Cash Flow Decision Making And Financial Accounting Presentation: A Computerized Experiment

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Abstract

The use of financial information to estimate future cash flows may be influenced by the format and scaling of financial statement data. This study experimentally manipulated format by providing a graphical alternative to the conventional tabular presentation, and scaling by offering a probabilistic alternative to the single point estimates of financial statements. Subjects, recruited from large public accounting firms in the US, received the complete experiment in a self-contained computer diskette. The interaction of scaling and format characteristics produced significantly different cash flow estimates. Furthermore, subjects tended to adjust their cash flow estimates based on the interaction of presentation and the skew of the distributional information when probabilistic information was provided. Subjects also altered their cue utilization for the estimate of cash flow when they received differently designed information. Implications for financial reporting and accounting education, centering around the revision of the basic information package, are drawn.

Introduction

Financial accounting contains a central contradiction. Although most agree that its value relates to assisting the decision making process, the information it presents is often both ambiguous and uncertain. Financial accounting numbers are based on a variety of rules and conventions, many of which involve nondeterministic allocations. The level of uncertainty has evoked various recommendations for change. However, few involve suggestions for other than minor reform and changes limited to the unique features of particular accounts.

Part of the limitations on accounting information may pertain to the conventions adopted for the presentation of financial statements. Account balances combined in tabular displays and represented by single number estimates may constrain the user's decision making ability. More consistent and convergent decisions might result from the graphic presentation of information and the distributional elaboration of account balances.

This paper described an experiment in which financial accounting information presentation is manipulated to consider the impact of format and scaling on cash flow decision making. The literature reviewed in the next section yield a set of research questions. This is followed by sections describing the method of the experiment and its results. The last section discusses these results and draws conclusions about the substantive content of the experiment.

Literature Review And Question Development

The Financial Accounting Standards Board, as the primary source of accounting regulation in the United States, in Objectives of Financial Reporting by Business Enterprise (SFAC, No. 1) states: Financial reporting should provide information to help investors, creditors, and others assess the amounts, timing, and uncertainty of prospective net cash inflows to the related enterprise (1978, par. 37). Unfortunately, the realization of this objective is limited by the lack of recommendations about the reporting of financial information that would make it possible. The fundamental problem remains the ambiguity in financial statements that limit their usefulness in cash flow estimation decisions.

Cash flow estimation is a specific instance of a more generic decision making task. As such it is useful to conceptualize an essential input-process-output sequence that underlies it. Libby and Lewis (1977) used such a scheme to classify information processing variables. Two of their information input variables of interest are the scaling characteristics of individual cues and the format of the presentation.

Scaling

Two ideal types of scaling provide a useful approach to this dimension. Point-estimates suggest the existence of a single number and provide no other information. For example, a balance sheet might provide $1,452,799 as the total for accounts receivable. Probability distributions provide a range of possible values, all of which have some chance of being the true value. Within receivables, variations from the single point estimate might be caused by a variety of factors such as sampling error, collectability concerns and future customer discount behavior. The magnitude of these chances will vary according to the expressed distribution, although the single most likely value may be equal to the point estimate. Whereas the point estimate implies precision by suppressing any indication of uncertainty, the probability distribution reveals the full extent of the nature of uncertainty. The financial accounting reports of business entities provide point estimates only. However, in accounting research involving judgment tasks, probability estimates are often provided to specify alternative states, define payoffs and allow subjects to choose optimal actions (see Dickhaut, 1973; Felix, 1976; Crosby, 1981). If probabilistic information is needed in other accounting judgments, it could also be helpful in the use of financial information.

Several official bodies have considered the scaling dimension of the uncertainty of US financial statements. A Statement of Basic Accounting Theory (ASOBAT) (AAA, 1966) explicitly recommended probability distributions. The final report of the Trueblood Committee (AICPA, 1973) came to a similar suggestion in the advocacy of 'possible ranges and dispersions.' However, there has never been a sustained attempt to alter the point-estimates of conventional financial statements.

Format of Presentation

A broadly based research tradition in the information system literature involves the superior ability of multi-dimensional graphics to communicate financial information (i.e., Altman, 1983; Stock and Watson, 1984). Several specific approaches have been used for the interpretation of financial statement data. Chernoff's (1973) schematic faces have been shown to outperform ratios as predictors of bankruptcy (Moriarity, 1979). The substitution of nonmonetary units for monetary ones may also effect decision-making (Harrell and Klick, 1980). These studies, among others, suggest that improvements on the tabular format of accounting information may be possible.

The production of graphical information had been, until recently, technologically constrained. Even if graphs did communicate more effectively, the inability to produce them may have justified their neglect. Advances in computer technology have devastated this restriction. Graphical presentation, in a dazzling number of arrays, is now within the capability of any minimally trained individual equipped with a personal computer and the appropriate software. Despite this capability, the reporting of financial information continues to be a tabular presentation.

