
Studying Information Technology in Organizations: Research Approaches and Assumptions

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We examined 155 information systems research articles published from 1983 to 1988 and found that although this research is not rooted in a single overarching theoretical perspective, it does exhibit a single set of philosophical assumptions regarding the nature of the phenomena studied by information systems researchers, and what constitutes valid knowledge about those phenomena. We believe that a single research perspective for studying information systems phenomena is unnecessarily restrictive, and argue that there exist other philosophical assumptions that can inform studies of the relationships between information technology, people, and organizations. In this paper, we present two additional research philosophies for consideration—the interpretive and the critical—and for each we provide empirical examples to illustrate how they are used. We conclude by suggesting that much can be gained if a plurality of research perspectives is effectively employed to investigate information systems phenomena.

Philosophical assumptions—Research approaches—Positivist research—Interpretivist research—Critical research

Introduction

The purpose of this paper is to stimulate reflection on the implications of the research approaches we as researchers employ when we investigate information systems phenomena. Our intention is to motivate a more reasoned, reflective adoption of approaches from the diverse perspectives available to investigate the diverse arena of information technology development and use in organizations.

One of the most pronounced features of contemporary social research—and by this we mean those disciplines concerned with human phenomena (individual and collective) such as anthropology, psychology, sociology, and their applied fields of administrative science, education, industrial psychology and industrial sociology—is the great range of research perspectives that operate concurrently (Astley and Van de Ven

1983, Burrell and Morgan 1979, Morgan 1980, 1983, Pfeffer 1982). These disciplines are marked by a plethora of "schools of thought," each with its own metatheoretic assumptions, research methodologies, and adherents. To the extent that one believes that the social phenomena studied within these fields are complex, the existence of a plurality of perspectives allows the exploration of phenomena from diverse frames of reference.

In information systems research, however, such a range of research traditions is not evident. In this paper we present evidence of the lack of diversity in information systems research, by describing a survey in which we examined 155 information systems research articles published from 1983 to 1988. We found that although information systems research is not rooted in a single overarching theoretical perspective, it does exhibit a single set of philosophical assumptions regarding the underlying nature of phenomena being investigated, the appropriate research methods to be used, and the nature of valid evidence. Our intent in this paper is to discuss the range of philosophical assumptions available to study information systems phenomena, and to encourage greater debate and mindfulness around the assumptions we adopt when we embark on research investigations.

The paper is structured as follows. In the first section we detail the results of a survey which provides evidence for a collective research tradition within the information systems field, and discuss why we believe such a single philosophy toward studying information systems phenomena can be limiting. In the following two sections we describe and illustrate two other philosophical research traditions which we consider to be valuable approaches to studying information systems and their development and use in organizations. We conclude with some general recommendations for the information systems community.

A Dominant Perspective in Information Systems Research

Much recent self-reflection in the information systems discipline has involved a discussion of the status of information systems research vis-à-vis the norms of what constitutes a scientific discipline (Banville and Landry 1989, Benbasat 1984, Culnan 1986, 1987, Culnan and Swanson 1986, Hamilton and Ives 1982, Hirschheim and Klein 1989, Keen 1980, Klein and Welke 1982, Lyytinen 1987, Mumford et al. 1985, Weber 1984). The purpose of these expositions has been to identify and articulate theoretical commonalities or topic syntheses. We argue however, following Chua (1986) and Webster and Starbuck (1988), that another indicator of a research tradition is the extent to which there exists a set of dominant philosophical assumptions or a world view that informs the work of the researchers in a discipline. Chua (1986, 602) suggests that a community of scientists share "a constellation of beliefs, values, and techniques" and these beliefs "circumscribe definitions of 'worthwhile problems' and 'acceptable scientific evidence.'" In the following section we show that information systems research has indeed been guided by a dominant world view.

Evidence of a Dominant Perspective in Information Systems Research

In a recent assessment of the published information systems literature, Culnan's (1986) bibliographic citation analysis of information systems research publications (1972 to 1982), established nine distinct (and disparate) research areas in the information systems community. Further, Culnan (1987), again employing bibliographic citation analysis, identified five intellectual subfields within current information systems research, suggesting "that while MIS is still preparadigmatic, it has made

Journal	Frequency	Percent
<i>Communications of the ACM</i>	56	36.1
<i>MIS Quarterly</i>	49	31.6
<i>Proceedings of ICIS</i>	43	27.7
<i>Management Science</i>	7	4.6
	155	100%

FIGURE 1. Articles per Journal.

progress, if one accepts the argument that MIS, like all social sciences, is a multiple paradigm discipline" (1987, p. 347).

In this paper we wish to argue that while there may be no theoretical or topic congruence among information systems researchers, there is a consistent philosophical world view that underlies much of the activity constituting information systems research, and that binds information systems researchers together.¹ To explore this assertion we examined more than five years of published information systems literature—from between January 1983 and May 1988—in four major information systems outlets. These sources were *Communications of the ACM*, *Proceedings of the International Conference on Information Systems*, *Management Science*, and *MIS Quarterly*.²

Figure 1 displays the distribution of information systems research published across these four sources. As we are concerned with research conduct, we excluded any conceptual or framework articles from consideration. A total of 155 empirical research articles were included in this analysis.

The research articles were categorized along several different dimensions. The first used Culnan's (1987) five topic-oriented research categories. These topic categories include research foundations, organizational approaches to information systems, individual approaches to information systems, information systems management, and information systems curriculum. Culnan's foundation and curriculum categories were excluded as we were only concerned with approaches to research studies. The distribution of articles by Culnan's categories is presented in Figure 2. This data confirms Culnan's (1986, 1987) conclusions in that, as in her studies, there does not appear to be one dominant theoretical topic area, but rather several different and distinct streams of research.

To explore the extent to which a dominant set of assumptions informs information systems research, we analyzed the sample in three different ways. The first is by research design, the second by time frame of the study, and the last by epistemology. A discussion of the implications of our findings is taken up in the following section.

¹ We specifically limit our remarks to that subset of information systems research which studies the interaction of information technology and humans at both macro and micro levels of analysis, as this is the domain most closely concerned with social science issues. Information systems research conducted in the computer science or engineering traditions is beyond the scope of our discussion.

² We only examined mainstream American journals, as we believe that these represent the largest forums for publishing information systems research, and that these currently inform the work of most information systems researchers. We acknowledge that by excluding the European journals we have limited the survey's exposure to nontraditional research work.

Research Category (Culnan 1987)	Frequency	Percent
Individual Approaches to MIS Design and Use	85	54.8
MIS Management	36	23.3
Organizational Approaches to MIS Design and Use	34	21.9
	155	100%

FIGURE 2. Articles Classified by Research Category.

Figure 3 presents the first breakdown showing the frequency of the various research designs. The three primary research designs which emerged from this analysis are case studies (13.5%), laboratory experiments (27.1%) and surveys (49.1%). These three designs account for almost 90% of the studies. Surveys, however, were clearly the dominant research method in this sample.

The data were then analyzed by time period of the study. Four different categories were sufficient to classify the data: one-shot cross-sectional, cross-sectional over multiple time periods, longitudinal, and process traces. Studies involving process tracing techniques such as protocol analysis were classified separately, as they do not neatly fit into the other categories. They employ continuous data collection, but are not truly longitudinal, as the trace is typically conducted over a single discrete event—such as a meeting or problem-solving exercise—lasting a short period of time, such as a few hours. We distinguished between multiple-time-period, cross-sectional studies and longitudinal ones: the former employ some measure(s) administered at several time intervals, providing many discrete snap shots of the phenomenon; the latter are continuous studies, where the researcher engages with the phenomenon over an uninterrupted period of time, such as a few months or years. Longitudinal studies typically focus on issues of process. The breakdown of articles by time period is presented in Figure 4. Static, one-shot, cross-sectional studies are clearly the predominant form of research in information systems. These studies account for 90.3% of the articles in our sample. Longitudinal and multiple time period studies account for only 4.5% and 3.9% of the sample, respectively.

