

Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications

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Although much contemporary thought considers advanced information technologies as either determinants or enablers of radical organizational change, empirical studies have revealed inconsistent findings to support the deterministic logic implicit in such arguments. This paper reviews the contradictory empirical findings both across studies and within studies, and proposes the use of theories employing a *logic of opposition* to study the organizational consequences of information technology. In contrast to a logic of determination, a logic of opposition explains organizational change by identifying forces both promoting change and impeding change. Four specific theories are considered: organizational politics, organizational culture, institutional theory, and organizational learning. Each theory is briefly described to illustrate its usefulness to the problem of explaining information technology's role in organizational change. Four methodological implications of using these theories are also discussed: empirical identification of opposing forces, statement of opposing hypotheses, process research, and employing multiple interpretations.

(Organizational Transformation; Impacts of Technology; Organization Theory; Research Methodology)

The potential of information technology to transform organizations has been a persistent theme in both the management and information systems literatures since computers were first introduced commercially in the 1950s. Each new generation of technology and each major technological advance has been accompanied by energetic claims that organizations as we know them will be radically and fundamentally altered. Leavitt and Whisler's (1958) early prognostications set the tone for later speculations: organizations would leverage their mainframe computing power to reduce middle management levels and push decision making upward to a small executive elite. With the advent of desktop

computing in the 1980s, this vision shifted to focus upon a work force of autonomous knowledge workers and empowered clerical staff. During the 1990s, as computers became networked within and across organizations, predictions of "virtual organizations" emerged. More recently, the World Wide Web has spawned still another set of projections for electronic commerce among "boundaryless" organizations and "intranet systems" within them. Programs of business process reengineering have given way to broader agendas for organizational transformation and knowledge management, each with its own implications for revised structural forms. Thus, four decades following

Leavitt and Whisler's speculations, information technology is still seen as a powerful force enabling radical new designs for organizations (Galliers and Baets 1998, Hammer 1996, Lucas 1996).

Until recently, the predominant logic employed in such arguments was deterministic, placing technology in the role of an external agent capable of transforming organizations directly. Writers who described information technology as a "force," "driver," or "imperative" were advising managers that they must adjust to the demands of this external agent of change. For example, Scott Morton (1991) argued that all successful organizations would pass through a transformation during the 1990s: "All dimensions of the organization will have to be reexamined in light of the power of the new IT. The economics are so powerful and apply to so much of the organization that one has to question everything before accepting the status quo" (p. 11).

A more moderate determinism portrayed managers as rational designers using information technologies as tools to fashion radically new organizational designs that their businesses needed. Writers who referred to the "enabling" role of information technology placed managers in the role of causal agent, triggering the "magic bullet" of information technology to transform organizations (Markus and Benjamin 1997). For example, Lucas (1996) treated information technology as a "design variable" that enabled a variety of new forms (T-Form organizations) to be realized. Nonetheless, Lucas felt that managers' choices were limited and that "firms will have to adopt the T-Form organization to survive in the highly competitive global economy of the twenty-first century" (p. 2).

Several critical reviews have questioned the deterministic logic underlying such analyses of the organizational impacts of information technology (DeSanctis and Poole 1994, Hirschheim 1985, Kling 1980, Markus and Robey 1988, Mowshowitz 1981, Orlikowski and Robey 1991, Walsham 1993). Drawing from various sources, these authors have argued for a more complex relationship between information technology and organizations, advancing concepts such as emergent and reciprocal causality, and promoting interpretive research methods. These suggestions have influenced recent empirical studies, and have produced more elaborate analyses of organizational change. Professional

management literature also manifests greater sophistication of argument, rejecting the optimistic determinism of earlier writings on the transformational potential of information technology (Galliers and Baets 1998, Markus and Benjamin 1997, Sauer and Yetton 1997). Thus, while deterministic logic continues to guide much empirical research and social commentary, alternative causal logic has become established within information systems research.

In this paper we explore the application of one particular logic for advancing theory and empirical research on the organizational consequences of information technology: *a logic of opposition*. Briefly, a logic of opposition explains organizational change by focusing on opposing forces that respectively promote and oppose social change. By contrast, a logic of determination explains change as the consequence of variation in a set of predictor variables. While both logics may be successfully employed to study the organizational consequences of information technology, a logic of opposition potentially explains a wider range of organizational outcomes. Whereas deterministic logic is equipped to account for orderly relationships among the variables in a theoretical model, logic of opposition is equipped to account for contradictory outcomes of information technology in organizations.

We review evidence of contradictory findings in the literature on information technology and organizational transformation. Such findings may be viewed as a problem produced by flawed research methods, or they may be taken at face value as evidence of widely divergent consequences. Rather than resolving empirical contradictions and searching for consistency in information technology's effects on organizations, the latter approach resolves the "problem" of contradictory research results by using theories able to account for the findings actually observed. Theories employing a logic of opposition, and the empirical methods associated with them, account for contradictory empirical findings in a different way than deterministic theories and methods. Theories using a logic of opposition may be more "interesting" (Davis 1971) because they deny—rather than affirm—the common assumption of a consistent relationship between technology and organization.

We first discuss the roles of contradiction and paradox in organizational science, where they have been used to stimulate theory building and guide empirical research. Contradictory findings on the role of information technology in organizational change are then documented, both across studies and within studies. We then propose the use of four theories that incorporate a logic of opposition to explain organizational change: organizational politics, organizational culture, institutional theory, and organizational learning. Each theory is briefly described, its basic logic is identified, and both conceptual and empirical studies are cited to illustrate the theory's usefulness to the challenge of explaining information technology's role in organizational change. Finally, we offer concrete methodological guidance for empirical research that seeks evidence of the opposing forces contributing to organizational change.

Contradiction and Paradox in Studies of Organization

Recently, both practitioners and academics have been attracted to the idea that contradiction, and more specifically paradox, may help to explain organizational change. Contradiction is a general term referring to a statement expressing or asserting the opposite of another statement. Common types of contradictions are: paradox, irony, hypocrisy, oxymoron, conflict, inconsistency, double bind, and dilemma. While these differ in important ways, they are used commonly as rhetorical devices to create (and later resolve) tension in a story, expose novel insights, and produce humor. By posing a tension between two or more apparently incongruous statements, contradictions force creative thinking about how opposing statements can logically coexist. For example, the paradoxical, yet profound wisdom that "less is more" may stimulate the creative search for ways to overcome resource limitations. Likewise, foolish and self-defeating practices may be exposed in an oxymoron like "wildlife management."

