of the control procedure. On the other hand, pps methods may be very useful if the audit setting is interim transactions tests, oriented toward dual purpose or substantive objectives.

Some additional minor points I would like to make in this area are:

1. Anderson's smoke to fire ratio of 3 to 1 at 80% confidence levels may be just as arbitrary at a different level as 95%, 5% rules, and

2. The statement that "... ABC's system is required to be more effective than XYZ's since its objective is to prevent and/or detect a $100,000 error in a cost of sales population almost twice as large ($25,700,000 vs. $13,200,000)" doesn't make sense. Why does the dollar size of a transaction or balance necessarily affect the reliability of control procedures? Is it possible that, for a given firm, internal control procedures are more reliable for larger transactions or balances?

In the appendix, Don mentions the one difference he has with the letter. Don's difference seems more concerned with the example used in the letter than with the intent. I perceive the intent of this section to be that audit considerations of accounting materiality must respond not only to the need to reduce the error limit (a benefit) but also to the cost of the evidence needed to achieve the precision.

CONCLUSION

In conclusion, I want to say that Don's paper is interesting and diverse. I might add that I strongly support his concluding observation that differing mixes of audit techniques are desirable—implying, of course, that pps samples should not be required for testing the reliability of internal controls.
FIVE
A Behavioral Approach to Auditing Research

MICHAEL GIBBINS

INTRODUCTION AND FRAMEWORK

Auditing is a complex process. It involves individuals, information, systems, organizations, evidence, regulations, computers, history, money, and more. It is based on a simple triad (information preparer, information user, and information auditor), but the relationships and information-flows—within the triad and between its members and the world at large—are both complex and fluid. Each member of the triad is itself usually an aggregation of individuals, organizations, and systems; each aggregation is continuously evolving and its components are often hard to ascertain.

The complexity, the relationships, the fluidity, make the auditing situation an exceptionally rich and challenging one for researchers and, of course, for practitioners. Various characterizations of the auditing situation are possible; the one this paper will assert and explore is a behavioral one. Auditing will be viewed as fundamentally a behavioral process, a process that results because people, trying to use information prepared by other people, need some assurance about the validity of the information they are receiving.

\footnote{I wish to thank Professor R. J. Swieringa of Cornell University for his advice and encouragement and D. R. Carmichael of the American Institute of Certified Public Accountants for his comments on some aspects of this paper.}
This paper presents a review and evaluation of auditing research that can be related to a behavioral view of the auditing process. This view does not preclude other views; as will be seen, taking auditing seriously as a behavioral process offers much potential for expanding the understanding of it that other views may provide. An important part of the auditing research literature is concerned with the behavior of the people involved in the audit situation. Many auditing research studies have used the theories, viewpoints, or methodologies of the social sciences to examine behavioral issues directly; other analytic or conceptual studies have identified phenomena or relationships having significant behavioral implications.

The aim of this paper is to identify what has been learned from behavioral research in auditing, to knit together the various findings, and to suggest where they lead us. Behavioral research in auditing is still in its infancy; there are large gaps in the literature, many questions yet to be addressed and many more to be resolved. Therefore, the paper will also attempt to identify such gaps and suggest bodies of research from other fields that may bear on the study of behavior in the audit situation. Issues of both theoretical and practical interest will be addressed, and the spirit of the paper will be to interpret both "auditing" and "behavioral" fairly broadly and so include research studies\(^2\) rather than exclude them.\(^3\) Auditing will be viewed as an information evaluation and communication process as well as an investigative and assurance process.\(^4\)

The next, and central, part of the paper is Part II, the research review. It is organized into sections, according to a framework to be described, and contains descriptions of research studies, evaluative comments and suggestions for further research. The comments and suggestions are usually aimed at the general subject matter of each section, rather than being critiques of individual research studies.

Part III contains an overall discussion and conclusions about

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\(^2\) Some non-behavioral empirical and conceptual studies are included because they appear to bear on behavioral issues. Such a research method as the "efficient markets" empirical approach, for example, may be quite helpful in studying behavioral questions.

\(^3\) However, in the interests of keeping this paper to a manageable size, the large number of nonempirical articles exhorting practitioners to pay more attention to various behavioral issues (e.g., motivation) has generally not been included in the review.

\(^4\) More explicit descriptions of potential behavioral interpretations of auditing will be presented in the review and evaluation parts of this paper.
behavioral research in auditing, bringing together the evaluations and research ideas that are spread through Part II.

The paper ends with a bibliography of all the research studies reviewed, plus other references. The reviewed studies are so identified and the location of each in Part II is specified.

REVIEW OF RESEARCH

The framework used to organize the review was developed partly with reference to three committee reports of the American Accounting Association: the Committee on Basic Auditing Concepts [1972], the Committee on Auditing Education [1973] and the Committee on Auditing [1974]. The framework will be "fleshed out" progressively; for now, its headings are as follows:

Division A: The External Audit

1. Environment: The external auditor and his role
2. Environment: Characteristics of accounting important to the auditor
3. Environment: Effects on and by the organization being audited
4. Environment: The usefulness of the external audit of financial statements
5. The audit engagement; auditor-client interaction
6. The auditor's report

Division B: The Investigative Process

1. Auditing standards and the accumulation of evidence
2. Evaluation of internal control
3. Specific accounts and/or audit techniques
4. Formation of the auditor's judgment

Division C: Internal and Managerial Auditing

Division D: Extensions to the Audit Function

A. The External Audit

This division’s six sections are concerned with the environment, interpersonal relationships, and output of the external audit.\(^5\)

\(^5\)Some overlaps and arbitrariness of classification are inevitable because many of this paper's topics are highly interrelated. Two examples: the auditor's role and the public's expectations of it will be included in section A(1), on the auditor's role, not in section A(4), on the usefulness of the external audit; preparation of the audit report will be included in section B(4), on the formation of the auditor's judgment, as well as in section A(6), on the auditor's report.
Because it is concerned with the audit and auditor, this division generally will include only those studies of accountants or accounting firms that relate to auditing functions. Not included, therefore, are papers on such topics as opinions about public accounting as a profession (e.g. Vance and Wiseman [1961]), the future of the profession (e.g. Roy and MacNeill [1967]), interpersonal and personality characteristics of public accountants (e.g. DeCoster [1971]), or staff retention and turnover in public accounting firms (e.g. Sorensen, Sorensen, Rhode, and Lawler [1976]).

Division A's sections and the papers and books included in each are:

1. Environment: The external auditor and his role

   (a) The auditor's role and responsibilities

   (b) The auditor's independence

   (c) The auditor's code of ethics
   Papers and books included: Loeb [1971, 1972, 1975].

2. Environment: Characteristics of accounting important to the auditor


3. Environment: Effects on and by the organization being audited

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6Many studies, especially surveys, that deal with such other topics as financial reporting often contain questions or measures that are or could be related to the external auditor and his role. Although their primary topic has led to their being excluded from this review, such studies may well contain useful evidence on auditing matters. The interested reader is referred to the reviews and bibliographies of Epstein [1975] and Dyckman, Gibbins, and Swierenga [1975], which include a large number of such studies.

7This author has not seen the Beck [1972] study, which is unpublished, and so relies on the description of it in Davidson [1975].

4. Environment: The usefulness of the external audit of financial statements

Papers and books included: none.

5. The audit engagement; auditor-client interaction


6. The auditor’s report


1. Environment: The External Auditor and His Role

(a) The Auditor’s Role and Responsibilities. At this writing, a major research effort is under way by the A.I.C.P.A.’s Commission on Auditors’ Responsibilities. The Commission’s April 19, 1976, list of research projects is long; several of the projects, when completed, will be relevant to the topics covered by this review. One such project is Davidson’s [1975] study, which is an exhaustive review of a number of opinion surveys concerning the role and responsibilities of the auditor.

Davidson’s review includes three of the studies in this subsection: Beck [1972], Lee [1970] and Opinion Research Corporation [1974], henceforth ORC, done for Arthur Andersen & Co. The ORC survey included a large and broad sample of American shareowners, executives, analysts, professors, and others, plus a few accountants. The Lee survey, done in the United Kingdom, was similarly broad but included proportionately more accountants (audit firm partners and staff). The Beck survey included only shareowners and accountants.

Lee’s questions were directed primarily at the audit function, but the other two surveys contained over 70 questions, many of them open-ended, about the stock market, financial accounting,
the accounting profession, auditing, and other topics.⁸

As surveys usually do, the three surveys displayed a range of opinions on many questions. For example, non-accountants, especially shareowners, were more likely than accountants were to hold the auditor responsible for the detection of fraud. And accountants and others tended to disagree on what the major problems facing accountants or auditors were. But perhaps more impressive was a high degree of consensus on many of the questions addressing fundamental issues, such as general audit objectives, the accountability of auditors and the need for tightening up of standards and performance. The ORC survey tended to show shareowners’ opinions diverging from the consensus more than other groups’ opinions did, but perhaps that was related to the survey method: shareowners were selected by random sample and interviewed over the telephone for about 10 minutes, while members of other groups were selected in an explicitly non-random way (individuals who were expected to have something to say were contacted) and were interviewed in person for about an hour.⁹

Devine [1966] and Robertson and Smith [1973] provided evidence on role and responsibilities in interesting indirect ways. Devine asked students to respond to two case questions on professional responsibilities by indicating the degree of responsibility the accountant or auditor involved had to various groups. Responses were then analyzed according to the students’ own characteristics, such as their level of accounting study and expected future occupation. Some results were contrary to Devine’s expectation (e.g. more advanced students indicated less overall responsibility), some were not (e.g. students planning to be accountants indicated more overall responsibility than students with other plans). Robertson and Smith set out to obtain practitioners’ views on auditing course content, but their results shed some light on the aspects of practice the practitioners thought important (or that the practitioners thought a university could deal with) and so, indirectly, on the practitioners’ views about their role.¹⁰ The authors devel-

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⁸The financial accounting aspects of the ORC survey were reviewed in Dyckman, Gibbins, and Swieringa [1975].

⁹ Judging from the frequency of their comments as reported in the appendix to the ORC survey, the professors interviewed seem to have been an especially garrulous lot!

¹⁰The notion of relating Robertson’s and Smith’s results to the role of the auditor is this author’s; Robertson and Smith adhered to their objective of studying course content.
oped a ranking scheme to compare the practitioners’ views about various potential course topics, for example. Of the 5 highest-ranked topics, 3 dealt with litigation and liability, one with S.E.C. requirements, while audit procedures topics tended to receive rankings in the middle of the range, and social and behavioral topics were thought to have very little importance.

Three studies, Causey [1973, 1976] and Norgaard [1972] assembled descriptive evidence about the auditor’s role and responsibilities by analyzing legal cases and other authoritative material. These papers are included in this review because such a methodology seems potentially to be of great usefulness in studying behavioral issues free of the obtrusiveness, reactance, and abstraction from reality that tend to characterize surveys and experiments. For example, Causey [1976] examined the degree to which the auditor is responsible for foreseeing the future and, in the process, generated a number of hypotheses about the role of expectations in the auditor’s decision processes and in those of other parties. Causey considered the auditor’s potential loss position (raising some of the same issues as do such analytical studies as Scott, [1973]), the auditor’s ability to foresee, the related setting of the audit fee, conservatism, and other topics with strong behavioral implications. Perhaps if the evidence provided by such studies could be quantified or otherwise systematized, their findings could be used directly to test behavioral hypotheses or, at least, as “validity checks” on more obtrusive behavioral research.

The studies in this subsection display a variety of opinions and other evidence about what the auditor’s role and responsibilities are or should be. To the extent the auditor is aware of, or tries to satisfy, such diverse expectations, he is likely to experience personal conflict. Role conflict has been studied by behavioral researchers for some years, but Schultz [1974] seems to have been the only study of role conflict involving auditors. Schultz sent a questionnaire containing two “conflict” cases and several measures to new managers in two accounting firms and tried to uncover the influences the auditors felt when they made decisions to resolve the conflict. The principal influence Schultz was able to observe was the auditor’s perception of the legitimacy of various choice alternatives: the auditor tended to select the choice deemed more legitimate. This finding has interesting implications to the “credibility” question to be raised later, though the cognitive dissonance literature (for example, Zajonc, [1968]) suggests that the legitimacy measure may be a reflection of the auditor's
rationalizing his choice after making it, rather than of his using the legitimacy judgment as a factor influencing the choice beforehand.

(b) The Auditor's Independence. The independence, objectivity, disinterestedness, of the external auditor has long been considered of fundamental importance. Mautz and Sharaf [1961, p. 204] noted:

The significance of independence in the work of the independent auditor is so well established that little justification is needed to establish this concept as one of the cornerstones in any structure of auditing theory.

The chapter that followed this remark was rich in issues deserving empirical research, such as: the components of independence, interactions among those components and between them and various environmental pressures, maintenance of independence over time, the relationship between the auditor's competence and his independence, independence of individual practitioners versus independence of the profession as a whole, firm growth and the effects of engagement-seeking behavior by auditors, and the effects of professional courtesy, management advisory services, and specialization. Empirical research has managed to ignore most of these issues, but two have received significant attention: the general factors affecting auditor independence and the impact of management advisory services on the auditor's independence.

Papers addressing the general factors of independence are Davidson [1975], Lavin [1976], and Opinion Research Corporation [1974]. The Davidson review and ORC survey approached questions of independence in the same way as they did their other topics. The ORC results for the question, "(Do you agree that) the public accounting firms exercise independent and objective judgment in performing corporate financial audits?" suggest a behavioral hypothesis: that one's perception of the independence of the auditor is directly related to one's "closeness to the action." ORC's results, arranged by this author in accordance with his own biases about who is close to the action, are:

<table>
<thead>
<tr>
<th>Profession</th>
<th>Percent agreeing with the statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountants</td>
<td>100</td>
</tr>
<tr>
<td>Corporate executives</td>
<td>97</td>
</tr>
<tr>
<td>Securities lawyers</td>
<td>92</td>
</tr>
<tr>
<td>Analysts/Brokers</td>
<td>85</td>
</tr>
</tbody>
</table>
Professors (mostly of accounting) 87
Institutional investors 81
Government officials 72
Business press 81
Corporate social activists 37
Individual shareowners 81

Lavin prepared a set of case questions, each describing a circumstance involving an accounting firm (e.g. that it rented its office space from a client) and sent the set to accountants, bankers, and analysts. Each respondent was asked to decide whether the accounting firm in each case was independent or not. Lavin then looked for statistically significant departures from 50% in the proportion of respondents opting for either independence or lack of it, and tried to relate various characteristics of the respondents to their choices. He found a remarkably high degree of consensus about the cases, suggesting that at least people can recognize independence (or its lack) when they see it, and that accountants tend to see such situations in the same way that bankers and analysts do. Lavin also developed an analysis of the extent to which the observed consensus on each case corresponded with Lavin’s interpretation of the A.I.C.P.A. or S.E.C. position on that case, and reported more apparent correspondence with the A.I.C.P.A. than with the S.E.C.

The remaining papers in this subsection were part of a flurry of empirical and other articles on the effects on auditors’ independence of the auditors offering management services. Schulte [1965] led off with a survey of financial executives that indicated the executives thought independence was a good thing and that several of them (33%, or 43% of the 76% who could make up their minds) thought management consulting endangered independence. Schulte was taken to task, especially for using an “emotionally loaded” term like management consulting, by Carey and Doherty [1966] but his findings were supported by a survey conducted by Briloff [1966, 1967]. Briloff included accountants in his survey and found that the accountants were much less concerned about the effects of management services on audit independence than were people from the financial community. Several articles arguing about and trying to define the issues then appeared (e.g. Carmichael and Swierenga [1968]) and the A.I.C.P.A.’s Ad Hoc Committee on Independence [1969] did a non-random and rather defensive interview-based study question-
ing the usefulness of the previous empirical research.

Titard [1971] and Hartley and Ross [1972] were the most recent empirical papers on the management services issue. Both were mail surveys. Titard was largely concerned with whether internal separation by firms of their auditing and management services operations would make a difference (it might) and with what sort of services should be prohibited. Hartley and Ross covered pretty well all the issues that previous researchers had (importance of independence, awareness of the management services matter, specific services that might cause loss of independence, and so on). The two papers basically supported the earlier surveys: somewhat less than 50% of respondents seemed to think it was a serious problem, and Hartley and Ross found accountants to be less concerned about it than were analysts and financial executives.

Perhaps surveys have contributed about all they can to the management services-independence question. At any rate, neither ORC [1974] nor Lavin [1976] dealt with it (except in slight tangential ways) in their surveys. Practicing accountants are certainly aware of the potential problem now, as are the drafters of codes of ethics. Empirical research has, in raising the problem forcefully, contributed to the process of solving it.

(c) The Auditor's Code of Ethics. One of the profession's responses to the sort of role and independence difficulties noted in the previous two subsections has been to attempt to better codify rules about (un)acceptable behavior and to step up related enforcement. For example, after years of debate, the Canadian provincial institutes of chartered accountants, which constitutionally hold regulatory power over Canadian C.A.s, have developed largely uniform codes of ethics. The A.I.C.P.A.'s Ethics Division has also been very active.

Loeb's 1971 study was an extensive interview-based examination of the dynamics of ethical and unethical behavior. Loeb used cases having ethical conflicts and studied the behavior of both ethical and unethical CPAs. The study is an outstanding example of the combination of obtrusive and unobtrusive research, of careful questionnaire construction and of systematic analysis of interview data.

Leob's 1972 study was a similarly careful examination of the disciplinary files of a state society of CPAs. Analyses of punishment
severity, characteristics of CPAs disciplined, etc., were done. His 1975 article is a review of his own prior research and two studies of lawyers, focusing on professions' rules against sharing of fees with non-members of the profession.

