ORGANIZATIONAL ADAPTIVE CAPACITY:

A STRUCTURATION PERSPECTIVE

by

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Abstract

Conventional approaches to organizational effectiveness and survival in highly volatile and complex environments focus on adaptation strategies of cost-cutting and rationalization. We propose that building adaptive capacity is a more appropriate organizational strategy in such environments. Using Giddens' structuration theory, we discuss multiplexity, redundancy, and loose coupling as important structural dimensions of adaptive capacity, and highlight the challenges involved in managing these dimensions. Because structuration theory considers simultaneously all aspects of managerial practice, including the political, cognitive, and normative aspects of managing change, it offers a useful framework for understanding adaptive capacity as a strategy that extends beyond the technical efficiency focus of conventional adaptation thinking.

Business environments in many sectors of economic activity are characterized by extreme turmoil, complexity, and discontinuity. Such "hypercompetitive" environments (D'Aveni, 1994) call for organizational strategies and structures which place a premium on learning, innovation, and cooperation. The conventional approach to management in such environments is reactive and adaptationist. Organizations following this approach tend to adopt a “lean and mean” strategy, focusing on their core competencies, streamlining routines, and tightening resource belts (Harrison, 1994). They view organizational flexibility in terms of cost-cutting, rationalizing, and routinizing, and “behave as if complex, dynamic and interrelated environments are in fact simple, static and unrelated” (Bozeman & Slusher, 1979, p. 346). The adaptationist approach considers organizational slack a form of inefficiency and frowns upon experimentation with unproven structures and procedures, if such experimentation is seen as conflicting with activities that have clear and immediate payoffs.

An alternative strategy in “hypercompetitive” environments is to develop adaptive capacity. Firms with adaptive capacity continuously develop and apply new knowledge, and do so in ways that are sustainable and difficult to imitate by competitors (Hanssen-Bauer & Snow, 1996; Oliver, 1997). The idea is not to seek the "optimal fit" to existing contingencies, as with adaptationist strategies, but to endure some resource slack supporting a repertoire of potential solutions to unforeseen problems. We propose that adaptive capacity is a useful corrective to conventional calls for lean and efficient structures.

We suspect that, while the adaptive capacity approach has received some theoretical attention (Chakravarthy, 1982; Staehle, 1991; Stacey, 1992; Grabher, 1994; Nonaka, 1994; Nohria & Gulati, 1996; Morgan, 1997), in practice most organizations are adaptationist in their structures and behaviors. If given a choice between two organizational arrangements, one of which was better adapted to existing circumstances than the other, few managers would prefer the less well adapted form. The problem is that adaptive capacity is characterized by considerable ambiguity and complexity, with contradictions that are difficult to manage and

with payoffs that are rarely immediate. The challenges of managing adaptive capacity are most evident in the tensions inherent in the three structural properties of adaptive capacity we examine in this paper: multiplexity, redundancy, and loose coupling. We use Giddens' (1984) structuration perspective to explore these properties and to indicate the managerial challenges they present for the organization. Giddens' structuration perspective, updated by his recent discussion of society in late modernity (Giddens 1990, 1996), is particularly useful in this regard, because it forces an appreciation of the contradictions and dynamics of adaptive capacity.

Adaptation Versus Adaptive Capacity

Approaches to organizational effectiveness and survival in "hypercompetitive" environments may be distinguished in terms of whether they focus on reaction or proaction, and whether they identify organizational designs that indicate "best practice" or designs that support ambiguity, diversity, and continuous learning.

The Conventional Approach: Adaptation

Much of current research and writing on organizations and management is dedicated to the pursuit of adaptation. This is true for much of the work on organizational flexibility, innovation, and strategy. Research on organizational flexibility tends to emphasize efficiency, even if it attends to social variables, such as knowledge diffusion and cooperation. Discussions of innovation systems and industrial districts conceptualize the success of firms and interfirm networks as the result of efficient adaptation to changing requirements (e.g., Storper & Christopherson, 1987; Pyke & Sengenberger, 1992). The development of interorganizational cooperation is often seen as proceeding through identifiable stages of adaptation to changing contextual conditions (e.g., Ring & Van de Ven, 1994; Hanssen-Bauer & Snow, 1996). And the strategy literature on interfirm alliances emphasizes the calculative rationality of actors seeking

a better fit between relational governance structures and market contingencies (e.g., Eisenhardt & Schoonhoven, 1996). Network studies taking an adaptationist perspective have been criticized for adopting a static view on the way firms cope with a rugged fitness landscape, by studying interfirm networking as a strategy for committing to (rather than exploiting) an array of options (Staber, 2001). And adaptationist approaches in general have been criticized for ignoring, or at least downplaying, the possibility that organizations can be too well adapted (Granovetter, 1979). The very strategies that foster allocative efficiency may undermine the organization's ability to prosper under conditions of extreme volatility. Fitness under specific conditions may be suboptimal in a constantly changing environment where there is no one best solution.

Writers have identified several kinds of "fit" that organizations seek (Venkatraman & Camillus, 1984), and have interpreted "fitness" from a number of theoretical perspectives. Contingency theorists propose that organization designs should be consistent and should match the demands of environment, technology, size, and culture, (for a summary of this literature, see Daft, 1997). For example, organizations operating in stable environments are assumed to be more efficient when they have mechanistic structures, while survival in more dynamic environments is thought to require organic designs (c.f. Burns & Stalker, 1961). Transaction cost economists focus on efficiency in exchange relations and argue in favor of governance structures that suit both internal and external contingencies related to the costs of evaluating and monitoring economic exchange (Williamson, 1985). Social exchange theorists emphasize perceived equity as an important foundation for stable organizational and interorganizational governance structures (Neale & Northcraft, 1991). Strategic choice theorists argue that managers should scan organizational environments for information about threats and opportunities, formulate strategies that are appropriate for existing conditions, and then transform organizational structures and processes consistent with the chosen strategies (Tushman & Romanelli, 1985). Decision theorists think of adaptation as an incremental search

for organizational routines that match environmental contingencies (Mintzberg et al., 1976), and highlight the importance of agreement on organizational objectives and problem priorities (Cyert & March, 1963). Resource dependence theorists view adaptation as a process by which environmental uncertainties are minimized (Pfeffer & Salancik, 1978). Population ecologists explain adaptation as the outcome of environmental resource constraints interacting with organizational forms (Aldrich, 1979; Hannan & Freeman, 1989). Community ecologists view adaptation as a collective response of interacting organizational populations (Baum & Singh, 1994). And institutional theorists argue that successful organizations adapt to normative prescriptions, especially under conditions of uncertainty (DiMaggio & Powell, 1983).[1]

What these theoretical perspectives have in common is a view of organizational change as an attempt by management to enhance organizational performance through adaptation to existing contingencies. They differ mainly in the processes and mechanisms by which they propose adaptation is obtained, such as through learning, imitation, coercion, or natural selection. With the exception of some ecologists who deny the possibility of radical internal change, adaptation is seen as the result of adjusting organizational strategies and structures to fit contextual conditions, either incrementally or in quantum leaps, but mostly reactively.