Unlike scaling, the format of accounting information has not received any explicit attention from authoritative professional accounting bodies. However, a reasonable extension of the advocacy of probabilistic and range information is the argument for nontabular presentation. Probabilistic information is conventionally graphically depicted as a probability density function, although its use is not necessarily dependent on visual inspection.

Research Questions

A large volume of accounting research supports the pervasive uncertainty that surrounds accounting decision making. However, extensive research in auditor behavior has pointed towards some consistencies in the information search behavior of individuals with similar backgrounds and occupations (see Ashton, 1974; Ashton and Brown, 1980, Libby, 1979). Therefore, given more relevant information, decision makers might make more consistent decisions. Information for these purposes might include the means by which data are presented and arrayed to the decision maker.

Perhaps the most salient change in US financial reporting over the past fifteen years has been the movement toward cash flows and away from strict accrual accounting. Perhaps spurred by the 'surprise' bankruptcy of the retail giant W.T. Grant, cash flow reporting and objectives became a priority topic for the Financial Accounting Standards Board (FASB) in the early 1980s. This resulted in the replacement of the Statement of Changes in Financial Position (an accrual report) with the Statement of Cash Flows. However, the FASB allows an 'indirect' method that essentially adopts the accrual

approach of the former statement. Although the FASB recommends the 'direct method' for the Cash Flow Statement, the collection of accounting data by companies does not easily accommodate its requirements. Nonetheless, a bevy of academic research has provided methods for the estimation of cash flows (see e.g., Ketz and Largay, 1987; Charitou and Ketz, 1991). Subsequent research also has incorporated the cash flow estimation as the legitimate purpose of financial accounting information (see Gordon and Hamer, 1988; Neill et al., 1991).

The primary emphasis in decision studies pertains to enhancement of the quality of outcomes. However, since no objective standard exists for the projection of cash flows, the closest test of quality involves the identification of systematic shaping factors. If aspects of cash flow decision making can be associated with increased consistency and comparability, knowledge about this decision making has improved. This paper suggests the possibility that different decisions will result that can be attributable to scaling and formatting characteristics of accounting information. Specifically graphic presentation and tabular presentation might produce different estimates of future cash flows. Furthermore, point estimates and probability distributions could produce different estimates of future cash flows. Differences in cash flow estimates may be attributable to the combination of format and scaling characteristics.

H_1 Cash flow estimates are significantly associated with the interaction of scaling and format characteristics of presentation.

This hypothesis asserts the argument that the combined influence of multiple factors is more important than the constituent main effects (see Neter et al., 1985).

While outcome issues are important, they fail to exhaust the more general concern with improvements in decision making. Attention to the process of reaching a decision, although exploratory, represents new research questions pertaining to cash flows. For these purposes, how people use information contained in specific cues is believed to be the pivotal concern. Both scaling and format might involve different cue utilization patterns.

H_2 Cue utilization is significantly associated with differences in the scaling and formatting of presentation.

No correct model of information use in cash flow estimates exists. Therefore, the second research question is limited to the identification of differences. For these purposes, cue utilization includes the extent of, and order that, subjects considered the pieces of information. These factors are consistent with the heuristic nature of accounting decision making. For example, Tversky and Kahneman (1974) identify recency, representativeness, availability and anchored adjustment as rules of thumb that people use to cope with uncertainty. Therefore, which cues were examined most carefully, and which were examined first, become important ways of gaining insight into how cash flow decisions are made.

Description Of The Experiment

Prior studies involving financial information judgment tasks suffer several methodological weaknesses. Most important, by offering subjects a small set of cues, they usually ensure that subjects will use those cues in making their decisions. In these cases, it cannot be determined if the cues are as relevant to the judgment task as they seem, since subjects had little choice but to use them. This problem, referred to as a demand effect, can be mitigated by offering a wider set of relevant cues. A second problem occurs with any experiment that uses a paper and pencil technology. In such an environment, researchers necessarily must rely upon the self-reports of subjects about their decisional process. Since these self-reports tend to be unreliable, the conversion from input (the cues) to output (the decision) remains a black box. Past studies have concluded that even experts have limited insight into their own use of cues in a rich informational scenario (Libby and Lewis, 1977; 1982). Rectification of this situation requires a means of objective evidence production possible only when the paper and pencil technology is abandoned. A third methodological problem involves inadequate control over the randomization process. Experiments usually require a random assignment of subjects to groups. Researchers often fail to report how this was accomplished. The practical difficulties of achieving sufficient randomization are compounded when primitive techniques are used. Although impossible to measure, unintended bias may be introduced. The apparent remedy requires that the assignment of subjects be taken out of the researcher's control.