Paradox is the theme of several practical books on the management of organizations (e.g., Farson 1996, Handy 1994, Naisbitt 1994, Price Waterhouse 1996). The appeal of these books rests upon the awareness that, both as a general statement and in organizational

life, "so many things seem to contain their own contradictions, so many good intentions to have unintended consequences, and so many formulas for success to carry a sting in their tail" (Handy 1994, p. x). The acknowledgment that disorder and confusion are natural occurrences in organizations has posed a serious challenge to the traditional notions of organization and management that emphasize stability and order. Rather than advise managers to eradicate paradox through rational programs, the emerging literature urges managers to embrace paradoxical thinking as a stimulus for more complex and creative action.

Paradox has also captured the imagination of academic writers concerned with building theory and conducting empirical research. Poole and Van de Ven (1989) argued that theorists typically try to maintain an "elusive consistency" by refusing to acknowledge paradoxes inherent in the phenomena they are seeking to explain. However, the acknowledgment of paradox can stimulate theory building by provoking creative insights that accommodate seemingly opposite positions. Accordingly, paradox and contradiction have assumed central importance in theories of organizational effectiveness (Cameron 1986), organizational culture (Martin 1992), and organizational change and development (Ford and Backoff 1988, Ford and Ford 1994, Van de Ven and Poole 1995). Contradiction also informs critiques of popular management practices, such as business process reengineering, by exposing inherent contradictions and guiding revisions to orthodox practice (Boudreau and Robey 1996). Empirical studies have also begun to demonstrate the value of contradiction. In their well-known "competing values model," Quinn and Rohrbaugh (1983) showed how effective organizations pursued logically inconsistent objectives simultaneously. The competing values model has informed empirical research on leadership, showing that effective leaders demonstrate more complex, contradictory, and paradoxical behaviors than ineffective leaders (Denison et al. 1995).

The fascination with contradiction expressed by both practitioners and academics may be applied directly to the question of information technology's organizational consequences. In the following section we examine the extent and nature of these contradictory findings.

Contradictory Empirical Findings

Empirical contradictions may occur both across and within individual research studies. Contradictions across studies in any field are understood as *inconsistencies* within a body of research and typically motivate efforts to restore order by resolving or explaining the observed discrepancies. Contradictions within studies, by contrast, involve results that run counter to expectations based in the theory guiding the research. Contradictions within studies often motivate revisions of theory so that observations might be explained more satisfactorily. In addition, contradictions of both types are often resolved by prescribing methodological improvements in research.

Contradictions Across Studies

Reviews of the literature continue to chronicle the inconsistent organizational consequences of information technology across studies (Ang and Pavri 1994, Baskerville and Smithson 1995). While many speculations of widespread transformations have been made, the projected emergence of new organizational forms has not materialized and has not been documented in the research literature. Fulk and DeSanctis (1995) characterized the rates of progression by firms toward new forms as "gradual in most firms, dramatic in some, and nonexistent (or nearly so) in others" (p. 339). These recent conclusions corroborate reviews conducted much earlier by Robey (1977) and Attewell and Rule (1984). Indeed, over many years researchers have discovered information technologies to be associated with seemingly polarized pairs of social outcomes: empowered employees (Attewell and Rule 1984) and oppressed employees (Nelson 1990, Whisler 1970); extended hierarchy (Blau et al. 1976) and reduced hierarchy (Crowston et al. 1987); organizational rigidity (Whisler 1970) and organizational flexibility (Foster and Flynn 1984); and increases in staff and radical downsizing (Brynjolfsson et al. 1994, Pinsonneault and Kraemer 1997). Researchers have even differed in their conclusions when studying the same system in the same organization (Damsgaard and Lyytinen 1997, Teo et al. 1997).¹ In sum, the search for an orderly relationship

¹The respective analyses of EDI adoption in Hong Kong illustrate the difference between a deterministic analysis (Teo et al. 1997) and an institutional analysis (Damsgaard and Lyytinen 1997).

between information technology and organizational form continues to be elusive (Fulk and DeSanctis 1995).

Three strategies are commonly suggested for resolving inconsistent findings among studies. First, theories may be elaborated by the inclusion of additional "contingency" variables. A common approach for identifying overlooked contingency variables is to sort available research into groups with similar findings and to search for potential (but unmeasured) similarities among the research sites or samples. This strategy was articulated by Attewell and Rule (1984) p. 1189:

We must identify those variables that can account for differential outcomes and examine them in a comparative study of a stratified sample of organizations. Variables include organizational size, industry type, degree of prior routinization or variability of work, degree of dependence upon a professional or high-skilled work force, and the patterns of information usage and information flow associated with the technologies in use.

This strategy potentially resolves future contradictions by including neglected variables and interaction effects that may account for unexplained variance in observed outcomes.

This strategy also includes attempts to distinguish among different types of information technologies, thereby avoiding the assumption of a universal association between all information technologies and organizational change. A difficulty faced by researchers on the organizational consequences of information technology is that technologies are rarely comparable across studies. Not only does this problem introduce inconsistencies among studies, but it also limits the effective use of replication. When technologies change every few years, opportunities for meaningful replication disappear.

A second strategy is to evaluate the validity of research findings with the goal of ruling out studies that use flawed research methods. Several articles in information systems literature have addressed important methodological issues such as research design (Fulk and DeSanctis 1995, Jarvenpaa et al. 1985), construct measurement (Straub 1989), and statistical power (Baroudi and Orlikowski 1989). These articles have assessed research practices across the whole spectrum of information systems research, and their recommendations may be applied directly to research on the organizational consequences of information technology.

By depending upon only those studies using unflawed methods, the expectation of greater consistency of results in a particular area of inquiry increases.

A third strategy is to conduct better reviews on substantive research questions and specific technologies. Information systems research has depended primarily upon narrative reviews in which the author often advocates a favored theoretical solution as the key to resolving conflicting findings (e.g., Nelson 1990). Narrative reviews sometimes claim that researchers have a priori biases (e.g., optimism or pessimism) that color their approaches to research on information technology (Hirschheim 1986, Mowshowitz 1981). One means for overcoming editorial slants in narrative reviews is to conduct formal meta-analyses (e.g., Alavi and Joachimsthaler 1992, Schaubroeck and Muralidhar 1991). Relatively few meta-analyses have been conducted in information systems research, perhaps because relatively few comparable studies have addressed any single research question or focused on the same technology.

