Accounting Information and Stock Market Decisons: A Laboratory Study

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ABSTRACT

This research proposal entails analyzing the results of five exploratory studies and aims toward improving the understanding of selected features in the human information processing of financial and accounting information. The studies surveyed multiple features of human decision making through the use of a surrogate stock market environment. The key variables being considered are cognitive style, information overload, type of accounting event, decision speed and level of performance.

The first part of the proposal examines some of the current literature in the field of human information processing in accounting (HIPS). The second part of the paper describes the focus and features of the experimental procedures used in the development of the data to be analyzed. The third part deals with the research questions being asked and outlines the data analysis being proposed. The fourth part of this proposal lays out and details a schedule for the study. The last section of this proposal discusses the potential findings of this research, places it into a general context and proposes future paths of research effort along the same general lines.

ACCOUNTING INFORMATION AND STOCK MARKET DECISIONS: A LABORATORY STUDY

The study of Human Information Processing in Accounting has added a new dimension to the understanding of accounting phenomena. Libby and Lewis (1976), Driscoll and Mock (1976), and AAA (1978) surveyed studies in accounting and psychology in an attempt to organize relevant studies and place them in a context identifying the state-of-the-art.

Libby and Lewis proposed a simple information processing model composed of three basic components: input, process and output. This proposal encompasses the analysis of the data from five similar experiments performed at different times using a simulated stock market setting. The "input" element is commonly avaliable stock market information; the "process" is simulated by surrogate decison makers; and the "output" is represented by the subjects' stock trading decisions and their trading performance.

Slovic (1972, p. 779) stressed the desirability of the utilization of a stock market setting for Human Information Processing studies:

> "... in no other realm are such vast quantities of information from such diverse sources brought to bear on so many important decisions. Careful accumulation and skilled interpretation of this information is said to be the sine qua non of the accurate evaluation of

securities."

Slovic (1969), Slovic, Fleissner and Bauman (1972) and Savich (1977) conducted experiments on human judgement and information utilizations within a stock market evaluation and decison setting. All these experiments utilized hypothetical companies with real (stockbroker) or simulated (student) subjects to study the stock decision process. The experiments to be analyzed in this project followed a subject during an academic semester (about four months) and utilized last day of trading closing prices for trading. The design of these experiments allows the examination of several information processing issues along multiple dimensions and across five experiments with increased realism at the expense of some experimental control.

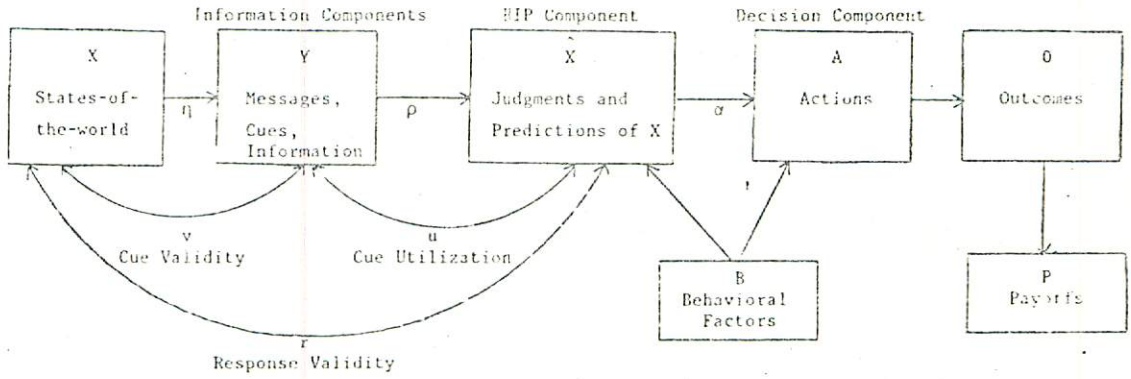
Libby and Lewis (1976) pointed out four basic research paradigms in Human Information Processing: (1) lens model, (2) risky choice, (3) probabilistic judgement and (4) cognitive style. Slovic and Lichtenstein (1971) in comparing the Bayesian and regression approaches to human judgement analysis stated:

> "...some new approaches might be even more illuminating ... subjects are processing information in ways fundamentally different from Bayesian and regression models. Thus, if we are to pursue this line of research we will have to develop new models and different methods of experimentation."(p.729)

Mock and Vasarhelyi (1978) proposed a combination of the lens and information economics models for the study of human information processing phenomena. This model (in Figure 1) is used as a basis for this study. A series of more elementary

models (e.g. Brunswick, 1955; Ashton, 1974; Libby, 1975) served as a basis for its inception.