Group Definition

The research questions were tested by the construction of four experimental groups. Table 1 illustrates the nature of these divisions as they vary by format and scaling treatment. Group 1, by being exposed to a tabular format and a point estimate scaling, represents the current state of financial reporting practice. This allows this group to function as a control group. Group 2 varies from Group 1 by the substitution of probabilistic information for point estimates. Group 4 alters the information provided to

Table 1
Experimental Design
Format and Scaling Characteristics

Group 1 Format: tabular Scaling: point estimate Not sensitized	Group 2 Format: tabular Scaling: probabilistic Not sensitized	Group 3 Format: tabular Scaling: probabilistic Sensitized
Group 4 Format: graphical Scaling: point estimate Not sensitized	Group 5 Format: graphical Scaling: probabilistic Not sensitized	Group 6 Format: graphical Scaling: probabilistic Sensitized

Group 1 through the use of graphical presentation. Group 5 contains both treatment effects.

New means of presenting financial information could baffle decision makers. Since graphic presentations have permeated other aspects of accounting practice to a much greater extent than probabilistic scaling, no special instruction was necessary to sensitize subjects to this format. However, probabilistic scaling represents a more novel treatment that could exceed the familiarity of some subjects. Therefore, two additional groups were constructed to elaborate the groups receiving a probabilistic treatment. Group 3 and Group 6 both received a tutorial on probability. The latter group, unlike the former, received graphical information for their judgment task. By not having all subjects in treatment groups exposed to the tutorial information, the effect of this sensitization can also be determined.

The experimental design assigned subjects to a specific group for all decisions they were asked to make. In other words, an inter-subject design was used for the format and scaling variable manipulation. This approach avoided the more problematic learning effect interpretations associated with completely intra-subject designs.

The Judgment Task

The dependent variable for the judgment task directly posed the cash flow problem by asking 'What is your best estimate of the net cash inflow for the next year?' A large number of information cues were made available for this estimation purpose. All subjects received access to a complete set of financial statements for the previous year, background information, assessments by third parties and industry comparison data. The cue that was expressly manipulated was additional information on accounts receivable. Table 2 clarifies what each group received. Groups 3, 4 and 5 were given a probability density function[1]. However, Groups 2 and 3 received information that would allow subjects to quantify the uncertainty of the accounts receivable balance.

Subjects in groups with point estimate information (Groups 1 and 4) were given two separate cases to consider. These cases differed only by the numbers that were involved. One case established numbers at the 25th percentile of the Robert Morris and Associates ratio information. Combined with the second case, wherein numbers were set at the 75th percentile, the repeated measure design allowed the consideration of whether subjects would disproportionately alter their cash flow decision based on the viability of the hypothetical company. These two levels were chosen so that the poorer of the two (25th percentile) would have marginal cash flows from operations and the better firm (75th percentile) would have strong cash flows from operations.

Subjects in the other four groups had four cash flow cases to consider. In addition to the repetition necessary to vary the percentile position, an explicit within-subject manipulation was performed. Probabilistic information

Table 2 -- Panel A
Information Cues To Experimental Groups
Common Information

1. Audit Report	Unqualified, but with uncertainty as to collectability of a large receivable.
2. Background information	Information about the firm's history, facilities and competitive environment.
3. Credit Report	Information on key personnel, information system, financial reporting quality.
4. Five Years Summary	Key income statement and balance sheet financial information (last five years).
5. Notes to Financial Statements	Additional information on depreciation methods, tax liability and long term debt.
6. Robert Morris Associates Ratios	Key liquidity and profitability ratios for current year contextualized by RMA quartile percentiles.
7. Statement of Financial Position (Balance Sheet)	Two years of information, standard format.
8. Statement of Earnings	Single step, two year statement.
9. Statement of Cash Flows	Previous year's report prepared in the standard indirect format.

can vary in its skew. Right skewed distributions have a large proportion of the area under the curve toward the left side of the mean and a longer 'tail' on the right end. Left skewed distributions will have the same attributes on the reverse sides. Both can be contrasted with the familiar normal distribution, which is symmetrical when divided at the mean. The four cases examined by these groups exhausted each combination of the two percentile positions and the two skew characteristics.

Skewness was introduced on an intra-subject basis to evaluate the robustness of the research question conclusions. Without a skewness difference in the repeated measures, it would be impossible to consider whether the resultant format and scaling conclusions were just an artifact of the skewness and percentile choices imposed. These intra-subject variations, although not the primary purpose of the research, offer some additional information about cash flow decision making.

Administration

Subjects received the complete experiment on a diskette, which they were asked to return to the researcher. The only periphery element was the transmittal letter requesting cooperation with the study. The hardware and software demands made by the experiment were modest[2] and the user interface was both highly friendly and resistant to user error[3]. The experiment requested a very reasonable number of keystrokes (usually less than 100) from the subjects.