The Challenge: Adaptive Capacity

An alternative approach to organizational and interorganizational change views adaptation not as an optimal end state but as a dynamic process of continuous learning and adjustment that permits ambiguity and complexity. The focus here is less on best practices than on effective search, less on optimizing exploration or exploitation strategies than on balancing both (March, 1991). Parsons (1964, p. 340), in his analysis of social organization, describes

[1] In our list of adaptation perspectives we exclude recent writing on post-modernism and post-structuralism (e.g., Kilduff and Mehra, 1997), because this work is more concerned with general issues such as the representation of truth and the usefulness of total theories than with adaptation *per se*.

adaptive capacity as a search process which enhances the “ability to survive in the face of its unalterable features ... [and] the capacity to cope with ... uncertainty ... and unpredictable variations." Applied to regional economic development, Grabher (1994) contrasts adaptation with "adaptability", with the latter implying more choice, discretion, learning opportunities, and variable interpretations, which has survival advantages in volatile and unpredictable markets. While adaptation reflects equilibrium-seeking behavior and maximizes fitness to existing conditions, adaptive capacity refers to the ability to cope with unknown future circumstances. Organizations with adaptive capacity can reconfigure themselves quickly in changing environments, rather than merely identify existing demands and then exploit the available resources. Chakravarthy (1982) thinks of “adaptive ability” as the only basis for successful adaptation processes and for achieving viable states of adaptation to environmental changes. Adaptive ability, he argues, is rooted in the information processing ability of an organization. It also reflects the latitude for experimentation given to managers when short term performance has produced slack for which stakeholders need not be compensated but which can be used to build adaptive ability.

The learning approach of Argyris and Schön (1978) interprets adaptive capacity in terms of double-loop learning, which enables questioning and changing the prevailing goals and ideologies, as well as developing new rules and methods of decision-making. Single-loop learning, by contrast, assumes that goals are relatively stable and focuses more on the means by which existing goals are pursued. The capacity of organizations for double-loop learning assumes a higher level of organizational reflexivity than single-loop learning, and may be most useful for dealing with complex and tacit knowledge, and under conditions of extreme uncertainty. Organizational reflexivity also implies a recursive interplay between the organization and its environment. Organizations with adaptive capacity do not experience environments passively. In the process of interpreting and acting upon environments they reconstruct them in ways that change the conditions to which they then adapt. Transformations

help the organization not only to keep pace with constantly changing demands but also to anticipate changes. In contrast to adaptation perspectives, the double-loop learning approach to adaptive capacity proposes that the organization must be reinvented continuously, using feedback from its environment.

Adaptive capacity should thus be viewed in relative and dynamic terms. That is, organizations have adaptive capacity when learning takes place at a rate faster than the rate of change in the conditions that require dismantling old routines and creating new ones. Organizations with limited adaptive capacity tend to search for solutions to problems in terms of the competencies they already possess and can therefore understand. Because their adaptive capacity is low, they may not even realize the need to develop new knowledge in an evolving and uncertain environment (Cohen & Levinthal, 1990). Under these circumstances, organizational (core) capabilities may turn into (core) rigidities (Leonard-Barton, 1992). By contrast, organizations with have high levels of adaptive capacity exhibit “dynamic capabilities” (Teece et al., 1997) and avoid structures that are too well adapted to specific circumstances, unless there is some reassurance that these circumstances will never change -- a highly improbable proposition. Managers oriented towards adaptation may interpret organizational and material capabilities -- if they do not have the properties of a dynamic capability -- as temporary and find their organizational designs thwarted by unforeseen side effects of their actions or by new developments in their environments. By contrast, managers interested in adaptive capacity accept unpredictable side effects or new developments, and are prepared to experiment with new designs, hoping that one of these will have adaptive value under different conditions.

[Table 1 about here]

Although adaptation and adaptive capacity are, as summarized in Table 1, analytically distinct concepts, they may be related empirically. They may be negatively related in that

adaptation to a given set of conditions may reduce the organization's ability to cope with changes in those conditions. The more perfectly adapted the organization is to a given environmental state, the more disastrous may be an even minor change in that state. Or, an organization with adaptive capacity may never see the future, if it is outcompeted by rivals who are better adapted to the current state. Organizations that hedge against a long term fit may not survive when competing with those that have a better momentary fit (Weick, 1979, pp. 135-136). Adaptation and adaptive capacity may also be positively related, as when the former is a necessary condition for achieving the latter. For instance, an organization which is well adapted to its current environment may earn extra returns on investments that have long term payoffs for survival in future environments.

The distinctions between adaptation and adaptive capacity, as conventionally discussed, are a useful point of departure, but they remain at the descriptive level. Also, as Chakravarthy's (1982) analysis suggests, most previous writings attempt either to resolve or downplay the inherent conflict between adapting to existing environmental conditions and setting aside resources and capabilities for mastering unknown future environmental states. A more useful approach, we believe, is to acknowledge and explore this conflict. In this paper, we reconceptualize the tension between adaptation and adaptive capacity in structurationist terms.

A Structuration Perspective on Adaptive Capacity

Theoretical perspectives on adaptation do not capture the contradictions and dynamics involved in creating and managing adaptive capacity, because they focus on optimization solutions under existing conditions. A key concern of these perspectives is the efficiency of resource allocation, especially in transaction cost economics, traditional decision theory, and population ecology. While some perspectives (ecology, institutionalism) emphasize the constraining influence of contextual forces, others (strategic choice,decision, resource dependence) recognize opportunities for human agency. While some perspectives (contingency,

ecology) focus on structure, others (institutionalism, decision) emphasize processes. Each of these perspectives helps to understand a particular aspect of how organizations develop "fitness" within a given context. But they do not explain how organizations survive in endogeneously dynamic environments and how they cope with unknown future states. Adaptive capacity aims less at improving economic efficiency than improving the ability to learn, act reflexively, and maintain or transform social structures and processes. We think that Giddens' (1984) structuration theory offers a more balanced and comprehensive approach to organizational response to uncertainty than adaptation perspectives, because it deals both with the creation and maintenance of ideas and structures, and with change and continuity, using the same language.

