

STRATEGIC RENEWAL AS IMPROVISATION: RECONCILING THE TENSION BETWEEN EXPLORATION AND EXPLOITATION

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ABSTRACT

Management theory has paid scant attention to the nature and reconciliation of the tension between exploration and exploitation, in spite of its central importance to strategic renewal. This paper uses Hurst's (1995) ecocycle to frame the tension and employs complexity theory to examine how the tension manifests itself across levels and time. Improvisation is advanced as a process to reconcile and manage the tension between exploration and exploitation.

A decade ago Baum (1996, p. 106) issued a clarion call: "Now is the time to expand the boundaries of ecological and adaptationist perspectives to create a combined approach that sees the processes of adaptation and selection as complementary and interacting." The apparent contradictions between

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adaptation at the level of the firm through organization learning and adaptation at the level of population through environmental selection can be best understood and resolved by examining the individual and organizational forces that can encourage learning and change in a context where ecological forces constrain choice and foster organizational inertia. This conflict mirrors the tension within firms identified by [March \(1991\)](#) between exploration (learning and change) and exploitation (routine and repetition).

We employ an ecological perspective to understand the underlying tensions and then use research from the field of improvisation to examine how individuals and organizations can counter the ecological forces that manifest themselves in organization inertia. The chapter begins with a discussion of the tension between exploration and exploitation. It then presents [Hurst's \(1995\)](#) ecocycle as a means of framing the tension. We use the ecocycle to describe a natural or evolutionary process of adaptation. Complexity theory is employed to discipline the analogies between natural systems and human systems, to build on the ecocycle, and to explain how firms can become trapped in either exploration or exploitation modes at the expense of the other. Finally, improvisation is offered as an approach to suggest ways in which managers can break away from the natural tendencies of complex systems. The ecocycle and complexity theory serve to describe and explain how firms tend to operate, while improvisation takes a normative perspective to suggest how firms might operate. Our intent is to move from description, in the discussion of the ecocycle and complexity theory, to provocative prescription, in the discussion of improvisation. Implications for research and management are then presented.

EXPLORATION AND EXPLOITATION

[March \(1991, p. 71\)](#) succinctly described exploration, exploitation and the balance between the two.

Exploration includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation. Exploitation includes such things as refinement, choice, production, efficiency, selection, implementation, execution. Adaptive systems that engage in exploration to the exclusion of exploitation are likely to find that they suffer the costs of experimentation without gaining many of its benefits. They exhibit too many undeveloped new ideas and too little distinctive competence. Conversely, systems that engage in exploitation to the exclusion of exploration are likely to find themselves trapped in suboptimal stable equilibria.

Recognizing and managing the tension between exploration and exploitation is a “primary factor in system survival and prosperity” (March, 1991, p. 71) and one of the critical challenges of strategic renewal (Crossan, Lane, & White, 1999). This tension has been variously described as a tension between creation and maturity, flexibility and efficiency (Lant & Mezias, 1992), variation and selection (Ashby, 1960; Hannan & Freeman, 1987), feed-forward and feed-back (Crossan et al., 1999), inertia and stress (Huff, Huff, & Thomas, 1992) and mindful and less-mindful behavior (Levinthal & Rerup, 2005).

Although the exploration/exploitation tension and related concepts have long been identified, theorists often find themselves on different sides of a theoretical gulf or even in a debate, and have tended to polarize rather than synthesize the discussion (Levinthal & Rerup, 2005). As a result, there has been little in the way of research that addresses the nature of the tension and how it might be reconciled. As Weick (1998, p. 551) explains:

There is currently an abundance of conceptual dichotomies that tempt analysts to choose between things like control and innovation, exploitation and exploration, routine and non-routine, and automatic and controlled, when the issue in most organizations is one of proportion and simultaneity rather than choice.