Contradictions within Studies

Three types of contradictions within individual research studies may be identified: studies in which the expected consequences of information technology do not occur; studies in which different organizational consequences result from the use of nearly identical technologies in comparable settings; and studies in which contradictory consequences result from the use of the same technology in a single organization.

Studies in which expected consequences do not occur. Numerous studies have revealed that the expected organizational consequences of information technology did not occur, even though researchers and participants expected them to occur. For example, Bjørn-Andersen et al. (1986, see also Robey 1981) sought to explain the organizational changes associated with the implementation of computer-based systems in eight organizations. However, they found anticipated structural changes in only three of the organizations studied. Likewise, Franz et al. (1986) found mostly "no effect" of a new system to support nursing stations in a hospital. Studies that produce no effect, or effects much less dramatic than anticipated, are contradictory because the researchers expected organizational consequences. The search for change motivates most of these

studies, and the failure to produce evidence of expected changes is contradictory, especially where adequate care went into the design of the research.

A second type of finding in this category is the discovery of unanticipated adaptations, usually by the users of technology. Here, technology plays an important role in realizing the changes that are observed, but neither the researcher nor the participants are able to anticipate or predict such change. Studies of "reinvention" of information technology are representative of this type of finding. For example, Kraut et al. (1989) found that users of a computerized record system ingeniously created a clandestine note-passing facility where no formal electronic messaging feature had been provided. By leaving notes in a field of the database record intended for customer comments, users were able to communicate with each other through their ordinary use of the system. Ironically, one of management's intentions in implementing the system was to increase efficiency by removing such opportunities for social interaction. Other studies of user adaptations offer ample evidence of this type of contradictory finding (Johnson and Rice 1987, Manning 1996, Markus 1994, Zuboff 1988).

Studies in which different consequences result from the use of nearly identical technologies in comparable settings. A number of studies indicate that comparable organizations employing identical technologies experience sharply contrasting consequences. For example, Barley's (1986) study of computerized tomography showed different effects on social roles in two hospitals, and Robey and Sahay (1996) found distinctly different social consequences from the implementation of geographic information systems in two county government organizations. In addition, Orlikowski (1993) showed that computer aided software engineering (CASE) tools produced different degrees of change in adopting organizations. Studies of groupware technologies have also shown that identical technologies are appropriated differently by different groups, thereby creating inconsistent effects (DeSanctis and Poole 1994). Related studies show how identical technologies experience divergent implementation histories, which may help to account for divergent outcomes (eg., Campbell-Kelly 1996, Robey and Rodriguez-Diaz 1989). Studies of this type challenge

deterministic logic by showing contradictory outcomes where uniform effects might have been expected.

Studies in which contradictory consequences result from the same technology in a single organization. A third group of studies shows contradictory consequences of the same technology implemented in a single organization. For example, Buchanan and Boddy's (1983) study of a Scottish biscuit plant showed that computerization of the production process upgraded the requisite skills of some operative employees while it simultaneously downgraded the skills of others. Similarly, Burkhardt and Brass (1990) found that the introduction of an information system affected the distribution of power and network centrality differently among users. While these results are not surprising, they are contrary to the generalized expectation inherent in either the job "deskilling" or "upgrading" hypotheses (Attewell and Rule 1984). Outside of a production environment, Orlikowski and Gash (1994) and Karsten (1995) observed the occurrence of divergent interpretations of Lotus Notes in the firms they studied. Differences in interpretation affected the implementation and consequent use of the technology.

More compelling demonstrations of contradictory results from the same technology identify paradoxes and ironies in its use. In a study of electronic mail use, Markus (1994) found users to be so sensitized to the need to communicate electronically that their face-to-face meetings were frequently interrupted by beeping terminals that signaled incoming electronic messages. Many face-to-face meetings were thereby rendered ineffective despite their supposed superiority in handling equivocal communication. Markus also reported that users found electronic media to be ideal for storing and organizing the trail of documentation needed to justify decisions. Ironically, such compulsive documentation detracted from the very productivity it was designed to increase (Markus 1994, p. 142). Elsewhere, Star and Ruhleder (1996) explored the double binds and paradoxes within a community of scientists who were provided an electronic infrastructure to support their communication with remote laboratories. Among the contradictions experienced was the disincentive for scientists to use the network for sharing preliminary results; they saw electronic sharing as less prestigious than more traditional journals and newsletters. Also,

Orlikowski (1991) noted the irony in the use of CASE tools by systems consultants who were closely controlled in their own use of information technology while creating purportedly innovative solutions for their clients. Other recent studies (eg., Bjørn-Andersen and Turner 1998, Dickson et al. 1997, Manning 1996, Wilson 1996) have reported similar contradictory consequences.

In seeking to resolve contradictions across and within studies, researchers should most certainly seek the methodological improvements mentioned earlier in this section.² In addition, researchers may consider the adoption of theoretical logics that accommodate contradiction in observed phenomena. As Eisenhardt (1989) suggests, "conflicting literature represents an opportunity. The juxtaposition of conflicting results forces researchers into a more creative, framebreaking mode of thinking than they might otherwise be able to achieve" (p. 544). In the next section of this paper we present four specific theories that incorporate a logic of opposition, in which change occurs as a result of the interplay of opposing, contradictory forces. From the interaction between forces for persistence and change, a wide range of inconsistent, contradictory and paradoxical forms may emerge. The four theories considered here are summarized in Table 1.

Four Theories Employing a Logic of Opposition

Organizational Politics

The usefulness of organizational politics as a theoretical perspective on management and organizations has been well established since the early 1980s. Earlier treatments of social power (e.g., French and Raven 1959, McClelland 1970) sought to understand the power of managerial leaders, a decidedly biased perspective that ignored the power of other stakeholders. Following the significant social unrest of the late 1960s and 1970s, academic treatments of organizational politics began to acknowledge the competing interests of stakeholders with incompatible goals (Mintzberg 1983,

²Our discussion of methodology is admittedly brief because extensive treatments have been provided elsewhere in literatures on organizations and information systems.