Following a welcome and a screen depicting the objective of the task, subjects read a scenario providing the history and general business environment of a medical practice. This hypothetical case was chosen for its simplicity (no inventories involved) and its economic stability (no major demand swings expected). The program assigned the subject to the control group or to one

Table 2 -- Panel B
Information Manipulation
(sample screens seen by subjects)

<table>
<tr>
<td>Group 1

No unique screen</td>
<td>Group 2 and Group 3

Table of Statistics for Accounts Receivable Balance
at year ended December 31, 1987

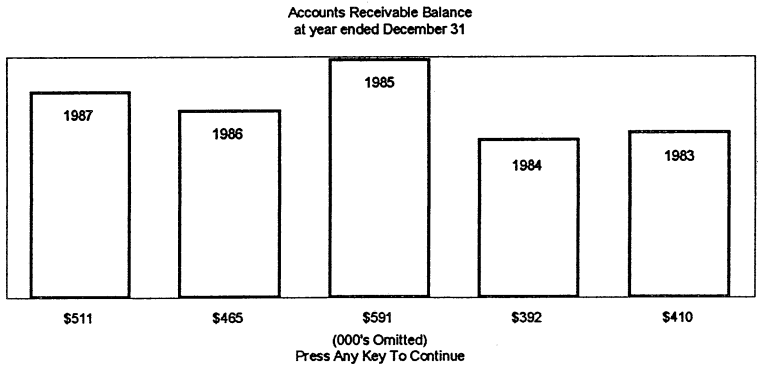
Accounts Receivable

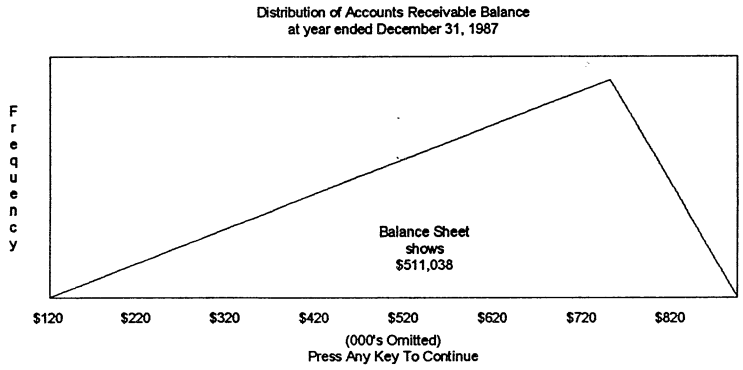
Mean$511,038

Standard Deviation$169,410

Range$134,801 to $892,790

Press Any Key To Continue</td>
</tr>
<tr>
<td>Group 4

 
</td>
<td>Group 5 and Group 6

 
</td>
</tr>
</table>

of the experimental groups in an unobtrusive manner. The program also randomized the sequence of cases seen by the subject and the order of cues in the selection menu.

The novelty of the computerized administration of the experiment should have combated the lack of interest that plagues field research (see Alreck and Settle, 1985). This technology also allowed subjects to complete the experiment at their own convenience, without jeopardizing the internal validity of the task. This feature should have also contributed to the response rate.

Sample Selection

An experiment centering on cash flows requires a population familiar with financial statement construction and use. Certified Public Accountants (CPAs) should, in addition to meeting this requirement, be familiar with SFAC No. 1 and its focus upon the primacy of cash flows. American Institute of CPAs Conduct Rule 203 positions the SFACs as the strongest articulation of accounting thought in the US. These conditions make familiarity and acceptance of the substantive content of this experiment part of the assumed knowledge base of CPAs.

Within the population of certified public accountants, those involved with the large public firms are most likely to have the requisite background for the experiment[4]. Correspondingly, only members of six of the largest firms were considered. Another restriction involved selecting against staff members with insufficient work experience. Therefore only seniors, managers and partners were considered. To avoid any results caused by practice differences in particular areas (i.e., office effects) qualified individuals in three major US cities were considered as part of the sampling frame.

The cooperation of a senior firm member in each involved office was solicited and received. Diskettes were mailed to these individuals, who would in turn, distribute them to subjects. Following completion of the experiment, subjects returned diskettes to this key individual, who subsequently forwarded them to the researcher. Since no confidential or sensitive information was involved, this mediated administration should have achieved an acceptable degree of control.

In sum, sample selection, while not strictly random, achieved access to a knowledgeable population in the best way possible. Respect for the convenience of the involved firms was made even more necessary since the experiment was conducted during December through April, which in the US is known as 'busy season' for public accountants.

Results

Response

A total of 275 diskettes were distributed. Of these, 117 were returned, representing a 42.5% response rate. Respondents were distributed by rank and firm in a manner that did not support the existence of any particular response bias. Table 3 summarizes the 117 responses by firm and rank.

Table 3
Responses by Firm and Rank

	Arthur Young	KPMG	Arthur Andersen	Coopers & Lybrand	Deloitte	Touche Ross
Partner	5	2	5	1	1	2
Manager	17	21	24	12	13	14
Total	22	23	29	13	14	16

In addition to the editing controls that prevented unusable responses, no data was lost in the collection process. A control program read data from subject diskettes into an aggregate database. This included information about the subjects' use of the diskette, as well as those responses purposefully made by the subjects.