Pfeffer (1982) identified three distinct perspectives of action that underpin different theoretical approaches, and tend to resist attempts at reconciliation (rational, constrained and emergent perspectives). The rational action perspective views action as purposive, intentionally or boundedly rational and prospective or goal-directed. The rational action perspective portrays managers as “knowing what to do, and free to act.” This is the central tenet of contingency theory (Lawrence & Lorsch, 1967): firms’ challenges are analyzable and managers can act to meet them. In contrast, the constrained action perspective views action as both internally and externally constrained or situationally determined. The best known expressions of this view are resource dependence theory (Pfeffer & Salancik, 1978) and population ecology (Hannan & Freeman, 1977). The constrained action perspective portrays managers as “knowing what to do, but not free to act.” Finally, the emergent action perspective portrays action as an unfolding process (March & Olsen, 1976) in an undecipherable environment. Actors are cognitively constrained and rationality is constructed after the fact in a process of retrospective sense making (Weick, 1979) or post hoc rationalization. The emergent action perspective portrays managers as “free to act, but not knowing what to do.”

When applied to the field of strategy the different perspectives of action can be seen to manifest themselves in the 10 schools of strategy identified by Mintzberg (1990), of which three have dominated the strategy literature (design school, planning school, positioning school). Mintzberg (1994, p. 2) describes the three dominant schools as follows:

... the “design school” considers strategy making as an informal process of conception, typically in a leader’s conscious mind. The design school model, sometimes called SWOT also underlies the second, which I call the “planning school” and which accepts the premises of the former, save two – that the process be informal and the chief executive be the key actor ... The third, which I call the “positioning school,” focuses on the content of strategies more than on the processes by which they are prescribed to be made.

Underpinning these three dominant schools is a rational perspective of strategy: a goal-oriented, instrumental rationality that reflects the origins of the concept in theories of industrial organization and neoclassical microeconomics. Six schools (cognitive, entrepreneurial, learning, political, cultural, and environmental) rely primarily on the constrained and emergent perspectives. Although they have received some attention, these schools remain largely disconnected from the mainstream discussion of strategy. Mintzberg, Ahlstrand, and Lampel (1998, p. 302) suggest that a tenth school, the configuration school, “differs from all the others in one fundamental respect: it offers the possibility of reconciliation, one way to integrate the messages of the other schools.” They highlight Hurst’s organizational ecocycle as a framework in the configuration school with potential to integrate the other schools.

We selected Hurst’s framework not only because of this integrative capacity, but also because it can incorporate Pfeffer’s three perspectives on management action, while framing the tension between exploration and exploitation. It is not our intent to compare and contrast Hurst’s framework with Mintzberg’s 10 schools. Rather, since the framework draws heavily on all of the schools, we will briefly present the framework and show how it serves to integrate and extend the discussion into the arena of improvisation.

ORGANIZATIONS AS ECOSYSTEMS – CONNECTING THE PERSPECTIVES

Hurst (1995) suggests that Pfeffer’s three perspectives are analogous to the phases of ecological succession to be found in the development of natural ecosystems (Holling, 1986; Gunderson & Holling, 2002) and that they can

be connected via a well-defined process: the organizational ecocycle (Hurst & Zimmerman, 1994). Forests and other natural ecosystems are dynamically stable entities. While their elements live and die, forests survive through continual cycles of creation, growth, destruction, and renewal. This pattern is called an *ecocycle* to distinguish it from the more familiar *life cycle* (Greiner, 1972; Kimberly & Miles, 1980) that applies to individual organisms. A life cycle is generally depicted as an S-shaped, or logistics curve; ecocycle consists of two such curves arranged to form an infinite loop, as shown in Fig. 1.

The ecocycle is consistent with the weak selection hypothesis (Singh, 2006) in which both adaptive learning within the organization and selection mechanisms at higher levels (population, community) interact to shape the evolution of organizations. Indeed, we can expect to find the ecocycle dynamic present at every level where whole systems are being studied. It has been suggested, for example, that whereas individual organizations excel at the exploitation of their environment, much exploration takes place at the population level (Levinthal & March, 1993; March, 1999) and there is empirical support for this view (Baum & Ingram, 1998; Baum, Li, & Usher,