Giddens employs the concepts of duality of structure and structuration to explain the dynamic relationship between human agency and the structure of social systems. *Duality of structure* means that social structures are constituted by human action and, at the same time, are the medium of this constitution. Social systems *are* not structures, but they *have* structures; they have structural properties which actors draw upon in their social interaction. The concept of *structuration* refers to the process by which actors reproduce and transform social practices across time and space. These processes are related to structures in that practices are embedded in the system which, depending on how it is structured, either enables or constrains action. Structures never determine action. Actors are engaged in structures which they transform in the process of acting upon and through them. Structuration theory offers a conceptual scheme for understanding how actors create organizational structures as both the medium and the outcome of organizational design.

Giddens' theory focuses on the recursive interplay of structure and process, and deals simultaneously with power, cognition, and legitimacy as interrelated aspects of the processes through which structures are constituted. Unlike theories which emphasize action and focus on the symbolic or cognitive aspects of behavior, structuration theory also takes power into account. And unlike theories which analyze structures primarily in terms of power or efficiency,

structuration theory also pays attention to normative issues of practice which give meaning to power and efficiency. Because adaptive capacity combines structure and practice, its management requires attention to all aspects of social practice through which adaptive capacity is constituted.

[Figure 1 about here]

As depicted in Figure 1, structuration theory views social practice in terms of two recursively-linked dimensions: structure and interaction. The structural dimension involves signification (meaning), domination (control), and legitimation (morality). The interactional dimension contains communicative, power, and sanctioning aspects. Giddens thinks of structure as the *rules and resources* which facilitate and constrain action. Rules refer to the signification ("this is how we do it in this organization") and legitimation ("this is how we should do it") aspects of structure. Resources reflect domination and the distribution of power in the system ("who is in charge here?"). Giddens distinguishes between allocative (control over material resources) and authoritative (control over persons) resources. Structure and interaction are mediated by interpretative schemes, facilities, and norms. Actors make sense of behaviors and events through communication, thus reproducing the rules of signification. They use facilities to mobilize available resources, thereby translating power into domination. And by using norms to sanction behaviors and events they confer legitimacy.

Although Giddens views structuration theory mainly as a social theory, to characterize social life and change at the level of society, this theory can also be applied to understand social relations at the organizational and interorganizational level. Organizations are social systems, in the same sense that Giddens defines social systems as social practices which are reproduced and transformed across time and space through the actions of human agents. As in societies, organizational participants are involved in political processes, sense-making, and legitimation.

And they face the same challenges as in larger societal settings when responding to and using the social structures in which they are embedded, by settling disputes, compromising, negotiating, evaluating, risk taking, and so forth. Structuration theory has been applied in the analysis of organizations (e.g. Bouchikhi, 1993; Whittington, 1992), interorganizational networks (Sydow & Windeler, 1998), and organizational accounting systems (Macintosh & Scapens, 1990). Structuration theory has also been proposed as a metatheory to reconcile the explanations of different theoretical perspectives in organization studies (Weaver & Gioia, 1994). If structuration theory is used as a metatheory, reconstructing and integrating useful concepts from other theories around the main thrust of structuration, it can help to understand social structures and processes, both at the organizational and interorganizational level. This theory is also useful for exploring adaptive capacity, because it emphasizes processes without neglecting structures and recognizes the importance of structural change without ignoring the need for stability. Criticisms that structuration theory puts too much emphasis on *re*production processes (i.e., stability and maintenance) ignore the possibilities of change which can be revealed through a structuration analysis. Possibilities of change are deeply anchored either in structural contradictions of various kinds (see Sydow & Windeler, 1998, for details) or in events and relationships which increase the knowledgeability and reflexivity of agents.

In his more recent (1990, 1996) writings on social relations in late modernity, Giddens has gone beyond his stratification model of the agent as a key element in his concept of duality of structure and structuration processes. To develop a more systemic understanding of reflexivity, he now not only emphasizes the reflexivity of agents but is concerned more with developments at the level of society. His idea of “institutional reflexivity” refers to the institutionalization of the “continuous filtering-back of expert theories, concepts and findings to the lay population” (Giddens, 1996, p. 91). This implies that institutions, by developing a kind of surveillance capability, support individual and corporate agents in systematically reflecting upon their actions, as well as the conditions and consequences of their actions, including the

possibility of unintended consequences. Institutional reflexivity may enable the rediscovery and strengthening of traditional practices. But it may also lead to the dissolution of traditional practices, for example, by questioning their legitimacy. At the same time, it may help to reshape "habits and expectations" in light of the "pervasive filtering-back of information" (p. 91). The crucial point, however, is that this institutional reflexivity "is introduced into the very basis of system reproduction" (Giddens, 1990, p. 38). If aimed at organizational adaptive capacity, it changes the very conditions for organizational and interorganizational action.[2]

We propose that structuration theory, through its reference to the duality of structure, the stratification model of the agent, and institutional reflexivity, is a useful framework for explaining the difficulties of managing organizational adaptive capacity, including the rules and resources that must be reproduced or adjusted continually with respect to their signifying, legitimizing, and dominating dimensions. Adaptive capacity contains tensions and conflicts which are at the core of organizational responses to conditions of uncertainty.

Structural Properties of Adaptive Capacity

Organizational slack has been considered in various writings on organizational change mostly as a structural property of adaptive capacity, enhancing the ability of organizations to adapt to unknown environmental conditions (e.g. Cyert & March, 1963; Bourgeois, 1981; Chakravarthy, 1982; Nohria & Gulati, 1996; Greenley & Oktemgil, 1998). According to Bourgeois (1981, p.30), who builds on the seminal work by Cyert and March (1963), "slack is the cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment." Slack can help to resolve latent goal conflict between political coalitions in organizations and thus prevents them from

[2] This systemic kind of reflexivity is also referred to in the organization theory discourse on learning and the reflexive monitoring of learning systems (Argyris & Schön, 1978; Volberda, 1998, pp. 53-63).

breaking apart (Nohria & Gulati, 1996, p. 1247). It helps organizations to pursue innovative projects, experiment with new structures, and implement strategic change. But too much slack may also be detrimental to innovation if it diminishes the necessary discipline that is exercised in the selection of innovative ideas, the termination of experiments with new structures, and the control of strategic change programs (Nohria & Gulati, 1996).