Loeb's work provides a solid start on the behavioral investigation of ethics and ethical behavior. But his is the only work in the area.

Interestingly, no research whatever seems to have been done on the fundamental matters of whether such codification and enforcement procedures improve practitioners' ethics in any operational way, whether ethical decisions are handled any more effectively by individuals, whether ethical matters receive greater weight in general decisions made by practitioners, whether other methods than codification would be more efficient.\footnote{The recent court arguments between Arthur Andersen & Co. and other public accounting firms on the issue of the S.E.C.'s specification of accounting policies suggest that codification is not seen by everyone as a reasonable solution to the profession's difficulties.} The profession's response to recent attacks on its ethics might make an interesting behavioral study in itself.

\subsection*{(2) Environment: Characteristics of Accounting Important to the Auditor}

In 1972, the AAA's Committee on Basic Auditing Concepts [1972, p. 23] made the following comment on the relationship between accounting and auditing:

A close relationship obviously exists between accounting and auditing as these terms have been defined. Auditing is generally concerned with the accounting process and the systems that facilitate that process as well as the information they generate. In general terms, accounting (the system, the process, and the information generated and communicated) contains the subject matter of an audit. Much of the evidence gathered in the conduct of an audit will be drawn from the accounting system. Quite often auditing or certain audit techniques will form an integral part of the accounting system. Thus, in many respects, auditing and accounting are inseparable. An auditor must have expertise in accounting.

Accounting is a particular kind of information or communication system. It systematizes and filters data about the world, accepting some data and not others, organizing what it accepts in certain ways and performing various transformations and validity checks [Crandall, 1969]. If auditing is as closely tied to accounting as the above quotation indicates, then auditing itself is both defined and constrained by the nature of accounting.
The Will [1976] paper is the only one to have examined the behavioral implications of the auditing-accounting connection. Using ideas from cybernetics concerning the “variety” (roughly, unknowingness or equivocality—e.g., Weick, [1969]) that an information system contains and the matching degree of variety that must be applied to the information to remove the variety, i.e., to specify what the information means, Will argued that the audit’s own variety or flexibility should match that of the accounting system to which it is applied. According to the cybernetics argument, for example, an auditor facing a highly diverse or chaotic accounting system must respond with equivalent diversity in his techniques if he wishes to produce financial statements whose meaning is fairly stable. If the auditor responds with standardized techniques or falls back on official rules, he will simply not perform the function he is supposed to be performing; he will not reduce the equivocality of the financial statements.\textsuperscript{12} Will’s paper was not empirical but raised a number of empirical issues concerning accounting and auditing research.

The Willingham and Malcom [1970] paper reported an empirical (interview-based) investigation, though its focus was primarily on accounting. The paper inquired into what sort of phenomena are allowed into accounting systems, and was based partly on interviews.

All this may sound rather arcane. Still, the fact that the auditor is dealing with the output of an accounting system, rather than with the many other kinds of information that exist, deserves some research attention.\textsuperscript{13} For example, if “true” accounting income is essentially unobservable because of the great variety of accounting methods that are possible, does the auditor’s choice about what method(s) to accept, define, rather than follow from, the reality that users of the financial statements experience? Ijiri [1975] has proposed a specifically behavioral overlay on the accounting measurement process; he would calculate a measure’s “hardness” by examining the extent to which different measurers agree on what the measured quantity is, or can be defined to be. Psychometricians, trying to measure “intelligence,” solve some

\textsuperscript{12}This notion has interesting implications for the “codification” matter discussed above under Ethics.

\textsuperscript{13}More research than the two papers listed in this section has been done. Much of the research to be discussed in Division B, on the investigative process, has been explicitly or implicitly related to the characteristics of accounting.
problems by definition—for example, it may be agreed that
“intelligence” will have a zero correlation with people’s sex and
then “intelligence tests” are constructed that will produce a measure
with the desired zero correlation. Do similar processes operate
in the auditing situation and, if so, how? What are the roles of
consensus and of definition (e.g. of accounting’s nature) in the
auditing process? What conceptions of accounting underly auditors’
approaches to their task? What relationships between accounting
numbers and other measures or phenomena do auditors expect
to exist, and how do such expectations shape their audit programs?
Gibbins [1976] found students’ perceptions of the reliability of
accounting numbers to be highly related to perceived expertise
of the accountant who prepared the statements, and their percep-
tions of the numbers’ objectivity to be highly related to the
accountant’s degree of self-interest in the situation. What percep-
tions do auditors have of the accountants and accounting numbers
they work with, and how do such perceptions translate into auditing
judgments?

(3) Environment: Effects on and by the Organization Being Audited

The Churchill [1962] study (parts of which were reported also
in the Churchill and Cooper [1964] and Churchill, Cooper, and
Sainsbury [1964] papers) was a landmark, in several ways. It
was the first experimental study of an auditing topic; it contained
a careful model of the auditing process that emphasized the general
behavioral mechanisms that would exist in any such monitoring
process; it used an experimental task that attempted to reproduce
only the essential characteristics of the auditing process so that
effects could be revealed as clearly and unambiguously as possible;
and research interest focused on the effects on task performance
of keeping records that were subject to audit as well as on the
adequacy of the records kept themselves. The behavioral effects
of the very existence of an audit, even if not directly connected
to the problem-solver’s rewards, were examined.

Churchill’s task was a highly specific one (solving problems on
a wired board representing a water supply system), the records
were not accounting records, and the experimental context was
artificial and obtrusive. The experiment found some interesting
effects of the subjects’ anticipating being audited and a number
of related situational and organizational sensitivities, but Churchill
and his colleagues noted that field testing of the results was
necessary. Some subsequent research was done in the field; because an internal audit setting was used, this research will be reviewed under Division C below.

Barefield's [1975] study was very similar to Churchill's. It also employed a "minimal task" (puzzles, in this case) and attempted to expose specific mechanisms. Barefield's focus was on the impact of the frequency of being audited on a problem-solver's degree of compliance (or noncompliance) with internal control procedures. His study included a complex Markov-process model of the effects of audit frequency on the "auditee's" behavior and a set of hypotheses derived from that model. However, the empirical part of the study, the experiment, had only 9 subjects, so Barefield had some difficulty in establishing statistical significance in his results.

The Carpenter and Strawser [1971] study was entirely different in subject matter and method. It was concerned with an effect of the "auditee" on the auditor, whereas Churchill and Barefield studied the reverse effect, and it was a mail survey, not an experiment. Carpenter and Strawser started with an earlier survey of CPAs apparently done by the A.I.C.P.A., that had indicated concern with "auditor displacement": companies' changing from "local" to "national" auditing firms just before "going public." They surveyed companies that had recently gone public and found some evidence that such a local to national displacement was indeed happening; responding companies often indicated such a change had come at the suggestion of the underwriters of the first public issue.14

(4) Environment: The Usefulness of the External Audit of Financial Statements

Authoritative definitions of accounting (especially financial accounting) and the auditor's duties and responsibilities abound. A large amount of research on the role of the auditor has already been reviewed in this paper.

But what difference does having an external auditor really make? How does the existence, or character, of an audit impact upon users' decisions, how does information about the audit or auditor fit into users' decision rules? What are the economic and/or social costs and benefits of the external audit? Whom does it benefit, whom does it cost?

14See comments on the Carpenter and Strawser study in Coffman [1974].
These questions may sound academic (in the pejorative sense of the word!), but they aim at the heart of what research in auditing, whether behavioral or otherwise, must sooner or later deal with: the fundamental purpose of the external audit, the reason(s) society permits, even encourages, auditors to ply their trade. It is argued in several places in this paper that we do not have adequate descriptive knowledge (at least organized systematically as research findings subject to hard-nosed examination) of a large part of what the auditor actually does; but also we do not know, fundamentally, why he does it and why people pay him to do it.

Following are some examples of the sort of study of fundamentals that is needed in this area.

In their review of research on alternative accounting techniques as information in a capital markets framework (which review included some behavioral studies), Gonedes and Dopuch [1974] examined at length such concepts as the market for information, the effects of “free riders” (users of information who do not have to pay for the information’s production), and limitations in research conclusions that are imposed by the nature of the information and equity markets. Their analysis can be related directly to the “usefulness of auditing” question because audited information can be conceived of as one kind of information in the market for information. Behavioral as well as analytic or economic questions about auditing’s role in this market could be framed.

One alternative to audited information is of course unaudited information. Winters [1975] and Guy and Winters [1972] sent questionnaires to bankers and CPAs asking about the effects of CPA firms' involvement with unaudited financial statements. Though the two surveys did not address the “usefulness” issue directly, they serve as a reminder that the gradations of information are many and that, when cost is considered, audited information will not necessarily be the most preferred.

Some of the questions Winters asked were about the credibility of unaudited statements. Credibility has been studied for many years in various behavioral disciplines and recently has been brought into the accounting area (e.g. McCabe [1973]—a survey of financial analysts; Taylor [1975]—an experiment based on a psychological theory, structural balance theory; and Gibbins [1976]—an experiment based on persuasive communication theories). Credibility is considered by many (e.g. McGuire [1973]) to have such components as expertise and trustworthiness of the
source of the information and so can be related to the literature on accounting measurement (e.g., Ijiri [1975]) and its examination of reliability, objectivity, and so on. When the auditor reports that, in his opinion, the financial information is fair, he is essentially claiming that the information has a (high) degree of credibility, believability, and is buttressing that claim with his own professional reputation. “The addition of credibility to financial information” would seem to be a good candidate for a major component of the audit’s usefulness, but behavioral research has shown that credibility-related factors often do not work in simple or intuitive ways. One theory (see Gibbins [1976]) would suggest that increasing the credibility of information may decrease the extent to which recipients of the information actually use it in their decisions, because the recipients may rely on the credibility rather than on the information itself.

(5) The Audit Engagement; Auditor-Client Interaction
Perhaps the most striking aspect of this section is the lack of attention given to it by researchers. Although such matters as interpersonal negotiation, coalition formation, power relationships, and group dynamics generally, have been extensively studied by social scientists for many years, no empirical research into the dynamics of the audit engagement seems to have been done except for the Bedingfield [1974] study.

Bedingfield mailed questionnaires to CPAs asking if they had changed their auditing procedures as a result of recent litigation. Not many of the respondents (32%) said they had changed (increased the scope of) their procedures—the rest indicated they had made no change. But the validity of Bedingfield’s results suffers not only from the usual problems of mail questionnaires, but from his rather low response rate (also 32%) and the apparent lack of controls for the effects of changes in authoritative pronouncements, training of audit staffs, etc. In a sense, the occurrence of litigation could be considered an “intervention” by society in the conduct of an audit; in order to sort out which is affecting what, great care must be taken to account for various possible influences (see for example, Campbell’s [1969] article on “Reforms as Experiments”).

The other three papers deal analytically with the auditor-client relationship. Goldman and Barley [1974], and Nichols and Price [1976], assume that relationship is fundamentally one of antago-
nism and conflict. Interpersonal power is the main focus of both papers: Goldman and Barlev apply a sociological, structural analysis while Nichols and Price base their study on “exchange theory” (e.g. Thibaut and Kelley [1959]), which is a social psychological theory with strong economic overtones. Both papers develop primarily descriptive characterizations of the audit context. Demski and Swieringa [1974], on the other hand, start with a specific characterization that allows them to develop a more normative model that emphasizes mechanisms for auditor-client cooperation.  

Empirical investigation of the operation of an audit engagement is sorely needed; without it, the papers noted in this section mostly provide interesting speculation, the usefulness of which depends on the reader’s own world view. Interesting empirical questions abound. If audit procedures have become more extensive in recent years, is that because auditors, defensively, are more afraid of being sued? Or because they, professionally, are getting better at their job? Or because they, interpersonally, are becoming cynical and less trusting of their clients? Or because they, technically, face a more complex task? Or because, functionally, their role is changing? Since all these influences probably have some effect, what are the circumstances in which one of them would tend to dominate, and what would be the predictive and/or policy implications of such dominance? Is a cooperation vs. conflict continuum useful for describing different auditing situations? What are the forces that would drive a given audit engagement in one direction or the other? To what extent do auditors and managers perceive that they share risks?  

What effects do such perceptions have on the behavior of the parties in the audit? How do, or could, auditors recognize the impacts on their position and procedures of various interpersonal forces and perceptions?

Similar questions could be addressed to the creation of the audit engagement, the process leading to the appointment of the auditor. The appointment process has received no direct research attention, though of course it is an important facet of the research on auditor independence discussed earlier.

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15 This approach to studying the auditor-client relationship has raised some hackles: Carmichael [1976a], for example, managed to complain that the Demski-Swieringa paper was full of both “commonplace notions . . . (and) ponderous platitudes” and “assumptions . . . (of) questionable validity.”

16 In this connection, see Carmichael [1976], re “business” risk vs. “information” risk.
(6) The Auditor's Report

The eleven studies in this section may be grouped into three general topic areas: compliance of audit reports with authoritative requirements, communication impact of the audit report and preparation of the report.

The two "compliance" studies, Cerf [1968] and Daily and Strawser [1974], were reviews of banks' reports only. Cerf studied the auditors' reports of a large number of California banks to ascertain whether auditors had complied with authoritative bodies' rules and then focused on the cases of apparent noncompliance. He also examined the reasons for qualifications and disclaimers encountered. Daily and Strawser studied banks' annual reports to determine their degree of compliance with the A.I.C.P.A.'s bank audit guide. More general information of this sort is of course available from the A.I.C.P.A.'s Accounting Trends and Techniques series, the C.I.C.A.'s Financial Reporting in Canada series and such other sources as the Disclosure Journal.

The seven "communication" studies provide an interesting range of research methods. Neumann's [1968, 1969] studies were oriented to consistency exceptions and the apparent materiality of the items to which auditors took exception. The studies were primarily descriptive in nature and tried to relate consistency exceptions to companies' industries, different C.P.A. firms, etc. as well as to materiality of effect on net income. Neumann concluded that auditors seemed to take exception to many items that were immaterial and he raised several questions of a behavioral sort about this apparently odd finding. Frishkoff [1970] compiled a sample of annual reports that contained accounting changes and divided them into two groups: those for which the auditors' opinion was qualified and those for which it was not. He used multiple discriminant analysis with a number of variables in an attempt to discover which variable(s) could be used to predict whether a company with an accounting change would have a qualified opinion or not. Only a relative income measure was significantly useful in predicting the classification when all variables were considered, and even that measure had "little or no predictive value" when considered by itself.

In a similar approach, Baskin [1972] used an "efficient capital

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17 Cerf indicated that the A.I.C.P.A. did a similar national study in 1954, but its results have apparently not been published.
markets” empirical examination of stock prices to investigate the “communicative effectiveness of consistency exceptions.” The study considered the timing of any exception announcement and included control group firms having no consistency exceptions. Baskin concluded:

... the consistency exception opinion does not appear to have information content for most investors. Investors either do not or are unable to deal with the subtle differences in the quality of the accounting data tested in this research.

From the point of view of research on the auditor’s report itself, the Baskin study has a fundamental weakness: its design cannot distinguish between the impact of the accounting change and that of the auditor’s exception concerning it.\textsuperscript{18} The study’s failure to observe inconsistency effects of course suggests that neither impact is important; however, since Baskin could not control for the possibility that information concerning accounting inconsistencies reached the market in other ways or was impounded in other effects, the null finding does not necessarily rule out either impact.

The Purdy, Smith, and Gray [1969] research was a laboratory simulation experiment. Therefore, though the situation was not “real,” as Baskin’s was, the flow of information through channels other than the financial reports could be prevented and the impact of the accounting change vs. the auditor’s exception could be differentiated. The findings were opposite Baskin’s: the change, if known to the subject, had an effect on his decisions. But it did not seem to matter whether the inconsistency was noted (with approval) in the auditor’s report or in a footnote to the financial statements.

The Opinion Research Corporation [1974] survey touched on this area also. One of its questions (pp. 35–36, 38) asked shareowners how often they read the auditor’s report: 49% said they read it only sometimes—or never! Since one might expect the “demand characteristics” of such a survey to prompt people to claim they read it when they did not, rather than the other way around, perhaps the 49% is a conservative estimate.

Epstein’s [1975] study includes a review of research on the communication effectiveness of annual reports and comes to

\textsuperscript{18} This remark is not intended as a criticism of Baskin’s study since Baskin was not concerned with making such an auditor vs. accounting distinction.
gloomy conclusions.¹⁹ For example, quoting Brenner [1969, 1971], Epstein reports the following percentages of respondents to a mail survey who said they read the auditor’s opinion very carefully: analysts, 32%; bankers, 43%, stockholders, 14%. Epstein’s study, also a mail questionnaire (concerned with the whole annual report, not just the auditor’s report) found that 25% of the respondents said they read the auditor’s report “somewhat thoroughly” and only 13% said the auditor’s report was even “somewhat useful”!

Ijiri [1975] argued that the recipient of accounting information has to know, or judge, the information’s reliability, bias and related characteristics. Earlier in this paper, the subject of credibility was raised. In such a light, the contribution of the auditor’s report to the overall measurement/communication package represented by the annual report deserves study. Such study would have important implications both for those seeking to understand the communication role of the auditor and for those making policy decisions. Some questions that could be addressed: What are the communication effects of standard-wording reports vs. other forms of reports (e.g., reports explicit as to the procedures followed in auditing the particular organization being reported on)? What is the interplay, if any, between the credibility of the audit report and that of the financial statements? (For example, it is possible that the very existence of an audit report has more communication impact for most users of the accounting information than has the content of the report, whether or not qualified.) Do recipients of accounting information know, or care, what all the “except for” and “subject to” and other wording variations are meant by the auditor to communicate?²⁰ Do recipients evaluate the credibility of the audit report (and of the accompanying statements) by evaluating the credibility of the auditor? (Such a possibility seems reasonable—but it implies that what the auditor says is less important than who says it. If the recipient relies on the auditor as an expert, then explanations of what the auditor’s procedures were and precisely what his opinion is may serve no useful function.)