Table 1 Theories Using a Logic of Opposition

Theories	Nature of Logic
Organizational Politics	Groups with incompatible opposing interests engage in political activity (using information technology as a resource) from which organizational changes emerge.
Organizational Culture	Information technologies are produced and interpreted as cultural artifacts that may symbolize a variety of values, beliefs, and assumptions. <i>Integration</i> Culture is portrayed as unified and consistent, opposing organizational change. <i>Differentiation</i> Culture is composed of subcultures. Conflicts occur at the boundaries separating two or more subcultures. <i>Fragmentation</i> Culture is viewed as inherently ambiguous and contradictory. Opposing and irreconcilable interpretations may be entertained simultaneously, both within and across subcultures.
Institutional Theory	Institutionalized patterns and practices sustain an organization's legitimacy and are unlikely to change. Information technologies may be adapted to institutional practices or used to reform them.
Organizational Learning	Existing organizational memory may impair new learning. Information technologies both enable and disable organizational learning.

Pfeffer 1981). Power was conceived as a product of dependence, access to information, and control of resources (Astley and Sachdeva 1984, Hinings et al. 1974), and greater attention was placed on strategies for obtaining subgroup outcomes through a political process of acquiring, using, and preserving power (Cobb 1984). While it is conceivable that conflicts among stakeholders could be constructively resolved, political analysis does not presume political equilibrium in which the interests of all stakeholders are harmoniously aligned. Contemporary organization theory regards the study of organizational politics to be mainstream, and political analysis has become a useful framework for studying organizational transformation (e.g., Bacharach et al. 1996).

The concept of social power as a property of a social position, influenced by the organizational context surrounding it, is viewed as a limited conception by theorists interested in the social construction of power relations. The concept of *disciplinary power*, advanced in European social theory (Coombs et al. 1992, Foucault 1979), addresses the notion that individuals and groups discipline themselves, often unconsciously, largely eliminating the need for external controls. Self-control, in this sense, does not imply emancipation from social control, but rather uncritical acceptance of it. Individuals rarely need to exercise power over others to obtain conformity; rather, actors interpret their

social positions as requiring conformity and suspend their judgments about alternative courses of action, even those that might otherwise relieve their oppression. Disciplinary power is embedded in social structures and technologies that essentially control the premises for social action. Thus, political analysis should not be reduced to identifying the actions of conflicting interest groups in pursuit of incompatible goals. Rather, organizational politics is extended to include "auto-regulation," in which both the powerful and the powerless control themselves in order to become "normal" within a set of institutionalized social relations (Coombs et al. 1992, p. 62–63).

Political theory uses opposition as the underlying mechanism for explaining social change (Benson 1977). Organizations are regarded as arenas in which the contributions and rewards of multiple parties are sometimes aligned, often misaligned, and occasionally realigned (Bacharach et al. 1996). The tension created by misalignment becomes the source of energy from which efforts to transform organizations may arise. However, actions undertaken by one party are likely to be opposed by another, and these opposing forces account for outcomes that are inherently contradictory. For example, denial of opportunities for labor and clerical workers to participate as they desire in organizational decision processes may cause them to oppose

managerial objectives to design new organizational structures. However, allowing labor to participate may prevent managers from achieving important economic objectives like increasing shareholder value. Instead of transforming their organizations, therefore, managers may merely incite opposition by disgruntled workers who are more worried about job security than meeting managerial goals. Negotiated solutions to such disputes may reveal deep contradictions. For example, office staff may concede to reorganization plans and "labor-saving" technologies only if current jobs are not threatened, an outcome as paradoxical as the practice of retaining firemen on diesel locomotives.

Interest in the use of organizational politics to understand the role of information technology in organizational transformation can be traced to Kling (1974, 1980), who identified both organizational politics and class politics as perspectives that challenged the assumptions about consensus and technological progress found in rational social analyses of computing. Similarly, Mowshowitz (1981) contrasted political approaches, such as pluralism and radical humanism, with the dominant approach of technological optimism. The earliest empirical work adopting the political perspective challenged the assumption that diverse societal interests were uniformly served by the use of computers in government. Laudon's (1974) analysis of computing in urban bureaucracies revealed that computers failed to make public decision processes more participative. Rather, the promise of reform was dissuaded by established interest groups that contested for power and control in a sociopolitical context in which computer technology was a new ingredient. Laudon's analysis was supported by other research on computing in city governments that identified computers as a resource that reinforced political power instead of distributing it more widely (Danziger et al. 1982). Rather than placing policy debates on a more rational level by supporting them with computer-generated analyses, automation in local governments was selectively used to support positions already taken and to symbolize rationality. These interpretations are supported by a recent historical analysis of the role of technology in the British census (Campbell-Kelly 1996) and by Pinsonneault and Kraemer's (1997) analysis of downsizing in city governments.

Empirical studies also reveal the value of using a political perspective to study contradictions apparent in the transformation of individual organizations. For example, Markus (1983) explained how a decentralized organization adjusted to the implementation of a centralized system for reporting financial data to corporate headquarters. At any point in the history reported in this case, an observer might conclude that the configuration of information technology and the organization's design was contradictory. However, when viewed as an unfolding drama involving politically motivated actors, such paradoxical arrangements become easier to explain. Markus' analysis shows how the centralized information system was imposed on the decentralized organization in order to rein in divisions that had become too independent in the eyes of corporate managers. Zuboff's (1988) many illustrations of contradictory arrangements involving information systems and organizational structure are also understood more readily when accompanied by the political interpretations provided by the author.³

The concept of disciplinary power has been applied to the study of information technology in numerous organizations, including Britain's National Health Service (Bloomfield 1995, Bloomfield et al. 1992, Coombs et al. 1992). Under the direction of the Resource Management Initiative, physicians in Britain were increasingly subject to fiscal controls that threatened their clinical freedom. Information systems requiring more extensive cost reporting played a prominent role in redefining the normal work of the physician, supplanting reports that focused exclusively on the medical requirements for patient care. By shifting attention toward the issue of resource cost, information technology helped to redefine the criteria considered by physicians when recommending alternative treatments and procedures. The solution to the problem of healthcare was also reframed as a competitive issue, in

³Zuboff's (1988) text is widely cited as empirical support for the concept of informing, in which advanced information technologies are used to expand the scope of work and draw out the intellectual capacities of workers. However, Zuboff's empirical results more readily support political arguments in which the promise of informing is frustrated by managers and others acting in self-interests.

which hospitals needed to become more efficient in order to compete for patients (Bloomfield 1995). Consequently, physicians became dependent upon a network of computer-mediated practices involving them in the management as well as the delivery of health services. The effects of these changes were not uniform and were subject to a variety of interpretations and controversies over the nature and purpose of resource management (Bloomfield et al. 1992).