Figure 1



Information Economics Notation

X = Set of relevant states-of-the world;

Y = Set of Messages (information) about X;

η = An information function relating states and messages

α = A decision function (rule) such that $A_i = \alpha(Y)$

ω = A utility or preference function such that P = ω(O)

A = Set of Possible Actions

O = Set of Outcomes (one outcome for each X,A)

P = Set of Payoffs (associated with each outcome)

Lens Notation

X = Status of the environment that is of concern to the decision makers (distal variables)

Y = Cues as items of information

P = Human informaton processing function

v = Cue Validity

u = Cue Utilization

B = Behavioral variables that impact upper core information processing and decision making

r = Response Validity

Note
Related concepts are lined up, identical concepts are identified by the same variable.

FIG. 1.--An integrated model of decision, information, information utilization, environmental variables, and outcomes. (Single period without feedback.)

The state-of-the-world (represented by actual stock market condition in the simulation), leads to information (formal and

informal), to judgements and predictions made by decision makers (of different cognitive styles and backgrounds) and to actions (on trading) and its consequent outcomes (portfolio values). A feedback loop, if added, would discriminate between a series of trade decisions and intermediate outcomes in relation to the final outcome of a decision period.

Essential to the Human Information Processing and Decision Model (HIPD) are its three main components: man, information, and the environment.

The decision maker, supposedly a real investor using accounting and other information for decision making, was surrogated by the use of graduate students. The literature dealing with the adequacy of students as surrogate decision makers in experimental settings is extensive (see Cunningham et al., 1974; Abdel-khalik, 1974) and leads to mixed conclusions. Such an objection is not important in this research in that replication of actual businessmen's decisions is not being attempted. Rather, the main interest lies in the constructs of decison making and the individual differences between people and their patterns of information utilization.

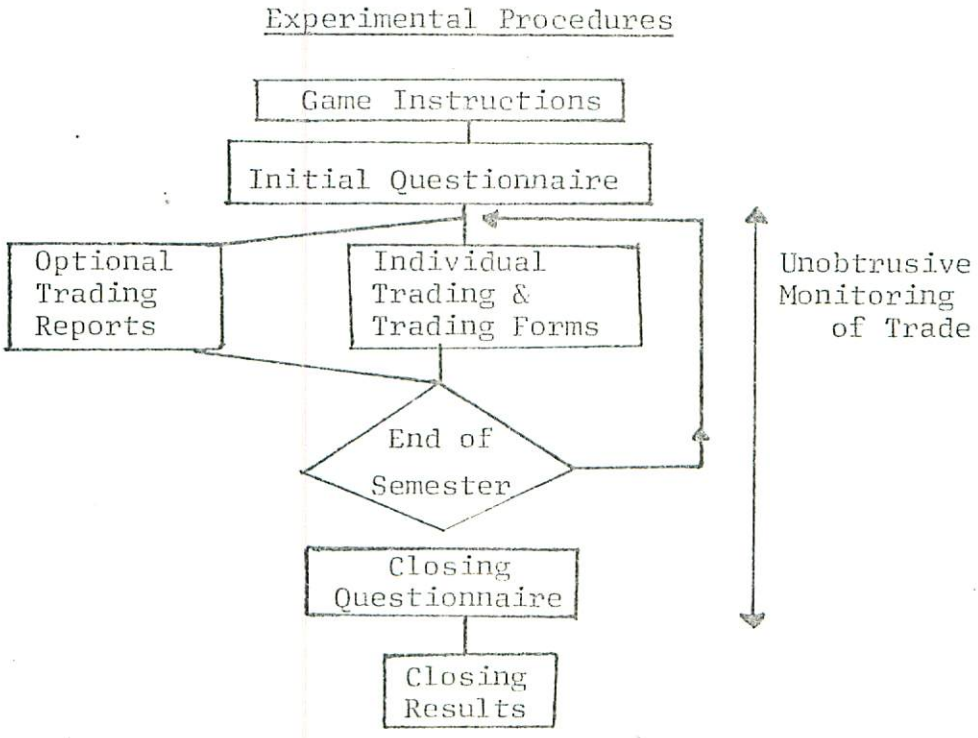
The information supplied and used throughout the experiments was highly monitored and somewhat controlled. Measures were obtained through subject monitoring, subject perceptions and system traces.