Given today’s very detailed financial statements and notes, exceptions and problems are explained anyway, so the audit report

¹⁹Epstein came to similar gloomy conclusions from his research. His study is titled “The Usefulness of Annual Reports to Corporate Shareholders” and its cover features a waste basket full of annual reports.

²⁰Numerous potential research topics in this area can be found in such nonempirical papers as Carmichael [1974b] and Rosenfield and Lorensen [1973].
perhaps could consist simply of one word like “passed” and the auditor’s name!)

The two “preparation” studies, Carmichael [1972] and Loeb and Bedingfield [1974] focused on the audit report from the auditor’s side. Carmichael’s study, the A.I.C.P.A.’s first Auditing Research Monograph, was an extensive examination of the development and application of reporting criteria surrounding the actual expression of the auditor’s opinion, the auditor’s statement of the degree of responsibility he is taking for the financial statements. Carmichael attempted to construct a foundation of descriptive information about the writing of the auditor’s opinion and so made extensive use of issued audit reports, audit firms’ files, legal criteria and interviews with auditors. Loeb and Bedingfield followed from this. Using a set of five “cases” developed from auditing firms’ files, they wrote to CPAs, asking them to indicate what their opinion would be, and why. The cases were designed to represent various situations of conflict, though it was not ascertained whether the respondents saw the conflicts in the same light as did the researchers. A low response rate was obtained (37%) and the principal finding was that respondents tended to agree in their choice of the appropriate type of opinion for each case.

B. The Investigative Process

Division B’s sections and the papers and books included in each are:

1. Auditing standards and the accumulation of evidence
   Papers and books included: Hubbard and Strawser [1972], Joyce [1976], Ward [1976].

2. Evaluation of internal control

3. Specific accounts and/or audit techniques

4. Formation of the auditor’s judgment

21 Barefield [1975], discussed in Section A(8), also was oriented to internal control.

1. Auditing Standards and the Accumulation of Evidence

The auditor’s report is a product of the investigative process he has directed. Auditing standards and evidence have been the subjects of a large volume of analytical and authoritative writing. Such papers as Ijiri and Kaplan [1971] re sampling objectives, Toba [1975] re a general theory of evidence in auditing, and Robertson and Clarke [1971] re verification of management representations, raise many points about the ways auditors do or should compile the evidence on which their reports are based. The A.I.C.P.A. has issued a series of “Statements on Auditing Standards” and the C.I.C.A. now makes auditing standards a part of its members’ handbook and therefore of its official pronouncements.

Such writings express views and present analyses about how the audit should be planned, organized and conducted and how the various parts of the investigative process should be pulled together into the whole that the auditor’s report represents. Though there has been a sizeable amount of behavioral research in the specific areas to be discussed in the next three sections, there has been little done on the more general, more integrative level of this section. For example, Toba discusses the role of heuristic reasoning and the diminishing marginal importance of additional evidence. Behavioral and other researchers have studied the accumulation and combination of evidence in considerable depth but their findings have not been empirically transferred to the auditing situation to provide a descriptive foundation for articles such as Toba’s.

We do not know, for example, how auditors apply auditing standards to real, specific auditing problems, how authoritative pronouncements are interpreted on the job. Though there are many audit programs that could be studied, and numerous texts, no research has been published on how the auditor knows when he has enough evidence, how he combines conflicting evidence, whether evidence from correlated sources is properly discounted or how imperfect evidence is weighed. ²²

²²Mautz [1975] suggested a long list of descriptive questions about audit planning, audit programs, standards, evidence and other parts of the audit operation in which he thought researchers would be interested.
The first paper in this section, Hubbard and Strawser [1972] was concerned not with such descriptive questions, but rather with a specific part of Ijiri and Kaplan's [1971] paper on sampling objectives. They surveyed some C.P.A.s to determine whether the C.P.A.s agreed with three sampling objectives suggested by Ijiri and Kaplan, paraphrased and taken out of context. The results were inconclusive.

Joyce [1976] focused on audit planning (using the audit of accounts receivable as the research situation). He systematically varied information about receivables to produce a set of mini-cases that constituted an experimental manipulation of the group of information items, and had auditors make some time-related audit planning judgments. The judgments were then analyzed to produce statistical descriptions of the weights and interactions of the information items in forming the auditor's judgments. Joyce's results were clouded by many subjects' apparent use of simplified decision rules (producing decisions not sufficiently different from one another to create data with the properties Joyce's sophisticated analyses required), as well as by the possibly weak connection between his time allocation measures and the dynamics of auditors' planning activities.23

Ward [1976] conducted interviews with auditors that included systematic measures of the auditors' perceptions of factors important in judging errors' materiality and of their expectations of negative consequences to themselves in case an overstatement of income occurred because of an error (in receivables). Interestingly enough, the auditors ranked "degree to which audit complied with professional standards" as the most important factor in judging error materiality and "effect of the error on stated income figure" as second most important. Were those auditors more concerned with "protecting their backsides" than with providing information to the recipients of the financial statements?23

2. Evaluation of Internal Control

In order to evaluate the client organization's internal control, the auditor must determine how the system operates, what the flows of documents and the attendant behaviors are, as well as judging the adequacy of control both from his own and the client's perspective. Even though many of the procedures may be mechanized or computerized, the evaluation process is fundamentally a

23. The sort of statistical model-building Joyce did will be discussed further in Section B(4), on the formation of the auditor's judgment.
behavioral one, in which the auditor must decide how much he can rely on the organization itself to produce valid accounting measures and protect its various assets.

One would expect, therefore, that internal control evaluation would be a "natural" area of interest for behavioral researchers. Not only are there large bodies of research in various decision theory, economic, organizational behavior, sociological and psychological disciplines that could be applied to the study of the subject, but also the experiences of and data collected by auditors are likely to be of considerable interest to researchers in fields other than accounting and auditing, per se. Three of the papers in this section, Carmichael [1970], Konrath [1971] and Willingham [1966] were non-empirical characterizations of internal control as a behavioral process and exhortations to researchers (and auditors) to take advantage of the techniques and conceptual richness that behavioral sciences offered. Willingham suggested the viewpoint of organizational behavior and the technique of sociometric analysis; Carmichael set out a thoughtful and extensive set of hypotheses that a behavioral characterization of internal control suggested; and Konrath argued that the auditor needed a better understanding of just how a behavioral system operates and how tenuous any sub-system's boundaries are likely to be.

The Swieringa [1969, 1972] and Swieringa and Carmichael [1971] studies reported results of applying behavioral (sociometric) analyses to the description of internal control. For example, by focusing on the organizational positions involved in a process of interest, the auditor could use sociometric analysis of interpersonal relationships (formal and informal) to discover and test how the organization actually operates. Such a control objective as segregation of duties could then be rigorously (and, if desired, quantitatively) evaluated. The studies (based on research in Swieringa [1969]) showed how such an analysis worked and illustrated its benefits.

Unfortunately, no further empirical work has been done on behavioral analyses and/or evaluation of internal control. The lack of such work is puzzling; perhaps auditors and systems-oriented researchers have had their hands full coping with the enormous impact of computer systems on internal control evaluation and have simply not felt that the behavioral analyses offered sufficient marginal benefit to be given much priority. Process-oriented techniques such as those proposed by Skinner and Anderson in
Analytical Auditing [1966] and computer-related ones such as in the C.I.C.A.'s Computer Control Guidelines [1970] and Computer Audit Guidelines [1975] books have been very popular, as have been statistical sampling techniques. Though behavioral approaches are compatible with, and in this author’s view would greatly strengthen, such techniques, perhaps their time has not yet come. These reasons do not sound persuasive when applied to researchers’ apparent lack of interest in the matter; an opportunity for significant increases in our knowledge of organizational behavior and for significant help to harrassed practitioners seems to be being missed.

The Ashton [1974a, 1974b] study had different objectives. Rather than study internal control as an organizational process, Ashton attempted to determine how auditors made internal control judgments. By systematically varying “information cues” about internal control in a payroll system, Ashton was able to develop a statistical description of which cues the sample of auditors used and how, if at all, the cues seemed to interact in forming the auditor’s judgments. The results consisted primarily of the statistical descriptions and analyses of individual auditors’ stability of judgments and of consensus among auditors.

3. Specific Accounts and/or Audit Techniques


Davis, Neter, and Palmer [1967] altered code numbers on customers’ demand deposit confirmations (which drew attention to the code numbers) but did not alter the account balances. They observed a better error detection rate for positive than negative confirmations (perhaps because second requests were used in the former case), but noted that the error detection rate was still not good (59%) even for the positives. They surveyed non-respon-

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24 Ashton’s statistical model-building approach was very similar to that of Joyce [1976], mentioned earlier. See further discussion in Section B(4) on formation of the auditor’s judgment.
ments; most said they hadn’t replied because they hadn’t noticed
the error in the code. Sauls [1970] used positive confirmations,
with some deposit accounts correct, some with balance over-/or
under-stated by 10%, and some with no balance given. His analyses
showed few differences among the various categories as to re-
sponses. Warren [1974] used positive and negative confirmations
and two levels of error (5% over or under and 10% over or
under). His analysis was done in terms of conditional probabilities:
both in the case where the balance is correct and when it is not,
about the only significant effect observed was that a response
from the customer is more likely for a positive than a negative
confirmation.

Hubbard and Bullington [1972] used the same sort of approach
as the three deposit account studies, though the errors in account
receivable balances they introduced were somewhat smaller as a
percentage of the balances. Though respondents’ error detection
rates were better for positive than negative confirmations, the
differences were not statistically strong, and of course the positive
confirmations included second requests, whereas the negatives did
not. Sauls [1972] focused on improper responses and non-re-
sponses to receivables confirmations and included blank confirma-
tion forms, i.e. forms, with no balance given, asking the customer
to report what he or she thinks the balance is. Because of “adverse
customer response” to the manipulation of account balances done
for part of the sample, Sauls sent second requests only to the
“correct balance” and “blank” groups, damaging the comparability
of his results. No improper responses were received, and in the
end the main finding was that fewer responses were received
to the blank than to the correct balance requests.

Practitioners may be comforted to know that positive requests
are probably better for detecting errors than negative requests
are, and that customers are more likely to answer positives than
negatives, and positives with a balance than blank positives. In
this case, research seems to have supported what has been assumed
all along in practice. Of course, research does not have to disconfirm
conventional wisdom to be useful!

The other three papers in this section dealt with other audit
techniques. Aly and Duboff [1971] used a mail questionnaire
to compile data on how auditors chose “judgmental” samples of
accounts receivable and compared the judgmental consensus to
results using statistical sampling techniques. They concluded that
the statistical sample was smaller and better stratified than the
judgmental consensus, though the range of judgmental samples
was great. Interpretation of their results was somewhat hampered
by their 24% usable response rate and their design, which required
the deletion from the results of any respondents who said they
would use statistical sampling; these two factors together may cause
one to wonder if there was a bias against sophistication in their
responses, which of course might help to produce an apparent
superiority of the statistical sampling method.

Bedingfield [1975] surveyed national firms' and non-national
firms' partners about the use of statistical sampling in auditing,
asking whether such sampling was used, where it was used, and
the reasons for its use or nonuse. Of the national firm partners
who responded, 89% said they used statistical sampling; of the
non-national firm partners, only 36%. Bedingfield's various ques-
tions enabled him to compile fairly extensive comparisons of users
and nonusers.

The last paper, Harmeyer and Wood [1975] was not an empirical
study. It was a behaviorally-oriented examination of the problem
of interviewing client personnel during an audit.

4. Formation of the Auditor's Judgment

This section includes primarily descriptive research on how
auditors make the decisions that face them, how their professional
judgments form. As such, this section overlaps with several others,
since the auditor's judgment is a crucial factor in many areas
of auditing research. The papers in this section relate to four
main topics: modeling the auditor's judgmental processes, the
impact of uncertainty on judgments, heuristics and decision rules,
and group decision-making.

Papers modeling auditors' judgmental processes were Ashton's
two [1974a, 1974b] and Joyce's [1976]. All were discussed in
erlier sections; they are included here also because they are
examples of a research technique (often referred to as "cue
utilization" or "analysis of variance" research) that is growing in
popularity and may have great promise for auditing research.
By systematically varying a predetermined set of information cues
over a sequence of decisions or judgments made by an auditor
or other subject, the researcher can produce a quasi-experimental
manipulation of the information cues within each subject's set of
decision situations. The results for each subject can then be analyzed
using a number of powerful statistical techniques that provide
descriptions of which cues were important to the subject's decisions, 
how cues interacted, how consistent (or stable) a decision-maker 
the subject was, and so on. Because all this can be done for each 
subject, the technique is an efficient user of such a scarce resource 
as the time expert auditors have available for participation in 
research experiments. The researcher can learn a lot from a sample 
of one, whereas for survey research, sample sizes well up in the 
hundreds are usually necessary. The method has some severe 
limitations (which can be overcome only as more research is done 
and more is learned about both the method and auditors): in 
order to systematically vary the cues, the researcher usually has 
to construct a series of obviously artificial situations; the results 
are only as good as the cues used, so the researcher needs to 
know as much as possible about the real decision-making situation(s) 
faced by the auditor who is to be his subject; the results are 
limited by the nature of the statistical techniques available for 
the analysis; and the method has so far been better at displaying 
the fact that people differ in their usage of cues than at explaining 
why they differ.

The "uncertainty" group consists of the Chesley [1975], Corless 
[1972], and Felix [1974] papers, of which only the Corless paper 
was empirical. Much of the research into human decision-making 
has long been concerned with how people assess the various 
uncertainties that affect their decisions and how such assessments 
impact on the decisions. Corless applied this approach to the 
auditing situation by raising the question of how auditors combine 
the results of a statistical sample with other beliefs (subjective 
probabilities) about the audit situation. To study such combining, 
the other beliefs must be assessed. Such an assessment was Corless' 
aim: based on two audit case descriptions, he asked C.P.A.s to 
specify various subjective probabilities and then investigated the 
implies probability distributions for consistency, effects of the 
auditor's background, effects of differences in strength of internal 
control, and so on. Chesley's paper was a review of the general 
literature on elicitation of subjective probabilities and contained 
a number of variables and effects of potential interest to auditing 
researchers. Felix's paper related decision theory to auditing and 
in the process also proposed a number of potential research issues, 
not the least being a suggested sequential model of the auditor's 
judgment process.
The Swieringa, Gibbins, Larsson, and Lawson [1976] paper's topic was heuristics and decision rules in people's judgmental processes: the representations, approximations and shortcuts that people do (or may) use to help them deal with complex or, on the other hand, routine, decisions. Because decision-making heuristics may be used by auditors, the paper included some auditing scenarios; however, the empirical results were based on experiments involving student subjects. People's heuristics may be both idiosyncratic and situationally specific, so considerable research will be needed to uncover how auditors may use and determine which general findings may apply to the audit situation.

The last paper, Barrett and O'Malley [1976], introduced research on group decision-making to the auditing context. Student subjects were used here too, but the experimental situation was an auditing one. The aim of the research was to determine if group decisions about qualified vs. unqualified reports were different than the individual decisions of group members would have been, i.e. whether group decision-making induced more risky or more cautious decisions. The authors reported some evidence that when the subject of the decision could be "culturally characterized as risk-oriented," group decisions were more risky; when the subject of the decision was caution-oriented, the group decision was more cautious.

All the research noted in this section is very preliminary in its application to the auditing context. Several papers were written to bring potentially useful techniques or other research literatures to the attention of auditing researchers. In all the areas discussed, large amounts of research will be needed before findings useful in an applied sense will begin to develop. But also, the potential seems great for both the scientific understanding of an important and behaviorally rich decision-making context and the assisting of practitioners with their daily task of making professional judgments.

C. Internal and Managerial Auditing

The papers and books included in Division C are:

Four studies used interviews or questionnaires to examine the role of internal auditors and internal auditing. Bakay [1973] surveyed college students, who thought internal auditing was neither very exciting nor high in status! Gobeil's [1972] article was a report on the Institute of Internal Auditors' "common body of knowledge for internal auditors." His report included a survey of Institute officers and committee members about the body of knowledge, which produced a rating of the level of knowledge the respondents on average thought appropriate for each part of the body of knowledge.

Churchill and Cooper [1965] and Delaney [1971] conducted detailed field interview and questionnaire studies of internal auditors and their functions. Churchill and Cooper held unstructured interviews with 66 executives at various levels and with various functions in 8 companies, exploring attitudes toward internal auditing, perceived effects of internal audits and similar factors. A number of overlapping attitude questions and background inquiries were asked and the responses to them interrelated in order to help place the respondents on various dimensions, though due to the unstructured nature of the interviews, such measures usually included substantially less than the full sample. For example, 26 people responded to the question, "Who is the internal auditor most like?" and 15 of those thought he was most like a policeman.

Delaney's study was similar to Churchill and Cooper's except his 63 interviewees included proportionately more non-accounting personnel and his interviews and questionnaires were more structured and subjected to a variety of statistical tests. The 5 companies in which he collected his data all had corporate internal audit staffs and the interviewees had recently participated, or been affected by, the regular internal audit. Delaney and Churchill and Cooper found general support for internal auditing functions (of course, not surprising given the nature of such interviews) and were able to relate differential degrees of support to several other attitude and background measures.

