1980

MIS AND THE BEHAVIORAL SCIENCES: Research Patterns and Prescriptions

Martin L. Bariff
Case Western Reserve University

Michael J. Ginzberg
New York University


· N E W D . O C ·

MIS AND THE BEHAVIORAL SCIENCES: Research Patterns and Prescriptions

MARTIN L. BARIFF

Case Western Reserve University

MICHAEL J. GINZBERG

New York University

ABSTRACT

Many of the questions of concern to information system (IS) researchers and practitioners are, in essence, behavioral questions. Behavioral considerations in the design and implementation of information systems and in the management of IS professionals are crucial to the successful development and delivery of quality services to users. Implementation of IS may provide a beneficial means to facilitate changes in task design, organizational structure, and social relations. Guidance for interpreting past MIS behavioral research and suggestions for future studies are provided by a proposed research framework. The importance of adopting behavioral science research standards, e.g., theory-based research questions and appropriate methodology, is stressed.

1.0 INTRODUCTION

Traditionally, land, labor, and capital have been viewed as primary organizational resources. In recent years, however, information increasingly is being recognized as another primary organizational resource. Computer-based information systems provide essential technology for satisfying information processing needs, e.g., data bases for regulatory demands and decision support, real-time response for transaction processing and process control, and networking for shared data and electronic mail. The availability of appropriate computer technology represents a necessary, but not sufficient condition for successful information systems (IS).

Information is reactive. It motivates user behavior with intended and often unanticipated consequences. Further, the introduction of IS may alter task, social, and organizational structures. Since planning and control systems are predicated upon an ability to predict and influence organization members' responses to informational and social stimuli, these behavioral aspects require explicit recognition and management. Thus, both appropriate IS technology and consideration of behavioral factors represent are necessary for successful IS efforts.

In this paper, we will first identify the stakeholders whose behaviors represent important issues for IS success. We will then present a framework for classifying and analyzing behavioral IS research, showing how this research is related to underlying behavioral science disciplines. Finally, we will discuss ways to improve behavioral IS research by linking it more closely to the underlying behavioral disciplines.

1.1 IS STAKEHOLDERS -- RELEVANT BEHAVIORS FOR STUDY

The behavioral sciences' contribution to research on information systems in organizations is a diverse and rich set of theories, methodologies and research findings relevant to IS professionals and IS users. The research is oriented to processes rather than to products, e.g., it focuses on judgment formation, decisionmaking and interlocking role behaviors.

Within the information services subsystem, planning, control, and performance of development and operations activities are investigated. In each of the IS consumers' subsystems (both internal and external to the organization) individual and group planning, control, and operations activities affect by or

affecting IS actions are examined. Both primary and secondary effects are of interest. For example, the introduction of an integrated customer order system which links order entry, inventory, and distribution functions, should improve customer service as a primary consequence. The closer coordination and sharing of information should reduce conflict between these subunits and may enable horizontal transfers or promotions as secondary effects. Moreover, these subunit commonalities may promote joint political action related to some organization-wide policy issues. Other counterveiling coalitions may be established. Thus, conflict resolution among these coalitions may be more difficult than among fragmented individual subunits. Research on IS in organizations should consider both primary and secondary effects.

Since IS technology is somewhat mysterious and threatening to users, appropriate supportive behavior by liaison persons (e.g., systems analysts and IS client representatives) is essential to user recognition and adoption of potential IS support facilities. Thus, selection of liaison strategies for improving user-IS understanding and resolving conflicts is another important behavioral research area.

In the organization's external environment, a variety of stakeholder groups (e.g., IS technologists, regulators, and consultants) affect IS capabilities and policies of an organization. Members of organizations will attempt to influence administrative rulings and legislation related to IS. Consultants act as technology transfer agents among medium and smaller organizations. Thus, both an organization's IS boundary spanners and relevant environmental parties provide interesting behaviors for research.

At a more aggregate level of analysis, nations have varying information ownership, privacy, and security policies. Therefore, the behavior of governments and multi-national organizations (e.g., transborder data flow) provide another research focus.

These identified stakeholders represent the major classes of behavioral interest in the private and public sectors. It should be briefly noted, however, that the ability and adoption of personal computers in households represent interesting research opportunities for studying changes in family and community relationships.