Articles were finally examined for the underlying epistemology which guided the research. We followed Chua's (1986) classification of research epistemologies into

Research Design	Frequency	Percent
Survey	76	49.1
Laboratory Experiment	42	27.1
Case Study	21	13.5
Mixed Method	5	3.2
Field Experiment	4	2.6
Instrument Development	4	2.6
Protocol Analysis	2	1.3
Action Research	1	0.6
	155	100%

FIGURE 3. Articles Classified by Research Design.

Time Period of Study	Frequency	Percent
Cross-Sectional: single snapshot	140	90.3
Longitudinal	7	4.5
Cross-Sectional: multiple snapshots	6	3.9
Process Traces	2	1.3
	155	100%

FIGURE 4. Articles Classified by Time Period of Study.

positivist, interpretive, and critical studies.³ **Positivist** studies are premised on the existence of a priori fixed relationships within phenomena which are typically investigated with structured instrumentation. Such studies serve primarily to test theory, in an attempt to increase predictive understanding of phenomena. The criteria we adopted in classifying studies as positivist were evidence of formal propositions, quantifiable measures of variables, hypotheses testing, and the drawing of inferences about a phenomenon from the sample to a stated population. Exceptions to this are "descriptive" studies. We found it useful to distinguish within the positivist category those studies where the researchers were working within a theoretical tradition, and those where the researchers' intentions were "descriptive." In "descriptive" work, researchers attempted no theoretical grounding or interpretation of the phenomena; rather, they presented what they believed to be straightforward "objective," "factual," accounts of events to illustrate some issue of interest to the information systems community. Our criterion for this "descriptive" category was based on what the researchers thought they were up to in their exposition. That some might consider such "objective" or "factual" accounts problematic was seemingly not apparent to the researchers, or at least not evident in their discussion. "Descriptive" articles typically included case studies, with or without simple descriptive statistics (frequencies and percentages).

Interpretive studies assume that people create and associate their own subjective and intersubjective meanings as they interact with the world around them. Interpretive researchers thus attempt to understand phenomena through accessing the meanings that participants assign to them. In direct contrast to the "descriptive" studies above, interpretive studies reject the possibility of an "objective" or "factual" account of events and situations, seeking instead a relativistic, albeit shared, understanding of phenomena. Generalization from the setting (usually only one or a handful of field sites) to a population is not sought; rather, the intent is to understand the deeper structure of a phenomenon, which it is believed can then be used to inform other settings. The criteria we adopted in classifying interpretive studies were evidence of a nondeterministic perspective where the intent of the research was to increase understanding of the phenomenon within cultural and contextual situations; where the phenomenon of interest was examined in its natural setting and from the perspective of the participants; and where researchers did not impose their outsiders' a priori understanding on the situation. **Critical** studies aim to critique the

³ A detailed examination of the philosophical assumptions underlying information systems research studies follows in subsequent sections.

Epistemology	Frequency	Percent
Positivist	150	96.8
"descriptive"	(37)	(23.9)
theoretically grounded	(113)	(72.9)
Interpretive	5	3.2
Critical	0	0
	155	100%

FIGURE 5. Articles Classified by Epistemology.

status quo, through the exposure of what are believed to be deep-seated, structural contradictions within social systems, and thereby to transform these alienating and restrictive social conditions. The criteria we adopted in classifying critical studies were evidence of a critical stance towards taken-for-granted assumptions about organizations and information systems, and a dialectical analysis which attempted to reveal the historical, ideological, and contradictory nature of existing social practices.

Figure 5 shows the breakdown of articles by epistemology. Positivism is clearly the dominant epistemology, accounting for 96.8% of the studies. "Descriptive" articles make up a quarter of the positivist category, or 23.9% of the total sample. Interpretive studies represent only 3.2% of the total number of studies, and critical studies are not represented at all.

The figures collectively show that while no one topic area or theory dominates information systems research, there clearly is a prevailing set of assumptions about what constitutes acceptable information systems research. This set of assumptions, that appears to influence much of the published information systems research, is primarily survey or laboratory oriented, and investigates phenomena within a single cross-section or slice of time. It is not clear, however, that researchers consciously examine these assumptions; rather, it appears that they are largely taken for granted within the information systems research community.

Beyond a Dominant Research Perspective in Information Systems Research

Much of the information systems research being conducted today is concerned with the ongoing relations among information technology, individuals, and organizations. For example, implementation studies (Alavi and Henderson 1981, Franz and Robey 1984, Ginzberg 1981, Lucas 1981, Markus 1983) are concerned with how information technology is successfully introduced into organizations. Systems development researchers (Bostrom and Heinen 1977a, 1977b, Mumford and Weir 1979) are concerned with building information systems that are efficient, effective, and that also increase users' job satisfaction. There is a large and growing interest in computer-mediated support of communication, coordination, and group decision making (Culnan and Markus 1987, Kraemer and King 1988, Malone, Yates and Benjamin 1987, Poole and DeSanctis 1989, Sproull and Kiesler 1986). Information systems personnel researchers (Bartol 1983, Baroudi 1985, Ivancevich et al. 1983, Weiss 1983) are concerned with understanding the processes which result in job dissatisfaction, turnover, and stress for systems builders. Other researchers have focused on the power shifts generated by technology and technological dependence (Lucas 1984, Markus and Bjørn-Andersen 1987, Saunders and Scamell 1986). Many studies have

been conducted into the effects of computerization on job skills and employment levels (see the review of studies by Attewell and Rule 1984). The "impacts school" of information systems research examines the implications (individual, group, organizational and societal) of widespread use of information technology (Bjørn-Andersen and Pederson 1980, Danziger et al. 1982, Kling 1978, 1980, Kling and Iacono 1984, Laudon 1974, Olson and Primps 1984, Turner 1984, Zuboff 1988). These are only a sampling of topics that one can find under investigation; yet all share a common thread. All are concerned with the social processes surrounding the introduction, creation, use/misuse/disuse of information technology, as portrayed by Kling and Scacchi's (1982) metaphor of the ongoing "web of computing."

To date, as evidenced by the survey presented above, much information systems research reflects a positivistic orientation, a research tradition that has its roots in the natural sciences. An exclusive view is, in our opinion, always only a partial view, and the dominance of positivism, by not acknowledging the legitimacy of other research traditions, has limited what aspects of information systems phenomena we have studied, and how we have studied them. This has implications not only for the development of theory and our understanding of information systems phenomena, but also for the practice of information systems work. The findings of information systems research filter into the practitioner community and are used as prescriptions for action. Restricted research, thus, has far-reaching consequences.