The Mints [1972] study was one of the most extensive pieces of research done on auditing. The study included questionnaires sent to internal audit managers, a laboratory simulation experiment using graduate students, business employees and internal auditors as subjects, and field experiments conducted in 4 organizations. The general focus of the research was on possible antagonism and conflict in the auditor-auditee relationship and on the impact
of various auditing "styles" on auditees' attitudes to the auditor. Mints first sent questionnaires to audit managers to find out how they perceived their function and how they managed the human relationships part of it. The laboratory experiments then examined effects of three popular "styles": hardline, participative and moderate (neutral). The participative style was related to better performance than were the other two, which did not differ significantly. Then, the 4 organizations were asked to schedule a number of audits using each of the three styles, to provide a field test of the laboratory results, and a variety of measures of performance and auditee attitudes was collected. Some difficulties were encountered in the administration of the field stage, but the results generally supported the earlier findings: the auditor's behavior seemed positively correlated with the auditees' reactions and their acceptance of his recommendations. The auditor's personal characteristics also were important to the auditees' acceptance.

The remaining six studies were concerned with managerial or operational auditing. Carlson and Song's [1969] and Churchill's [1966] papers were case studies, without analytical data. Churchill, for example, described in very general terms some aspects of internal auditing in the Department of the Navy. The Churchill and Cyert [1966] article was similarly general, describing the use of a management game, in which auditing was involved, in university teaching. 25

Norgaard [1969] conducted interviews with C.P.A. firm partners and some managers on the subject of whether the public accounting profession should become involved in operational auditing. Her article included no data, but she reported a lack of consensus among both groups on the issue. Smith and Lanier [1970] addressed the same issue via a mail survey of controllers and C.P.A. firm managing partners. Their response rate, especially for the latter group, was very poor, and only lukewarm support for the idea seemed to exist. The Smith, Lanier, and Taylor [1972] study was also a mail questionnaire on operational audits by C.P.A. firms, sent to a larger and somewhat broader sample. Its response rate was not good either (just over 20%) and again no consensus appeared on the issue.

It is interesting that no research has been done on whether

25The management game was described in more detail in Churchill, Miller, and Trueblood [1964].
anyone at all should do operational auditing, on just what its benefits in a general sense would be. Rather than starting with such a study, researchers jumped to the question of whether C.P.A. firms should do such auditing. This sort of skirting of the underlying question of usefulness is also evident in some of the research on “audit extensions” to be discussed in the next division.

D. Extensions to the Audit Function

The papers and books included in Division D are:


These papers addressed three topics: whether the attest function's boundaries should be extended generally, whether C.P.A. firms should audit and report on financial forecasts, and whether “social auditing” should be invented.

Imke [1967] surveyed a small number of practicing C.P.A.s and controllers, who generally agreed that the attest function should be extended to new areas, especially government and regulation-related work. Norgaard [1972] consulted a variety of historical and authoritative materials and interviewed some practicing C.P.A.s, to try to determine whether the attest function had in fact been extended in recent years and/or was likely to be extended in the future. She concluded that “there is a lack of evidence that such extensions are taking place or can be projected for the foreseeable future.”

Asebrook and Carmichael [1973] surveyed C.P.A.s, financial executives, and analysts by mail concerning whether audit reports on forecasts would be desirable. They found the usual general support (mostly among C.P.A.s and analysts) and diversity of opinion. Carmichael [1973] interviewed accountants in the United Kingdom, where a form of reporting on forecasts is required, and found few serious objections to the matter and even some support for it. Corless and Norgaard [1974] sent questionnaires to analysts (and some MBA students) that suggested one of three possible reporting formats (positive assurance, negative assurance and the United Kingdom version, which refers to “correctness”). Their experiment by mail found only a slight increase in respondents' expected confidence in forecasts if attested by a C.P.A. Rather, the analysts seemed to express a general lack of faith in forecasts, period.
Dilley and Weygandt [1973] tried to develop a social accounting/auditing system for a utility and applied it to a company as a case study. However, their paper did not address such general issues as whether social auditing would benefit society (net of its cost) and whether institutionalizing and regulating such a control device would be preferable to other ways of meeting social objectives.

The "extensions" topic presents somewhat of a conundrum. On the one hand, since the above studies really only constitute a beginning of research into the topic, and as usual, questions of usefulness and purpose have not been squarely faced yet, one could complain that the topic has not received adequate research attention. On the other hand, however, a case could be made that "extensions" is largely a non-issue. Auditors are concerned with doing the job they are already expected to do, at fees that clients are willing to pay and at a level of competence that will keep the malpractice lawsuits at a tolerable level. The search for new auditing worlds to conquer may, like the Apollo moon program, be a phenomenon of the expansive sixties that has lost much of its allure in these more careful seventies.

**DISCUSSION AND CONCLUSIONS**

The 83 papers and books reviewed above related to 72 separate research studies.\(^{26}\) The following table categorizes those studies by their principal research method.\(^{27}\)

<table>
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<tr>
<th>Surveys:</th>
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<td>Mail questionnaires</td>
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<td>Questionnaires to students</td>
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<td>Interviews</td>
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<td>Experiments &amp; quasi-experiments:</td>
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<td>Experiments by mail</td>
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<td>Laboratory experiments</td>
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<td>Cue utilization research</td>
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<td>Field experiments</td>
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<td>Cases mailed for response</td>
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<td>Field studies</td>
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\(^{26}\)Some studies were reported more than once and 5 papers were reviews or summaries of research.

\(^{27}\)Some studies used more than one research method and so had to be classified somewhat arbitrarily.
Analytical & a priori research
Analysis of historical material:
  Accounting reports  3
  Efficient market research  1
  Legal cases, authoritative material  7  11
                                 72

These studies represent a great deal of research effort. Some major issues have been tackled and some interesting research approaches have been used. A good start has been made.

But it is only a start. Even 72 studies end up spread rather thinly across all the areas represented in the review's framework; seldom are there enough in an area to comprise the "critical mass" of findings that both researchers and practitioners need before they can rely on the research results.

What would such a critical mass look like? How might it be assembled: in effect, where should behavioral research in auditing go from here? Is sparseness of research the only problem that needs to be solved, or should different questions be asked or research methods tried?

The remainder of this paper will attempt to answer such questions by discussing the implications of and drawing overall conclusions from the research review. In the process, a number of features of "a behavioral approach to auditing research" will be suggested. The apparent validity of such suggestions, i.e. the answers to the questions asked above, will depend on one's own view of the world, but it is hoped that putting them forward will provoke the reader to think seriously about them and about conducting behavioral research on auditing.

Describing, Persisting, and Complicating

To focus the discussion, consider the following example scenario, drawn from one topic area, auditor independence:

Picture an audit partner who is on his way to a meeting with a client

28Because so much remains to be done, these evaluative comments will naturally tend to refer to the weakness and omissions in research to date. However, the intent of the comments is to be constructive, not negative.

29The features to be suggested relate to research on auditing as a behavioral process, to investigating behavioral phenomena in the auditing context and the behavioral dynamics of auditing. Comments will be made about modeling auditing as a behavioral process, but there is no intention to present such a model in this paper.
about the list of changes in the financial statements that the auditor's staff and his firm's policy committee and review department feel should be made. He knows there are several items on the list that the client will be aghast about and that reasonable counter-arguments against some can be made. He and his advisors are by no means unanimous themselves, nor are they always sure what kind of disclosure will really be most helpful to the readers of the financial statements or what the effects of different disclosure alternatives might be on the client company's share prices, borrowing freedom, etc. The client is a "good" client to have, in many ways. The audit fee is substantial, but also the audit firm has been able to provide tax, systems, and other services that the client has clearly appreciated and that saved the client large amounts of money, perhaps more than the audit fee in some years. The audit partner is pleased with his firm's accomplishments and gets a genuine feeling of satisfaction from his relationships with the client company. The rapport between the firm and the client is so good, in fact, that over the years, several people from the firm have accepted senior positions with the client—one of those is the man the audit partner is going to meet.

The conclusion is inescapable that the research reviewed in Section A. 1.(b) has not helped us to learn about how the auditor's independence really works, to learn about the dynamics of the sort of scenario sketched above. Among all the studies reviewed, there is very little descriptive research, to tell us what the auditor does, why he does it, what his alternatives are, what the consequences are.\textsuperscript{30} We are similarly ignorant about the whole interpersonal context in which he works.

Both researchers and practitioners are handicapped by this ignorance. Researchers do not have a solid empirical base on which to build scientific knowledge about the auditing process and so inevitably produce fragmented, disjointed studies that fail to knit together either scientifically or in terms of their practical or policy implications.\textsuperscript{31, 32} Practitioners, trying to make sense of their own experiences and of the articles they read about auditing, similarly

\textsuperscript{30} This complaint is not a new one. Mautz ([1975]), for example, in an article adapted from his presentation to the 1974 Audit Research Symposium, called strongly for more solid descriptive research.

\textsuperscript{31} One reason for the relative fragmentation of behavioral research in auditing is the plethora of theories and research in the behavioral disciplines. Chaos in the underlying disciplines does not make it easy to construct the descriptive foundation needed in auditing, nor does it remove the need for such a foundation.

\textsuperscript{32} Parenthetically, the lack of a hard-nosed empirical foundation also makes it difficult for a researcher to be enthusiastic about the behavioral richness of the auditing situation to interest other researchers in the area. Almost no auditing research has been published outside the confines of the accounting-auditing journals (one exception is Ashton, [1974b]).
lack firm ground on which to evaluate, learn from or contribute to research. As a result, and having many other things to do anyway, both academics and practitioners may not think seriously, or communicate meaningfully, about auditing research.\textsuperscript{33}

The descriptive foundation requires, among many other things, a good understanding of how auditing's central actor, the auditor, sees the world and how his perceptions affect his behavior. Numerous surveys and interviews were included in the research review, but this understanding eludes us. The fault seems to be in two factors, at least. One is in the research methods used. The connection between attitudes and behavior is complex and in most cases tenuous (McGuire, [1973]). Therefore, obtrusive, reactive questionnaires and interviews provide data difficult to incorporate into the strong behavioral foundation this paper proposes. Experiments are also obtrusive (usually) but provide at least glimmerings of cause-effect relationships. One way to improve the descriptive foundation would be to use more observational and historical research methods to investigate behavioral questions. Auditing, since it is based on a "hard-copy," historical information system and involves the accumulation of evidence in audit files, ought to be a "natural" for this sort of unobtrusive research.\textsuperscript{34}

The other factor at fault, and this one is far easier to complain about than to solve, seems to be in the kinds of research questions asked and the way those are translated into research data. Weick [1970], talking to behavioral accountants, observed:

\ldots my reading of your research proposals is that you have already shrunk your possibilities for research to a dangerous minimum. I find this shrinkage puzzling because I'm sure that you know more about behavior than you've shown. While you may not know much of what the social science disciplines have to say about human behavior, you surely are familiar with human behavior per se. This leads me to think

\textsuperscript{33}These auditing symposia are of course a major attempt to create meaningful communication. Another example is the book Research Opportunities in Auditing by Peat, Marwick, Mitchell & Co. [1976]. Several of the many ideas in the book have undoubtedly found their way into this paper.

\textsuperscript{34}We saw some examples of unobtrusive "hard-copy" research in the research review. To carry the thought further, the topic of audit confirmations offers another example. Descriptive research would address matters such as the factors the practitioner may have to consider when deciding on a confirmation strategy: costs of various alternatives, customer reactions, client reactions, likely differences in the nature of large vs. small accounts, and what he does about each. Audit files would be a rich source of data for such an investigation.
that the problem is access to interesting behaviors rather than a conceptual
deficit . . . you seem to have problems dredging out those insights,
obranching interesting regularities in what people do, and mining these
observations for their relevance to behavioral accounting.

Behavioral research in auditing also needs to go after those
interesting behaviors. If only X% of shareholders read the auditor's
report, what do the rest read? Anything? What is the sequence
by which an auditor puts together an audit file, and what does
that tell us about his judgmental processes, about his private
definition of materiality, about his response to deadline pressure?

A descriptive foundation, less intrusive research methods and
a stronger orientation to behavior are not enough alone, however.
If only so that researchers have some idea of what to look for,
some theory, some concept of auditing as a behavioral process,
is required. Such a concept does not exist, though this paper
has suggested some components of it and several writers have
proposed complete or partial characterizations of auditing that
have a strong behavioral flavor.\footnote{See, for example: Churchill [1962] for an
overall behavioral model, Swierings [1969] for a sociometric characterization,
Carmichael [1970], for behavioral
hypotheses of internal control, Reit [1974] for a sequential model of the auditor's
judgment process, or Peat, Marwick, Mitchell & Co. [1976] for a model of auditing's
function in society.}

The problem of theory is an awkward one, for given the
theoretical diversity of the underlying social sciences, the likelihood
that any two researchers will agree on a theory seems small. One
difficulty the research review showed is that, even within a single
topic area, there were sometimes as many conceptual approaches
as there were studies. How to attain a critical mass of findings
in such a circumstance?

This problem possibly has no real solution, at least in applied
research such as auditing, since it is caused partly by fragmented
and fluid theories in the underlying disciplines [Cronbach, 1975].
We may not in the foreseeable future agree on a single theory.
But some of the ways scientists have worked out for coping with
multiple theories could be put to better use in auditing research.
One way, fundamental to empirical science, is to do careful
empirical research that is specifically designed to pit one theory's
predictions or explanations against another's, and so to gradually
weed out the unsuitable (or even unhelpful) ones (Hendrick and
Jones, [1972]). Another is to use various methodologies and/or
theories to “triangulate” on an issue, focusing on the overall understanding achieved rather than on which theory has the best box score (Runkel and McGrath, [1972]). As we saw in the review, the Churchill [1962, etc.] and Mints [1972] studies followed this sort of multipronged strategy. Another approach is to pick a theory that appeals, use it to organize and design research, and then stay with it over a series of research studies. McGuire [1969] noted, in discussing the proliferation of theories and research about attitude change:

This research illustrates the power of even inadequate theories in advancing our scientific knowledge. They keep our research program going in a discernible direction that makes for progress and leads toward clarification of the problem, even though it may later appear that some other theoretical approach would have been better. Pursuing any theory with persistence is more likely to be enlightening than is engaging in unprogrammatic research involving one little experiment after another.

The research review showed few examples of either theory-based empirical research or persistence, and no examples of both.

As this paper comes to an end, let us return briefly to its first sentence: “Auditing is a complex process.” We encountered the cybernetics idea of “variety” earlier; Weick [1975] applied it to research on organizations:

The notion of requisite variety states that any person cannot understand a person more complicated than himself. Directed towards the complexity of organizations and groups, a straight-forward extrapolation says that no researcher can sense complexity in excess of his own complexity or that of his research instruments.

We therefore should encourage complicated research on auditing and frown on simple studies because they will be unlikely to sniff out enough of the phenomena we need to know about. This does not necessarily rule out surveys, interviews, and so on, but it means that they should be constructed in anticipation of encountering and coming to grips with complexity, not of simplifying it. The Loeb [1971] study of ethical behavior did manage complexity well, but it was an exception.

The auditor operates in a large and tangled net of interpersonal relationships, organizational structures, and information flows. Yet most research studies focused on one or two components of this complex system (often, just the auditor himself), basically in isolation from the other components. Such research cannot hope to identify properly the fluid and ill-defined constraints and
conflicts under which the auditor operates. We tend to see conflict, for example, as a problem for the auditor, and for individual auditors it undoubtedly is. But in a broader sense, the auditor's very presence (between the information preparer and the user, who is unwilling to rely on the preparer) is a phenomenon of conflict. With an eye on the overall system, we could study the role of the auditor, the ways he manages, even generates, conflict, in a more positive way by relating it to the operation of the overall system of which the auditor is an integrated part.

CONCLUSION

In this part of the paper, an attempt has been made to explore the consequences to behavioral research in auditing of taking auditing seriously as a complex process and to relate those consequences to the research review. Arguments have been mounted for the construction of a strong descriptive foundation, less intrusive research, more attention to actual behavior, more attention to theory, more persistence and more complicated research.

All these suggestions, so easy to make, amount to a very tall order for researchers to fill. The research studies reviewed do not seem to show any trend in that direction, so there may be little grounds for optimism. But if behavioral research in auditing is ever to assemble scientific knowledge that does justice to the richness of the auditing situation and to provide real help to practitioners and policy-makers, such a major effort will have to be made.

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Note: Each paper or book reviewed in Part II is identified with an R and the appropriate section of Part II is specified.


56 There has been no attempt to discuss policy issues or practical auditing choice problems. Until it can answer the questions of "what is," "why is," and "how does," auditing research will be of little use in policy-makers' and practitioners' "what should" questions. Description must precede prescription.


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Discussant's Response to "A Behavioral Approach to Auditing Research"

NORMAN L. VINCENT

Michael Gibbins took on a very difficult task when he reviewed the literature in an attempt to pull together the apparently unrelated aggregation of auditing research studies. His classification of seventy-two research studies into a framework describing the auditing process represents a significant effort toward synthesizing diverse research results into a meaningful whole.

The goal of Gibbins' paper was "to identify what has been learned from behavioral research, to knit together the various findings and suggest where they lead us." The needles upon which the various findings are knit were four broad categories:

1. The external auditor;
2. The investigative process;
3. Internal and managerial auditing; and
4. Extensions to the audit function

THE NEED FOR A DEFINITION OF "BEHAVIORAL"

Within the first few paragraphs of his introduction, however, Gibbins creates a turbidity that permeated the entire paper. "Auditing," Gibbins states in his second paragraph, "will be viewed
as fundamentally a behavioral process.” Yet a few paragraphs later, he appears to contradict that statement by saying that auditing will be viewed as “an information evaluation and communication process as well as an investigative and an assurance process.” These processes are not behavioral; rather, the processes of information evaluation, communication, investigation, and assurance are theoretical constructs used to label what goes on in the auditor’s mind during the auditing process. These constructs serve as a theoretical framework to explain observable behaviors which people in the auditing process exhibit. There is some considerable confusion in Gibbins’ paper over what is an observable behavior and what is not, a confusion which continues throughout the entire paper.