2.0 MIS AS AN APPLIED DISCIPLINE

2.1 THEORY-GROUNDED RESEARCH

MIS behavioral research tends to be descriptive, that is, searching for systematic relationships among observations of user and IS personnel behavior. Such descriptive modeling is appropriate for exploratory studies which should lead to theory building and subsequent hypothesis testing. All too often, however, variables are selected without careful consideration of theory and non-directional differences from the null hypothesis are predicted.

Presently, MIS has no core, basic theory. Concepts and relationships are derived from underlying disciplines, e.g., behavioral sciences, economics, and computer and management sciences. As these disciplines develop and change, so does MIS. As an applied discipline, MIS behavioral research studies should be grounded in one or more of the underlying behavioral sciences. Testable hypotheses and exploratory propositions explicitly should be derived from a behavioral science theory rather than from intuition. Furthermore, methods for conducting research studies should be compatible with (i.e., derived from) the underlying discipline.

The MIS context may be viewed as one of many contexts for testing behavioral science theories. We suggest that MIS researchers with behavioral science interests should not only apply existing behavioral science theory and measurements, but should also develop behavioral science theory and measurements and conduct crucial experiments, i.e., tests of competing theories. Thus, two types of MIS behavioral research are proposed:

Strong tests of behavioral science theories -- hypotheses for assessing validity, competing theories and theoretical extensions.

Weak tests of behavioral science theories -- hypotheses which transfer behavioral science knowledge to MIS contexts. Generalizability, not validity is examined.

It is preferable that MIS researchers conduct strong tests of behavioral science concepts. Active participation by behavioral scientists may be necessary. Such interaction should be mutually reinforcing.

Although descriptive research tends to dominate emerging disciplines, such as MIS, some relevant prescriptive theories can and should be examined in a MIS context. MacCrimmon (22) tested aspects of team theory (23) in a laboratory setting with executive MBA students. This research strategy enables reinforcement, revision, or possibly rejection of existing theories. In an applied discipline, theory often is conceived as a guide for explaining phenomena in a particular situation (36). This appealing strategy, however, does not promote cumulative learning.

2.2 BEHAVIORAL SCIENCE FOUNDATIONS

MIS behavioral studies should be designed and interpreted in recognition of behavioral science theories, nomological networks, and measurement validity and reliability. When feasible, results should be compared to normative theories and policy recommendations for reducing descriptive-normative differences should be proposed. One indicator of achieving theory-grounded MIS research will be citations of MIS research in behavioral science journals.

2.2.1 Anthropology

Cultural anthropology examines recurrent patterns of men and women as members of organizational societies (7). The research emphases are shared behavioral expectations, values, and customs within a culture. IS exist within organizations which contain infrastructures and climates. The latter is influenced, to varying degrees, by cultural values. For example, introduction of computer-based IS may reduce the aggregate demand for labor and management skills. A society's value related to provision of work for persons could affect the speed and scope for introducing this technology. In some European nations, unions are demanding computer impact studies. Thus, cultural values that influence contexts in which IS reside or will be introduced require explicit consideration.

In addition to within-cultural studies, cross-cultural research on IS professionals' practices and users' perceptions of information provide interesting opportunities for describing alternative policies. Such insights may facilitate technology transfer among nations and improve overall MIS practice.

Both participant observation and use of selected informants represent potentially useful IS research methods. The typical in-depth, longitudinal study is a productive strategy for a MIS researcher to adopt for collecting rich, process-type data during descriptive studies. The researcher time commitment, however, is a troublesome constraint.

2.2.2 Organizational Behavior

Unlike other behavioral sciences, this area is interdisciplinary itself since individual, group, and organizational levels of analysis exist. However, a multi-paradigm discipline is not uncommon. A primary research focus is the prediction and explanation of patterned initiating and responding behaviors of individuals and groups within subunits and the organization's context. The studies tend to emphasize macro-level variables, e.g., size, specialization, standardization and workflow technology. Two other relevant areas are organizational development (i.e., implementation and change) and socio-technical systems (i.e., task design). Respective examples of MIS research are (1) organization characteristics and IS organization (31), (2) characteristics of successful and unsuccessful implementation (14), and (3) changes in task design (27, 33). This discipline provides both normative and descriptive theories and field research methods (including survey research) are often most appropriate for studies grounded in organizational behavior.