Through this paper we wish to encourage a greater awareness and understanding of the diversity of assumptions that underlie various types of social research. In particular, we want to draw attention to the inadvertent restrictions we impose on our research when we unquestioningly accept the research assumptions of the dominant perspective. We suggest there are a number of other philosophical perspectives that may be effective in helping us to study the phenomena which absorb information system researchers. In the following sections, we explore this claim in more detail by examining the various research perspectives with which social science researchers may approach their phenomena of interest. In discussing these various research approaches we draw on Chua's (1986) classification of the assumptions constituting the philosophical stances that researchers adopt towards the world and their work. Chua (1986, p. 604) articulates three sets of beliefs that "delineate a way of seeing and researching the world," that is, 1. beliefs about the phenomenon or "object" of study, 2. beliefs about the notion of knowledge, and 3. beliefs about the relationship between knowledge and the empirical world. Various positions on these three sets of beliefs can be seen to constitute the distinctive research perspectives or world views that social science researchers have adopted towards their research (see Figure 6).

1. *Beliefs about Physical and Social Reality.* Ontological beliefs have to do with the essence of phenomena under investigation; that is, whether the empirical world is assumed to be objective and hence independent of humans, or subjective and hence having existence only through the action of humans in creating and recreating it. Then there are beliefs about human rationality, which deal with the intentions ascribed by various researchers to the humans they study. For example, the discipline of economics is premised on beliefs about humans as utility-maximizing, and as having limited access to information. Finally, there are beliefs about social relations, about how people interact in organizations, groups, and society. For example,

Beliefs about	Explanation
<i>Physical and Social Reality:</i>	
Ontology	Whether social and physical worlds are objective and exist independently of humans, or subjective and exist only through human action
Human Rationality	The intentionality ascribed to human action
Social Relations	Whether social relations are intrinsically stable and orderly, or essentially dynamic and conflictive
<i>Knowledge:</i>	
Epistemology	Criteria for constructing and evaluating knowledge
Methodology	Which research methods are appropriate for generating valid evidence
<i>The Relationship between Theory and Practice:</i>	
	The purpose of knowledge in practice

FIGURE 6. Beliefs Underlying the Conduct of Research.

researchers may believe social interactions to be stable and orderly in general, or they may believe them to be primarily dynamic and conflictive.

2. *Beliefs about Knowledge.* Epistemological assumptions concern the criteria by which valid knowledge about a phenomenon may be constructed and evaluated. For example, the positivist world view asserts that a theory is true only if it is repeatedly not falsified by empirical events (Chua 1986, p. 604). Methodological assumptions indicate which research methods and techniques are considered appropriate for the gathering of valid empirical evidence. Which methods are considered appropriate clearly depend on how the veracity of a theory is established. Positivist researchers, for example, believe that large-scale sample surveys and controlled laboratory experiments are suitable research methods, as they allow researchers a certain amount of control over data collection and analysis through manipulation of research design parameters and statistical procedures.

3. *Beliefs about the Relationship between Knowledge and the Empirical World.* These beliefs concern the role of theory in the world of practice, and reflect the values and intentions researchers bring to their work. That is, what researchers believe is appropriate to accomplish with their research work, and what they intend to achieve with a given research study. Some researchers pursue their research interests and certain kinds of theory to provide technical answers to specialized problems. Other researchers pursue theory which they hope will improve the social relations of organizations, or eliminate social inequities.

The following sections explore the underlying assumptions of three research philosophies that have been used to conduct social science research, including information systems research: the positivist, interpretive, and critical philosophies. We will discuss each in turn, outlining the distinctive positions each assumes on the three sets of beliefs articulated in Figure 6.

The Positivist Philosophy of Information Systems Research

As indicated above, a positivist research perspective is dominant in information systems research—a status which reflects much of Western science. With roots in

logical positivism, this perspective reflects the precepts informing the study of natural phenomena (Lincoln and Guba 1985, p. 36)⁴:

- The phenomenon of interest is single, tangible and fragmentable, and there is a unique, best description of any chosen aspect of the phenomenon.
- The researcher and the object of inquiry are independent, and there is a sharp demarcation between observation reports and theory statements.
- Nomothetic statements, i.e., law-like generalizations independent of time or context, are possible, implying that scientific concepts are precise, having fixed and invariant meanings.
- There exist real, uni-directional cause-effect relationships that are capable of being identified and tested via hypothetic-deductive logic and analysis.
- Inquiry is value-free.

A number of commentators have indicated that the application of these precepts to research on social phenomena is problematic (Evered and Louis 1981, Galliers and Land 1987, Lincoln and Guba 1985, Morgan 1980, Morgan and Smircich 1980, Weick 1984). Indeed, many researchers practicing positivist research would agree that some of these precepts are ideals that are typically compromised in the exigencies of daily research activity. In the following we explore some of the assumptions underlying the positivist philosophy.

Positivist Research Philosophy: Assumptions

Assumptions underlying the positivist research philosophy are examined in terms of Chua's (1986) three categories described above, as we will do for the other two philosophies in later sections.

Beliefs about Physical and Social Reality. Ontologically, positivist information systems researchers assume an objective physical and social world that exists independent of humans, and whose nature can be relatively unproblematically apprehended, characterized, and measured. For example, organizations are understood to have a structure and reality beyond the actions of their members. The role of the researcher is to "discover" the objective physical and social reality by crafting precise measures that will detect and gauge those dimensions of reality that interest the researcher. Understanding phenomena is thus primarily a problem of modeling and measurement, of constructing an appropriate set of constructs and an accurate set of instruments to capture the essence of the phenomenon. It is assumed, explicitly or implicitly, that there is a one-to-one correspondence between the constructs of a researcher's model and the events, objects, or features of interest in the world. The researcher herself is seen to play a passive, neutral role in this investigation, and does not intervene in the phenomenon of interest. For example, when researchers investigate the relationship between information technology and organizational structure, they assume structure to be objective and hence capable of being represented via a number of researcher-devised constructs and measures such as: span of control, division of labor, centralization, formalization, and hierarchical levels.

⁴ Recent work in the post-empiricist philosophy of science (Bernstein 1985, Bhaskar 1978) has begun to question the validity of these assumptions for the practice of natural science. To the extent that the positivist dogma lose their currency among mainstream natural scientists, we should begin to see a growing interest among social scientists for additional research perspectives of the sort discussed in this paper.

Most researchers subscribing to the positivist perspective assume that human action is intentional and rational, or at the least, boundedly rational. The assumption about social reality is that humans interact in relatively stable and orderly ways, and that conflict and contradiction are not endemic to organizations and society. When conflict does occur, its effect is seen to be dysfunctional to the social system (group, organization, or society) and hence it is something to be suppressed or overcome. Conflict is seen as serving to reveal some discrepancy in the system, as a symptom of a problem which can be corrected, hence preventing some potentially disruptive system breakdown.

Beliefs about Knowledge. With respect to knowledge, the epistemological belief of the positivist perspective is concerned with the empirical testability of theories, whether this requires theories to be "verified" or "falsified." This belief, in what is known as the hypothetic-deductive account of scientific explanation, has two consequences (Chua 1986, 607):

- A search for universal laws or principles from which lower-level hypotheses may be deduced. Positivist researchers work in a deductive manner to discover unilateral, causal relationships, that are the basis of generalized knowledge; that is, that can predict patterns of behavior across situations (Putnam 1983, p. 41).
- A tight coupling among explanation, prediction, and control. If an event or action is only explained when it can be deduced from certain principles and premises, then knowing the principles and premises beforehand enables prediction and control of the event or action.