The concept of organizational slack has been studied most intensively and rigorously as a basis for the strategic flexibility of organizations (e.g. Evans, 1991; Das, 1995; Greenley & Oktemgil, 1998, p. 379; Volberda, 1998; Tienari & Tainio, 1999) and interorganizational networks (Young-Ybarra & Wiersema, 1999, p. 440). Although these studies have produced useful insights, they are limited in their contribution to an understanding of adaptive capacity in several respects. First, the concept of organizational slack, as defined by Cyert and March and their followers, focuses on resources but neglects rules. According to structuration theory, rules are an equally important dimension of structure, flexibility, and adaptability. They figure prominently in the "mental flexibility" (Volberda, 1998, p. 52) of strategic schemes and may be an outcome of double-loop learning. Second, the concept of slack is too general to capture usefully the variety of structural properties which enhance an organization's adaptive capacity. The broad measures of slack which researchers have employed (e.g., Greenley & Oktemgil, 1998, pp. 386-387) do not reflect the multi-dimensional character of adaptive capacity. Third, while the concept of slack may be applicable at all levels of *organizational* analysis (Nohria & Gulati, 1996), it is difficult (in contrast to the concept of flexibility) to apply to the more encompassing *inter*-organizational levels of analysis, such as business associations, networks, or sectors. Despite these reservations about the concepts of slack and flexibility, as they are usually employed in the organizational and management literature, we will refer to the results of several empirical studies of resource slack when we analyze below the adaptive capacity enhancing effects of redundancy.

As depicted in Figure 2, we identify three important structural dimensions of adaptive

capacity: multiplexity, redundancy, and loose coupling. Some writers have recognized the tensions and dynamics inherent in the management of these dimensions (e.g., Weick, 1976; Orton & Weick, 1990; Staehle, 1991; Grabher, 1993, 1994; Morgan, 1997), but have not analyzed them with respect to the recursive relationship that exists between action and structure. By emphasizing either process *or* structure, either at the level of single organizations or interorganizational networks, they have not addressed the problem of how organizational actors who are subject to the codes, rules, and resources of the organization's social order can, at the same time, also transform that order. Because adaptive capacity reflects the contradictions and tensions inherent in the duality of structure, it is important to understand how managers create, reproduce, and transform the various properties of adaptive capacity. We believe that the structuration processes of interpreting (signification), sanctioning (legitimation), and controlling (domination) of multiplexity, redundancy, and loose coupling, among others, have not received sufficient attention in previous theoretical work on adaptive capacity.

Multiplexity

Multiplexity refers to the number and diversity of relations between actors in organizations or interorganizational networks. For example, individuals employed in the marketing and R&D departments of an organization have multiplex relations if they meet in different settings (conferences, professional associations, etc.) to discuss different issues related to the organization (new product developments, government regulations, etc.). Interorganizational relations are multiplex through the linkages among boundary spanners representing different parts of each organization. A variety of resources may be exchanged in this way, with multiple uses and for different purposes, such as meeting the instrumental, affective, and legitimation needs of organizations and individuals.

Multiplexity may be considered an aspect of adaptive capacity similar to the way in which information theorists describe the advantages of highly differentiated knowledge

structures (Quastler, 1955; Cohen & Levinthal, 1990). Multiplexity creates a “capacity for the evolution of a ‘shared organizational mind’” (Morgan, 1997, p. 104), because information can spread throughout the system and can be accessed from a variety of points of view. Multiplexity contributes to requisite background knowledge and facilitates the rapid spread of information when it is needed. Information flows in multiplex systems may not be as efficient as in systems where all actors subscribe to the same specialized language and meaning. But they are more effective to the extent that they permit actors to tap into diverse repositories of knowledge. Multiplexity can thus enhance the organizational system's versatility in responding to volatile and fragmented demands from the environment.

But multiplexity does not, by itself, guarantee that information is sought by all actors and employed in ways that enhance the organization’s adaptive capacity. Whether knowledge is shared, manipulated, distorted, or withheld is related to the signification aspects of structuration and depends on existing rules and the way in which they are interpreted by organizational actors and used by them for sanctioning events or behaviors. For example, the organization may have a history of resource competition between distinct subunits with divergent interpretations of problems and solution alternatives. When interpretations are inconsistent or conflictual, multiplexity may stall or distort the flow of information and thus limit adaptive learning. Or, an organization with significant membership turnover may experience multiplexity as disrupting its capacity for sustained knowledge creation and information sharing. In terms of the domination aspects of structuration, there is the risk that individuals in positions of power will instrumentalize multiplex relations in ways that lead to conflict and resistance, rather than adaptability. Affective relations may be used by powerful actors to control other forms of linkage as well, thus limiting the degree of openness and reflexivity required in an adaptable organization. Or, the organization’s reward system may place differential emphasis on particular forms of relations and limit adaptive capacity by causing actors to question the legitimacy of resource sharing. For these and other reasons, related to signification, domination, and

legitimation, the contribution of multiplexity to adaptive capacity is not automatic but requires managerial attention. The multiplexity property of adaptive capacity must be interpreted, sanctioned, and governed.

The empirical evidence on the relationship between structural multiplexity and adaptive capacity is limited and somewhat difficult to interpret. Some studies are mostly descriptive, showing the extent of multiplex linkages that exist in and between organizations. Other studies address the performance implications of multiplexity, but often do so in a univariate framework, without controlling for contextual conditions and structuration processes. It is not clear from these studies if organizational or interorganizational systems with multiplex structures perform well because of effective structuration processes or because of other, exogenous circumstances. For example, Gerlach's (1992) study of intercorporate relations in Japan showed that most firms were linked in multiple ways. The findings suggest that multiplexity supports coherent and stable cliques of firms, but the performance outcomes of interorganizational structures are not known. A study of a sample of biotechnology firms in the United States, Europe, and Japan found that most firms had multiple links with other actors in the industry, which they used to develop synergies with the knowledge base in their highly volatile environments (Arora & Gambardella, 1990). Whether this strategy was more effective than other approaches or, at least, led to a higher level of adaptive capacity was not studied.