Descriptive Results

The computerized randomization of the assignment of subjects to groups proved effective. The 117 respondents produced group sizes of 16, 28, 24, 22, 14 and 13 for groups 1 through 6.

Subjects averaged seven years of work experience, although this ranged widely from two years to twenty-eight years. Correspondingly, subject ages ranged from 23 to 51, and yielded an average age of 31. 20.5% of the sample had completed graduate level education. These demographic characteristics suggest that the necessary skill to perform the cash flow judgment task was present.

The distribution of the cash flow estimates was examined for normality on an individual case basis with stem and leaf and normal probability plots. The first device approximated the familiar bell-shaped curve. The other tool showed only small departures from the expected straight line. The Kolmogorov-Smirnov test for the cases also failed to cast doubt on the assumption of normality. Since the data did not depart materially from normality, no transformation was warranted.

Reliability Checks

To evaluate whether subjects took the experiment seriously, subjects were asked to estimate the number of minutes they took to complete the experiment. This report was then compared to actual minutes as recorded in the output files available to the researchers. Self-reports, with a mean of 32 minutes, proved to be very accurate predictors of actual minutes (mean 36 minutes). The lack of significantly different time estimates provides evidence that realistic effort was expended to produce cash flow estimates.

Another indication of reliability is the level of self-reported interest on the judgment task reported in debriefing. Over 85% of the subjects reported the making of notes during the experiment. Over 44% of the subjects requested a summary of the results by providing their name and address. Only 11% of the subjects characterized the experiment as 'very dull.'

Test of Research Questions

Since better cash flow decisions involve estimates that are more consistent and more convergent, tests of the format and scaling dimensions were done both on the actual cash flow estimates and on the error terms produced by the difference between the subjects' estimate and the modal values of the accounts receivable distribution that they were presented with in each case examined. For purposes of the second research question, a residual was computed that differenced the subjects' cue use from the group mean. This was then divided by the number of subjects in each group and multiplied by the number of cases performed to control for unequal conditions in each parameter. Such a procedure was done on a straight forward basis for the number of seconds and the number of times the subject examined the cues. However, several different algorithms were used to capture the sequence of cues.[5] This resulted in four values for each group, and therefore a balanced, fully-crossed 2x2x3 design.

The first research question involves the impact of both scaling and format on cash flow. Table 3 reports the results of the first research question using multiple analysis of variance (MANOVA). Table 3 illustrates that this interaction effect is significant at $p<.10$. This is true for both the actual cash flow estimates and the residuals of estimates from their group means. Evidence consistent with the first research question has been produced. A manipulation of both dimensions, taken together, produces different cash flow estimates.

The second research question involved cue utilization. The data captured through the output files included three important cue utilization dimensions. How important a cue is to the final cash flow estimate relates to how many times it is examined, the time the subject spent examining it, and the order in which the cue was examined. For these purposes, cues were ranked according to these dimensions. Table 4 reports the results of nonparametric tests performed on the resultant ranks. The results indicate that groups defined by scaling and format differences differed significantly ($p<.05$) on two of three cue utilization patterns. Groups differed in the time and frequency of cue examination. The absence of a definite model for the priority of cue use complicates the interpretation of this aspect of the decision process. Nonetheless, the priority of cue use reaches significance at $p<.05$ when cues are considered a cardinal and an arithmetic progression.

Figure 1 shows how groups used their cues. This figure considers the two unequivocal dimensions of time and frequency of examination. Groups with the more non-traditional presentations of accounts receivable information tended to use that information more than did other subjects. The presentation differences between groups essentially indicate that presentation differences change how the cash flow decision is made. The groups that saw probabilistic information on accounts receivable (Groups 2, 3, 5 and 6) vary distinctly from those groups that did not. The evidence contained in Table 4 and

Table 4
Impact of Scaling and Format:
Results for Research Question 1
Cash Flow Estimates

Source of Variation	Hotelling Value	Degrees of Freedom	F Value	p Level
Format	.01556	2	0.85583	0.428
Scaling	.01605	4	0.43742	0.781
Format by Scaling	.07680	4	2.09286	0.083

Residual Estimate

Source of Variation	Hotelling Value	Degrees of Freedom	F Value	p Level
Format	.01556	2	0.85583	0.428
Scaling	.01605	4	0.43742	0.781
Format by Scaling	.07680	4	2.09286	0.083

Figure 1 suggests support for the second research question relating cue utilization to presentation characteristics.

Other Results

This section considers the secondary characteristics of the manipulation in order to further examine how cash flow decisions are made. For these purposes, skewness and percentile position were varied across the judgment tasks that most subjects faced. This allows a test of whether cash flow estimates are sensitive to the particular shape of probability distributions (skewness) or to the financial well being of the company (percentile position). These dimensions also pose the possibility that these dimensions may interact with the main manipulations of scaling and format.