The search for general connections between information technology and changing environmental conditions or organizational forms—as evident, for example, in the contingency or transaction costs theories—assumes that the empirical world is largely characterized by knowable, constant relationships. To support such an epistemological belief, the positivist research perspective endorses a number of "appropriate" research methodologies. The belief here is that following these sanctioned methodologies is the only way in which valid knowledge can be obtained—what Gibbons (1987, p. 1) refers to as "methodological monism." He goes on to characterize the epistemological beliefs of this mode of inquiry as one in which units of data are assumed to be identifiable (for example, subjective attitudes) and assumed to exist independent of the method used to reveal or measure them. Sample surveys and controlled experiments are the primary data collection techniques, and inferential statistics is the data analysis method used to "discover" causal laws. The validity and reliability of identifying and measuring instruments are crucial, as are researcher detachment from the research process, random assignment of subjects, and control over confounding influences. The concepts present in the language of the positivist research philosophy cannot reflect the everyday language usage of the study participants, as these are considered too ambiguous and subjective. Consequently, the concepts of positivist science "must be redefined in order to eliminate the evaluative dimension and to ensure uniformity of measurement among researchers" (Gibbons 1987, p. 1).

An illustration of these practices can be found in Baroudi's (1985) work, where the author attempted to examine the relationship between boundary spanning activities of information systems personnel, the ambiguity and conflict experienced as a consequence, and the impact this had on employee job satisfaction, organizational

commitment, and turnover intentions. Each of the anticipated links was carefully stated a priori as an explicit hypothesis, and the direction of the relationship was prespecified. The study paid close attention to employing standard instrumentation with established records of validity and reliability. Participants were required to express their experiences in terms of the researcher's constructs through questionnaire items, thus facilitating replication of this study and its findings by other researchers in other settings.

Beliefs about the Relationship between Theory and Practice. The relationship between theory and practice in the positivist philosophy is primarily technical. That is, as characterized by McCarthy (1978, p. 139): "If the appropriate general laws are known and the relevant initial conditions are manipulable, we can produce a desired state of affairs, natural or social." Because positivists believe that scientific inquiry is "value-free," what such a desired state of affairs is cannot be resolved scientifically. It is believed that as impartial observers, researchers can objectively evaluate or predict actions or processes, but that they cannot get involved in moral judgments or subjective opinion. That is, researchers can comment on means, but not ends. This position is in direct contrast to that adopted by the interpretive and the critical philosophies, which argue that the very distinction between fact and value is itself a value judgment (Weber 1947). The whole philosophical debate around the value-ladenness of assumptions, approaches, data, theories, and explanations is typically not engaged in by positivist researchers, who take for granted the value-neutrality of their position.

Another aspect of the value-neutral stance adopted by positivist researchers is the belief that they are detached from the phenomena of interest. Interpretive and critical researchers, in contrast, have argued that on a number of levels—conceptual, methodological, and substantive—all researchers are inherently implicated in the object of their research. In particular, this implication pertains to the role played by social research in practice. While it has been argued that there exists an independence between researcher and phenomenon of study in the natural sciences,⁵ the same assertion cannot be made for the social sciences. While the results of natural science do not impinge on and change the nature of the phenomena studied, the results of social science do enter into the discourse of everyday human reality, and clearly can and do transform the nature of these phenomena. As Giddens (1987, p. 19) notes, in the social sciences, unlike in natural science, there is no way of keeping the concepts, theories, and findings of the researchers "free from appropriation by lay actors." Clearly, information systems research enters into the very constitution of the phenomena it studies. Indeed, a major goal of information systems research is to have an impact on information systems practice; that is, the findings of information systems research are intended to inform and improve the development and use of information systems in organizations. Baroudi (1985), for example, concludes his study with recommendations for information systems management. He states (p. 353), "The IS manager may want to consider recruiting and selecting those individuals who have tolerances for both role ambiguity and role conflict, as these may be unavoidable conditions of the IS professionals' world." To the extent that information systems managers follow Baroudi's recommendations, they will change the relationships

⁵ Recent work in the history and philosophy of science has questioned even this assumption (Bernstein 1985, Bhaskar 1978, Kuhn 1970).

among the variables he observed. There clearly is a reciprocal and reflexive relationship between information systems research and social reality; the two are not independent of each other. In the light of this, claims of objectivity and value-neutrality in information systems research may be misleading.

Positivist Research Philosophy: Assessment

The positivist stream of research has institutionalized certain criteria of validity, rigor, and replicability in the conduct of scientific research. It has enforced standards of quality in empirical research, and has sought to build a tradition of cumulative knowledge across the various disciplines in which it is practised. Research models and results fill journals, and much has been learned about the development and use of information systems (Jarvenpaa 1988). Difficulties arise, however, when proponents of this research perspective do not admit the validity of any other philosophical stance, precluding the possibility of different forms of knowledge and different assumptions about reality. From the perspective of many nonpositivist researchers, such orthodoxy is unacceptably restrictive.

A number of commentators have discussed the limitations of the positivist research perspective (Burrell and Morgan 1979, Chua 1986, Lincoln and Guba 1985, Morgan 1983, Mumford et al. 1985, Putnam 1983, Weick 1984). We will just mention two here. The quest for universal laws leads to a disregard for historical and contextual conditions as possible triggers of events or influences on human action. The design and use of information technology in organizations, in particular, is intrinsically embedded in social contexts, marked by time, locale, politics, and culture. Neglecting these influences may reveal an incomplete picture of information systems phenomena. Because the positivist research perspective tends to disregard the historical context of phenomena, positivist research studies are rooted in the status quo. For example, many of the information systems research studies classified as positivist in the prior section were concerned with users' information system satisfaction levels. These studies, however, ignored the historical context within which systems are used which may affect satisfaction levels. Baroudi, Olson and Ives (1986), for example, examined the link between user involvement, system usage, and user information satisfaction. While they found empirical evidence which suggested that user involvement was associated with information systems' satisfaction, they did not explore how the history and context of organizations may have influenced their data. The relationship between involvement and satisfaction may depend on the history of organizational practices regarding employee participation in decision making. That is, where a firm has no tradition of worker involvement in organizational decision making, the failure to consult users of technology may be less disruptive than in firms who have long-standing practices of involving their organizational members in workplace issues.

Likewise, the positivist aim to explain and predict external reality implies that people are not active makers of their physical and social reality. Positivistic research techniques encourage deterministic explanations of phenomena, in that these explanations emerge from interactions between the researcher and his subjects, where the researcher, by definition, dominates the relationship. In the search for causal relations, the positivist researcher focuses on the validity and control of the research procedures, and hence adopts a predefined and circumscribed stance towards the phenomenon being investigated. Such a posture is not conducive to the discovery

and understanding of non-deterministic and reciprocal relationships. Laboratory subjects and survey respondents act and react mechanically to the research stimulus. Rowan (1973, p. 210) notes: "Research can only discover one-sided things if it insists on setting up one-sided relationships. . . . You only get answers to those questions you are asking." Only if we have strong reason to suspect that the relationships underlying our phenomena of interest, interaction among information technology and humans, are determinate and one-dimensionally causal, can we utilize such positivist techniques with confidence. As Markus and Robey (1988) elucidate, there is no reason to suspect that this is the case with information technology and human affairs.

In the following two sections, we examine two other research philosophies, the interpretive and the critical, which may offer powerful insight to our studies of information systems phenomena.

The Interpretive Philosophy of Information Systems Research

In this section we focus on the premises of the interpretive perspective, which is receiving increased attention and popularity in many social science fields (organizational studies, political science, sociology, marketing, education, and social psychology). A fundamental distinction between the interpretive and positivist world views is the former's primary presumption of social constructionism. Interpretivism asserts that reality, as well as our knowledge thereof, are social products and hence incapable of being understood independent of the social actors (including the researchers) that construct and make sense of that reality. The world is not conceived of as a fixed constitution of objects, but rather as "an emergent social process—as an extension of human consciousness and subjective experience" (Burrell and Morgan 1979, p. 253). The aim of all interpretive research is to understand how members of a social group, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action. The interpretive perspective attempts "to understand the intersubjective meanings embedded in social life . . . [and hence] to explain why people act the way they do" (Gibbons 1987, p. 3).