In summary, researchers studying information technology's role in organizational transformation should be aware of both the interests of those promoting particular objectives of transformation (usually the managers of a particular organization) and the interests of those opposing them (usually those who will be materially disadvantaged by transformation). Political theory directs attention to these opposing interests and sensitizes the researcher to the political dynamics underlying change. It probes past the facade of rational explanations and seeks to understand how ensembles and networks of information technology control the premises for action, even where overt signs of control are absent.

Organizational Culture

Organizational culture has been a popular approach to understanding organizations since the late 1970s. The popularity of organizational culture can be traced to the interest in intangible aspects of managing organizations that accompanied the admiration of Japanese management systems (Smircich 1983). While early studies were almost exclusively focused on the issue of identifying ways to build strong, cohesive cultures, cultural analysis has also proven adaptable to the study of conflict and contradiction within organizations. This is especially true of Martin's (1992) articulation of three different perspectives for interpreting organizational culture: integration, differentiation, and fragmentation (see also Meyerson and Martin 1987).

Integration. The integration perspective portrays culture as unified and consistent; culture is the glue that holds an organization together and helps to define its distinctive features. Culture signals areas of strong consensus wherein values, assumptions, and behaviors are shared. Not surprisingly, the integration perspective was favored in the earliest excitement about

organizational culture in popular books written in the 1980s (Deal and Kennedy 1982, Peters and Waterman 1982, Schein 1985). Despite this focus on consensus, the integration perspective offers potential for explaining contradictions. Because the original concept of culture was formulated to explain those aspects of social organization that persist rather than change, cultural theories help to remind researchers of the difficulty of transforming organizations. Cultural "drag" may be too difficult to overcome even when concerted efforts are made to change. Thus, cultural analyses from the integration perspective may reveal a dialectic between old patterns of assumptions and fresh challenges to established patterns. Resistance to new technologies, in particular, can be explained by noting their inconsistency with the values and assumptions of a strong organizational culture (Sproull et al. 1984). Initiatives into electronic commerce, for example, may threaten a corporate culture by contradicting deeply held values promoting physical "closeness to the customer."

Differentiation. The differentiation perspective describes organizational culture as a collection of subcultures with consensus emerging only within subcultural boundaries. Even though a homogeneous culture may exist *within* each group, the differentiation perspective focuses on differences *among* those groups. Conflicts and contradictions are a central concern of the differentiation perspective, occurring at the boundaries separating two or more subcultures. For example, the implementation of an electronic mail system may become symbolic of a new openness in an organization. However, organizational policies prohibiting the use of electronic mail for personal reasons may contradict the value of openness and produce a cultural clash between the organization's leaders and its employees. Depending on one's subcultural identification, technology may acquire different significance and meaning and provoke ambiguity and conflict (Orlikowski and Gash 1994). Like organizational politics, the differentiation perspective of organizational culture traces contradiction to the incompatible interests of different stakeholders.

Fragmentation. The fragmentation perspective views ambiguity and contradiction as the pervasive and inevitable essence of culture. Contradiction and complexity become the researcher's main focus of attention

in the fragmentation perspective, and several studies have adopted this view to explain ambiguities and contradictions (eg., Dubé 1995, Martin 1992). According to this view, any cultural symbol can be interpreted in different ways, and irreconcilable interpretations may be entertained simultaneously. Culture, therefore, is defined as a fragmented and ambiguous social setting where paradoxes and contradictions abound. For example, the Internet may increase the efficiency of an organization's members by providing them with information from disparate sources. Simultaneously, however, the Internet may cause wasted time by generating an overload of information with questionable validity. The effects of the technology on efficiency, from a fragmentation perspective, would therefore be expected to be contradictory.

When applied with full appreciation of the "contested, temporal, and emergent" nature of culture, as represented in contemporary anthropology (Avison and Myers 1995, p. 53), a cultural analysis of information systems is well positioned to explain contradictions and paradoxes. Information itself is symbolic, and the technologies used to process information may produce positive social meanings such as competitiveness, modernity, status, and legitimacy, as well as negative meanings such as the restriction of personal freedom (Feldman and March 1981). Because the same artifact may simultaneously acquire different social meanings, even within the same culture, contradictory consequences resulting from information technology are easy to envision (Robey and Azevedo 1994).

This potential is illustrated in the few empirical studies that regard information technologies as cultural artifacts that embody social values and assumptions. Romm et al. (1991), for instance, asserted that cultural assumptions are embedded within information systems and that effective implementation calls for the early detection of a potential cultural clash between the system and the organization. The authors used a series of cases to identify circumstances under which such detection is justified. Likewise, the failure to implement an information system may be attributed to a clash between the culture presumed to be embedded in the system and the actual culture of the implementing organization (Pliskin et al. 1993). Cooper (1994) argued that some systems capabilities align more closely

with some cultural values and assumptions than with others, and that information technology tends to be resisted when it conflicts with organizational culture.

Although these studies adopt a restricted approach to understanding the relationship between information technology and organizational change, they illustrate the importance of symbolic meanings of technology and the difficulty of implementing systems in resistant cultures. Outcomes emerge as newer technologies confront older cultures, and residues of new and old may combine to produce paradoxical or ironic consequences of information technology. At the extreme, confusion and fragmentation may be the most appropriate description of information technology's consequences in organizations.

Institutional Theory

Like theories of organizational culture, institutional theory has historically explained why organizational structures and values endure, even in the face of strong reasons and elaborate programs to change them.

Institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers—cultures, structures, and routines—and they operate at multiple levels of jurisdiction (Scott 1995, p. 33).

Organizations acquire institutional properties by drawing from abstract ideals in a society, such as competition, progress, and efficiency. This "institutional environment" both supports and produces normative pressures on an organization to perform in a legitimate fashion (Suchman 1995, Zucker 1987). For example, business organizations are governed by rules that reflect societal expectations about appropriate business conduct. To achieve and sustain legitimacy, organizations tend to conform to institutional models while resisting attempts at reform, even where organizational efficiency is threatened (Meyer and Rowan 1977).