2.2.3 Political Science

Although power is one research focus in organizational behavior, it represents a major emphasis in political science. Typically, the study of political institutions of governance at national and sub-national levels is the research arena. Indeed, a series of IS studies in municipalities (19) represents one interesting research application context. Beyond identifying another research context, political science provides formal theories of influence, power, and authority distribution and change strategies (e.g., (12, 20)) which are central to IS implementation research (4, 32). The research methodologies are representative of case study and survey research techniques, e.g., interviews, questionnaires, and archival data analysis (voting patterns and causal factors). Field experiments also provide causal analysis insights.

2.2.4 Psychology

Both individual and group processes are studied in this underlying discipline. Numerous subfield areas, e.g., cognitive, clinical, developmental, industrial, and social, provide important foundations for

studying both users' and IS professionals' judgments and behaviors. Mason and Mitroff (24) provided a rationale for considering individual differences in system design. A review of studies of this type was completed by Zmud (40). The cognitive science area is especially relevant to design of decision aids and information display (11). Human factors research (25) provides a foundation for end user facility design, e.g., alternative forms of query languages (38). Industrial psychology provides the basis for previously cited user and IS professional task design. Research methodologies include laboratory experiments, observation, protocol analysis, and self-report instruments.

2.2.5 Sociology

This macro-behavior discipline is pervasive in that groups of individuals (at a subsocietal and societal level) within any voluntary (e.g., community and occupation, type) or compulsory (e.g., prison) "institutional" setting are studied. Typically, patterns of behavior are related to demographic classifications, e.g., socio-economic status, occupation, and educational level or organizational characteristics. Indeed, sociology, political science and organizational behavior have many commonalities, but emphasizing different perspectives (26). This macro analysis focus is relevant to IS implementation (18), redistribution of power (4), and IS team design strategies.

The theories are both normative and descriptive. Research methods include surveys, archival data analysis, causal modelling, and participant observation.

A FRAMEWORK FOR BEHAVIORAL RESEARCH ON MIS

3.1 THE NEED FOR A FRAMEWORK

Behavioral issues in MIS cover a very wide range; e.g., evaluating and motivating programmers, coordinating the interfaces among users and analysts, managing MIS impact on the organization's planning and control structures, and adjusting the labor force to a changing mix of skill requirements. While research has been conducted concerning all of these (and others) questions, there has been (to the best of our knowledge) no effort to tie these various questions together. That is, no framework exists which shows the full range of behavioral questions concerning MIS and the relationships which exist among these questions.

Having this type of integrating framework should prove to be quite beneficial for researchers, teachers, and practitioners. First, it would serve as an outline of the behavioral side of the MIS discipline; pointing out the breadth of issues which are the legitimate concern of MIS professionals, and facilitating communication about these issues among MIS professionals with diverse backgrounds. Second, by identifying relationships among the issues it should provide increased understanding of how the solution to one problem might also have an impact on other problems. These benefits, while valuable to established MIS professionals, would be particularly helpful to those entering the field (i.e., students), as it would provide a degree of perspective that can now be acquired only through years of experience.

Beyond the benefits cited above, researchers should find additional value in such a framework. When used to classify existing research, the framework would clearly point out those areas most in need of additional research. Further, if the framework can be linked to the underlying behavioral science disciplines, it would be of help in identifying fruitful research approaches to be followed in investigating an issue. Since most MIS research in the past has followed one or two "classical" scientific paradigms, identifying alternative paradigms would be of great value.

3.2 CRITERIA FOR A FRAMEWORK

In order for a framework to provide the types of benefits discussed in the previous section, it must have certain characteristics. These characteristics are discussed below.

The first is completeness: does the framework capture the full richness of behavioral issues in MIS? Since a major purpose of the framework is to identify and organize those questions which should be classified as behavioral questions concerning MIS, any framework which ignores some portion of those questions is unacceptable.

A second required characteristic is consistency: is there an understandable logic upon which the framework is based? A framework without an apparent, underlying logic is unlikely to be acceptable to professionals, especially in a field so oriented to logic and rationality. Thus, care must be taken in selecting the dimensions of the framework.

Third, the categories within the framework should be mutually exclusive. This does not mean that an issue cannot span multiple categories. Rather, it implies that each category should be distinct, representing a unique set of problems. That is, no category should be a sub-set of any other category.

Fourth, the framework should be concise. A framework with too many categories will not be easily remembered; hence, it will not be used.