Table 5 reveals these results. Skewness, as a main effect, is not significant at $p<.10$. However, the direction of the effect shows that subjects, when shown a left skewed accounts receivable distribution, estimate a significantly higher cash flow than when they are shown a right skewed array. The scaling-skewness interaction term is also significant at $p<.05$. The interaction between skewness and format almost achieves significance at $p<.10$. These interaction results suggest that the form the distribution takes cannot be ignored in judgments about financial statement presentation. More extreme skewness conditions exacerbate the differences between conventional and novel forms of presentation, although the evidence on this is mixed.

Although a direct test of the impact of percentile position is not consistent with their use as repeated observation in the doubly MANOVA design such an analysis provides a realism check. In results not shown, subjects tended to judge that firms at the 75% percentile position would have higher cash flows than those at the 25% percentile position (significant at $p<.01$).

On a more descriptive level, this experiment provided a unique view into how accountants make cash flow decisions. Figure 2 depicts the average usefulness of the various pieces of accounting information to the estimation of cash flows for all subjects measured in terms of time of examination. Since factor analysis (not shown) supported the view that all three process variables could be construed as a single factor, Figure 2 is also generally descriptive of

Table 5
Cue Utilization Pattern Differences
Results for Research Question 2

Cue Frequency: Number of Times Subjects Examined Cues Ranked By Groups

Chi Square	p Level
13.2629	.0210

Cue Examination Time: Number of Seconds Each Cue Was Examined Ranked By Groups

Chi Square	p Level
13.2981	.0207

Cue Priority: Order In Which Cues Were Examined Translated Into A Priority Score Ranked By Groups

	Chi-Square	p Level
Exponential*	4.7253	.4503
Logarithmic	8.3544	.1378
Cardinal	13.0664	.0228
Arithmetic	13.1311	.0222
Geometric	4.5286	.4761

*An exponential weighting of cues assigning 1.000 points to the first cue was used for these purposes.

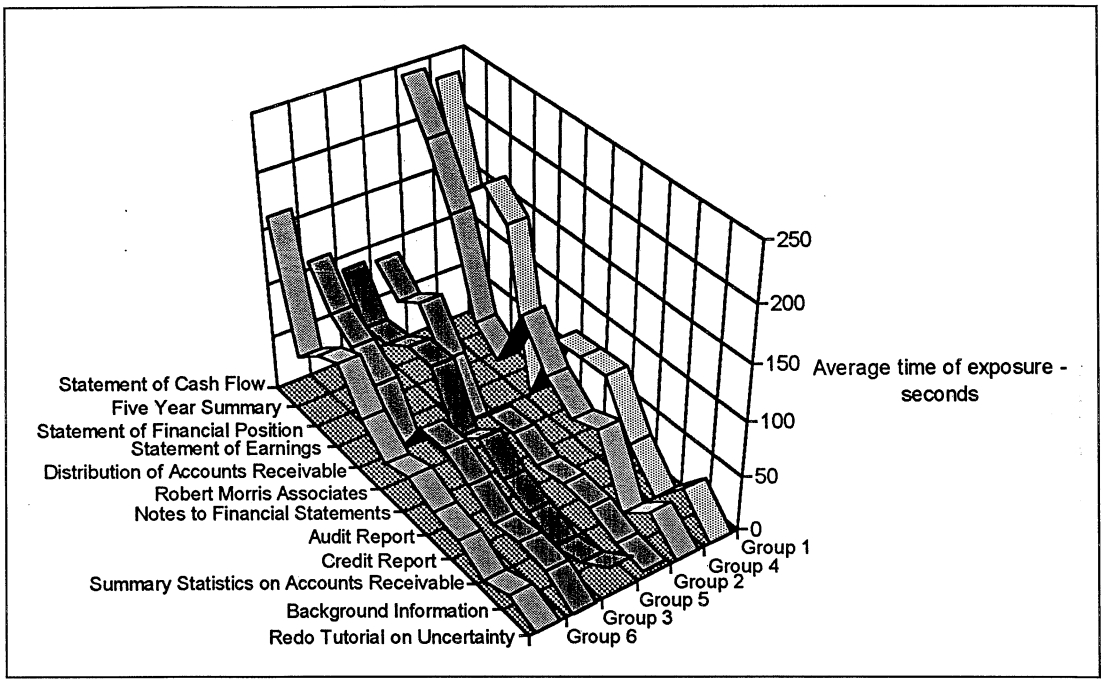
the frequency examined and priority of examination. The prior years cash flow statement and the five year summary appear to be more important than the balance sheet and income statement for these purposes.