Interpretive Research Philosophy: Assumptions

Assumptions underlying the interpretive research philosophy are examined in terms of Chua's (1986) three categories described above.

Beliefs about Physical and Social Reality. Ontologically, the interpretive perspective emphasizes the importance of subjective meanings and social-political as well as symbolic action in the processes through which humans construct and reconstruct their reality (Morgan 1983, p. 396). For example, this tradition does not presume that organizational structure or social relations are objectively known and unproblematic, but attempts to understand how and why individuals, through their socialization into, interaction with, and participation in, a social world, give it a certain status and meaning. Meaning and intentional descriptions are important, not merely because they reveal subjects' states of mind which can be correlated with external behavior, but because they are constitutive of those behaviors. Social reality is understood to be reproduced through ongoing interactions. Fay (1987, p. 86) notes:

It is only because actors share certain basic conceptions that there can be certain types of social action. For example, the social practice of the market-place can occur given the shared constitutive meanings of (say) some conceptions of private property, the notion that in the

exchange of goods and services some form of maximizing one's resources is the appropriate course of action, some idea of being an independent agent, etc.

Ontologically, interpretive informations systems research assumes that the social world (that is, social relations, organizations, division of labor) are not "given." Rather, the social world is produced and reinforced by humans through their action and interaction. Organizations, groups, social systems do not exist apart from humans, and hence cannot be apprehended, characterized, and measured in some objective or universal way. Unlike the premises of the positivist perspective where researchers are presumed to "discover" an objective social reality, interpretive researchers believe that social reality can only be interpreted. While interpretive researchers share with the positivist philosophy a belief in relatively orderly interaction, this regularity is not attributed to functional needs of the social system, but to the shared norms and interests that bind humans together. While not positing conflict or contradiction as endemic to social systems [as does the critical philosophy (see following section)], interpretive researchers recognize that as meanings are formed, transferred, and used, they are also negotiated, and hence that interpretations of reality may shift over time as circumstances, objectives, and constituencies change.

Beliefs about Knowledge. The interpretive philosophy is premised on the epistemological belief that "Social process is not captured in hypothetical deductions, covariances, and degrees of freedom. Instead, understanding social process involves getting inside the world of those generating it" (Rosen 1991). This philosophy challenges the positivist perspective's insistence of a disjuncture between everyday social practices and the language used to describe them. The interpretive position asserts that the language humans use to describe social practices constitutes those practices. Thus, understanding social reality requires understanding how practices and meanings are formed and informed by the language and tacit norms shared by humans working towards some shared goal. Interpretive researchers construct interpretations or explanations that account for the way that subjective meanings are created and sustained in a particular setting (Putnam 1983, p. 41). Such explanations are causal, but not in the positivists' uni-directional sense; neither are they sought for the same purpose. Interpretive researchers posit circular or reciprocally interacting models of causality, with the intention of understanding actors' views of their social world and their role in it.

The research methods appropriate to generating valid interpretive knowledge are field studies, as these examine humans within their social settings. Following on the ontological belief that reality is socially constructed, the interpretive researcher avoids imposing externally defined categories on a phenomenon. Instead of the researcher coming to the field with a well-defined set of constructs and instruments with which to measure the social reality, the interpretive researcher attempts to derive his or her constructs from the field by in-depth examination of and exposure to the phenomenon of interest. The categories and themes that emerge out of this approach are intended to closely couple those relevant to the study's participants.

The underlying premise of the interpretive researcher is that "individuals act towards things on the basis of the meanings that things have for them, that meanings arise out of social interaction, and that meanings are developed and modified through an interpretive process" (Boland 1979, p. 260). In this attempt to understand meaning, positivist approaches are not useful. Rowan (1973, p. 216) notes that in

positivist research "we are talking to 'processed people' in the sense that they can only answer in terms of *our* questions and *our* categories." In contrast, interpretive techniques allow participants to use their own words and images, and to draw on their own concepts and experiences. The primary endeavor is to describe, interpret, analyze, and understand the social world from the participants' perspective, and any rigid a priori researcher-imposed formulations of structure, function, purpose and attribution are resisted (Glaser and Strauss 1967).

Beliefs about the Relationship between Theory and Practice. The interpretive research approach towards the relationship between theory and practice is that the researcher can never assume a value-neutral stance, and is always implicated in the phenomena being studied. Researchers' prior assumptions, beliefs, values, and interests always intervene to shape their investigations. The extent of researcher implication, however, is the cause of some debate within the interpretive tradition. Just as the positivist research perspective is not entirely homogeneous, with researchers differing on issues such as verifiability and researcher independence, the interpretive perspective is also differentiated. Two primary variants are recognizable, and they differ on the role of the researcher in investigating phenomena. Both variants recognize that human actors enact their physical and social reality, and that they come to share a set of meanings around this reality (Weick 1979). In the "weak" constructionist view, the researcher attempts, through various data collection techniques, to understand the existing meaning systems shared by the actors, and thereby interprets their action and events in her recounting. As Fay (1987, p. 88) puts it, "The social scientist is redescribing an act or experience by setting it into progressively larger contexts of purpose and intelligibility, . . . [and] reveals *what* the agents are doing by seeing what they are up to and how and why they would be up to that."

In the "strong" constructionist view, however, the researcher is not merely presumed to describe a phenomenon in the words and categories of the actors, but is presumed to enact the social reality she is studying. Retelling the actors' story is never fully possible, as the interpretive schemes of the researcher always intervene, and hence the researcher in part creates the reality she is studying through the constructs used to view the world. Astley (1985, p. 498) writes:

The world of practice has its own "objective" reality, but since as scientists, our only recourse to that world is through what we see and do, our knowledge is unavoidably subjective in nature. The "facts" constituting our knowledge, are necessarily theory-dependent, since we can perceive nothing except through the knowledge structure in which perception is embedded. . . . There is no direct access to reality unmediated by language and preconceptions.

This difference between weak and strong constructionist positions has implications for how interpretive research relates to research conducted in the positivist mode. From the viewpoint of weak constructionism, interpretive research is understood to complement positivist research, that is, by generating hypotheses for further investigation, and by filling in the knowledge gaps that positivist research cannot attend to, such as the contextual exigencies, the meaning systems, and the interaction of various components of a system. The researcher chooses between positivist and interpretive approaches based on the research question and the nature of the phenomenon of interest. This argument, postulated among others by Daft and Wiginton (1979), suggests that the positivist research approach (seen as encompassing "low variety" techniques) is not complex enough to reflect all of the inherent complexity,

ambiguity, and instability of organizational systems. Invoking the principle of requisite variety, Daft and Wiginton (1979, p. 187) encourage the use of alternative "high variety" methodologies. They note:

If complex organizational behaviors are modelled as if they are simple, well understood, deterministic systems, or even as stochastic systems, then the resulting models will tend to be insignificant. We propose that languages of high variety are useful tools for developing models of organizations because they have sufficient scope and richness of meaning to describe organizational processes.

A similar case has been argued for information systems research; that is, that the current positivist perspective has insufficient variety for the nature of the phenomena investigated by information systems researchers (Benbasat et al. 1987, Kaplan and Duchon 1988, Lee 1989). And hence a call for triangulating the use of interpretive methods with positivistic ones has been issued.