Finally, the framework should impact research behavior. As suggested earlier, it can do this by pointing out areas in need of investigation and by identifying potentially fruitful research approaches. Any framework which does not provide such guidance cannot be considered a useful framework for researchers.

We have specified five characteristics which should be required in a framework for behavioral research on MIS. These characteristics should serve as criteria against which any proposed framework is measured.

3.3 DIMENSIONS OF THE PROPOSED FRAMEWORK

The framework we propose has two dimensions: processes and levels of analysis (Table 1). The process dimension represents the generic activities necessary for MIS to exist in an organization: design and implementation of the MIS, use of the MIS, and management of the MIS function. It is in carrying out these processes that the behaviors upon which behavioral research focuses occur.

Each of these processes is carried out at a number of levels, and these levels are the basis for the second dimension of the framework. The levels of analysis considered are: individual inter-individual (group), organizational, and inter-organizational (societal). Thus, as an example, the framework recognizes that the process of using an MIS and the impacts of that use are not solely individual level phenomena. Rather, MIS usage is felt at all four levels of analysis and presents unique research issues at each level.

Before examining the issues falling in each cell of the framework, we should ask how well it meets the criteria set out above. The completeness of the framework depends on how completely each of the dimensions is specified. The levels of analysis dimension, with four levels ranging from the individual to the society, would seem to cover all relevant actors for man-made systems. It is more difficult to be sure that all MIS-related processes have been specified. In developing this framework, we were unable to identify other unique processes (i.e., processes which are not sub-sets of the three listed); however, this does not assure completeness. Clearly, additional processes could be added should this prove necessary.

Consistency, the logic underlying the framework, has been largely addressed above. To recap, the framework is to be one for behavioral issues in MIS. The proposed framework addresses this by identifying processes (i.e., arenas for behavior) and actors (those who carry out the behaviors of interest).

Mutual exclusivity of the cells within the framework seems quite straight forward. Each level of analysis is distinct from each other level, as are the three generic processes. That the cells give rise to fundamentally different questions can be seen from the representative issues presented in each cell (see Table 1).

While we know of no absolute measure of conciseness, the total of twelve cells identified in this framework would satisfy most people as being a concise representation of an area. Compared with other MIS research frameworks, it is slightly "bulkier" than Gorry and Morton's (16) 9 cells but more parsimonious than Nolan and Wetherbe's (30) 19 cells.

At this point, we can only speculate about the impact of this framework on research behavior. Certain of its characteristics, however, suggest that it will be helpful. First, it does provide a way to categorize research and thus to identify areas which have received little attention. Second, each level of analysis is associated with certain underlying behavioral disciplines: e.g.,

- individual: cognitive psychology, clinical psychology
- group: group dynamics, social psychology
- organizational: organizational behavior, control theory
- societal: sociology, political science

These underlying disciplines should suggest the research approaches most appropriate to the questions at each level of analysis.

TABLE 1

RESEARCH FRAMEWORK AND MAJOR RESEARCH ISSUES

Level of Analysis \ Process	Design and Implementation of the MIS	Use of the MIS (Impacts of Use)	Management of the MIS Function
Individual	1) individuals as information processors & users 2) causes of acceptance/rejection of information systems	1) impact on job characteristics, job satisfaction 2) determinants of use of & satisfaction with the MIS 3) patterns of MIS usage	1) motivators for programmers, analysts, & operations personnel 2) job enrichment in the IS function 3) career paths for IS personnel
Inter-Individual (Group)	1) composition, structure, & functioning of the design team 2) design of systems for large user groups	1) impact on interaction within work groups 2) impact on job mix in work groups	1) factors affecting productivity of system development group 2) role relationships among different functions within IS 3) mix of skills required for future IS portfolio
Organizational	1) integration of diverse groups into design process 2) effect of organizational characteristics on design & implementation	1) impacts on power, control, & coordination structures 2) criteria for selecting and evaluating MIS applications 3) factors which foster/inhibit growth of IS	1) impact of location within the organization & structure on IS effectiveness 2) centralization vs. distribution 3) user vs specialist control of IS operations & planning 4) cost recovery; impact of charge-out methods
Inter-Organizational (Societal)	1) participation of external parties (e.g., unions, external users) in design process	1) impacts on distribution of jobs, power, & wealth in society	1) professionalism vs. organization loyalty

In summary, our a priori assessment suggests that the proposed framework meets all five criteria. A more complete assessment of the merits of the framework must wait, however, until other MIS professionals have used it.