Some investigators have attempted to measure the performance outcomes of multiplex interorganizational relations. Kogut (1989), for example, found that joint ventures between U.S. firms which had multiple relationships had significantly higher survival rates. Kogut interpreted this finding as evidence that, to be successful, joint ventures need to be part of a larger web of interfirm agreements. A study of interfirm networks in the New York City apparel industry showed the importance of embeddedness in multiple dyads (Uzzi, 1996). The findings indicate that businesses with diffuse trading ties with a large number of firms tend to survive longer than firms with concentrated ties. Uzzi (1996, p. 680) argued that multiplexity facilitates the "rise of

embedded ties from preexisting embedded relations to new relationships and situations." But because multiplexity was not measured directly and structuration processes were not explored, it cannot be inferred from the available data that signification, domination, and legitimation processes were managed in ways that supported the firms' and interfirm network's adaptive capacity. Multiple dyads do not necessarily cohere into a network of adaptable ties. Grabher's (2001) study of advertising networks suggests that the success of advertising firms in London is, in part, a function of the high level of diversity of relationships and organizational forms. Structuration processes in the "advertising village" are described in terms of the reflexivity which organizational diversity affords: a tolerance for ambiguity, diversity of interpretations, and decentralized power structures. Unfortunately, this study does not offer comparison cases of advertising networks which lack multiplex structures to test the extent to which these structures, and not others, explain success.

Redundancy

Redundancy is usually viewed as resource slack, reflected in the presence of surplus employees, unused productive capacity, overlapping jurisdictions, broad job descriptions, tolerance for mistakes, parallel communication channels, or idle information. The conventional practice of managers is to limit redundancy, to obtain the best possible fit to contextual conditions and to maximize efficiency (Nohria & Gulati, 1996). Transaction cost economists consider redundancy synonymous with resource waste, and agency theorists think of redundancy as an opportunity for actors to pursue their own interests rather than act in the interest of the organization (Jensen, 1993). Learning theorists often emphasize optimization processes in information acquisition and diffusion, as is typical in much of the literature on "innovation systems" and "learning regions" highlighting the necessity of "rapid diffusion of knowledge and best practice" (Nauwelaers & Reid, 1995, p. 13).

Other organization theorists have identified also positive aspects of redundancy. Cyert

and March (1963), for example, proposed that organizations with slack find it easier to resolve goal conflicts between political coalitions, because redundant structures offer alternative options. Tolerance for slack thus contributes to an organization's ability to cope with unforeseen challenges. Others view slack or redundancy as part of an organizational culture that rewards experimentation without the expectation that all innovation needs to pay off (Bourgeois, 1981). Not all innovations lead to positive outcomes, but the few innovations that do succeed can have significant adaptive value for the organization that operates in complex and volatile environments.

We think that redundancy contributes to organizational adaptive capacity in terms of the distribution of information, tasks, and relations (Cohen & Levinthal, 1990; Staehle, 1991; Grabher, 1994). With respect to *information* redundancy, the "amount of unutilized possibilities to carry information" (Quastler, 1955, p. 150) confers benefits for the adaptability of the system that depends heavily on information. The English language, for example, is highly redundant; speakers use many more words than are minimally needed in order to be understood. Communication would be an hazardous process if language were used efficiently, because of the risk of misinterpretation that efficiency implies. With redundancy, some details may be ignored without losing the intended meaning of a statement. Without redundancy, it is difficult to detect errors, should they arise. Redundant information thus enhances the reliability of transmission. When information redundancy is combined with multiplex knowledge structures that link actors with diverse competences, conditions are optimal for making novel linkages and associations (Cohen & Levinthal, 1990). However, agents have to make use of these linkages by means of their communications and power resources, and by employing sanctions in ways which increase, rather than limit, the adaptive capacity of an organization or an interorganizational network.

Task redundancy contributes to adaptive capacity in that different elements of the system can accomplish a variety of functions. When tasks are redundant they are not being pursued at

all times but are completed only when needed. Because not all elements need to be equally active at all times, the failure of any one element will not lead to the failure of the entire system. Redundancy of *relations* means that actors are linked in several ways, at least some of which carry the same information. A relation that fails can be replaced relatively easily if it is duplicated by other relations of equal value. In combination, redundancy of information, tasks, and relations make the system more "error friendly" and more conducive to experimentation, improvisation, and risk taking.

But whether redundant structures are employed in ways that do in fact encourage innovation depends on whether structuration processes support change rather than persistence, risk taking rather than risk aversion. For example, the use of redundant information may signify different meanings for different actors and lead to conflict and resistance to change. Task redundancy may be instrumentalized by dominant actors to further their personal interests rather than those of the organization. Redundancy may only facilitate error detection if the rules of the organization are interpreted with a view toward revealing and discussing errors, rather than concealing them. The discovery of errors may upset the existing power structure, which may not be considered legitimate. Also, whether failed elements of a redundant system are replaced or left vacant depends partly on the distribution of power. In organizations with concentrated power, relations may converge towards powerful coalitions and tasks may be assigned in ways that preserve, rather than challenge, the power structure. It would thus be wrong to conclude that redundancy of information, tasks, and relations will always and automatically enhance adaptive capacity. In some cases, redundancy may increase competition above an acceptable and useful level, stifling the willingness of actors to take risks. In other cases, redundancy may limit variability within organizations or networks to a degree that makes communication repetitive, without adding value.

Not surprisingly, research findings on the performance outcomes of redundancy are mixed. Some studies show that organizational slack (the usual measure of redundancy)

encourages innovative behavior. Singh (1986), for example, found in a cross-sectional sample of large U.S. and Canadian corporations that slack was a significant mediating variable between performance and risk taking. Firms that operated under competitive conditions and committed excess resources took risks that often paid off. Cohen and Levinthal (1990, p. 134) cite research on Japanese firms suggesting that "*overlapping* (emphasis ours) product development cycles facilitate communication and coordination across organizational subunits" and accelerate innovation. Other studies suggest that slack has debilitating effects, while efficiency-seeking measures, such as cost cutting, budget tightening, and outsourcing peripheral operations, enhance organizational performance (e.g., Womack et al., 1990). Finally, a study of functional departments in national subsidiaries of two major multinational corporations found a curvilinear relationship between slack and innovation (Nohria & Gulati, 1996). Innovation was least likely to occur when there was not enough slack or too much slack. Insufficient slack, the authors argue, discourages experimentation, while too much slack promotes waste and insufficient discipline. Unfortunately, none of these studies provide micro-level data that permit an assessment of the ways in which structuration processes make use of redundant rules and resources and mediate the relationship between redundancy and performance.