For proponents of the strong constructionist view, however, no triangulation is possible, for there is no sense in which the interpretive perspective can accommodate positivistic beliefs. Interpretive research is seen to be based on philosophical assumptions which are essentially different from those of the positivist perspective. The role of interpretive research then, is not to complement positivist investigations, but to replace them. In this extreme view, a researcher cannot select his research perspective based on the nature of the phenomenon, for there is no way he can independently assess that nature without relying on his predispositions. Thus, in choosing a research approach, the researcher is in fact choosing which aspects of a phenomenon he wishes to focus on. The researcher constructs the form and nature of the phenomenon through the world view he adopts to do the research. So the researcher's assumptions and values are deeply embroiled in the phenomenon—even in the very selection of a research approach. And if that is the case, then a researcher cannot really choose an "appropriate" research method. One is reminded of Simons' allegorical tale recounted in Weick (1979, p. 1) of the three baseball umpires disagreeing about the task of calling balls and strikes:

The first one said, "I calls them as they is."

The second one said, "I calls them as I sees them."

The third and cleverest umpire said, "They ain't nothin' till I calls them."

Interpretive Research Philosophy: Empirical Example

In this section we will review a study exploring the interaction of technology in organizations which was executed using an interpretive research approach (Orlikowski 1989). This should help to illustrate the characteristics and assumptions of this approach.

Study Description. In this study, Orlikowski (1989) studied how the deployment of information technology in primary business activities affected production workers. She was specifically interested in understanding how the use of information technology would change the division of labor and patterns of dependence among workers engaged in systems development work. The research site was a large consulting firm employing computer-aided software engineering (CASE) tools. Orlikowski studied several teams within the firm, making sure to include teams in all the various stages of the systems lifecycle. The study employed ethnographic techniques (Agar 1980; Van Maanen 1979, 1988) such as observation of participants, researcher interaction with

and study of CASE tools, documentation review, social contact, unstructured and semi-structured interviews; and was executed over eight months, full-time within the firm and in those client sites where project teams were building application systems. Orlikowski employed a theoretical framework which focused her questions and observations; however, she used no structured instrumentation and conducted no statistical inference testing to analyze her data.

Orlikowski attempted to understand the implications of the CASE tools for the work and workers through understanding the norms and meanings the project team members shared around their work, how they interacted among themselves and with the CASE tools, and how these meanings and experiences changed with the deployment of the information technology. In her analysis she draws extensively on her field notes to illustrate and ground the findings. In addition to reporting the participants' experiences in their own words, Orlikowski attempts to interpret these experiences in terms of the theoretical model guiding the study. This theoretical interpretation allows her to restate the specific findings more generally, by deriving general interaction patterns that may be meaningful beyond the confines of the one research site.

Orlikowski found that the deployment of CASE tools had significant implications for the division of labor and relations of dependency among the project team members. In particular, she found that the use of information technology "triggered structural changes within the project teams, which institutionalized the existing, formalized fragmentation into technical and functional groupings" and that such technological change "undermines the homogeneity of the [firm's] 'team' ideology by breeding subcultures and territorialism . . . [resulting] in tension and conflict on project teams."

Study Critique: Strengths and Weaknesses. This study has the distinctive flavor of interpretive research. Orlikowski clearly states her theoretical framework and assumptions up front, such that the readers may understand some of the biases she brings to the study. Second, she presents data directly from her field notes, hence allowing the readers to interpret the data and determine for themselves the adequacy of the interpretation. The study is careful to delineate the contextual conditions within which the research was conducted and the patterns of findings observed and analyzed. There is no underlying determinism, or search for universal laws. Orlikowski states:

How this conflict is played out across various production arenas remains open to empirical elaboration. . . . Different outcomes will be generated across different contexts and different outcomes may be generated over time within the same context. While such outcomes can never be predicted unequivocally, we can determine the likelihood of different patterns of response based on an understanding of contexts, actors, and resources.

The study draws heavily on participants' experiences and interpretations, and hence is very dependent on these interpretations. To the extent that individuals are confused, unaware, or deceptive, these findings will be misleading. A remedy would be to rely more on observation of participants or even participant observation on the part of the researcher, where intentions and impressions can be weighed against actual behaviors. Another limitation of this study is that while Orlikowski presents her field notes, we are only shown selected portions of the notes, and thus it is impossible to interpret this data within the context of the entire study and data collected. A possible, although potentially voluminous solution, would be to provide

an appendix with some of the field notes presented in greater detail. Another potential shortcoming is the primary focus on CASE tools. We are left with little understanding of the organization or its members beyond their use of information technology. We have little understanding, for example, of how the recruitment practices of this firm may serve to reinforce its culture—perhaps more significantly than the information technology. Other potentially important structures, symbols, and practices of the firm are also not elucidated. However, the format within which these findings are reported—an article—are not conducive to lengthy descriptions of the site or explorations of the multifaceted nature of the workplace. Books have generally been the medium of choice for conveying interpretive research results, and the choice of an article in Orlikowski's case clearly limits her exposition options.

Interpretive Research Philosophy: Assessment

The contribution of the interpretive research philosophy is that it reveals the underlying connections among different parts of social reality, by examining the social rules and meanings that make social practices possible (Gibbons 1987, p. 7–8). This approach reminds us that the whole arena of social relations revolves around shared meanings, interpretations, and the production and reproduction of cultural and social realities by humans. It motivates investigations into how humans enact a shared, social reality through understanding human behavior from the point of view and intentions of the human actors themselves. In particular, social process can be usefully studied with an interpretive perspective, which is explicitly designed to capture complex, dynamic, social phenomena that are both context and time dependent.

The interpretive research philosophy, however, has been subject to criticism (Bernstein 1978, 1985; Burrell and Morgan 1979; Fay 1987; Gibbons 1987). Fay (1987, p. 92) suggests four different deficiencies. First, the interpretive perspective does not examine the conditions, often external, which give rise to certain meanings and experiences. Second, research in this perspective omits to explain the unintended consequences of action, which by definition cannot be explained by reference to the intentions of the humans concerned. These unintended consequences of action are often a significant force in shaping social reality. For example, Giddens (1979) suggests that an important and typically unintended consequence of human action is that which reinforces the actions, roles, beliefs, and relative power of members of a group, so as to sustain the structure and practices of that group as a whole over time. Third, the interpretive perspective does not address structural conflicts within society and organizations, and ignores contradictions which may be endemic to social systems. This perspective cannot account for situations where participants' accounts of action and intentions are inconsistent with their actual behavior, and hence it cannot discern or analyze the means by which actors may be blinkered in their self-understanding and limited in their social interactions. Finally, the interpretive perspective neglects to explain historical change; that is, how a particular social order came to be what it is, and how it is likely to vary over time. Fay (1987, p. 96) notes that this perspective "assumes an inherent continuity in a particular society, i.e., it systematically ignores the possible structures of conflict within a society, structures which would generate change."

The Critical Philosophy of Information Systems Research

An important distinction of the critical research philosophy is its evaluative dimension. More than either the positivist or the interpretive research perspectives, the

critical researcher attempts to critically evaluate and transform the social reality under investigation. Where the other two research perspectives are content to predict or explain the status quo, the critical perspective is concerned with critiquing existing social systems and revealing any contradictions and conflicts that may inhere within their structures. Through fostering this type of self-consciousness and understanding of existing social conditions, critical researchers believe they can help to overcome oppressive social relations (Bernstein 1978, p. 181).