4.0 REPRESENTATIVE RESEARCH ISSUES

4.1 ISSUES WITHIN THE CELLS

What are the research issues suggested by the framework outlined above? Some key issues in each of the cells are shown in Table 1. Each of these issues can be further elaborated into a set of questions which suggest testable research hypotheses. For example, at the "Group" level within the "Management of the MIS Function" process, one issue is the "role relationships among different functions with IS." A partial list of the questions underlying this issue is:

1. Is it more effective/efficient to have programmers and analysts reporting to different managers or the same manager? Under what circumstances?

2. How can the necessary adversary relationship between quality assurance personnel and the operations staff be developed without destroying the generally positive atmosphere needed for coexistence within the DP shop?

3. To what extent should development personnel be able to influence operations practices? Through what mechanisms?

4. How do reporting relationships impact the relative independence and perceived power of security officers, data base administrators (DBAs), and quality assurance personnel?

5. To what extent should the DBA be responsive to requests from development personnel vs. a promulgator of rules and procedures which development personnel must follow?

The list of questions for this one issue could be expanded substantially. Clearly, it is beyond the scope of this paper to attempt to identify all questions for all issues. We can, however, point out some key aspects of the issues. At each level of analysis, certain generic themes arise; and, they are the same across all of the processes. At the individual level, the focus is on individual information processing behavior, motivation, and job design. At the group level role relationships and skills requirements changes are the main concerns. At the organizational level, the primary themes are power, control, and coordination; and, these concerns are repeated at the societal level, but at this level the focus in on a much larger group of actors.

4.2 LEVELS OF ANALYSIS: SIMILARITY FOR ONE ISSUE

Often, one research issue may be examined from different levels of analysis. The appropriate independent and dependent variables may vary with the level of analysis, and similar variables may have different meanings at varying levels of aggregation. Consider the following issue: What impacts are associated with providing application programmers with expanded freedom of choice for working hours distribution within a week and for the location of their workplace.

At the individual level, improved productivity and job satisfaction should be a result of task flexibility subject to locus of control and perceived freedom measures.

At the group level, aggregate productivity should increase, but group cohesion may decline. Since programmers apparently exhibit low social interaction need (10), satisfaction may not significantly decrease (may increase).

At the organization level, work patterns of other subunits (e.g., maintenance and security) or within the IS subunit (operations staff) may require modification and result in conflict between subunits or IS professional groups.

At the societal level, the ability to vary working hours and work location could impact family relations, programmer labor-market characteristics (e.g., housewives in suburban Chicago programming in their homes with CRTs connected to a host in central Chicago), and IS professional organization loyalty.

4.3 CLASSES OF PROCESSES: SIMILARITY FOR ONE ISSUE

A second interesting perspective is the treatment of one issue across processes at the same level of analysis. A MIS manager might be concerned about the user and IS professional productivity effects from decentralization of systems development staff to major IS users. We can trace this issue across processes at the individual level. Within the design-implementation process, if the user absorbs MIS local staff costs, more careful selection of projects may occur; yet, "busy work" projects may be requested

by the user during slack development demand to rationalize utilization of a fixed cost resource.

Users of IS should have greater confidence in locally developed systems and be more willing to experiment with innovative enhancements.

Management of MIS professional issues include the impact on analyst/programmer career paths and job satisfaction.

MIS researchers should consider the full range of single level aspects during design and interpretation of such a study. More comprehensive policy insights may occur and additional classification (co-variate) variables may be discovered.

4.4 PATTERNS OF PRIOR RESEARCH

Analysis of previous MIS behavioral studies may reveal degrees of consensus (viz. free market) as to interesting issues for examination. Cautious inferences are required, however, for concentrations of studies on an issue may be artifactual, e.g., easier to conduct or more funding available. Aside from such reservations, the presence of patterns may imply cumulative research strategies. Again, some caution is required. Cumulative knowledge requires sets of studies which include the same or very comparable conceptual and operational variables using similar type subjects, tasks and contexts (a condition seldom met in MIS behavioral research).

Few examples of coordinated programs of research are apparent. Some notable exceptions are the Minnesota experiments (11), Lucas Implementation Studies, Lusk et al. display format research, Kling et al. organizational studies in urban government, and Mock information structure experiments.