Girard and Stark's (2001) case study of a new media startup firm is suggestive of how structural redundancy, coupled with multiple and diverse frames of reference, can contribute to adaptability and success. People in this organization work on several projects simultaneously, relationships are recursive, and boundaries around jobs, projects, and networks are open and constantly shifting, thus permitting the continual reinterpretation of information and development of new knowledge. Authority and power in this organization are not distributed vertically but emerge laterally. Redundancy of tasks, information, and relations ensures that by generalizing the functions of exploration throughout the organization innovation is less about exploring than exploiting ambiguity. This organization, according to Girard and Stark (2001, p. 9), has adaptive capacity because redundancy is used by management to "create an

organizational space open to the perpetual redefinition of what *might* (emphasis ours) constitute an option."

Loose Coupling

A third structural property of adaptive capacity is the strength of linkages among system elements. A system is loosely coupled if its elements share few variables in common, or if common variables are weak relative to other factors influencing the elements (Glassmann, 1973). Loose coupling in organizational and interorganizational systems means that the various units and activities are relatively independent and can adjust to changing demands in different ways and at varying rates. In terms of the organizational structure's domination dimension, loose coupling implies that control is decentralized and information travels slowly and unevenly. In terms of signification, members may draw on a variety of inconsistently related criteria to interpret their participation. And in terms of legitimation, the norms by which rules are evaluated are scattered thinly throughout the system.

Although loose coupling places substantial demands on management, especially when objectives are ambiguous and not shared, technologies are unclear, rules are not internalized, and resources are inadequate, there are also advantages for organizations that operate under conditions of extreme uncertainty. When knowledge is tacit and the application possibilities of new knowledge are unclear, loose coupling raises the chance that at least one organizational element is exposed to the environment in ways that contribute to system adaptation (Cohen & Levinthal, 1990). Loose coupling reduces the risk of repeating mistakes (Masuch, 1985) and escalating commitments (Ross & Staw, 1993), and encourages the abandonment of rules and activities that have become dysfunctional under new circumstances (Weick, 1976). From an evolutionary perspective, by increasing variation in skills and competencies loose coupling raises the system's adaptive capacity (Aldrich, 1979; Dawkins, 1986). Rare and relatively less fit competencies, which would normally be weeded out in tightly-coupled systems, can survive

and contribute to the pool of possible solutions. Loose coupling thus raises the likelihood that the system possesses the competencies needed to adapt to new conditions, albeit at the cost of relative system inefficiency when these conditions do not exist.

Weak ties are beneficial if they allow actors to tap into a large pool of diverse information and if actors make use of this information in an adaptive capacity enhancing manner. Individuals with few weak connections are deprived of information from distant parts of the system and are confined to the resources and views of their close friends (Granovetter, 1982). But when actors are weakly connected to very different parts of the system, they have access to a broad range of information sources. While the loosely-coupled system as a whole may be fairly stable, individual subunits are free to adjust quickly to changes in specific circumstances (Aldrich, 1979, p. 326).

By constrast, in tightly-coupled systems any disturbing event is likely to spread rapidly and completely, and "incidents" can quickly turn into "accidents" (Perrow, 1984). Tightly-coupled systems have difficulty reaching stable states, as each disruption tears apart whatever stable form may have been reached. The disruptive event may be experienced by organizational actors less as an opportunity to look for novel solutions than a reason for adopting a defensive posture. From the structuration perspective, how the event is interpreted depends on the prevailing rules of signification and legitimation and whether and how actors refer to them in their organizational or interorganizational practices. New entrants to the system, with potentially useful information and resources, may be viewed with suspicion or may be denied access altogether. Tight coupling may encourage strategies that are too coherent and in-bred, risking the organization’s survival in highly uncertain environments.

Research on interorganizational networks in industrial districts underscores the significance of loose coupling for sustaining the right mix of cooperation and competition among legally autonomous but functionally interdependent organizations (Harrison, 1994). District networks are said to succeed in turbulent environments to the extent that specialized

firms cooperate to find solutions to common problems but compete fiercely in areas where they have distinct competencies. The result of the right balance of autonomous and collaborative action is that such networks possess a "collective learning capacity" (Sabel, 1989) and an ability to innovate constantly (Lazerson, 1995). This is in contrast to calls for *more* collaboration in or with “TheFuture.org” (Miles et al., 2000) that one normally reads in the strategy literature on organizational innovation.

While tight coupling may support the development of a common identity and strategy, which can facilitate system governance, it may also jeopardize the system’s survival in uncertain environments. In his study of business networks in the Ruhr region in Germany, Grabher (1993) found that tight linkages, which were effective under conditions of relative stability, robbed firms of the capacity to respond adaptively to new market conditions. Glasmeier (1994) found a similar outcome in her study of tightly-coupled interfirm networks in the Jura region of Switzerland. The internal integration and relative autonomy of the networks produced a short-term orientation to industry survival and discouraged actors to develop long-term strategies and seek novel solutions. As a result, government programs of job creation tended to mirror the region’s existing skill base, rather than sensitize the actors to external signals. Strategy formulation was dominated by the larger core firms whose insistence on preserving the hierarchically organized production system made it difficult, at least initially, to internationalize production.

[Figure 2 about here]

Figure 2 summarizes the recursive relationships among the structural properties of adaptive capacity and the structuration processes of domination, signification, and legitimation. Through the reproduction of domination, actors may create adaptive capacity for the system in

which they operate (1)[3]. For example, managers may draw on the resources of specific personnel to link, loosely and in multiple ways, units of the organizational system. They may develop information systems to generate redundancy in these linkages, in order to reduce their dependence on particular individuals and resources. The learning outcomes of adaptive capacity may augment these resources and thereby increase opportunities for domination by actors most capable of using facilities effectively (2).

Actors draw not only on authoritative and allocative resources but also on rules of signification to assign meaning to multiplexity, redundancy, and loose coupling (4). Interpretations may either facilitate or restrict adaptive capacity, depending on actors' motivations and location in the organization, the organization's culture, and so on. Because signification occurs with reference to *existing* rules, interpretations are not arbitrary, but are guided by the structural properties of adaptive capacity (3). Multiplexity, for example, may lead to divergent interpretations, while loose coupling may limit the disruptive consequences of such divergence. Or, if successful, the properties of adaptive capacity may help to reproduce signification structures by reinforcing prevailing modes of communication.