Critical Research Philosophy: Assumptions

Assumptions underlying the critical research philosophy are examined in terms of Chua's (1986) three categories described above.

Beliefs about Physical and Social Reality. The central idea within critical philosophy is the belief that social reality is historically constituted, and hence that human beings, organizations, and societies are not confined to existing in a particular state (Chua 1986, p. 619). Everything possesses an unfulfilled potentiality, and people, by recognizing these possibilities, can act to change their material and social circumstances. Despite this belief, the critical perspective recognizes that the capacity to enact change is constrained, because humans become alienated from their potential by prevailing systems of economic, political, and cultural authority. In the light of this alienation, an important objective of critical research is to create awareness and understanding of the various forms of social domination, so that people can act to eliminate them.

Another important idea in critical philosophy is that of totality, which implies that things can never be treated as isolated elements. A particular element exists only in the context of the totality of relationships of which it is a part, and the element and the whole are bound by an essential rather than a contingent interdependence. This dialectical relationship between elements and the totality is understood to be shaped by historical and contextual conditions. For example, a particular technology, such as a computer, is a productive force only in the context of those social relations in which it is used productively, such as a contemporary financial institution. In a different context of social relations, such as a pre-industrial society, that technology would no longer constitute a productive force. Or, following Chua (1986, p. 619), consider system developers. They are not isolated elements that can be studied apart from their institutional and historical situation; rather, they exist only in the context of organizations producing and using information technology, and in the context and time of a society investing in information technology as a form of production and communication technology. Even as society and organizations give meaning to the roles, relationships, and actions of system developers, so system developers, by their action, help to shape and give meaning to the organizations and society of which they are members.

Social reality is understood to be produced and reproduced by humans, but also as possessing objective properties which tend to dominate human experience. Because of the dialectical understanding of elements and the whole, as well as the belief in human potentiality, the critical research philosophy emphasizes the processual development of phenomena. Social relations are not posited as stable and orderly, but as constantly undergoing change. This instability is conceptualized in terms of fundamental contradictions that inhere in the social relationships and practices of societies and organizations (Benson 1973, Edwards 1979, Heydebrand 1980, Ollman 1976).

The critical philosophy assumes that the contradictions inherent in existing social forms lead to inequalities and conflicts, from which new social forms will emerge. Contradictions arise because of opposition among certain parts within the totality, and because of incompatible developments among the parts constituting the totality.

In their critique of advanced industrial societies, critical researchers examine the capitalist economies typical of these societies, and find a contradictory relationship between socialized labor and private appropriation of capital. Critical researchers thus posit that any organization that subscribes to the structural separation of labor and capital will embody antagonistic social relations, and that this inherent tension is the source of conflict as well as the basis of change. Further, because contradictory elements "may be masked or concealed by a variety of devices—role segmentation, ideological formulations, segregation of participants, and others" (Benson 1973, p. 383), the role of critical research is to expose these hidden contradictions and thereby attempt to reframe the basic oppositions, potentially enacting a different social order. Contemporary critical researchers' view of contradiction is thus closely tied to their critique of class-based societies and capitalist forms of production. In this view, contradiction in social relations can only be removed by transforming the basis of society and the forms of organization and production—a state only attainable with the transcendence of capitalism.

Beliefs about Knowledge. With respect to knowledge, the epistemological belief of the critical perspective is that knowledge is grounded in social and historical practices (Chua 1986, p. 620). There can be no theory-independent collection and interpretation of evidence to conclusively prove or disprove a theory. Because of the commitment to a processual view of phenomena, critical studies tend to be longitudinal (Benson 1973, p. 384). The research methods of choice are long-term historical studies and ethnographic studies of organizational processes and structures. Quantitative data collection and analysis are used, although to a lesser extent. The reliance on historical analyses is compatible with the belief that a phenomenon can only be understood historically, through an analysis of "what it has been, what it is becoming, and what it is not" (Chua 1986, p. 621). This analysis leads to research outcomes that differ from positivist research. Benson notes (1973, p. 391) that "Generalizations stemming from this approach would point to regularities of process rather than to cross-sectional differences," and Burawoy (1985, p. 18) comments that generalization in critical research ". . . seeks to illuminate the forces at work in society as a totality . . . [an] extension from the micro context to the totality that shapes it."

These research outcomes differ from interpretive research on two counts. The first difference deals with the role of knowledge in human affairs; the second, with the relationship between theory and practice, which we deal with below. On the level of knowledge, critical researchers do not aim to only give a recounting or interpretation of how participants perceive, understand, and act towards various phenomena. As with interpretive researchers, critical researchers believe they need to understand the language of the humans they are studying, an understanding that is necessarily temporally and spatially bound. However, critical researchers depart from their interpretive colleagues, in that they believe interpretation of the social world is not enough. The material conditions of domination need also to be understood and critiqued, and these are typically not accessible by merely asking participants, who often are unable to perceive and penetrate the circumstances that shape and constrain them. Thus,

researchers working in this tradition do not merely accept the self-understanding of participants, but also critically analyze it through the particular theoretical framework which they adopt to conduct their work.

Beliefs about the Relationship between Theory and Practice. The critical research philosophy towards the relationship between theory and practice is that the role of the researcher is to bring to consciousness the restrictive conditions of the status quo, thereby initiating change in the social relations and practices, and helping to eliminate the bases of alienation and domination. In this light, social research and social theory are understood as social critique. Steffy and Grimes (1986, p. 326), writing about critical organizational research, note that its aim "is to develop an organization science capable of changing organizational processes," while Benson (1983, p. 53) observes that critical theory must be "reflexive, critical, and emancipatory, thus transcending alienated theorizing." Burawoy (1985, p. 18) writes that the nature and direction of this transcendence is suggested by the assumptions and theories that guide the research: "A theoretical framework also leads us beyond what is, beyond verification, to what could be."

As with the other two perspectives we have discussed, researchers adopting the critical perspective differ in their beliefs about the role of the theorist in initiating social change. Benson (1983) for example, notes that the role of the critical researcher is always to go beyond mere studying and theorizing, to actively effect change in the phenomena being studied. Heydebrand (1983, 1985) extends this role even further by suggesting that critical research must also be reflexive, hence transformative not only of the object of investigation, but also of the investigator. Habermas (1974) on the other hand, distinguishes between the use of critical theories to initiate a process of self-reflection among human actors, and the actual selection of appropriate political action. While critical researchers are clearly responsible for the former, Habermas suggests that only participants in the community can carry out the latter task (Chua 1986, McCarthy 1978). He seems to assign a more analytic role to the researcher, although researchers, in their capacity as participants in organizations and societies, clearly could act to transform their social reality where appropriate. But neither this latter action, nor self-transformation, is seen as an essential component of a critical research agenda.

Critical Research Philosophy: Empirical Example

In this section we examine a study of the interaction between information technology and organizations which was executed using a critical research approach (Smith 1988). Reviewing such a study should help to highlight the unique characteristics of the critical perspective.

Study Description. In this study, Smith (1988) was concerned with what impact the introduction of electronic point of sale (EPOS) systems in retail organizations would have on retail service workers. Working out of a critical perspective, he was interested in understanding how EPOS would influence the labor process, and in particular, the relationship between labor and management. Smith selected retail organizations based on the managerial control systems currently in place. He examined eight retail firms with established histories of Tayloristic work practices and much evidence of worker deskilling through management control systems (including technology). He

contrasted these with eight other retail firms that had histories of craft work practices and which had resisted management control systems that deskill workers.