The environment entailed a series of limitations and trading methods of a simplified nature which more or less limited the ability to generalize the findings of the study. These features, and ensuing limitations are described in the following section of this proposal.

II. EXPERIMENTAL PROCEDURES

Figure 2 summarizes the main steps of the experimental procedures of the stock market simulation.

Figure 2



The different versions of the experiment empahsized different issues and used sightly different data collecting methods due to different experimental conditions, environment and questions. The following description is applicable to most versions of the experiment, differences are pointed out in Figure 3 and explain the sample differences to be found in the proposed analysis stage.

Figure 3

Experimental Characteristics

Version	1	2	3	4	5
Number of Subjects (MAB Students)	97	51	61	38	95 ..
Average Work experience	3.5 years	4.7 years	5.6 years	NA	NA
Date	Spring 75	Fall 75	Spring 76	Summer 79	Summer 80
Transactions allowed	Buy, Sell	Buy, Sell Sell Short (B,S,SS)	B,S,SS	B,S,SS	B,S,SS
Margin Allowed?	No	Y	Y	Y	Y
Security Choice	50 NYSE	Any listed Stock	Any Listed Stock	Any Listed Stock	Any Listed Stock
Availability of Reports	Every 2 Weeks	Upon Query	Upon Query	Upon Query	Upon Query
Instruments Administered	Bio Pre Post	Bio Pre-Med Post	Bio Pre Post	Bio	Bio Med Post
Reward System	Proportional to Investment	Prop to Investment	Prizes for Winners	None	None
Type of Accounting Class	Intro	Intro	Intro Adv.	Interm	Interm
Institution	USC	USC	USC	CU	CU

Subjects were MBA students in either an introductory or advanced financial accounting class in which the Stock Market Simulation accounted for a small part of the student's grade and was a required part of the course. Students were told during the first day of classes that they would be evaluated on the quality of their effort and results (not on frequency of trading). An initial questionnaire was distributed gathering bio data and some cognitive style information as well as some information utilization profile features.

The simulation procedure required students to trade with the previous day's closing prices on a computerized portfolio manager (CPM), which the students used to enter their own transactions. A transaction form was required to be completed and was used to monitor the reasons for student transactions. The CPM kept unobtrusive traces of student terminal access, trade time, number of reports requested and features used. Transactions were examined for accuracy before they were audited. Students were allowed to trade on any stocks listed in major American stock exchanges that had traded in the former day. They were allowed to buy, sell, sell short and to use margin funds. At the end of the semester all portfolios were liquidated at no transaction cost to the subjects and a ranking was developed. In addition, the information, utilization, instruments and debriefing questionnaires were used.

The next section posts the key experimental questions being

posed and the basic anlaysis to be performed.

III. RESEARCH QUESTIONS AND ANALYSIS

Experimental questions and analysis will be divided into four main areas:

1) Basic research questions

2) Feedback and attitude change

4) Cognitive Style effects

3) Modeling of the decision process

These four areas will allow the utilization of diverse HIP paradigms in its analyses.

Basic Research Design Issues

The first questions deal with research design issues basic to the comparison of the different experiments.

H1: Investment of real money in experiments and financial rewards will lead to improved subject performance.

H2: Investment of real money in the experiments will increase a subject's trading activity.

H3: An experimental environment will not substantially affect subject behavior in terms of trading frequency and performance.

H4: An experimental environment will not affect average subject cognitive style mix.

H5: Information protocols will not significantly affect trading behaviour.