Adaptive capacity also depends on the use of rules of legitimation to which agents refer via norms (5). In an attempt to justify the development of adaptive capacity managers may promote rules such as "it's okay to make mistakes" or "it's good to do the same things twice." At the same time, adaptive capacity may legitimize the reproduction of multiplexity, redundancy, and loose coupling, thus reinforcing prevailing norms of success (6).

Adaptive capacity generates intended outcomes not only through the reflexivity of agents who are capable of monitoring their actions as well as the conditions and outcomes of their actions, but also through any step taken towards the institutionalization of reflexivity, either at the level of the single organization or the network in which it may be embedded. Such institutional reflexivity not only supports reflexive action on the part of individual actors but

[3] The numbers in parentheses refer to the numbered arrows in Figure 2.

serves as a memory of and guide to collective action which aims at better understanding and managing these recursive processes. Ultimately, institutional reflexivity helps to balance adaptation and adaptive capacity in a more context-appropriate, sensitive, and comprehensive way than the reflexivity of individual actors can achieve.

The example of "parallel teams" in organizations (Staehle, 1991) serves to summarize, briefly, the recursive processes associated with creating and managing adaptive capacity. The redundancy, multiplexity, and loose coupling of parallel teams do not automatically support adaptive capacity. Team actors need to utilize the resources available to them, through facilities and in accordance with interpretive schemes and norms, in ways that lead to adaptable structures and processes. Parallel teams may be employed for all kinds of purposes, and may even be viewed as a strategy of "lean production", to enhance organizational efficiency rather than adaptability. If constant learning and versatility are the primary goals, then team structures need to reflect rules of signification and legitimation that are consistent with adaptive capacity. By enhancing organizational survival adaptable structures and processes may then also contribute, recursively, to the creation and legitimation of additional parallel teams and, thereby, further raise the adaptive capacity of the organizational system. An organization which tries to prepare itself for the unknown future should thus try to anchor its adaptive capacity enhancing use of parallel teams in the appropriate institutional structures and processes, instead of relying on individuals who merely understand the structures of adaptive capacity.

Conclusions

In this paper we explored three important structural properties of adaptive capacity and interpreted the challenges of managing these properties from the perspective of Giddens' theory of structuration and in the light of his more recent ideas on institutional reflexivity. We believe that managers can gain important insights from the analysis which collapses false distinctions between structure and process. Giddens' structuration theory suggests that multiplexity,

redundancy, and loose coupling do not create adaptive capacity automatically, but must be managed with respect to the signification, domination, and legitimation aspects of structural adaptability. The concept of institutional reflexivity suggests that single organizations as well as more complex networks of organizations can develop and institutionalize this capacity within their boundaries. The contribution of institutional reflexivity is to systematically guide and motivate organizational actors to question traditional practices with respect to their implications for enhancing or reducing adaptive capacity.

Implications for Theory and Research

The appropriate question to ask is not whether adaptive capacity is universally good or bad for organizational survival in turbulent environments, but rather, What level of adaptive capacity is optimal, and under what conditions does it have intended consequences? With respect to institutional reflexivity, the question is about the kind of institutions which enhance organizational reflexivity towards building and maintaining adaptive capacity. Unfortunately, the performance outcomes of adaptive capacity, with respect to its structural properties, institutionalization, and structuration processes, have so far attracted very little empirical attention. The few studies that do exist have addressed only particular facets of this concept (especially, organizational slack) and have yielded contradictory results (Greenley & Oktemgil, 1998).

This situation is similar to that in much of the research on context-structure relationships in organization design. Many studies test the fit between context and structure through correlation analysis, often using cross-sectional data, but do not measure directly the effect of context-structure relationships on organizational performance. It is, therefore, not clear whether observed relationships exist because they are indeed the most effective ones or because they are, for example, an institutionalized response. In the literature on innovation systems and interfirm networks, for example, successful relationships are normally thought to have a high degree of

multiplexity, redundancy, and loose coupling, but there is a tendency among researchers to select on the dependent variable by studying only successful systems. Without comparison cases of unsuccessful (inter-) organizational strategies and designs, it is premature to conclude that organizations and interorganizational networks with higher levels of adaptive capacity are more effective. And many investigators who claim that successful interorganizational networks are adaptable do not provide information on extraneous factors that should be controlled for, such as the local culture and institutional infrastructure in which the networks are embedded (Staber & Morrison, 2000).

There is also a tendency among investigators to measure the properties of adaptive capacity indirectly. Some researchers have used variables like organization size and age as proxies for multiplexity, redundancy, and loose coupling, but proxy indicators render the interpretation of the estimated effects difficult. For example, the tendency for an organization's survival chances to increase with organizational age has been interpreted by some as indicating that mature organizations have slack resources which, in turn, enhance survival (Sharfman et al., 1988). But not all mature organizations have resource slack or pursue a strategy of redundancy. Maturity can also correlate with debilitating factors such as internal conflict, external dependencies, and the like, which have the effect of reducing survival chances (Aldrich & Auster, 1986). Similar arguments can be made about the relationship between organization size and internal politics, and their effect on adaptive capacity. Large organizations may in fact have greater levels of multiplexity, redundancy, and loose coupling, but, unless supported by appropriate structuration processes, they may lead more to inertia than innovation and change.

There is a need for studies to measure directly the conditions under which adaptive capacity has intended consequences in turbulent environments. It may well be that in populations where most organizations adopt efficiency strategies and avoid risk-taking in times of stress, a few organizations for which risk-taking, experimentation, and redundancy-seeking behavior pays off perform quite well. When observed over the long term, and for a large sample

of firms, the emergent pattern would then probably show a shift in the composition of the organizational population, as the momentarily optimally adapted firms are replaced over time by adaptable firms. If this proposition finds empirical support, it would indicate a need for dynamic models that capture the tension between adaptation and adaptive capacity (Kurke, 1988). Such models would need to incorporate life cycle effects of the organizational system under investigation, as well as feedback effects among critical variables, to account for the endogenous relationships among the structural properties of adaptive capacity.