The following observations are based upon the authors' knowledge of published MIS behavioral research studies and some selective journal review. A systematic journal and citation analysis could provide a sounder basis for conclusions, though we doubt that the actual conclusions would be substantially different.

The following eight general themes appear to dominate existing (known to us) studies:

1. Joint effect of cognitive processing factors, information structure, and decision aids on task performance.
2. Impact of degree of user involvement on system acceptance/use.
3. Impact of IS characteristics on organization structure (and vice versa).
4. Impact of IS characteristics on user task structure.
5. Impact of IS characteristics on social relations.
6. Determinants of implementation success/failure.
7. Productivity of alternative systems analysis/design methods.
8. Determinants of degree of centralization of IS resources.

Much of the prior efforts appear to be concentrated in four cells: Design/implementation and MIS use at the individual and organizational levels.

These patterns do not necessarily represent coordinated sets of studies. The next subsection proposes additional areas for thematic research.

4.5 FUTURE RESEARCH DIRECTIONS

As stated earlier, one key value of a research framework would be the identification of areas underrepresented in the extant research literature. Our "quick and dirty" survey of the literature suggests that four areas are well represented, but the remaining eight are not. Perhaps this is due to training and background of IS behavioral researchers; a great number come to this field from the organizational behavior and cognitive psychology fields, hence they are most familiar with the problems and methods of those fields.

Whatever the reason for this apparent disparity of effort, we firmly believe that all twelve cells present substantial opportunities for future research. In those areas where a substantial body of research already exists, studies should be conducted which can integrate existing research results; e.g., by recognizing differences in measures used and contexts studied, or by including additional variables not previously considered. Such studies could build the true cumulative research tradition which is necessary for progress in this field. In those areas where little research exists, we can only hope that studies will be designed carefully to allow the accumulation of knowledge -- e.g., by selection of appropriate research methodologies and by the consistent definition of variables across studies.

In the next section, we examine briefly some methodological considerations for future studies.

5.0 RESEARCH METHODOLOGY

The purpose of this section is to highlight some important methodological issues for resolution within each study. Credible MIS behavioral research must be predicated upon adoption of standards used by behavioral scientists.

Formal and accepted research designs (8, 9) should be used for all, except some exploratory, research efforts. Operational definitions based upon concepts from behavioral science theories should be selected unless the focus of the study is the development of measurements. Validity and reliability (34) of formulated and existing measures should be considered.

In exploratory, theory building efforts, both field studies (correlational results) and laboratory experiments with students provide productive research strategies. Ultimately, however, multi-site longitudinal field studies, field experiments (manipulated variables), and laboratory experiments with actual (rather than surrogate) participants should be conducted to provide evidential support for hypotheses.

Much of the implementation research is longitudinal; yet, resource constraints sometimes require partial direct observation and some participant recall (e.g., critical incidents). The introduction of the change, however, may bias retrospective even description. Thus, attempts to secure objective or archival measures should be pursued.

Within the behavioral science community, a number of concerns about the validity of self-report data (29) have been raised. Some results indicate that the proper phrasing of instructions for providing verbal protocol data will minimize this threat (12).

The combination of theory-grounded research questions with appropriate methodology should provide a standard of quality acceptable to both MIS and behavioral science researchers.

6.0 CONCLUSION

The existence of some atheoretical, intuitively designed behavioral studies in an emerging discipline is anticipated. Some future exploratory studies will continue to exhibit diffused data gathering. In many areas within the proposed framework, however, adequate theory and methods are available from the underlying behavioral sciences. These resources should be utilized. Credible MIS behavioral research must be built upon cumulative MIS policy studies reflecting underlying behavioral science concepts and methodologies.

REFERENCES

1. Alter, S. and Ginzberg, M. Managing uncertainty in MIS implementation. Sloan Management Review, (Fall 1978), 23-31.

2. Bariff, M. The system survey: analytical and natural strategies for organizational diagnosis. In W. Cotterman (ed.), Systems Analysis and Design: A Foundation for the 1980s, (forthcoming).

3. Bariff, M. Information requirements analysis. Management Science, forthcoming.

4. Bariff, M. and Galbraith, J. Intraorganizational power considerations for designing of information systems. Accounting, Organizations and Society, 3, 1, (1978), 15-28.

5. Benbesat, I. and Vessey, I. Programmer and analyst cost/time estimation. MIS Quarterly, 4, 2, (June 1980), 31-44.

6. Bostrom, R. and Heinen, S. MIS problems and failures: a socio-technical perspecting part 1: the problem. MIS Quarterly, 1, 3, (September 1977), 17-32.