Lest this writer should be guilty of the same lack of clarity and resultant turbidity found in Gibbins’ paper, it seems worthwhile to define “behavioral” so that further comments can be evaluated in light of that definition. The term “behavioral” suggests a study of observable responses by objective methods as opposed to the necessarily subjective study of internal processes. Objective methods are used to observe acts which are characterized by movement, reaction, responses, or an outward, overt doing of some kind. The value of the behavioral approach is that it unequivocally defines what is to be studied in observable terms; the researcher is pulled out of the fruitless morass of making subjective postulations concerning underlying processes or states of mind. In the behavioral approach, the focus is on observable human behavior, whether it is of an individual or a group.

**GIBBINS’ CHOICE OF ARTICLES**

A second factor which added to a general sense of frustration in trying to find the “meat” of the paper concerned the selection of articles included. Since the stated purpose of the research review was to emphasize a behavioral approach, it would seem that the author would include or at least emphasize only those articles that described a behavioral approach to investigating the auditing process. No such qualifications appear in the paper, however, and the articles reviewed represent a mixture of methodologies employed, elements studied, and contexts in which they are studied. Gibbins’ failure to delineate what constitutes behavioral research makes it difficult to discern the basis on which these particular seventy-two articles were accepted while others were rejected, and it is difficult to find a behavioral thread running through those which are discussed.
WHOSE BEHAVIOR IS STUDIED?

A further cause for confusion results from the lack of definition concerning exactly whose behavior is being studied. Apparently this vagueness appears in some of the original articles cited by Gibbins. For example, two papers which Gibbins cites deal with the auditor-client relationship and assume that relationship is one of antagonism and conflict; however, we are left wondering if the focus of interest was on the behavior of the auditor, the client, or some joint behavioral manifestations of antagonism and conflict. Gibbins included in his review the results of various surveys of shareowners, analysts, bankers, stockholders, and others who received auditors’ reports and were asked to respond to questions concerning the utility of the reports. Again, we are left wondering whether the focus of attention was on the behavior of the auditor in developing and writing the report or whether it was upon the responses of the recipients. On the other hand, there were some papers reviewed which provided a clear definition of exactly whose behavior the researcher was interested in studying. For example, a study on group decision-making in the auditing context went to some length to describe the context and the group making the decision as well as the nature of the decision to be made.

Similarly, Gibbins often neglected to specify the individual or group which was being studied. At one point, Gibbins refers to a study in which an accounting firm was asked to make certain decisions, which were later analyzed by the researchers. Yet no explanation was given as to whether the decisions were made by professional as well as non-professional members of the firm, whether it was a true group decision made by arriving at a consensus among members of the firm, or a decision made by an individual member of the firm but backed up by others, or perhaps a decision made by one individual with no knowledge of it by any others in the firm. We are left without even an understanding of what is meant by “accounting firm.”

In another example, Gibbins was discussing the effects of an audit on and by the organization being audited. Gibbins describes one researcher’s efforts and ends with the statement, “The behavioral effects of the very existence of an audit, even if not directly connected to the problem-solver’s rewards, was examined.” He clearly referred to behavioral effects, but we have no idea who or what behaved. On the other hand, in discussing a similar study, a reference was made to “the impact of the frequency of being audited on a problem-solver’s degree of compliance (or non-
compliance) with internal control procedures.” In this case, it is quite clear that the problem-solver's behavior is that in which we are interested; specifically, we are interested in his degree of compliance and we are interested in studying it under a specific circumstance, which is the frequency of being audited.

THE ABSENCE OF OPERATIONAL DEFINITIONS

A third major drawback of Gibbins' review and of most of the works cited is the failure to provide what is usually referred to in behavioral research as an “operational definition” of the construct in which the researcher is interested. Gibbins' references in several instances to the “role and responsibilities of the auditor” beg the question of what is a behavioral manifestation of the auditor's role and responsibilities. A concept such as responsibility needs an operational definition before it can be studied behaviorally. Such a definition would include a statement of the operations, procedures, or behaviors which are observable and which will distinguish the exhibition of responsibility from the exhibition of other behaviors. “Role” and “responsibility” cannot be observed directly, and before they can be studied, some operational definition must be developed to delineate the behavior which will be accepted as evidence of a role or responsibility.

Gibbins was certainly not alone in neglecting to provide operational definitions. Their absence is also evident in several of the studies he cited. For example, one author “examined the degree to which the auditor is responsible for foreseeing the future . . .” Being “responsible” cannot be observed; neither can “foreseeing” be observed. Thus, a behavioral study of those concepts begs for a definition of their observable manifestations. Examples from other articles include references to theoretical constructs such as conservatism, role conflict, perception of the legitimacy of various choices, independence, objectivity, disinterestedness, attitudes toward auditing, and the evaluation process. None of these is defined in observable behavioral terms. In one instance, Gibbins suggests that one researcher was “able to observe . . . the auditor's perception of the legitimacy of various choice alternatives. . . .” Notice that the author was observing a perception. “Perception” is a theoretical construct used to describe a process which goes on within an individual and serves to synthesize sensory input with other factors and organize it into some meaningful whole. The internal process of perception simply cannot be observed.
by an outsider, and thus perception, per se, cannot be studied. However, it can be defined in observable, behavioral terms and those behaviors can be studied.

Included in Gibbins' review are some papers that did attempt to define in behavioral terms the theoretical concepts in which the author was interested. For example, one author who was interested in the accounting measurement process proposed that a measure's hardness be calculated in terms of the extent to which different observers agree on what the measured quantity is. Another author interested in audit planning set up a series of small cases with known differences between the cases. The variations in the auditors' responses to these cases constituted the author's definition of audit planning. Another author interested in auditing styles used laboratory experiments to study the effects of three styles (hard-line, participative, and moderate) which apparently had operational definitions explaining what observable behaviors constituted each of those styles.

To summarize, there appear to be four major flaws that, in Gibbins' paper, create the turbidity mentioned earlier. First, Gibbins did not define "behavioral" at the outset or, for that matter, anywhere in his paper. Secondly, the reader was given no behavioral rationale concerning why certain articles were included and others not. Thirdly, the reader was often left guessing specifically who was being studied in the various articles cited. And finally, there were few operational definitions provided to establish what observable, measurable responses would indicate the presence of internal processes taking place.

A MORE EFFECTIVE STRUCTURE

It would seem that a more effective structure for the paper would have been to cast the content into a paradigm that has a thread of behaviorism running through it rather than a thread of the auditing context. To be included in such a review, a study would have to meet certain qualifications:

1. The study should specify and deal with objective variables and stay away from subjective concepts or constructs which do not lend themselves to scientific research;

2. The article should clearly define whose behavior the researcher is interested in studying. It would seem elementary to ask that the author tell us whether he is studying the auditor, the auditing
firm, an individual client, a client firm, a combination of the auditing firm and the client firm, the user, or some other individual or group; and

3. The issues being investigated need clear definition. Behavioral research requires an environment of operational definitions of theoretical constructs. Also, it must be made quite clear that the observations taken and studied are actually relevant to the construct defined.

Such a behavioral paradigm would result in studies whose conclusions can be substantiated by independent observers through their own independent studies. It is in this activity of replication and substantiation that we begin to understand the human process which is being studied.

Certainly Gibbins took on no easy task in trying "to knit together the various findings" of the many articles he reviewed, for they were a diverse and fragmented lot. A footnote in his paper has a ring of truth to it, and this author can't help but agree with his statement that

one reason for the relative fragmentation of behavioral research in auditing is the plethora of theories and research in the behavioral disciplines. Chaos in the underlying disciplines does not make it easy to construct the descriptive foundation needed in auditing, nor does it remove the need for such a foundation.

A closer look at the status of research and understanding in the behavioral sciences would suggest, however, that the plethora of theories relates not to the observable behavior, but to the theoretical constructs such behavior supposedly represents. The act of one man striking another with a club is clearly an observable behavior and, in most instances, all observers will agree that the event did or did not occur. Where the differences occur, and the plethora of theories arises, is in attempting to postulate the motivation for the behavioral act. Whether the man was motivated by fear, anger, aggression, or perverse sexual pleasure is the focus of the debate. Similarly, in auditing, the auditor's act of stamping his approval on an accounting transaction is an observable behavior about which there can be no disagreement. But whether that act was motivated by his independence, attitude, style, or perverse sexual pleasure is the arena in which we can debate. Only by conducting research studies that are based on observable behavior and which can be replicated and substantiated by other researchers
will we ever reduce the plethora of theories and reach some fundamental understanding concerning the activities involved in auditing.

**Valid Questions for Further Research**

Despite its flaws, Gibbins' paper does fulfill one of his stated goals, to suggest where the research studies lead us. Throughout the paper Gibbins identifies numerous questions in the area of auditing that need answers. For example, in his discussion of studies regarding the auditor's code of ethics, Gibbins suggests that more work needs to be done to determine whether codification of auditing guidelines and enforcement procedures would improve the practitioner's ethics in any operational way, whether ethical decisions are handled more effectively by individuals, whether ethical matters receive greater weight in general decisions made by practitioners, whether other methods than codification would be more efficient.

In his section concerning the characteristics of accounting that are important to the auditor, Gibbins asks pertinent questions such as "What conceptions of accounting underly auditors' approaches to their task?" . . . "What perceptions do auditors have of the accountant and accounting numbers they work with, and how do such perceptions translate into auditing judgments?" These are just two examples of Gibbins' ability—throughout the paper—to point the way for further research.

However, Gibbins' suggested procedure for future studies which would attempt to answer these questions raises a question itself. In his "Conclusion" section, Gibbins says,

The auditor operates in a large and tangled net of interpersonal relationships, organizational structures, and information flows. Yet most research studies focused on one or two components of this complex system (often just the auditor himself), basically in isolation from the other components. Such research cannot hope to identify properly the fluid and ill-defined constraints and conflicts under which the auditor operates.

The mere fact that it is a complex system of fluid, ill-defined constraints and conflicts requires a researcher to isolate its various components and study them independently to determine their fundamental underlying characteristics. After these components are understood, they can then be combined to determine their interactive effects. The whole undoubtedly is more than the sum of its parts, yet we seem to be at a stage where we have not yet delineated the component parts, and we hardly appear ready
to combine them into the "tangled net of interpersonal relationships, organizational structures, and information flows."

The study of the auditing process in behavioral terms is a worthy endeavor and, like any research which attempts to describe and understand the most complicated animal on the face of the earth, it is a never-ending, tedious process. Nevertheless, it is through the process of studying behavior and talking to one another in behavioral terms that we will begin that understanding and will be able to communicate our findings with one another in unequivocal terms.
Developments in "Comprehensive Auditing" and Suggestions for Research

N. C. CHURCHILL, W. W. COOPER, V. GOVINDARAJAN, J. D. POND,
and J. G. SAN MIGUEL

INTRODUCTION
Auditing stands at the threshold of service opportunities we can as yet scarcely foresee, even in dim outline. —Mautz and Sharaf [1961]

This paper deals with developments in auditing which are extending its scope and purpose in a variety of directions. Our focus will be on these extensions toward what we shall refer to as “comprehensive auditing.” The exact meaning and significance we shall associate with this term will be made clear in subsequent sections of this paper. For the present, however, we may think of “comprehensive audit” as representing the ultimate extension from preoccupations with financial accounting and opinion audits, as in the past and present, to a future in which all phases of management will be subject to audit as part of an expanded (ultimately comprehensive) accountability for corporate behavior. In approaching this subject we need to carefully reexamine such topics as: (1) What should be audited; (2) How should it be audited; and (3) How and to whom should the audit results be reported. Concurrently, this carries further implications of who is competent
to conduct such audits, and what kinds of organizational arrangements and what social institutions should be designed to direct and control these kinds of audit activities.

The purpose of this first report on our studies is to present some preliminary findings and to point up some of the potentials for research which appear to be emerging from "on-site" investigations we have been conducting on how auditing is being used for management control and accountability. The underlying motive for these investigations was to uncover materials from which we might initiate a program for research and education into the potential of a broadened concept of auditing as a new tool for management and social control—a tool only recently expanding to the potential suggested in the above headnote.

This paper is organized into four sections: this introduction, an overview of the research to date, some possibilities for further research which have emerged in our investigations, and a summary section. The focus of our efforts to date is on the new developments which have been occurring in internal and governmental auditing with special attention to the directions and possibilities they might suggest for an expanded use of the audit function. Thus, we examined the customary attest function, as it is embodied in public accounting practice, only insofar as it related to these kinds of developments. In fact, our focus was narrowed even further toward what might perhaps be called the "cutting edge" of audit developments, many of which are still "in process," rather than on any attempt at a comprehensive survey or a balanced appraisal of the current state of internal and governmental audit practices.

We made no attempt at a statistically valid representation of even these developing practices. Instead we turned to organizations which we supposed were likely to be encountering problems that would cause them to be experimenting with the kinds of "cutting edge developments" central to our own interests. From these organizations, we chose four, for on-site observations. This selection was not done in a random fashion nor was it preceded (or accompanied) by a survey of organizations where such practices might be developing. Instead, as is natural at this stage (i.e., the formulative stage) of a research inquiry, we used information which came to us via leads or contacts, however fortuitous, as well as what a priori information we could glean from our own reading of the extant literature.

This can all be illustrated by our selection of the U.S. General
Accounting Office (GAO) as the only governmental organization we examined.\(^1\) This selection resulted partly from a reading of the open literature but it also partly resulted from a prior experience\(^2\) which suggested that the GAO was likely to be a rich source for such developments, whereas many other governmental organizations, including those at state and local levels, were likely to be following rather than leading in such undertakings.\(^3\)

In the private sector, we similarly avoided small businesses and those large businesses which operate with relatively homogeneous products or processes or are in stable markets and supply situations. We sought instead relatively large firms likely to be operating under varying conditions across both state and national boundaries with a complex array of products or services. From those considered we chose three corporations which reflected both breadth in functions and diversity in managerial issues. They also were utilizing and developing the audit function in different ways. All three firms, referred to as Corporations A, B and C were large (at or approaching the stage of multinational conglomerates), were known to be well-managed, and provided a climate that encouraged innovation, just as is the case with GAO. Unlike the situation with GAO, however, the terms under which our study was effected preclude our identifying these firms or making the acknowledgements that are due the many able line executives and auditors who helped us in the course of this study. We do hope that these persons will think that their help has been well-used. In any case, we absolve them, as we do those within GAO, of any responsibility for the findings, even the provisional ones, and the issues for research that we set forth in the subsequent sections of this paper.

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\(^1\) We are very grateful to Ellsworth H. Morse, Assistant Comptroller General, Donald Horan, Director, and Maurice Moody, Supervisory Auditor, Office of Policy of the GAO for their extensive cooperation and help—without which this part of the study would not have been possible within the time and resources that were at our disposal for these purposes.

\(^2\) W. W. Cooper has served as a member of the GAO’s Educator Consultant Panel since circa 1969.

\(^3\) This again comes from personal experience and informal consultation plus a check of the relatively sparse open literature on the subject—see, for example, O’Keefe [1976, p. 1], who reports on a cooperative International City Management Association/General Accounting Office “educational experiment” with “performance auditing” in 15 cities and observes that “No formal studies have yet determined the extent to which local governments have used performance audits, but apparently few such audits have been made.”
THE STUDY TO DATE

The Basic Findings

In every one of the organizations we examined, both governmental and private, we found developments well under way which represent a significant evolution of the audit function toward an examination and appraisal of all aspects of managerial performance—a comprehensive audit—and away from a preoccupation with financial controls and the "opinion audit" which has been made familiar by past and present practice in public accountancy. We believe these developments in audits raise some pointed questions about the character of the research and education which the academic community can and should supply in the area of audit practice. This is so because, at least to some extent, the future of these (and similar) developments will depend on research and education resources from the academic community.

As already indicated, we did not undertake a survey which would enable us to assess the ubiquitousness of this movement toward more comprehensive audits. Nevertheless, there is reason to believe that similar developments are occurring in other organizations. Marshall Armstrong, Chairman of the Financial Accounting Standards Board, has succinctly portrayed this in a recent article [Armstrong, 1976], "An Auditor for the Seventies," from which we quote (with some rearrangement) as follows:

The traditional role of the internal auditor has been almost clerical, the verification of the existence or nonexistence of assets, and has presented the internal auditor with limited opportunity for the exercise of professional judgment.

But that role is changing and changing rapidly . . . , for this is an era of revolution in internal auditing; an era of unmatched development.

Our studies also suggest that these changes in the character of internal audits carry with them the possibility of further changes in the relationships and practices of others who have depended upon them in the past. Consider, for example, the reliance by external auditors on the internal auditors as an important component of their attestation. Consider also how this might be attenuated or, on the other hand, how it might be strengthened as the

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"The Institute of Internal Auditors' [1976] recent survey of internal audit practices in companies reports that roughly fifty percent of internal audit efforts are in the area of "operational audits" and fifty percent are "financial audits."

"A need for considering new alternatives and supplements to present types of controls on which external audit and attest have previously relied is also becoming apparent in computerized data bases [Haseman and So, 1975]."
internal audit function develops further in some of the directions we have been examining—for example, by moving its focus to the analysis and evaluation of underlying management processes and making extensive use of individuals who are trained in disciplines other than accounting.