Discussion

The inability of the scaling or format manipulation to have separate and direct significant impact on cash flow estimates would seem to indicate the failure of the influence of presentation characteristics on cash flow decisions. However, this conclusion ignores the fact that scaling and format are merely analytical separations of the presentation issue. Probability information is rarely presented in nongraphical forms. Just as conventional financial statements combine the tabular format and point estimate scaling, graphical format and probabilistic scaling form another 'natural' combination. Therefore, the interaction effect of the two dimensions is the result that should capture disproportional interest. The significance of the format-scaling interaction means that cash flow decisions are a product of the way financial information is presented.

Taken together, the scale of numbers and their formatting appear to result in different decisions about future cash flows. This might suggest that conventional accounting information presentation is not optimal. While a strong argument for the revision of financial information presentation would require more evidence than these results can offer, there are alternative views about the findings. Graphical presentation may allow the superior processing of information. Probability distributions remind the reader of financial statements that inherent uncertainty exists in any single point-estimate. The augmentation of conventional presentations will certainly not make the formulation of cash flow estimates any more problematic. These new forms of presentation do not necessarily have to replace the conventional content of financial statements.

Figure 1
Cue Usage: Time of Examination by Group



Auditors might initially resist revisions of financial statements in the directions indicated by the research. Although it would seem that expansions of the attested information might prove useful to auditors. Insofar as probability density functions essentially hedge their attestation, auditors could benefit by implicitly communicating the inexact nature of their professional service. In addition to avoiding the artificiality of single point estimates, auditors would also ease their more difficult materiality decisions through probabilistic presentation.

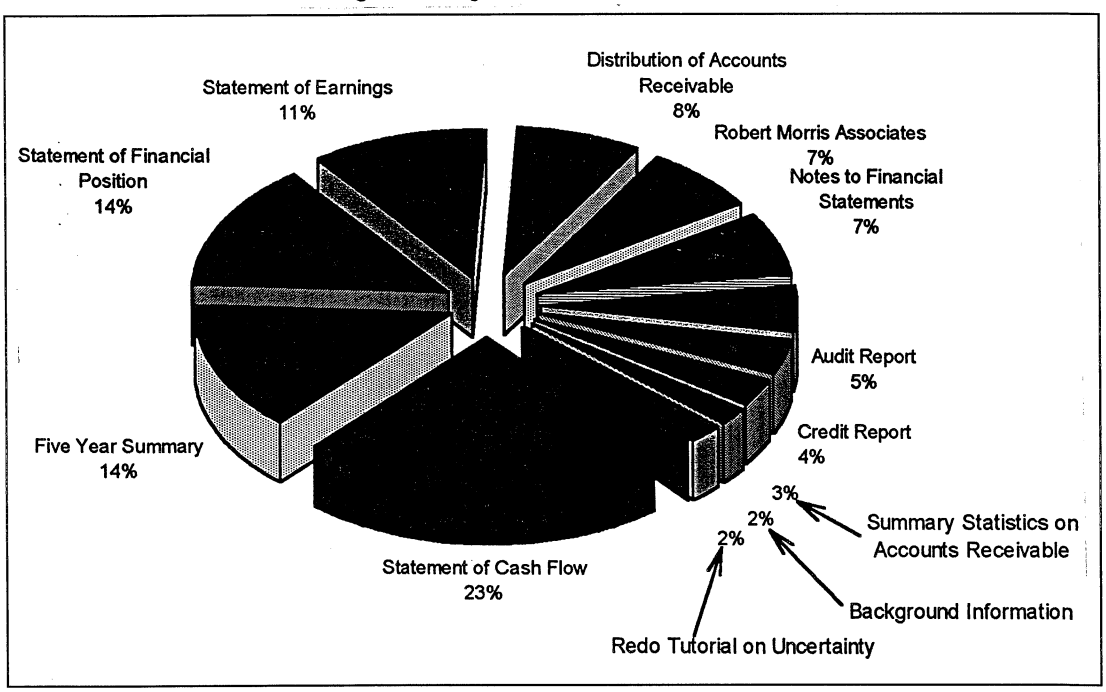
The interaction effects that were found significant should remind bodies in charge of accounting regulation that decision usefulness is a complex phenomena. Characteristics of presentation in statements perhaps not important in isolation, take on additional relevance in the context of other characteristics. These research results show that probability information can influence cash flow forecasts differently when arrayed in tabular or graphic form. Furthermore, the usefulness of probabilistic information is related to the shape of the underlying distribution. The extremity of skewness contributes to the estimation of cash flow and therefore provides greater incentive to give decision makers statements whose presentation includes this dimension.