Despite the traditional emphasis upon the persistence of organizational forms and practices, contemporary institutional theory exhibits a logic of opposition. Although the institutional environment presents normative forces that pressure organizations to conform in certain ways to maintain their legitimacy, a wide variety of organizational responses may be manifest. Oliver (1991) suggests that organizations may

compromise, avoid, defy, and manipulate the institutional environment as well as acquiesce to its demands. Clark and Soulsby (1995), for example, found that individual managers were instrumental in overcoming institutional inertia present in the former state enterprises of the Czech Republic. It is also possible in pluralistic environments for conflicting sources of institutionalized values to result in contradictory organizational responses (Meyer and Rowan 1977). For example, the values of economic performance and efficiency, considered fundamental to the functioning of a free-market economy, may conflict with societal expectations that business provide meaningful employment and security to a country's citizens. Under such opposing pressures, organizations may hypocritically commit to empowering their workers while pursuing efficiencies through downsizing and reengineering.

Institutional theory has informed a small amount of research on information systems. King et al. (1994) identified a broad range of institutional influences—national, cultural, and economic—impinging upon information technology innovations at both the national and organizational levels. Because such influences are exercised through the actions of governments and other policy-creating bodies, a variety of opposing pressures can affect innovation patterns and ultimately lead to contradictory outcomes of technology use. King et al. (1994) framed the institutional environment dynamically:

... we note that institutions must themselves be seen as fluid entities, as networks of organizations in action, that are being shaped by individuals, groups, organizations, and interest groups just as surely as they shape those entities. The axiom for the researcher studying IT innovation in an institutional context is to treat institutions as powerful sources of influence and regulation that are *somewhat* more stable than the entities they influence, but that over time, evolve in response to changing conditions and thus change their focus and methods of influence and regulation (p. 160).

Laudon (1985) compared institutional with environmental influences on U.S. states' adoption and use of a computerized criminal history (CCH) system. He found that environmental influences were primarily important in explaining the *adoption* of CCH systems but that institutional influences were primarily important in explaining the *use* of these systems. Thus, although systems were adopted by states with greater

environmental needs (eg., higher crime rates), the use of such systems conformed to institutional influences (eg., political, technical, and organizational infrastructures). While not revealing specific paradoxes, Laudon's results suggest a disconnection between the reasons for adoption and the reasons for use of information technology. Such a disconnection can certainly account for contradictory outcomes of those adopted technologies. In other research, Kling and Iacono (1989) concluded that information systems may take on institutional characteristics themselves, becoming traditional entities that resist attempts at modification despite the clear technical advantages of upgrades, conversions, and enhancements. As a result, technically meaningful advances may be avoided in the interests of preserving familiar, institutionalized system features.

Applied to the question of information technology and organizational change, institutional theory can address conflicts among normative pressures such as efficiency, rights to privacy and autonomy, and deeply embedded notions of bureaucratic and hierarchical structure. Although systems may ostensibly be designed to advance one of these valued ideals, usually efficiency, they may inadvertently affect others. Resulting organizational forms are likely to reflect such contradictions among competing values. For example, the persistence of occupational status differences within computer conferences that have removed visible symbols of social status suggests the durability of our institutionalized notions of social structure, despite the technology's ability to overcome status differentials (Saunders et al. 1994). As with theories of organizational culture, a researcher guided by institutional theory should be impressed by the difficulty of changing institutionalized practices and be more alert to the paradoxical outcomes described earlier.

Organizational Learning

Organizational learning considers organizations to be cognitive entities, capable of reflecting on and modifying their own behavior. The burgeoning literature can be separated into two groups (Argyris and Schön 1996). On the one hand, *organizational learning* has evolved with an academic orientation, seeking to explain how organizations learn new responses and why

they often fail to learn. Although this literature has progressed since the late 1970s, it has been the object of many controversies and criticisms. Huber (1991), for example, concluded that organizational learning lacked empirical studies, a cumulative tradition, and suffered from a lack of intellectual coordination among its proponents. Yet the interest in organizational learning has never been stronger, as evidenced by the number of recent articles providing conceptual clarification and focus (eg., Dodgson 1993, Jones 1995, Miner and Mezias 1996). On the other hand, practitioners have a strong interest in *learning organizations*, which achieve higher performance through their ability to learn from past experiences (Senge 1990). Learning organizations treat experience as empirical evidence that can be used to validate the assumed causal relationships between organizational actions and desired outcomes. In learning organizations, human capacity is expanded through training and teamwork, ensuring the continuation of inquiry and experimentation. Writings on learning organizations, although sometimes considered naïve and uncritical, offer prescriptions about the structures and technologies that enable organizational learning.

Although organizational learning adopts a more active and optimistic posture toward organizational change than the theories considered previously in this paper, it too embodies a logic of opposition in the concept of *organizational memory*. Organizational memory is typically defined as understandings shared by members of an organization about its identity, mental maps, and routines for thought and action (Fiol and Lyles 1985, Walsh and Ungson 1991). These components of memory are knowledge resources, learned from past experience, that members use to guide their actions. However, current knowledge may be a poor guide to future action when business conditions change. Ironically, organizations with successful histories may fall into "competency traps" by clinging to formulas for success that have become obsolete (Levitt and March 1988, Miller 1993). Effective learning organizations, accordingly, spend considerable effort *revising* organizational memory so that old knowledge is not superstitiously applied to new problems. They simultaneously exploit relevant lessons learned from past experience while they explore for new knowledge

(March 1995). These competing activities produce opposing pressures on organizational learning that may never be fully resolved.

The relevance of organizational learning to information technology was established by Argyris (1977), who argued that the contradictions inherent in systems implementation could be resolved through the type of authentic communication he prescribed as part of organizational learning. Despite this early and authoritative appeal, the link between information technology and organizational learning has barely begun to be explored. The few conceptual arguments examining this relationship agree that information technologies are not limited to the role of storage and retrieval devices supporting organizational memory (Campbell-Kelly 1996), but may also contribute to the process of organizational learning by supporting education, training, and the creation and communication of knowledge (Jones 1995, Pentland 1995, Stein and Zwass 1995). For example, Boland et al. (1994) proposed a software tool (Spider) enabling managers to represent personal cognitive maps and to facilitate dialogue with other managers about business situations. Likewise, Stein and Zwass' (1995) model for an "organizational memory information system" showed how information technology might support the learning process and provide electronic repositories for certain types of knowledge.