The efficient market hypothesis, in its strong form, may decry the value of performance data. On the other hand it may be interesting to examine the effects of monetary rewards upon subject performance and subject trading frequency. Subject performance (ROI) is to be measured as:

$$P=(Vl+D+Cl-Co-xx)/Co$$

where: p = ROI ratio

Vl= market value of the portfolio held at the end of the simulation

D = dividends earned during the simulation

Co= Begining cash (investment)

Cl= Ending cash

C = Average cash on hand during simulation

i = Risk free rate of money

M = Average margin balance

j = Call rate of money plus 1.5%

The value for xx relates to the charges for margin money and interest income on cash held (at the risk free rate):

$$xx=(C(i))-(M(j))$$

All hypotheses in this first part will be tested by a simple one way analysis of variance procedures. Hypotheses 1 and 2 will be tested using data from experiments 1 to 3 where subjects could opt between investing or not investing real money (and geting real money rewards). Hypotheses 3 to 5 will be tested contrasting the results of experiments 1 to 3 (performad at USC) with the results of experiments 4 and 5 (performed at Columbia). Hypothesis 4 will require nonparametric, nominal scale distribution testing.

Feedback and Attitude Change

> H6: The experiment will considerably change subject perception of information needed, data to be used, and decision strategy to be employed over the course of the experiment.

This hypothesis, stated in a general form, will be tested for several variables in the comparison of anterior and posterior questionnaires. The hypothesis relates to Chervany and Dixon (1974), Vasarhelyi (1977), and Casey (1980) dealing with questions of information overload. One way analysis of variance as well as paired t-tests will be used in this analysis.

Cognitive Style Effects

H7: Subjects will perform equally, regardless of their cognitive style.

H8. Decision style and decision approach are interrelated measures of cognitive style.

H9: Trading frequency will vary along the cognitive style dimension

Paradigm four in Libby and Lewis (1976) involves the study of cognitive style in human information processing. Two basic taxonomies have been used in parts of the experimental studies. The first, which classifies subjects into five categories, is called decision style (Driver and Mock, 1975), while the second, decision approach , uses the Analytic-Heuristic dichotomy (Huysman, 1969, Vasarhelyi, 1977; Benbasat and Dexter, 1979). These hypotheses relate to experimental questions raised by Benbasat and Dexter (1979), McGhee et al. (1978) and Collins (1978). Hypotheses 7 and 9 will be tested by parametric one way analysis of variance while hypothesis 8 will be tested by a chi-square test.

Decision Modeling

H7: Information utilization perception and background variables will significantly explain stock market trading performance.

H8: Differences will be found in weighing information utilization parameters between analytic and heuristic decision makers.

H12: Logical structuring of information and background variables will improve performance explanation.

Based on the model presented in Figure 1, a series of data relationships can be postulated. These relate to self insight (Slovic, 1971), personality variables (Collins, 1978 & Benbasat and Dexter, 1979) and other determinant variables drawn from earlier hypothesis testing. These models are going to be based on regression (Hughes & Downs, 1976) and tested both in terms of predictive ability as well as in terms of discrimination between cognitive styles.

IV. ADMINISTRATIVE MATTERS

The analysis being proposed in this paper entails considerable data preparation. Most of the data on experiments 1 to 3 is already keypunched and is available under Wylbur in the system 360.. However, certain elements of the analysis of transaction forms remain to be tabulated and typed into the system. The data from experiments 4 and 5 must be extracted from traces currently on floppy disks generated by the PDP-11 system. These will have to be summarized (through some BASIC programs yet to be written) and posted onto to the IBM files. A series of data will have to be drawn from transaction forms and other protocols and typed into the system. Analysis will be performed using the SPSS statistical package.

Time schedule

September 1980	Preparation of Data for experiments 1 to 3
October and November 1980	Preparation of data from experiments 4 and 5
December 1980	Analysis using the SPSS [ackage
January 1981	Writeup of article
February 1981	Exposure for Comments
April 1981	Submission of the article to the "Research Reports" section of the Journal of Accounting Research

V. CONCLUSIONS

This proposal deals with the analysis of data gathered throughout a period of four years over a set of five experiments and one pilot run. Its exploratory methodology and approach deal with both methodological and human information processing questions. The stock market simulation context can be used for a wide number of potential human information processing studies, which range from evaluating the information value of portfolio reports to testing multiple information structures.

The next step in this research effort will be to analyze subject trading protocols and to tighten the research design. A possible extention of this research would involve the cooperation of a brokerage firm and the use of real traders with a mix of real and "mock" portfolios. In conclusion, the securities price research area has produced interesting results, which have led to multiple inferences in regard to financial reporting and its effects; now it is time for accounting researchers to explain how the combination of individual information processing differences and available information leads to an efficient market.

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