Smith conducted extensive interviews and observations in the sixteen different retail organizations. Beyond the upfront focus on labor process issues of control and deskilling, Smith reports no formal hypotheses and he employed no structured instruments or statistical inference testing. Smith draws on his field notes of interviews, observations, and documents to explain what he found, and to support the conclusions he drew. He suggests that the information technology represented by the EPOS systems did not change the control systems of the retail firms, but rather, that the retail organizations and, in particular, the institutionalized management control systems and history of work practices shaped the use and impacts of the EPOS systems. Smith reports that firms with established Tayloristic labor relations and work practices deployed EPOS to further deskill the workers, and used the information in the EPOS systems to centralize decision making in the hands of fewer and more senior managers of the organizations. In these efforts, not only the workers were affected; the local retail outlet managers found that their authority and decision-making discretion had been undermined. In striking contrast, Smith found that the use of EPOS in craft retail organizations, rather than being used to centralize buying decisions at senior levels and deskill workers, was used to provide information directly to the local managers, resulting in a greater decentralization of control and an increase in local autonomy. Smith (1988, p. 159) concludes that the information technology represented by EPOS systems is "malleable," that is, capable of being deployed by managers in ways that reflect and sustain the existing social relations and management control systems.

Study Critique: Strengths and Weaknesses. Smith's study can be seen to reflect a critical perspective, as the focus is on the social practices used by management to control the labor process. Underlying this focus is the assumption of conflict between labor and management, which it is believed is played out on the shop or office floor through the deployment of control systems and technologies. Additionally, Smith's work acknowledges the importance of history in shaping events. He examines the history of management control systems and work practices in the firms, and investigates the extent to which these institutionalized forms shape the current deployment of technology in the workplace. Finally, Smith explores the subtle control mechanisms beyond those evident in the EPOS systems, such as emotional labor, that over time have become so embedded in retail social practices that they are no longer observable or discernable by the workers and managers.

From a critical perspective, one of the primary weaknesses of this study is that while it describes how management practices influence the implementation and use of technology, this description does not aid the transformation of the status quo. An objective of critical research is to liberate those studied from the oppression and "false consciousness" which constrains them. Smith's research does not attempt to do this, hence he has not tested his critical ideas in real organizational struggles. This could be remedied if Smith adopted a less passive stance towards social reality, and suggested how the workers could try and overcome their conditions. Another limitation of this study is its failure to address the nature and implications of contradictory social relations in the workplace. Contradiction is a key theme in the critical research tradition, and is not explored in great depth by Smith. He does not explicate how the

tensions between labor and management are artifacts of a capitalist mode of production, or how they can be transformed. Finally, while Smith studies the history of labor practices within a few firms, he does not examine in any depth, the role society has played in shaping these practices. A central tenet of critical research is its acknowledgment that organizational practices are shaped and constrained by larger social, economic and political forces. This could be remedied by grounding the analysis in the totality that informs relations in the workplace, such as competitive pressures on firms in the retail industry, government policies and trade union demands with respect to computerization, and the socialization of workers through institutions such as schools, community and the marketplace.

Critical Research Philosophy: Assessment

The critical research perspective offers a different view of the world than those of the positivist and interpretive perspectives. It alerts us to the reality of interdependence of parts with the whole, and that organizations cannot be studied in isolation of the industry, society, and nation within which they operate, and which they in part constitute. Likewise, we are exposed to the central influence of historical, economic, social, and political conditions on the nature and development of phenomena. And finally, this perspective reminds us of the constantly changing potential of humans who need not be confined by their immediate circumstances. The status quo is merely one moment along an evolving and emergent dynamic of social reality.

The critical approach also has some weaknesses, in part, these are a function of the assumptions which guide critical researchers. For example, socio-economic class is seen as the primary determinant of antagonistic social relations. This almost exclusive focus on economic factors obscures the importance of other factors such as race and gender that have also led to dominating and repressive social relations. This selectivity in perspective is also reflected in critical researchers' recognition of the inherent opposition or contradiction in social relations. While an advance over the positivist and interpretive philosophies with their bias for functionalist theories, this view may overstate the extent to which contradiction is a function of class societies. Giddens (1979, 1981), for example, posits instead that contradiction is endemic to the human condition, and not exclusive to capitalist societies. He suggests that contradictory relations are apparent in people's connected/disconnected relationship with nature (existential contradiction) and the opposition of interests represented by the role of the state in individual affairs (structural contradiction)—conditions which permeate all societies. Critical researchers often are not critical enough of their own concepts and theoretical models. For example, some variants of critical research tend to be deterministic, assuming simplistically that all managers want more control and that labor is either docile or completely ignorant of this control, not allowing for the possibility that labor may have means to mitigate, subvert or transform the mechanisms that control them. Further, some commentators have suggested that critical researchers are not reflexive, not applying their notions of transcendence to themselves, and hence not accomplishing self-transformation or "praxis" (Heydebrand 1983). Finally, the form of theory and knowledge in this tradition is uncertain. As noted by Chua (1986, p. 626), "Critical theorists do not share common philosophical standards for the evaluation of theories. What is acceptable theory or explanation is still debatable." This ambiguity of evaluation may be difficult for proponents of the dominant research tradition to accept, given their experience with positivism's relatively unambiguous criteria for what constitutes valid knowledge.

Conclusion

We believe that all three of the research philosophies we have discussed above can offer an insightful perspective on the phenomena of interest in information systems research. What is required is that researchers understand the implications of their research perspective, and act in ways that reflect that knowledge. Researchers, however, need to be aware of their research traditions and be open to the possibilities of other research practices, and not create an orthodoxy which precludes the use or publishing of different research. We must clearly state that it is not our intention to replace the positivist perspective with critical or interpretive ones. Rather, researchers should ensure that they adopt a perspective that is compatible with their own research interests and predispositions, while remaining open to the possibility of other assumptions and interests. They should understand and acknowledge the extent to which the perspective they adopt will focus their attention on some things and not others, and bias their perception of the phenomena they study.

It is certainly true that the research approaches adopted by all researchers, not only information systems researchers, are influenced to a greater or lesser extent by the various institutional contexts within which they are trained and work. An indepth examination of the structural dimensions of conducting information systems research is beyond the scope of this paper, and we will do no more than raise some issues for consideration (for more discussion see Podsakoff and Dalton 1987). Research methods and assumptions are not learned and appropriated in a vacuum. They are heavily influenced by the doctoral program attended, the agendas of powerful and respected mentors, the hiring, promotion, and tenure criteria of employing institutions, the funding policies of agencies, the rules of access negotiated with research sites, and the publishing guidelines of academic journals. For researchers in relatively powerless positions, awareness of the influence of each of these elements in shaping their research philosophy, while not eliminating the constraints, may at least facilitate informed choice and risk taking. For researchers in more powerful positions, awareness of these elements may be a step towards trying to lessen the persistent bias towards positivist research studies.

The issue of self-reflection about research perspective applies to all researchers, whatever the perspective they adopt, whether interpretive, critical, or positivist. Morgan (1983, pp. 389–391) drawing on Gödel's theorem to emphasize that all theoretical formulations are necessarily incomplete (Gödel 1962), succinctly captures the message we have tried to convey here:

[A]ll social phenomena may have many potential ways of revealing themselves and the way they are realized in practice depends on the mode of engagement adopted by the researcher. . . . [I]n choosing a research strategy the scientist in large measure determines how the phenomenon being studied will be revealed, and indirectly, the consequences of the knowledge thus generated.*

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