The efforts to design technology-based tools for enabling organizational learning must be balanced by arguments that information technology may also *disable* organizational learning. Gill's (1995) comparative analysis of Batterymarch Financial Management and Mrs. Fields' Cookies, both of which achieved notoriety for leveraging information technologies to produce competitive advantages, showed how heavy reliance on information technology could also impair a firm's capacity for organizational learning. Ironically, in both cases the applications that led to corporate success also disabled the organization's ability to learn appropriate actions for changed environmental conditions.

In each case, computers and communications were applied to successfully automate tasks which, in more traditional companies, had served environmental scanning as well as operational functions. As a consequence, when experiencing the rapid change that is inherent to complex environments, the

companies were deficient in their capacity to engage in the ill-structured activities of scanning and processing information, which are necessary to learn about the new environment. And failure to understand led to failure to adapt, shortly followed by failure to prosper (Gill 1995, p. 55).

Thus, as with the other theories considered, organizational learning operates in dialectic fashion where new learning replaces old knowledge at the same time that the stores of existing knowledge preclude new learning. Understanding such opposing forces is essential when examining the role of information technology in organizational change.

Methodological Implications

All four of the theoretical areas described above incorporate the logical argument that change occurs as a result of the interplay of opposing forces. In this section we identify four methodological implications of using a logic of opposition and offer concrete suggestions for researchers wishing to use these theories. To support our advice, we draw from recent empirical work on organizational transformation.

Identify Opposing Forces

The most obvious implication is for researchers to identify the opposing forces at play during the process of organizational transformation. Typically, opposing forces align with interest groups and political coalitions, perhaps representing the old and new guard or the privileged and the unprivileged. Opposing forces may also be more abstract, as in the case of culture, institutionalized values, and organizational memory. Regardless, opposing forces must be identified so that empirical evidence of their influence can be measured.

A good example of the identification of opposing interest groups is Bacharach's et al. (1996) analysis of employee assistance programs for flight attendants in the U.S. airline industry. In this research, interest groups were identified at three different levels of social analysis: the macro institutional level at which environmental changes were initiated; the managerial level within airline companies; and the technical level where flight attendants performed their jobs. Through interviews and examination of historical records, the researchers traced the "logics of action" (i.e., goals and methods) operating at each level since the deregulation

of the airline industry. Periods of stability in the evolution of employee assistance programs were associated with alignment among the logics of action at each level, whereas periods of instability were associated with misalignment. As a result of the interplay among different logics of action, the programs in question developed sporadically, first finding and later losing support within the industry. The identification of opposing forces allowed researchers to make sense of changes that might otherwise have been unexplainable.

The example illustrates the identification of political interest groups and the influence of the institutional environment on corporate and individual action. It is also possible to identify enduring cultural values and assumptions that may exist in different parts of an organization, some perhaps welcoming technological change and others resisting it. Finally, it is possible to locate repositories of organizational memory, some electronic and others not. For example, Campbell-Kelly (1996) concluded that the mechanization of the modern census provided the organizational memory that allowed the census to be conducted in the same way at intervals of ten years. While more abstract in nature than political interest groups, organizational memory exerts a comparable persistent force against organizational transformation and can be identified empirically.

Incorporate Opposing Hypotheses in the Design of Research

When using theories with deterministic logic, researchers typically specify directional hypotheses predicting that particular independent variables will affect dependent variables, either directly or inversely. Tests of such hypotheses can be easily conducted, and interpretations of statistical measures rendered without confusion. When employing a logic of opposition, however, the direction of prediction is more uncertain. An interesting practice that overcomes this potential difficulty is to specify multiple, competing hypotheses (Davis 1971). This practice has a long tradition, being cited in a classic work by Chamberlin, first published in 1897 (reprinted as Chamberlin 1965). According to Chamberlin, entertaining multiple, competing hypotheses may protect researchers from too strong an affection for favorite theories. This practice is illustrated by

Dickson's et al. (1997) study of the effects of communication technologies on organizational transformation. Their first proposition was: "Communication technology *facilitates* the transition from the multidivisional to the networked form of organization." A second proposition followed: "Communication technology *impedes* the transition from the multidivisional to the networked form of organization" (p. 303). In the ensuing empirical test, *both* propositions received support. Dickson et al. clearly expected communication technologies to produce contradictory consequences, although they failed to specify a theoretical foundation for their dual propositions.

This practice differs from the more conventional practice of failing to specify a directional hypothesis in exploratory research. For example, Brynjolfsson et al. (1994) refused to specify either a direct or inverse relationship between the use of information technology and firm size. They claimed that "theoretical arguments do not allow us to determine whether the decrease in average firm size . . . is related—either positively or negatively—to the increasing use of IT" (p. 1633). Brynjolfsson et al. then conducted an econometric analysis and discussed their results in relation to competing theoretical explanations. With multiple, competing hypotheses, researchers may incorporate both direct and inverse relationships into their research models, rather than remain noncommittal. Conflicting hypotheses are inherently embedded within theories that contain a logic of opposition.

Process Research

The identification of opposing forces alone is insufficient to support valid empirical explanations of the interplay between those forces. Process research is needed to focus on the way that opposing forces operate over time, as events comprising an historical account of organizational transformation. The key objective of process research is to identify patterns of influence from one period of time to another. Process research may be conducted using longitudinal research methods, wherein data are collected as events occur across time, or by using archival data sources (eg., Orlikowski and Yates 1994). In the case of large samples, the effects of logically opposed variables may be examined across time using econometric models

(eg., Brynjolfsson et al. 1994) or by conducting event-sequence analysis to detect recurring sequences of events that predict outcomes of interest in a large sample. Such techniques are used increasingly in organizational research because they support temporal theoretical reasoning to explain change (Huber and Van de Ven 1995). Their relevance to research on the organizational consequences of information technology is potentially great, although few researchers have exploited them for this purpose.

Process analyses may also be conducted on single cases. For example, Orlikowski (1996) traced the situated appropriations of new technology in a single organization, demonstrating how subtle, improvised changes provided the microfoundations for organization-level change. Data were collected in two phases, two years apart, and included both interviews and direct observation. Through qualitative analyses, Orlikowski was able to represent the interplay between deliberate and emergent changes in managers' practices.