At the recent Peat, Marwick, Mitchell & Co. Auditing Research Symposium, for example, Mr. Walter Marx, Director of Corporate Audit and Operational Analysis at Xerox Corporation, made a response to an inquiry on this subject from which we might paraphrase as follows: Only a few years ago the internal audit staff at Xerox devoted itself almost exclusively to “financial accounting” types of audit. Now, however, direct financial auditing per se constitutes only some seven or eight percent of their total activities and is largely concentrated at year-end in cooperation with the external auditors; and, as their attention turns to audits of other phases of management activities and processes, they are also recruiting ever more extensively from persons with backgrounds in disciplines other than accounting.

Our own observations indicated that these trends are likely to continue. However, Mr. Marx also emphasized (in a subsequent exchange) his belief that this need not weaken and does, in fact, strengthen the entire audit process as attention turns from verification of account bona fides, so to speak, to analyses of underlying causes and the evaluation of related management practices.

Because Xerox was not included in our study we have taken the liberty of paraphrasing as we have just indicated. However, the same kinds of developments and the same kinds of perceptions of problems and opportunities were observed in the private organizations we studied along with the conferences we also held with their external auditors in some cases. For example, Corporation C has similarly shifted away from financial audits. In a two year period, the time devoted by the internal auditors to financial audits has decreased from two-thirds to one-tenth while the internal audit staff has increased by forty percent.

Turning to governmental developments we may quote from a recent talk by the Comptroller General [Staats, 1976, pp. 6–8] as follows:

An important consequence of the proliferation of governmental functions is the growing demand for more efficient and effective government

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6Held at the Hotel Pierre in New York City on August 13, 1976, to discuss the program for research awards announced in Peat, Marwick, Mitchell & Co. [1976].
programs. The Hoover Commission's call for Federal performance budgeting in the 1950's, attempts to implement Planning-Programming-Budgeting Systems at all levels of government in the 1960's and the new congressional budget procedures enacted in 1974 all represent efforts by administrators and legislators to allocate and manage expenditures more rationally . . .

These developments have also placed new demands and challenges on GAO. Its work has broadened to the point where the primary emphasis is on evaluating the effectiveness and efficiency of programs operated by the administrative agencies.

Thus, the scope of our work in GAO has changed significantly toward an emphasis on the performance audit and program evaluation. Although financial auditing is still with us, today we emphasize evaluating program results and the attainment of program goals. Both the Legislative Reorganization Act of 1970 and the Congressional Budget Reform Act of 1974 gave GAO Congressional mandate to these ends.

The move from "financial" to "comprehensive" audits, while taking place in other organizations, is not without its supporters in the public accounting field. The partner in charge of the audit of one of the companies we studied commented that, in his belief, these changes were needed and actually strengthened the internal audit and attest function in the face of the client company's increasingly varied scope of activities, geographical dispersion, and concern for the risks inherent in the accompanying delegation of authority. In a sense, this was supported by the internal auditors of Corporation C. While their external auditors still relied on the internal auditors' assistance in performing traditional financial audit procedures, the internal auditors not only viewed this as an infringement upon the time they spent in extended audit activities, but also considered it to be an underutilization of the abilities of the audit staff.

While the ultimate response by the external auditor to changes in the internal auditor's activities remains to be determined, it seems clear that the external audit function will not remain unaffected. Similarly, developments such as those in the GAO's audits of program results and goals are likely to create a need for changing organizational designs and relations beyond those already indicated for external-internal auditor relations. For comprehensive audits, it is customary for the auditor rather than the client to determine the scope and timing of an audit, although negotiations almost always take place between the auditors and the audited organization. Hence there is perhaps more of a changed
emphasized, which is nonetheless important, than a changed relationship. These comprehensive audits also result in a report by the auditor with comments by the management rather than a report by management “attested to” by the auditor.  

While the above may be considered to be limited to internal and GAO audits, there is some reason to believe that these developments may extend to “public” audits. Witness, for instance, the following quotation from the AICPA Committee on Relations with the General Accounting Office [1973]:

The members of this Committee agree with the philosophy and objectives advocated by the GAO in its standards and believe that the GAO’s broadened definition of auditing is a logical and worthwhile continuation of the evolution and growth of the auditing discipline.

Moreover, another AICPA report is being readied on what a CPA firm should consider in “performing an audit in accordance with GAO Standards” at local government levels, even while various firms are making provisions for supplying these services [Rogoff, 1976].

We can, perhaps, make the tenor of what may be involved somewhat clearer by supposing a scenario like the following: Assume—as Ralph Nader [1970] has been recommending—that a uniform “Federal Incorporation” law is passed. Assume, also, that this law requires all incorporated entities to pay an annual fee of either fixed or variable amount, as a condition for “doing business.” These fees might then be fed into a common fund as the basis of support for one or more groups of professional auditors charged with responsibility for determining (as well as conducting) the scope and timing of comprehensive audits, or appropriate portions thereof, in each applicable instance.

Such a scenario, while far-fetched, is not completely beyond the realm of practicability and it, at least, has the advantage of allowing us to clarify the nature of the phenomena under study by considering arguments on the nature of accounting and its

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7 If placed in the context of a financial-type audit, this might lead to two different sets of financial statements (as Charles J. Christenson has observed to us), with one set prepared by the auditors and another, responding set, prepared by management.

8 See American Institute of Certified Public Accountants [1975], where this expression is employed. Other terms such as “broadscope audits,” “procedural audits,” “management audits,” are being employed as are more special terms like “performance audits” and “program audits,” sometimes with the same, broadened, meaning.
potential regulation in a new framework. Observe, for instance, that the posited approach does not necessarily involve any regulation of the nature of these audits or the ways in which reports might be rendered. It would probably not require revision in present relations between CPA firms and their clients, since the latter would still be free to contract with the former for services that they desire. Indeed, there is nothing in this scenario that necessarily implies any interference with the use of market mechanisms as guides for private resource allocation decisions, provided the managements being audited are also allowed to respond freely to audit findings (in ways that we shall shortly indicate). Note, in particular, that this scenario then supposes that management will retain its role as primary decision maker (at least as a matter of emphasis) while confining accountants and auditors (again as a matter of emphasis) to the roles of scorekeeper and critic, respectively.

The above scenario, whether likely or not, suggests the kind of relation that would presumably be needed if comprehensive, full-scope audits, with accompanying public disclosure, were to become a part of public accounting practice. Within corporations, we see already organizational changes appearing as internal audits move toward more comprehensive examinations. In Company A where we believed the scope of the audit function was the broadest, the auditors reported to a committee of the board of directors; in Company C there was active consideration for moving the auditors from the supervision of the chief financial officer to that of the board of directors; and in Company B where the auditors reported to the chief financial officer, no change was being contemplated.

This “cutting edge” tendency is not confined to audits in the private sector. At least some of the state governments moving to comprehensive audits are finding it desirable to have the auditing function report directly to the legislature (as does the GAO) rather than the executive [GAO, 1974].

The legislator in the public sector and the director in the private sector can then be provided with a new and potent tool for the discharge of their own responsibilities although this, too, must

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9 For an analysis of ways in which this might be determined on market forces, see Ng [1976]. See also Hamilton [1975].

10 The need for observing this division of labor was emphasized by Wriston [1976].
depend, at least to some extent, on the kind of research that is done, as well as on practical experience and experimentation.

**Characterizations of Comprehensive Audits**

**Scope**

It is time now to state more precisely what we observed in the way of expanded audit scope. By adaptations from terminology encountered in the course of our studies, we can say that we were concerned with audits which encompassed any or all phases of management activities for their bearing on:

1. Propriety
   (a) with respect to objectives pursued
   (b) with respect to methods and processes utilized
2. Effectiveness; and
3. Efficiency.

Propriety refers to standards of acceptability for conduct (which may change over time) as well as laws and other prescriptions (or proscriptions) for management objectives and the methods, processes and procedures utilized to achieve these objectives. Effectiveness refers to ability to "get things done" and the results achieved. This includes not only the ability to achieve stated goals but also the ability to change when circumstances indicate the need for such alterations. Efficiency, finally, refers to the amount and character of the resources utilized in the conduct of a management activity.

The ways in which these categories might be utilized are all brought conveniently together, and hence may be concretely portrayed, via the following summary from the story by *U.S. News & World Report* [1976] which discusses the GAO’s audit of the FBI:

That report [the GAO audit report] accused the Bureau of misusing its resources [inefficiency] by spying on domestic "radicals" [improper objectives] in ways that were of doubtful legality [propriety of methods?] and produced "few tangible results" [lack of effectiveness].

There are, of course, a variety of contexts, both public and private, which give other dimensions of meaning to these terms. Thus, in one context, propriety may refer to compliance with a law, regulation, or a specified corporate procedure while, in another, it may refer to deviations between planned and actual performance if the discrepancy is sufficiently serious.
We might detail this further with the varying scopes and types of audits we observed in Corporations A, B, and C as follows: In a major division of Corporation A, each manager had to set forth a detailed description of the processes to be utilized, the procedures to be followed, the decision parameters to be considered, and the objectives to be achieved. The manager's immediate supervisor reviewed this statement with particular reference to the objectives; the auditors reviewed it for propriety of methods and comprehensiveness of controls.\(^\text{11}\) In addition they then audited both managers' and subordinates' actions to see if they concurred with the standards and methods that had been set. Thus, the issue of propriety was first audited at the planning stage. Having passed the tests at this stage, the plan then became a control. The subsequent audit, which compared plans against actions, could be regarded as directed to the issue of effectiveness. Nor does this end the possibilities for interpretation, since audit attention could then also be focused on compliance with respect to all actions of the management tier being audited. In any case, the entire audit was also examining the effectiveness with which managers carried out the charge "set up an appropriate set of plans, controls, and procedures."

Turning to Corporation B, we may observe with interest that extension of its audit has been accompanied by the development of a manual which can be regarded as a codification of good management practice which is revised, partly on the basis of audit findings, from time to time. Thus, at any point of time, then, the scope of the audit in Corporation B was concerned primarily with management's compliance with this comprehensive codification of good management practice, including aspects of propriety, effectiveness, and efficiency. Here we again see the need for viewing the audit in a particular management context for, in one sense, the audit of Company B was compliance, but this compliance was not confined to the consideration of the adequacy of cash controls, or even to generally accepted accounting principles, as these might apply to financial criteria only.

In no case did we uncover specific examples of "efficiency audits,"

\(^{11}\) The difference between methods and objectives is not always clear; thus, the auditor's report might well relate to objectives as well as to methods. It should be noted that there are considerable advantages to be gained by dealing with potential improprieties in planned methods and objectives at an early stage where they can be more easily changed.
i.e., audits directed only to efficiency issues, in the private sector. Although elements of efficiency were contained in several of the audits we examined, the scope was broad rather than narrow. Several of the extended audits performed in Corporation C were especially noted, however, because they gave rise to improved operational efficiencies which resulted in considerable cost savings. How, and in what way, these various issues like efficiency and effectiveness, etc., might be separated in practice is perhaps less important than having them available for guidance in our examination of ways in which audits are (or might be) extended in practice. Then we can turn to other issues that also need to be examined.

With the extension of the scope of auditing, we must address not only what is being audited but also what can and what should be audited. Neither of the latter two categories appears to have received much explicit attention in the auditing literature to date. GAO moves freely with the mandate of Congress; in Corporation A the auditors were free to examine essentially anything they deemed necessary; in Corporation B the auditors were charged with auditing the operating units, but within them their scope was very broad. The scope of audit in Corporation C, whose internal audit department reported to the chief financial officer, was not as broad as the others.

While this describes what is being audited, the can be was in front of the auditors and the managers in all three corporations. When asked what cannot be audited the senior executive in charge of a major division of Corporation A replied, “Neither integrity, nor judgmental capabilities of managers.” Yet, two sentences later, he said, “Our audit system now picks up bad managerial judgments in a timely and vigorous manner.” We suspect that he had in mind a should be as well as a can be audited in response to our question and we regret only that we did not pursue this further with him at the time of our interview.

The issue of what should be audited is, of course, one of a philosophical (ethical) nature as well as an untended issue of a positive scientific research character. We believe that what should be audited needs to be considered along with what can be audited. To illustrate the problem one needs only to consider the likely behavioral consequences which may be caused by such audits along with the possible untoward effects, involving perhaps invasions of privacy that audits might exert on an individual’s character.
or social behavior. Scientific research on what can be audited is a necessary ingredient for the development of strategies for rationally deploying audit resources. We think it undesirable, however, to proceed apace in these dimensions without attending to the related philosophical or ethical issues, just as it is undesirable (or at least meaningless), we also think, to proceed with the philosophical or ethical considerations without any knowledge of the likely effects of audit activities such as we are now considering.

The Elements of an Audit

There are different opinions as to what constitutes an audit. Following an earlier usage [Churchill, 1962], we distinguish for purposes of clarification between “supervisory” or line-oriented audits and “accounting” or third-party audits. The first, as the name suggests, represents an examination conducted by the responsible decision maker and hence may constitute a part of the decision-making procedure. To state this differently, a supervisory audit may be specifically conducted for the purpose of affecting behavior in a wanted direction and need not raise any issue of reporting to third parties. Thus, it does not necessarily raise issues of objectivity and independence. This is not, however, the case with “accounting type audits” which are introduced as examinations of management (or other societal activities) as a basis for decision making by others—not the auditors—and hence automatically raise all of the issues such as objectivity that are inevitably involved in such third-party orientations.

An audit, be it supervisory or accounting, possesses a number of elements which influence decision making and organizational behavior. They are:

1. The anticipation of an audit;
2. The audit itself;
3. The audit findings; and
4. The audit recommendations.

Of course, these are all likely to be intertwined, in practice. For instance, audit recommendations or audit findings may be communicated to management, informally, while an audit is in process. This, in turn, may elicit a management response that

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12See, for example, the discussion of “cheating behavior” which was apparently induced by the varieties of audits imposed on subjects in the controlled experiments utilized in Churchill [1962].
can occasion a change in the course that an audit may take. Nevertheless, these terms, and the distinctions they carry with them, can provide guidance for research. Thus, we will continue to employ this terminology as introduced by Churchill [1962].

The effects of audit anticipations, for instance, may occur before an audit takes place and experiments designed to test these effects, separate from the effects produced by other parts of the audit process, may be usefully studied in a research context. The results of such research may then prove useful in the development of auditing strategies which could be intended to conserve the time of the audit staff by augmenting or supplementing them in various ways by announcements pointed toward one or more forms of such anticipations. The experience of the audit, an actual audit occurrence, can provide communication to auditees about the organization and what it considers important. Classifying these audit anticipations, together with actual occurrences in the one rubric of “audit per se,” we can then experiment, for example, in controlled laboratory contexts, with ways in which these communications might differ in their effects from what is, perhaps later, transmitted in the form of the auditor’s report.

By “audit findings” we refer to those parts of an audit report which can be validated, if required, and which supposedly represent the correspondence between what the auditor found and the audit criteria being used. Audit recommendations, on the other hand, characteristically take the form of prescriptions for correcting or improving organization performance. Thus, they extend beyond the kinds of evidence which are (or should be) available for audit findings. Such recommendations tend to make the auditor a party to the decisions (con or pro). Recommendations are an important part of the public accountant’s service to his clients, of course, but are usually separated from the audit report, e.g., in the form of a “management letter” which goes only to the auditee.

The kinds of involvement that such audit recommendations may produce was evident in the companies we studied. Where recommendations were made, the reports customarily included a response or commentary by management and this is intended to provide a broader basis for understanding by recipients of the report and, we think, it also provides a needed control on the auditor.

A further extension of the audit is exemplified in the recently released GAO [1976] report on its audit of certain activities
(compliance auditing) of the Treasury Department’s Office of Revenue Sharing. GAO customarily publishes its recommendations, a response by management to them, and its evaluation of management comments as well.

In this case, however, the Office of Revenue Sharing (at the Treasury) complained that GAO was reversing some of its earlier recommendations. The resulting dialogue format—audit findings, recommendations, auditee comments, auditor comments—may be regarded as an extension of the audit designed to explore new ways in which “third parties,” including the general public, may better perceive the alternatives from which a particular management problem might be approached [GAO, 1976, pp. 24–26]. It nevertheless raises questions of possibly shifting borderlines between management and auditor activity (and responsibility) which certainly merits attention.13

The inclusion of audit recommendations and the auditees’ comments in response (which is becoming an additional element of an audit) is widespread in the private sector. Indeed, all three companies studied included the auditee’s comments in the audit report and two of the three corporations included auditor’s recommendations. There is one view, which holds that recommendations may only be a necessary way by which auditors can test their own findings, viz, by thinking through some of their criticisms in a search for possible correctives.14 In another view these recommendations may constitute the gist of any value that an audit might have. Both positions were encountered in the course of our studies.15 Although both positions were argued vigorously by their proponents, it seems fair to say that this must depend at least to some extent on the underlying qualities of the audit personnel, their experience, and their familiarity with what is being audited. It also depends on the scope of the audit, the methodology that is available, and the organization’s policies on audit use.

13As Morse [1976, p. 9] observes, “Section 236 of the Legislative Reorganization Act of 1970 requires any Federal Agency that has been the subject of a GAO report containing recommendations to report to the Committees on Government Operations and on Appropriations on the corrective actions it has taken (84 Stat. 1171).”

14In much the same way that professional literary critics find it necessary to write poetry from time to time—not because this produces good poetry, but because it helps provide perspective, to them, for their criticisms of others.

15And a third less common one which held that audit recommendations only served to give auditors a feeling of job satisfaction.
Audit Personnel

Accounting is the source discipline from which auditing has been developed. The vast bulk of audits are currently performed by professional accountants, be they in government, industry, or public accounting. Yet the broadened scope of the comprehensive audit is raising questions as to the make-up of the audit team. For example, when Corporation C began to emphasize comprehensive audits it found that the then extant internal audit staff did not possess the requisite background to successfully perform these audits. The expansion of scope and the need to deal more effectively with EDP caused this relatively small internal audit department to experience a 100% turnover in less than two years. The predominant backgrounds of the internal audit staffs which we studied varied considerably. Corporation A uses line managers as auditors on a rotating two- to three-year term as part of its management development. Corporations B and C, however, still utilize primarily accounting trained persons in the audit function. GAO, on the other hand, now tries to hire, by explicit policy, no more than 50% of its audit professionals with background in accounting.