7. Buck, P. Modern Cultural Anthropology, 2nd ed., Knopf, (1974).

8. Campbell, D. and Stanley, J. Experimental and Quasi Experimental Designs for Research, Rand McNally, (1967).

9. Cook, T. and Campbell, D. Quasi-Experimentation: Design and Analysis Issues for Field Settings, Rand McNally, (1979).

10. Cougar, D. and Zawacki, R. What motivates computer professionals? Datamation, (September 1978), 114-23.

11. Dickson, G., et al. Research in management information systems: the Minnesota experiments. Management Science, 23, 9, (May 1977), 913-23.

12. Easton, D. A Framework for Political Analysis, Prentice-Hall, (1965).

13. Ericsson, K. and Simon, H. Verbal reports as data. Psychological Review, 87, 3, (May 1980), 215-49.

14. Galbraith, J. Organization Design, Addison-Wesley, (1977).

15. Ginzberg, M. A process approach to management science implementation. Ph.D. dissertation, MIT, (1975).

16. Gorry, A. and Scott-Morton, M. A framework for management information systems. Sloan Management Review, 13, 1, (1971), 55-70.

17. Hickson, D., et al. A strategic contingencies theory of intra-organizational power. Administrative Science Quartely, 16, 2, 216-29.

18. Keen, P. Managing organizational change: the role of MIS. In J. White (ed.), Seventh Annual SMIS Conference Proceedings, (1975), 129-34.

19. Kling, R. and Scacchi, W. Recurrent dilemmas of computer use in complex organizations. NCC Proceedings, (1979), 107-15.

20. Kornberg, A. and Perry, S. Conceptual models of power and their applicability to empirical research in politics. Political Science, 18, 1, (March 1966), 52-70.

21. Lucas, H. Why Information Systems Fail, Columbia University, (1975).

22. MacCrimmon, K. Descriptive aspects of team theory: observation, communication and decision heuristics in information systems. Management Science, 20, 10, (June 1974), 1323-33.

23. Marschak, J. and Radner, R. Economic Theory of Teams, Yale University, (1972).

24. Mason, R. and Mitroff, I. A program for research on management information systems. Management Science, 19, (1973), 475-87.

25. Meister, D. Behavioral Foundations of Systems Development, Wiley, (1976).

26. Merton, R. Social Theory and Social Structure, Free Press, (1968).

27. Mumford, E. and Weir, M. Computer Systems and Work Design: The Ethics Method, Wiley, (1979).

28. Myers, G. A controlled experiment in program testing and code walk throughs/ inspections. Communications of ACM, 21, 9, (September 1978), 760-8.

29. Nisbett, R. and Ross, L. Human Inference: Strategies and Shortcomings of Social Judgment, Prentice-Hall, (1980).

30. Nolan, R. and Wetherbe, J. Toward a comprehensive framework for MIS research. MIS Quarterly, 4, 2, (June 1980), 1-20.

31. Olson, M. and Chervany, N. The relationship between organizational characteristics and the structure of the information services function. MIS Quarterly, 4, 2, (June 1980), 57-68.

32. Pettigrew, A. Information control as a source of power. Sociology, 6, 2, (1972), 187-204.

33. Robey, D. MIS effects on managers' task scope and satisfaction. NCC Proceedings, (1979), 391-5.

34. Runkel, R. and McGrath, J. Research on Human Behavior, Holt, Rinehart and Winston, (1972).

35. Shneiderman, B., et al. Experimental investigations of the utility of detailed flowcharts in programming. Communications of ACM, 20, 6, (June 1977), 373-81.

36. Snizek, W. and Fuhrman, E. The place of theory in applied research: comments from Triandis, Tausky and Seashore. Journal of Applied Behavioral Science, 16, 2, (April-June 1980), 228-36.

37. Cooper, R. and Swanson, B. Management information requirements: the state of the art. Data Base, 11, 2, (Fall 1979), 5-16.

38. Thomas, J. Psychological issues in data base management. Data Base, 9, 2, (Fall 1977), 169-84.

39. Whisler, T. The Impact of Computers on Management, Prager, (1970)

40. Zmud, R. Individual differences and MIS success: a review of the empirical literature. Management Science, 25, 10, (October 1979), 966-79.