Multiple Interpretations

A final methodological implication is to subject data to multiple interpretations, thereby reducing the tendency to privilege a single dominant explanation. The basis for this advice is Martin's (1992) recommendation to apply multiple perspectives in the analysis of organizational cultures. For example, Meyerson and Martin (1987) used the three perspectives of integration, differentiation and fragmentation to understand organizational change in the Peace Corps/Africa. Similarly, Dubé (1995) used Martin's recommended perspectives to interpret the culture of a software development company. In each study, additional insights were gained with each successive perspective, resulting in a more complete understanding of the culture being analyzed. While the differentiation perspective is perhaps best suited to support an analysis of resistance to change, the fragmentation perspective is also valuable for detecting and understanding chaotic and ambiguous organizational outcomes of new technology.

No special methods are prescribed for applying multiple perspectives. The essential implication is to be open to new interpretations by freeing oneself from

any single perspective. However, this can be difficult. Even where the logic of opposition is apparent in theory, it is still common for a single perspective to be overly represented. For example, many treatments of organizational learning focus solely upon the enabling role that information technologies play in enhancing learning and expanding organizational memory. However, it is necessary to appreciate how technologies also disable organizational learning by embedding rules and processes into technologies that are hard to change (Gill 1995). Overcoming one-sided interpretations of empirical evidence is partially aided by specifying competing hypotheses, as described above, but it is more fundamentally related to an open-minded approach to inquiry.

Conclusion

Theories that use a logic of opposition, when coupled with appropriate research methodology, can make better sense of observed contradictions in empirical studies than theories that use deterministic logic. Each of the four theories considered in this paper incorporates a logic of opposition by including pairs of forces respectively promoting and impeding organizational change. Each theory sees organizational change as a process in which transformative actions must overcome persistent structures, and in which information technology can support the forces of either persistence or transformation, or both simultaneously. As intended new structures are greeted by political opposition, cultural drag, institutional inertia, or existing organizational memory, unexpected new organizational forms may appear. Theories with a logic of opposition offer an alternative explanation of the ways in which information technologies interact with organizations to produce social consequences. Rather than determining new structures and forms, information technologies are treated as elements in complex social processes with indeterminate implications for organizations. This indeterminacy does not imply that the organizational consequences of information technology are incomprehensible or unpredictable. Rather, the use of these theories and research methods allows opposing forces to be identified and permits the analysis and interpretation of the complex social processes of organizational change.

The theories and methods presented here are not the only avenues available to explain the contradictory outcomes of information technology. Dialectical reasoning pervades many other theories of social behavior, including the metatheoretical framework of structuration theory (Giddens 1984). Formulated as a general social theory capable of resolving the artificial separation between action and structure, structuration incorporates opposition directly by arguing that action and structure operate as a duality, simultaneously affecting each other (Poole and Van de Ven 1989). Applied to information technology, structuration illuminates organizational consequences by observing that technologies are human artifacts, produced and reproduced through human action, which simultaneously constrain and enable such action (Orlikowski and Robey 1991). Thus, paradoxically perhaps, information technologies are produced by the very social structures that they promise to transform. The understanding of organizational change can be improved if the mutual influences of action and structure are incorporated into research efforts.

Moreover, other logics besides that of opposition may help in the search for understanding organizational change. For those who consider the opposition inherent in dialectic processes to be too dismal and combative, a *logic of attraction* provides an idealistic alternative (Ford and Ford 1994). Employing "trialectics" instead of dialectics, a logic of attraction assumes that people can work harmoniously to create an attractive future. Rather than viewing existing structures and practices as a residual force to be overcome, trialectics regards a proposed organizational change as an "invitation to create a future full of promise . . . with an opportunity to be active in its fulfillment" (Ford and Ford 1994, p. 781). Van de Ven and Poole (1995) have also identified alternatives to dialectical logic for explaining organizational change. *Life-cycle* theory suggests that organizations progress through common stages in which changes occur while identity is preserved; *teleological* theory explains organizational change as conscious adjustments undertaken to achieve a clearly specified goal; and *evolutionary* theory proposes that organizations are selected to be members of a surviving macropopulation based on variations introduced at the level of the individual organization. While a discussion of the role of information

technology within these alternative theories is beyond the scope of this paper, useful insights could be gained by exploring such connections.

Our focus on theory and its methodological implications potentially understates the usefulness of this analysis for the management of organizational transformation. A logic of opposition asserts that managers are *not* in a position to determine outcomes unilaterally. Rather, managerial action may be conceived as *one* of the forces in a dialectic process of change. In the case of political theory, the opposing forces are familiar ones: Managers have always dealt with political resistance to change and have learned the importance of negotiation and compromise. In the cases of organizational culture and institutional theory, managers must understand that they often cannot overcome cultural and institutional persistence with new technology. If organizational practices are deeply influenced by historical traditions and enduring values, and if they are supported by societal sources of legitimacy, strong resistance to transformation can be expected. Appreciation and understanding of cultures and institutions may, however, stimulate thinking about longer-term strategies for organizational change. Finally, organizational learning offers the most optimistic role for information technology in organizational change. By drawing upon the metaphor of learning, managers may see more easily how information technologies both enable and disable organizational learning. However, existing memory must be dealt with realistically—not as a data base whose contents can be dumped and replaced, but rather as an enduring repository of historical knowledge.

In conclusion, information technology's role in organizational change has been more realistically appraised in recent years. In place of simple imperatives, researchers and practitioners have acknowledged the value of viewing information technology as an ingredient in a more complex process of social change, in which forces for transformation are frequently offset by forces for persistence. The four theoretical perspectives reviewed in this paper incorporate a logic of opposition that accommodates a wider range of observed outcomes. The methodological implications of using these theories are also described. Researchers wishing

to make greater sense of the contradictory consequences of information technology are advised to design their research studies so that opposing forces are identified and their interactions over time empirically examined. Researchers should hypothesize opposing outcomes and force multiple interpretations on their data. We have offered concrete examples of these practices and encourage their application to research on information technology's consequences for organizations.

There is every reason to expect that organizations will continue to change as newer generations of information technology emerge, and it is likely that empirical evidence of information technology's consequences for organizations will continue to be inconsistent. However, future research can make greater sense of empirical contradictions by anticipating the opposing forces that operate when social change occurs. By incorporating a logic of opposition into the initial conception of a research study, and by employing research methods capable of measuring and analyzing opposing forces, researchers should be more adequately prepared to explain the resulting organizational consequences.⁴

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