This separation of accounting and auditing, to the extent it occurs, raises questions concerning the need both to investigate and to teach the elements of auditing separate from those of accounting—possibly even to call for the development of a “discipline of auditing.” Such separation also seems to be a response to the nature of the comprehensive audits that are conducted. The audits we observed which involved an evaluation of effectiveness and of propriety seemed to require audit personnel with extensive knowledge of the process under audit. For example, Corporation C strongly prefers to hire auditors who have had relevant industry specialization. On the other hand, audits directed primarily to compliance with fairly explicit management standards utilized people closer to the discipline of auditing (accounting) and further away from the discipline being audited. The exact relationship of the audit scope and the extent, level, and nature of the auditor’s training and experience is a question which can and must be answered through research, as well as experience and experiment for some time to come.

Some Possibilities for Further Research

The possibilities for research that can aid or limit the developments which we have discussed are many. They range from research
of a philosophical or ethical nature, as we have already noted, to research on improved concepts and methodologies such as mathematical or statistical models for optimizing or controlling the allocation of audit resources. This research also includes empirical studies, such as surveys, that help to identify the education and experience of audit personnel employed, the different forms of organization being utilized within and around the internal audit function, etc. Tracking these developments in auditing practice is useful for detecting trends and, probably, directions of further developments and their implications for further research.

Rather than discussing the broad range of research possibilities alluded to above, we shall focus instead on "empirical" or "quasi-empirical" approaches which can be used at early stages in scientific inquiries which are aimed at identifying new problems rather than testing rigorous, already well-formulated hypotheses. The delineation of research possibilities is a vital step at the early stage of any scientific investigation, which can then lead to a structuring of the problems for further research of a more precise, analytical nature and hence our use of quotation marks is intended to differentiate terms like "empirical" from the meanings they might have at a later (better structured) stage of scientific research and development.

Consider, for example, the potential effects of "audit per se" on the behavior of prospective or actual auditees as discussed in the prior section. We suspect that these effects will depend, with varying degrees, on levels of education of auditors and auditees (the personal variables) as well as the organization (including cultural) milieu in which such audits are conducted. To examine these possibilities in the near future, we have made arrangements to expand our panel of cooperating organizations to include a hospital. In particular, we want to study practices and problems involved in the use of "tissue culture committees," and like devices, for auditing the decisions made by members of that hospital's surgical staff.

This is one instance of what we are referring to as an "empirical" inquiry, which attempts to identify and structure the research problems. In this inquiry, we are intent on discovering some of the potential behavioral effects that audits, and similar devices, may have when conducted by independent, highly educated peer groups such as the tissue culture committee. In addition, this research opportunity might enable us to consider variations on
the kinds of reports that are rendered, the extent of their circulation, and the kinds of consequences that such disclosure might have for surgical behavior. We might also want to use this opportunity to help demarcate boundaries for the scope of such audits and their disclosure. Note also, however, that our use of the term "empirical" refers to the careful selection of a study site rather than an attempt to secure an unbiased (representative) selection of a known or hypothesized development. Thus, in particular, we have selected a hospital rather than a scientific research laboratory, for example, because we prefer the relatively well-structured organization setting it possesses and the relatively well-defined objectives of the former kind of context at this early stage of our investigation.

With this example of an "empirical" inquiry we may return to our discussion of "audit recommendations" to illustrate what is intended by the term "quasi-empirical." One possible way to study the effects of "audit recommendations" would be to build on some of the earlier work by Churchill [1962] which, with controlled experimental designs, sought to study the effects of "audit per se" and "audit findings" on experimental subjects. These controlled laboratory experiments, which we would classify as "quasi-empirical," did not attempt the more difficult task of assessing the effects of "audit recommendations." The latter effects, we might suggest, could be examined in similar "quasi-empirical" experimental setups, where prearranged "audit recommendations" could be related (negatively as well as positively) to known possibilities for improving the previously designed set of operations. These known positive or negative recommendations and the observed behavior of a group of experimental subjects could be compared to the effects of these same recommendations offered at random to a control group of subjects.

Other extensions of this suggested experimental framework could be used to study the effects on auditors as well as auditees via the same kind of "quasi-empirical" inquiry. For example, we might return to the other side of this process and ask, via similar quasi-empirical studies, whether an auditor derives self-actualization or seeks a better understanding of the process under examination when preparing audit findings and recommendations. Alternatively, we might study whether this is a means of seeking approval from superiors or sustaining an auditor's own morale (under criticism) in a variety of contexts. Finally, we might ask
whether auditee responses to auditor findings and recommendations serve as controls over the auditor and whether they are useful (and in what form) for third party decisions? It would be necessary, of course, to consider the influence which is exerted on the above questions of auditor-auditee behavior in a context of organizational uses of audit reports as a basis for sanctions and possible disclosure effects as well.

The form in which "audit findings" and "audit recommendations" are communicated also invites "empirical" as well as "quasi-empirical" attention. Clearly some of these findings and recommendations might be expressed only in qualitative terms as in audits of propriety. Other audit findings and recommendations might be expressed in a sharper, more quantitative manner. Thus, the form of audit findings and recommendations and its effect on auditee and auditor are subject to "quasi-empirical" research. This could include experiments to study ways in which varying combinations of qualitative and quantitative information might influence decision-making behavior. In fact, work of this kind has already begun.\textsuperscript{16} This has been restricted to only a single decision-making dimension (accounting information variety) whereas what is wanted is a study of multiple dimension effects (auditing variety) in order to deal with, for example, propriety, efficiency and effectiveness, and accompanying disclosure possibilities.

The types of reports and the makeup of the audiences to which they might be directed also require investigation. The GAO, as we have observed above, has done a considerable amount of experimentation and innovation in its reports. This is partly because GAO serves a very wide audience with its generally distributed reports. The internal audit groups we examined, on the other hand, have quite different reporting requirements and generally do not distribute their audit reports widely, even within the confines of their organizations. On the other hand, their reports are pointed much more toward immediate management action and hence they have experimented with a variety of weighting systems and related scoring devices which can help their managements order (and reorder) their attention and priorities between (and within) these reports.

\textsuperscript{16}See the report by Flamholtz, Oliver and Teague [1976] which utilizes an experimental design approach as well as the earlier survey approach of Dearborn and Simon [1958].
As was mentioned earlier, a factor that appears to influence the organizational level of the audit function is the scope of the audit. Audit groups conducting broad scope audits generally report at higher levels of management than do those performing financial type audits. This scope-organizational reporting level problem is interesting in its own right. It also raises some interesting questions on the relationship of such a control-reporting system to the conventional performance evaluation system that is based on financial measures such as profits and return on investment. Here, too, there are a variety of interesting possibilities for research and education in management planning, reporting, and control systems.

The number of reports (in all of the organizations we examined) has now become so voluminous as to raise a problem in its own right. This problem is now receiving attention in some of these organizations and it might also command attention from the research community as well. In particular, there is a need for suitable means of summarizing reports to determine whether patterns of problems (or opportunities) are present in multiple reports that could go undetected if attention were confined only to individual reports.

Two issues related to the scope and organizational location of the internal audit function are whether it should be centralized or decentralized, and the issues of personnel composition—their experience, background, and educational preparation. These, we believe, are important areas for research and the most promising approach, at least for the immediate future, lies in observation of developments which are actually going on. The scope of the reports issued and the experience and education of the auditors has been commented on above but there are other issues as well. One such issue involves “traveling” versus “resident” auditors. The rationale for resident auditors is that it is the best (only?) way to develop in the auditor the requisite understanding of activities being audited, particularly where the nature of the operation is complex and fast-changing and the scope of the audit requires the assembly, and even the development, of managerial objectives, processes and procedures, and actions. The other side is, of course, the possibility for compromise of an auditor’s objectivity and, hence, his third party function via compromise of the auditor’s actual or perceived independence when he resides that close to those being audited. The interaction of scope, audit organization, and
auditor competence is important and is a challenging area for research for the development of comprehensive auditing.

We have begun to address these issues in our initial studies where the problem is present in two of the companies. It is clear that other research is needed by us and by others. Ideally this research could also include an examination of ways in which these functions are being organized in other countries, in both private corporations and in governmental units.\textsuperscript{17}

Finally, a question that is frequently raised in recommendations regarding the expansion of any existing information-processing activity such as auditing is—do the benefits justify the costs? The recent recommendations for social audits, for example, have been subjected to this critical question [AICPA, 1972]. The benefits of any corporation's socially related actions are frequently difficult to define or quantify in dollar terms.\textsuperscript{18} In evaluating benefits, we might argue that the existence of anticipatory effects confounds the measurement of benefits. In the example of the "tissue culture committee" audit of surgical performance, most of the benefits take place because their audit is expected; and thus the auditor finds little in the way of benefits since the desired results have already occurred. The cost/benefit question is an important issue and an area for research. Yet the nature of the comprehensive audit function suggests to us that the issues of what should be audited, how, by whom, and how the results should be disclosed are areas that need further exploration before the cost/benefit question can be productively addressed. It is in these areas that we plan to proceed.

\textbf{SUMMARY AND CONCLUSIONS}

Our use of auditing as a tool of management and social control derives from the existence of an "accountability relationship" between two or more parties. We emphasize that we are not simply restructuring accountability in terms of the traditional meaning

\textsuperscript{17}See, for example, the series of articles being published in \textit{The International Journal of Government Auditing} and especially the very interesting discussion by Zuckerman [1976] of "The Role of the Ombudsman in Israel," which examines ways in which Ombudsman and auditor might be simultaneously combined in a single agency.

\textsuperscript{18}In spite of this critical question, there is a great deal of activity in this area as is evident in Rossi and Williams' [1972] work on evaluating social programs and the forthcoming book by the AICPA, \textit{Measurement of Corporate Social Performance} [1976].
of management stewardship and responsibility. The audit by the "tissue culture committee" illustrates the broader meaning of accountability which applies to dynamic management and social processes in which someone, not necessarily a manager in the customary sense, is held accountable for his or her decisions and actions. The emergence of multinational and complex conglomerates underscores the importance and the need for broadened tools of management and social control which are flexible and adjustable to particular situations and yet provide adequate controls as a basis for comparison and evaluation. It is the need for servicing these accountability relationships, we might argue, which justifies the expanded use of auditing.

In summary, we have discussed some basic findings and their potential implications which we have obtained from our field research, thus far, on developments in what, for lack of a better term, we refer to as "comprehensive audits." These developments seem to us to raise a whole host of empirical questions and problems that need to be explicitly addressed by the auditing profession. Professional auditors in the private and governmental sectors have themselves instigated these new audits, and the evolving standards, processes, and reporting procedures which accompany them obviously require research attention. Fundamental issues such as the scope of an audit and the disclosure of the results and their effects on behavior need to be addressed. No doubt, the linkage between the scope of the audit and where the audit results are reported is an important one.

The auditing profession is confronted by a more dynamic and complex environment than it ever faced before even in the restricted domain of financial opinion audits. Legal liability, increased regulation, and technological developments are forcing the auditor to expand both education and training requirements. The technological area alone in terms of highly developed EDP systems has altered accounting information systems drastically and we haven't yet seen the end of these developments. For the auditor there may be no turning back to prior levels of audit and, indeed, there may be an increasing acceleration in the direction of comprehensive audit (and all that it implies) as the public continues its demands for improved accountability in all of its organizations—whether public or private and whether profit or not-for-profit oriented.

This paper has not been directed to all aspects of these topics,
even so far as they can be foreseen now. It has instead been
directed toward pointing up some of the immediately salient issues
which lie on the “cutting edge” of some of these developments
and toward suggesting possible responses from the research and
the educational community which may, in turn, affect the possible
course of further developments in the future.

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I am troubled by the concept of control in this paper. I am also concerned by the concept of comprehensive audits. I am not sure that I fully understand the comprehensive concept. First, however, I have to confess to a personal bias which is the fact that, though I teach at a Graduate School of Business, I have never particularly cared for the word control. To me, control connotes too much of constrained freedoms. It seems that comprehensive audits virtually, by definition, more extensively control and more extensively constrain freedom. To cite an example from the military, the Inspector General of the Army is an internal auditor who performs an audit that is totally comprehensive. The purpose of this audit is clearly to control. Yet, I am not sure what we could learn from the Inspector General, in an observation sense, that is either new or useful for the profession of auditing.

My troubles go somewhat further, in that recently I spoke with a colleague about the topics of internal auditing and comprehensive audits. He related to me a story of a doctoral student. The year was 1958, and the doctoral student was interested in operational auditing. The student didn't find much on the subject but, after some searching, discovered a Midwest chain store that had an
operational audit as part of its internal audit. One of the audit routines was to observe that the chain store manager followed the proper lock-up procedure when closing the store each night. Not surprisingly the lock-up procedure was followed perfectly whenever the auditor was there to observe. Such an audit is clearly more comprehensive than a typical financial audit, yet, once again, I am not sure that it provides us with anything new or useful for the profession of auditing.

Despite my disapproval of the term control and my confusion over the term comprehensive, I can imagine circumstances where control devices are entirely legitimate. It seems to me that the rise of the General Accounting Office has largely been due to the need of the Congress to control overly powerful Presidents and overgrown bureaucracies. Control in this setting is legitimate because it is used to restore a balance of power. And, here, control needs to be comprehensive because the scope of the Federal Government is comprehensive.

Control in the private, large, multinational corporation can also be legitimate when it is sanctioned by the more or less agreed upon goal of achieving success through profits. Nevertheless, control is tolerable in business organizations only through the establishment of reasonable standards and reasonable measures. By and large, persons in business organizations know what is expected of them. They typically agree to these expectations, and they usually endeavor to achieve them. Auditing of any sort, let alone comprehensive auditing, enters into this picture only in an ex post manner, that is, to determine whether the expectations were actually achieved. It seems doubtful to me that auditing can actually control. I believe it is the general propensity of persons in organizations to follow the rules and norms. (For example, consider the traffic cop. Does he actually cause the automobile to drive on the right hand side of the road?)

In short, I believe that there is a different underlying purpose of audits in general, and comprehensive audits in particular, than the purpose of control. I derive this conclusion from my own work, in which I studied the management strategy of a large public accounting firm using a participant observation methodology. In this study, I discovered that the management strategy of the public accounting firm consists of three basic components:

1. Maintaining and Improving Client Relationships;
2. Maintaining and Improving Relationships with Entities other than Clients; and

I discovered that within the area of maintaining and improving client relationships the firm could hardly be described as being in an adversary or even controlling position with respect to the client. The relationship between the firm and the client can best be characterized as an equilibrium condition which is maintained through the exchange of products of tangible value. For its payment of fees, the client expects to receive, and the firm endeavors to deliver, service in the following areas:

1. Tax return preparation and tax planning;
2. Management consultation on accounting and management information systems;
3. Training of, and search for, qualified accounting and financial executives;
4. Advice and expertise in matters pending before governmental agencies; and
5. Ready access to the securities and debt markets through the medium of unqualified financial statements.

I observed that clients will move to amend or dissolve their relationships with auditors unless they are receiving satisfactory service in all areas listed above. These services are not mere by-products of the audit process, as many writers would have us believe.

What I had hoped to see in the Churchill, et al., paper was a discovery similar to my own—that is, a discovery that the function of modern auditing is not so much control, with its accompanying adversary overtones, as, rather, consultation toward the achievement of managerial goals.

Theoretically, the corporate internal auditor and the division manager are on the same side, with the same interest in the success of the organization. The audit process should be, therefore, not only a feedback of ex post results to higher level managements, but also a feedforward of ideas and concepts for future success.

The authors observe that the structure and composition of internal audit staffs may be changing by moving away from strict accounting-trained auditors toward more general management-trained auditors, experienced in the processes that they will be
auditing. I believe that this lends support to my thesis of the consultative auditor whose function is to teach, more than to criticize.

At one point in the paper, the authors suggest a scenario in which the functions of management and auditing are strictly segregated into decision-making and scorekeeping, respectively. The authors go on further to suggest that comprehensive audits would require such a segregation. They cite evidence in two of the three corporations which they investigated, to the effect that such a segregation has actually been evolving through the means of audit reports which are submitted directly to the board of directors. I observed the same phenomenon in my own work—that is, the movement to closer contacts between boards of directors and auditors.

In the public accounting setting, I feel that this movement has been necessary in order to create a buffer between the need to deliver a tangible product to the client and the need to provide a social product in the form of reliable financial statements.

From the internal audit perspective, I would interpret the movement differently, however. In fact, I believe that the movement accords again with my thesis of the consultative auditor. It is, of course, the board of directors who have ultimate responsibility for the corporation. This ultimate responsibility is not just financial, it is comprehensive. It seems logical, therefore, that comprehensive audits should be reported to those with comprehensive authority.

I would assert that comprehensive authority is exercised most efficiently in a proactive, rather than reactive, manner. The consultative auditor functions in a proactive manner. Thus, I feel that comprehensive authority and comprehensive audits require consultative auditing, not segregation of functions into decision-making and scorekeeping.

At several points, the authors state that they observed proactive behavior on the part of auditors who perform comprehensive audits. I think it is possible that these auditors were actually acting in a consultative mode.