Several difficulties limit model building. First, because adaptive capacity is aimed at success in an unforeseeable future, it may be impossible to determine *ex ante* the optimal level of adaptive capacity. The trade-off between adaptation and adaptive capacity, to the extent there is one, may only be known *ex post facto.* Second, the problem of measuring the contribution of multiplexity, redundancy, and loose coupling to adaptive capacity is aggrevated by the fact that interrelationships are dynamic and recursive, and are difficult to capture with standard research tools. Third, there are probably also other structural properties, in addition to multiplexity, redundancy, and loose coupling, which contribute to adaptive capacity. For example, the literature on interorganizational networks often mentions trust as an important "lubricant" of organizational change and innovation (Lorenz, 1988; Sabel, 1993; Das & Teng, 1998; Sydow, 1998). How trust and other factors are related to multiplexity, redundancy, and loose coupling would need to be explored as well. We recognize that, while such model building would contribute significantly to theory development, it may also risk complicating the analysis beyond levels that managers find useful. But in the interest of empirical realism and rigour, such risks would seem to be worth taking.

Implications for Practice

While calls for higher levels of multiplexity, redundancy, and loose coupling may be theoretically meaningful, they may appear counterintuitive to managers who normally take an

instrumental and short-term oriented perspective. We suspect that most managers who are closely accountable to their shareholders will find it difficult to accept the possibility, and act upon it, that being well adapted to a particular set of demands can have disastrous consequences for the organization under different conditions.

One of the key questions for managers is what they can do to develop and maintain adaptive capacity in their organization. At first sight, organizing for adaptive capacity may be an intractable task. The design, management, and evaluation of adaptive capacity require at least some knowledge of future environmental states (Granovetter, 1979; Cohen & Levinthal, 1990). But no organization can be fully prepared for all possible contingencies, and one which is best prepared for those which are least likely to occur can hardly be said to have high adaptive capacity. Thus, if an organization spends vast sums of money and energy preparing for, say, a competitor takeover of its facilities which will most likely not happen, it pays the costs of this strategy now without ever reaping any benefits. The problem is that, in the absence of predictions of future problem-solving ability, it is difficult to determine what structural properties make organizations more or less adaptable.

Thus, it is not clear that managers can do much beyond providing a context within which the "right" level of adaptive capacity can evolve. Some would argue that structures and processes of social systems are emergent and in constant flux, depending on the volatility of external conditions. Giddens' (1984) structuration perspective acknowledges this fluidity and postulates that outcomes are determined neither by the actor nor the context, but emerge in the process of interaction in which the actor draws on structures of signification, domination, and legitimation. This view is consistent with a number of perspectives in organization theory, including organizational ecology, institutionalism, and political decision theory in so far as they suggest that organizational and interorganizational processes are not completely rational.

Despite these problems for management, there are a number of options available for developing adaptive capacity. Adaptive capacity may be obtained internally, for example, by

creating organizational structures that permit "aimless variations," that is, variations that are blind with respect to their consequences (Dawkins, 1986). Structures may also be created that permit “parallel” developments, experimentation, exploratory problem solving, and even mistake making (Staehle, 1991; Grabher, 1994). Externally, firms may align themselves, loosely, redundantly, and in multiple ways, with capable partners to create flexible networks. The pattern of such networks will probably vary across organizational systems, balancing change and control (Dore, 1986) and cooperation and competition (You & Wilkinson, 1994) in ways that reflect the specifics of existing political infrastructures, local traditions, and so forth. Such variations may be an important source of competitive advantage which efficiency-oriented adaptation strategies cannot produce. Recent developments in the new media industries (Grabher, 2001; Girard & Stark, 2001) suggest the potential of this approach. Last but not least, the general advice for managers is to reflexively review the structural properties of their organizations and interorganizational networks and develop the appropriate incentive structures, with respect to their potential contribution to building adaptive capacity. To strengthen the effect, incentive structures may be tied to recommendations which increase the institutional reflexivity and learning capacity of the organizational or interorganizational system.

While it may not be possible to determine *a priori* the optimal level of adaptive capacity and to manage that level strategically, a formal analysis of the structural properties of adaptive capacity, buttressed by empirical research, would at least raise managers' awareness of important variables and relationships. Beyond creating these structural properties, managers have to monitor reflexively how agents refer to them in their organizational and interorganizational practices, and thereby reproduce them as adaptive capacity enhancing structures. Measures aimed at institutionalizing reflexivity at the level of organizations and, if necessary, interorganizational networks may assist them in doing so.

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Table 1: Adaptation and Adaptive Capacity

Dimension or Construct	*Adaptation*	*Adaptive Capacity*
Environment		
future state	known or predictable	unknown
environment-organization relation	Reactive	interactive
Organization		
objectives	exploitation via best fit, avoiding slack	balancing exploration and exploitation, making use of slack resources, exploiting ambiguity
capabilities	given, incremental and path-dependent change	temporary or dynamic, potential rigidities are acknowledged
learning	single-loop learning	all kinds of learning, including double-loop and deutero learning
structures	lean	open
organization theories (examples)	contingency theory, institutional economics, resource dependence, population ecology, neo-instutionalism	some learning theories, new systems theory, structuration theory, complexity theory, evolutionary theory

Figure 1: Giddens' (1984) Structuration Framework

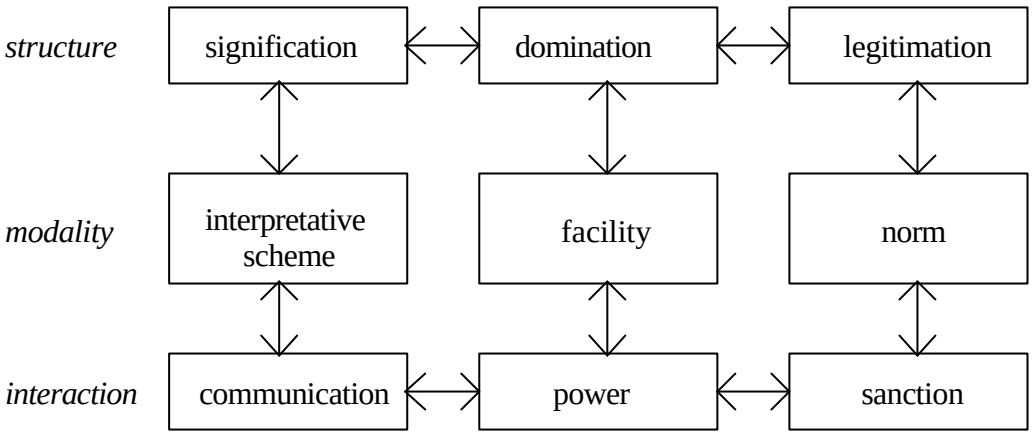

Figure 2: Recursive Relationships Between Adaptive Capacity and Structuration Processes