The results may have been influenced by the nature of the subjects. CPAs in the US, particularly those in large practices, adopt the self-image of conservatism. This

Table 6
Impact of Skewness Position

Source of Variation	Hotelling Value	Degrees of Freedom	F Statistics	p Level
Skewness	.03482	2	1.91483	.152
Skewness * Scaling	.10195	4	2.77808	.028
Skewness * Format	.03984	2	2.19106	.117
Skewness * Scaling * Format	.04917	4	1.33994	.256

Figure 2
Cue Usage: Average Time of Examination All Groups



stance may become more activated when confronted with a hypothetical judgment task. This philosophy was validated through a debriefing query in which only 9% of the subjects described themselves as above-average risk takers. Subjects also reported heavy reliance on traditional (64% mean) as opposed to nontraditional information (36% mean) for this experiment. Ceteris paribus, conservatism of this sort should have resisted probabilistic and graphical presentation. Conservatism may have manifested itself in many ways beyond resistance to information not on the current financial statements. For example, a conservative approach might create an inertia around the middle range of feasible cash flow estimates. This could have the effect of systematically dampening the impact of the primary and secondary manipulations. Stronger levels of significance could be expected in the results of a similar experiment using a less conservative group of subjects.

A great deal of residual uncertainty exists in accounting information that cannot be attributable to the variables manipulated in this experiment. In response to debriefing questions, 85% of the subjects indicated the need for more information despite the wide set of information provided (see Table 2), the overall clarity of instructions (78% found them very clear) and the crucial nature of the task (see SFAC quote, p. 1). Subjects appear aware of the ambiguity of cash flow since 81% felt uncomfortable about their estimate. A good deal of this uncertainty would appear to be more fundamental than can be isolated by varying the format and scaling of financial information. The results also cast some doubt on the practicality of estimating cash flows. The distribution of estimates received from the subjects suggests that even in a simplified environment, experts will vary widely in this critical projection. Based on the lack of significance for the main effects of the manipulations, this dispersion cannot be greatly attributable to how the information was presented. In debriefing, subjects professed high levels of general familiarity with the FASB's conceptual framework project (92% familiar) but lower levels of awareness of SFAC No. 1 (the first formal statement of this effort) which reoriented accounting toward decision usefulness and cash flows (54 % familiar). While the estimation of cash flows has achieved a broad consensus as a proper objective of accounting, exactly how it is to be done when uncertainty abounds remains a serious and unanswered question.

The results of this research could be reinterpreted in a way that highlighted the educational preparation of the subjects. The failure of the main effects and their interaction to result in highly significant different cash flow reports could be seen as the educational unpreparedness of US. accounting professionals to think in ways that extend beyond the double entry paradigm. Public accountants, in the US, trained formally to expect point estimates arrayed in tabular form may collectively feel a strong conditioning bond. Adherence to the heuristics that revolve around the familiar presentations may be a form of functional fixation that might be associated with bias decision making (see Einhorn and Hogarth, 1981). If this is the case, perhaps accounting education has created an 'iron cage' of tabular presentations and point estimates so

that individuals within this paradigm are systematically unable to deal with alternatively configured information. This condition may preclude better decisions even if information were made systematically more finely textured and rich. However, the significant interaction effect shown suggests that accountants are not hopelessly shackled to decision making with conventional financial statements. Furthermore, the cue utilization results show that specific sensitization can alter how information is used.

The public in every country depends on accountants for precision in financial matters. Servicing this need provides accountants with ample rewards but also imposes a psychological cost. If accountants begin to believe that accounting information is as certain as it appears to the public, less than optimal decisions will result. Only by embracing uncertainty can the future be made more certain. A revision of the presentation of financial statements, and the corresponding training to use this information, would be steps in the right direction.

Suggestions For Future Research

This study should be replicated using a larger group of subjects. Work along these lines should also consider whether groups other than public accountants react to presentation features in the same manner. We also need to identify if subject responses vary for different aspects of the financial statements. Work within accounts receivable could determine if more extreme scenarios would heighten the need for probabilistic information in non-tabular formats. 🕮

❄❄❄ Footnotes ❄❄❄

1. This was generated following Law and Kelton's (1982) model for instances of little available data. A triangular distribution, wherein a is a location parameter, b-a is a scale parameter and c is a shape parameter, a<b<c, was replicated 10,000 times for these purposes.
2. Completion of the experiment required that subjects had access to a computer with a minimum of 320KB of RAM and DOS 3.1 capabilities. All subjects were provided a 5¼" floppy diskette and offered a 3½" diskette alternative.
3. The user interface was menu driven with all necessary commands prompted on most screens. Any instance where a subject input an invalid response (i.e., something other than "Y" or "N" for a yes/no question) triggered a non-response from the program that prevented subjects from moving forward through the task. Subjects did not report difficulties using the software.
4. In addition to recruiting the "best and brightest" accounting students (see Kochanek and Norgaard, 1985) the large public firms provide their members with the greatest diversity in practice (Dittman et al., 1980) and with the most rigorous training and continuing education (Carcello et al., 1991) available in the U.S..
5. These included simple cardinal orders, arithmetic, geometric, exponential and logarithmic progressions. See Table 4 for more specific information.

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