The authors do not discuss their methodology in explicit detail. I have inferred that they performed their study largely through interviews. I would like to suggest, therefore, that there exists an organizational phenomenon which I have come to call a "structural transformation." It is my belief that interviews and surveys of organizational participants are often invalid due to
structural transformations. Put bluntly, organizational participants often may not know what they are talking about. In my own work, I have found that in order to overcome structural transformation it is often necessary to employ a participant observation methodology. I would suggest to the authors that an observation approach might reveal that the internal auditors who perform comprehensive audits actually act in a consultative manner. If this, in fact, turned out to be the truth, I think that those who believe in adversary relationships as a necessary mechanism for control of avarice and cupidity will probably be appalled. "How can auditors maintain independence if they are consultants?" they will say; and I have no answer to this question. However, I think that those who understand that social norms and values are, in fact, the deepest and most efficient means of social control will probably agree with me that the consultative mode for auditing is the desirable mode for the future.
Discussant's Response to "Developments in 'Comprehensive Auditing' and Suggestions for Research"

ARTHUR B. TOAN, JR.

I find much of the paper prepared by Professor Churchill and his associates at Harvard to be of considerable interest and value. There is a lot of good material in it, presented in a useful form. Somewhat surprisingly, I also find myself in disagreement with some of the facts, interpretations, and conclusions and with research priorities set forth in the paper. If I had "equal time," I might explore the differences in detail and you could judge for yourself. Since I do not, I shall concentrate on my suggestions for research and discuss aspects of the Harvard paper only when this is necessary to make my comments clear.

As you will see, my preference is for research that will provide needed information about what I believe are some of the more basic and fundamental aspects of comprehensive auditing. I feel that many of the projects suggested in the paper are of peripheral importance at this stage of the game. I likewise feel that, since much of what is labeled as "comprehensive auditing" is very similar to management consulting and to some of the work of staff departments and other types of auditors or inspectors, there is a great deal of useful information already available on many of the projects suggested in the paper. This should make their postponement even more reasonable.
I am going to try to be helpful by suggesting what the important questions are. It will by now come as no surprise to you that they are pragmatically oriented. Whether they are researchable and how and whether you wish to take them on, I leave in your hands. I hope there will be a match but I do not know.

I probably should declare myself a bit on the general subject of comprehensive auditing at the outset. I view some extension of the auditing process as desirable and, given the organizational dynamics of the situation, as inevitable. Personally, I am in favor of it—for internal, external, and governmental auditors. I am, however, less sure of the scope of activities that some people have indicated they would assign to these extended or alternative forms of auditing. And I am equally unsure of the validity of the idea—which often seems to be implied if not expressed—that there is necessarily something about the auditor or the auditing process that makes comprehensive auditing superior to reviews and evaluations and recommendations that have traditionally been made by other organizational executives and departments using roughly similar methods. In the true spirit of free enterprise, I welcome some competition that will help to decide this point.

But back to research.

First and foremost, I would like to see a project that would agree on terms and definitions. The present confusion is such as to make intelligent communication very difficult. The term “audit” is being modified by adjectives signaling uncertain expansions in scope. Even worse, the basic term “audit” is being used to describe work that varies all the way from a rigorous financial audit preparatory to the expression of an opinion by an independent CPA to what amounts to little more than the personal judgment of an individual who has reviewed and evaluated a situation and made recommendations about selected aspects of it. This is a project well worth doing. Since the agreement of the major parties involved is important, I suggest that some combination of the academic community, the GAO, the Institute of Internal Auditors and the AICPA work to bring it about.

A second, very important need is to establish the validity of one of the major assumptions about comprehensive audits set forth in the Harvard paper. It is the apparent conclusion of some internal and external auditors that: (1) the financial auditing and the financially-related-procedures auditing now carried out by most internal auditors is sufficiently unproductive so that it can be greatly reduced—sometimes almost eliminated—or, alternatively,
that: (2) this new review and evaluation of the efficiency and effectiveness of operations should be considered to be a substitute for it. I did not get that impression from Mr. Perry's comments yesterday, but if this is a view that is at all widely held, I would think it needs to be proven.

I can easily see why some of the work involved in financial auditing—at the detailed level, particularly—is much less interesting and challenging than comprehensive auditing. I can also see why it would seem "more professional," how it could be shown to be of greater value to management, and why it offers a more attractive career path for those engaged in it. I fail, however, to follow the logic that says that financial auditing work is, therefore, unnecessary or unproductive. What seems evident to me, however, is that, in a period in which one audit-related shocker follows on the heels of another, this is worth finding out.

External auditors, in many situations of which I am aware, place considerable reliance on the work done by internal auditors. On what basis can they or will they determine that comprehensive auditing is equal to or better than the old? Or, if they don't agree, what will auditors now do—not only to compensate for what they have lost but also to make maximum use of what is now available. And, if the expanded scope procedures of comprehensive auditing are effective substitutes for financial audits as carried out by the internal auditor, should not the external auditor likewise make important changes in his own auditing techniques? This—you can see—is an important, interesting, and complex topic.

A third set of questions that I see as both attractive and important is more organizational or managerial in nature. If we accept the idea that most "audits" of propriety, efficiency, and effectiveness are—as the GAO itself says—really reviews, evaluations, and recommendations, then we can see that they are very similar in objective—if not in approach—to the work of top management, line managers, and many staff departments. Why should we call them "audits" and set up still another group? What's the matter with those we have now? Is there something about the audit process or the auditor's role and position that makes him particularly productive? If so, what is it? Are these attributes unique or should they be introduced into existing departments? Or does each department or approach have an advantage or a role that makes it particularly effective in selected areas?
These questions will have to be answered sooner or later. If or when comprehensive auditors want increased budgets and a variety of expensive skills, any management worth its salt is bound to be concerned—not just with the comprehensive auditors but with the other departments involved. Those departments, you can be sure, will present their case forcefully, too. Since the future of comprehensive auditing may well be at stake under these circumstances, some sound answers based on both theory and proven experience would be helpful—perhaps to the auditor and surely to management, depending on what the research would show.

A fourth area—perhaps the most important of all—is concerned more directly with what comprehensive audits can really accomplish and how. I have, based on personal experience in a consulting career of some 30 years, absolutely no doubt that, in some situations, reviews, and/or evaluations, and/or recommendations can be made that will produce useful, reliable results. I am equally sure there are other cases where the chances of success are much more problematical. And finally, I am convinced that there are many areas where the chances of success are minimal. I could cite a number of such areas—for instance, “How does one determine the ultimate efficiency or effectiveness of expenditures for education or research?” might be a good one in view of the interests of this audience. Not only is the collection and analysis of data difficult and the interpretation and development of conclusions and/or recommendations more so, but there is wide disagreement among the professionals in the field. There are similar important areas in business, also; for example, how would comprehensive auditors have evaluated RCA’s decision to enter the computer business in, say, 1955. Calling these reviews “audits” and having them made by “auditors” is not going to make all that much difference. And cutting down just what it is you are auditing is not the answer, either, unless things can be made quite clear to all involved.

Auditors and auditing cannot conquer the world. I think some serious thought needs to be given to what auditors can do (and have done)—and how. I think they, too, eventually, will have to set limits which fit reasonable expectations as to resources and skills. Just as all consultant and staff departments have to specialize in subject matter as well as technique, I feel they will too. Some thoughtful study can help with this process.
One should also take note of the extraordinary opportunity for research in the GAO program—and what I suspect might be an inclination on the part of the GAO to support that research when it believes it will be of value. The expanded scope aspects of the program are one element of it, but there are other significant features to the program as well. There are provisions in the program for one set of auditors to rely on the work of other auditors on an unprecedented scale. There is a requirement that accountants rely on the work of nonaccounting experts beyond anything encountered in financial auditing. An attempt must be made, under many GAO-type audits, to extend evaluations of internal control to include evaluations of management planning and control systems and criteria in areas in which a good deal of pioneering is required. I could add a great many more. The point I am trying to make is that something big and important is going on and that the GAO efforts offer a fertile field for imaginative, realistic minds.

Finally, for those of you with a different bent, may I suggest something else. I find it of substantial interest that, at the same time that internal and governmental auditors are embracing comprehensive auditing with open arms, the public accounting profession, the AICPA, and the constituent firms are exhibiting a great deal of caution. I think this provides a perfect opportunity to study the profession and the context in which it operates. What is it—fear of lawsuits and publicity, fear of dilution of the financial auditing function, an unwillingness to experiment with imprecise opinions, greater concern as to what can be accomplished, or what? And, is it good or bad that it should be that way in the long run?

I cannot close without mentioning that, in at least two important respects, the paper did not deal at all with auditing as a tool for social policy—the second half of the title as it appears in the program. The paper does discuss, to a limited extent, auditing the efficiency and effectiveness of social programs—which clearly is one category of government expenditure in which social policy is important. It does not, however, discuss what might be described as auditing or establishing the accuracy of important social data—crime statistics, for example—the basic social information on which many governmental programs are based or in terms of which they are judged. Even more surprising—in view of the amount of time that Professor Churchill and I and some others have
spent in the past several years in writing a book for the AICPA on "Measuring Corporate Social Performance"—the paper does not mention the role of the auditor in that area either. I know that we both think that the auditor has an extremely important role to perform. We also believe that the need for meaningful research exists. I would like to suggest that you acquire a copy of the book when it appears in a month or so and that you read particularly a chapter on credibility and assurance and an appendix, entitled "Research Needs and Opportunities," and see if they hold interest for you.
Technology and public opinion are ruining the safe, comfortable world of auditing. The existing auditing tools and techniques have not kept pace with these conditions. In my opinion, many of the problems facing the auditing profession, both internal and external, relate to the fact that auditors are not properly equipped to perform their function.

There has been very little research done in the field of auditing during the past 50 years. The emphasis has been, and still remains, on methods of accounting. Practitioners, academicians, and professional research groups have concentrated their efforts on the accounting issues without addressing the problem of how auditors will audit compliance with accounting methods. Even today, the Financial Accounting Standards Board and the Cost Accounting Standards Board issue new accounting standards without ever discussing the control and audit aspect of those standards.

THE PROBLEM

Until very recently, the auditing profession—and, for a moment, let's not distinguish between external and internal—have been able to get by with their existing methodology. However, anyone who reads the newspaper knows that things are changing. This
change can be attributable to three factors. These are:

1. Business systems technology is changing rapidly, which is eliminating those characteristics to which traditional auditing methods apply. The characteristics of the newer technology are:
   a) Telecommunications—The linking of electronic communications with electronic data processing. Systems such as airline reservations systems, electronic funds transfer, and other on-line systems change the method in which transactions are entered and processed;
   b) Data integration—The consolidation of business records into a central location. There is consistency of data, right or wrong;
   c) Automatic transactions initiation—Transactions are initiated in the logic of computer systems, rather than human initiation; and
   d) Unconventional or temporary audit trail—The traditional method of following the path of a transaction no longer exists. Many of these exist only for short periods of time and in a format uncommon in manual systems.

2. Organizations are poor stewards of their environment and resources. It is no longer acceptable to pollute the environment, use stockholders' or taxpayers' funds without exercising due care; and

3. Many previous practices of organizations are no longer acceptable. Many organizations regularly try to control political parties and elections, bribe foreign governments for business, and divert funds for special interest purposes. The U. S. Government no longer finds these practices acceptable.

**EFFECT OF THE PROBLEM**

The auditing profession is coming under increasing criticism for the work they are performing. Most big CPA firms have been sued in one or more cases for malpractice, and even one internal audit group has been sued. The trend is bound to continue. Auditors are faced with the dilemma of trying to perform the minimum amount of work necessary to satisfy themselves regarding some aspect of an organization's work. Much of this must be done with inadequate tools and techniques.

The government is becoming very impatient with the auditing
profession. The attitude in Washington is that organizations must do more to provide the necessary controls to assure that questionable practices cannot occur. Now pending in the Senate of the United States is the Proxmire Bill, one of the most stringent on controls. The Proxmire Bill says that each organization coming under the bill (primarily those under SEC regulations) shall:

(A) make and keep books, records, and accounts, which accurately and fairly reflect the transactions and disposions of the assets of the issuer; and
(B) devise and maintain an adequate system of internal accounting controls sufficient to provide reasonable assurances that—
  (i) transactions are executed in accordance with management's general or specific authorization;
(ii) transactions are recorded as necessary (1) to permit preparation of financial statements in conformity with generally accepted accounting principles or any other criteria applicable to such statements and (2) to maintain accountability for assets;
(iii) access to assets is permitted only in accordance with management's authorization; and
(iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences.

The Proxmire Bill then goes on to say that any person who willfully violates this section shall upon conviction be fined not more than $10,000 or imprisoned not more than two years, or both. This bill, if passed, will have a major impact on organizations' control structures, including their internal audit function.

INTERNAL AND EXTERNAL AUDITORS' PERSPECTIVES

The functions of internal auditing and external auditing are radically different. The external auditors base most of their work on substantive testing, verifying the total amounts in the books of accounts. Internal auditors place their emphasis on the system of internal controls. Thus, the thrust of the external auditor is the verification of yesterday's transaction, while the thrust of the internal auditor is on the system of controls that guarantees the accuracy of processing of tomorrow's transaction.

The difference between an internal and external auditor and their relationship to an organization can be likened to a ham
and egg breakfast. In the auditing relationship to an organization, there are two parties, the internal auditor and the external auditor. In preparing a ham and egg breakfast, there are two parties involved—the hen that produces the egg and the pig that provides the ham. The similarity of the two is their relationship. The external auditor can be likened to the relationship of the hen to the breakfast, while the internal auditor’s relationship can be likened to that of the pig. The bottom line is that the hen (the external auditor) is involved in the breakfast, but the pig (internal auditor) is committed to the breakfast. Thus, while the external auditor can take a position on the accounts of the organization, the internal auditor is heavily committed to the ongoing aspects of the organization.

WHAT RESEARCH IS NEEDED

Accounting research can be theoretical in nature because it is designed to change the methods of reporting the financial condition of an organization. However, auditing research must be practical in nature because auditing is designed to evaluate things that have happened in the past or are currently happening. The research outlook for auditing is, in my opinion, different than most other research areas.

The results of auditing research should be immediately useful to the practitioners in the field. Much of this research must be based on actual field experience of practitioners. This necessitates researchers to leave the laboratory and go out into the field to perform meaningful auditing research. Conceptualizing models and theoretical approaches alone is not a practical means of conducting auditing research.

Following this approach, the types of auditing research needed are:

1. Definition of what is meant by an adequate system of internal controls;
2. Auditing tools and techniques for computerized applications, and for analytical purposes; and
3. Auditing methodology that is supportive of the regulative and authoritative groups such as the SEC, CASB, and FASB.

WHO IS EQUIPPED TO PERFORM AUDITING RESEARCH

Four general categories of individuals have the capability to perform meaningful research. These groups are:
1. The academic community;
2. The public accounting community;
3. Accounting and auditing consultants; and
4. Internal auditors.

In my opinion, the best research will be achieved when two or more of these groups work together jointly to solve particular auditing problems.

**WHAT THE INSTITUTE OF INTERNAL AUDITORS (IIA) IS DOING**

For many years, the IIA concentrated their research efforts on new areas of auditing. The goal was to extend the sphere of influence of the internal auditor. A major aspect of this was the promotion and definition of operational auditing. This dramatically changed the internal auditing profession from the financial auditing aspects of public accountants to operational audits.

Several years ago, the IIA recognized that they must redirect much of their research effort toward computer technology. This redirection shifted the emphasis from researching new areas of internal audit involvement to researching new auditing methodologies aimed at audits of computerized applications. The effort was directed at organizing electronic data processing audit functions, training all internal auditors in data processing techniques and concepts, as well as promoting EDP auditing tools and techniques.

This research effort was climaxd when the IIA received a $500,000 grant from the IBM Corporation to conduct research to develop manuals on the best audit and control practices for computerized applications. Stanford Research Institute was awarded the contract to do the fieldwork on this project. The fieldwork included mailing approximately 2,000 questionnaires to leading organizations worldwide. In addition, approximately 50 in-depth interviews were conducted worldwide with leaders in performing EDP auditing. The study encompassed government, industry, insurance, banking, the academic community, and public accounting firms. The results of this study, which we believe will have a major impact on internal auditing of the data processing function, are scheduled for release in the spring of 1977.

The thrust of this effort is hopefully to move EDP auditing from a specialized endeavor within an internal auditing function to the mainstream of internal auditing. Those that have been actively involved in EDP auditing cannot understand how—when
an organization's records are 95% computerized—the internal audit department can consider EDP auditing a speciality.

Planned and future research efforts by the IIA will be aimed at the following areas:

1. Definition of adequate internal controls in computerized systems;
2. Relationship of internal auditors and public accountants;
3. Working with computer mainframe manufacturers to promote and explain auditability in vendor products;
4. Role and responsibility of audit committees of Boards of Directors;
5. Development and promotion of a new generation of computer audit software;
6. Evaluating the effectiveness of auditing;
7. Development and promotion of effective computer audit tools and techniques;
8. Management of internal auditing;
9. Development and implementation of the methodology for auditing telecommunication and data base systems;
10. Techniques for selecting areas in need of audit; and
11. Fraud—both management and employee.

CONCLUSION

Internal auditing is undergoing a drastic change in function. Auditing traditionally has looked at historical transactions and concentrated its efforts on the verification and accuracy of historical data. The advent of operational auditing moved the auditor from a vantage point of having historical perspective to that of participating as a surveillant of the current time. In an operational audit, the auditor evaluated existing systems, not only for the control aspects but for their performance and effectiveness, as well. The future for internal auditing will be the verification of the processing logic for tomorrow's transactions. The internal auditor will be called on to attest to the correctness of transactions that have not yet been processed. This redirection will virtually obsolete the current methodology, tools, and techniques of internal auditing. Research must provide internal auditors with adequate methodology, tools, and techniques for their function tomorrow.