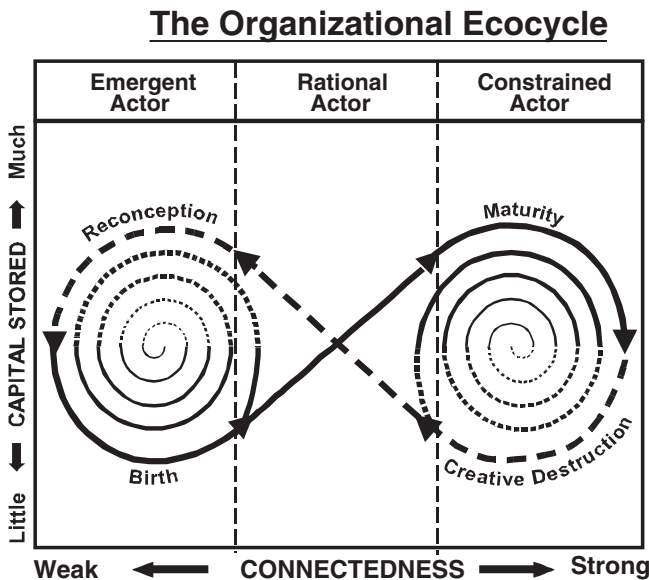


Fig. 1. The Organizational Ecocycle.

2000; Greve & Rao, 2006). Thus, it seems likely that the roles of exploration and exploitation will never be reconciled without looking at multiple levels of analysis simultaneously (Singh, 2006). In this discussion of the ecocycle we begin at the systems level before going on to discuss its application to single organizations. It should be clear throughout this section, however, that individual organizations cannot be located unequivocally at any single level of analysis. Some business firms – diversified, multi-product companies for example – have characteristics of both a single organization and a population.

Seen as a stylized, two-dimensional representation of a system's trajectory in a multi-dimensional phase space, the ecocycle's dimensions and the amplitude of its trajectories are the subject of debate (Ulanowicz, 1997). Nonetheless, the ecocycle concept is helpful in that its descriptive power makes it simple enough to be grasped while being complex enough to capture and use some of the key paradoxical elements (Poole & Van de Ven, 1989) encountered in the study of complex systems.

The front loop (solid line) is the familiar, conventional life cycle. In human organizations it tracks the growth of a technical system (Emery & Trist, 1973) from birth through maturation to decline and crisis. The back loop (dotted line) of the ecocycle is the less familiar, renewal cycle of creative destruction and reconception that only higher-level systems can follow. It begins in the confused aftermath of a crisis. The constraints (both internal and external) that bind the system are shattered and the large hierarchical structures (trees in the case of the forest) that monopolize resources are fragmented. It ends with the creation of new contexts (fertile soil) with accessible resources (nutrients, water, sun) in which new, small-scale organisms (weeds, seedlings) can flourish, setting the stage for another cycle of birth and growth. In human organizations the back loop can be seen as the development trajectory of a social system as it evolves from a group of scattered individuals into a community. The spirals on either side of the ecocycle will be discussed in the following sections.

There are several analogies between the development paths of natural and human ecosystems.

(a) New growth, for example, emerges on the edges of each system and in open patches within it. In these places there is equal access to resources (which are relatively plentiful) and, initially, little competition. A wide variety of young, small-scale organisms – entrepreneurs in human ecosystems – can co-exist. In the open patch, anything grows – ecologists call these organisms “r-strategists” (MacArthur & Wilson, 1967) after *r*, the growth

factor in the logistics equation. This entrepreneurial phase is characterized by trial-and-error learning with much experimentation and vicarious learning in an environment that is impossible to analyze. The dot-com boom of the late 1990s can be seen as an outbreak of “weeds” in the Western corporate ecology, with hundreds of small-scale organisms being showered with resources for which there was little competition. All that entrepreneurs had to do was to produce a business plan; although very few of their fanciful business models proved to be viable as the unknowable future unfolded. Such entrepreneurial action can be classified as pre-rational or emergent. [Burgelman \(1983, 2002\)](#) describes its corporate-level counterpart as autonomous strategy.

(b) Over time, as the patches become crowded, classical Darwinian competition for resources breaks out. Organisms have either to specialize or to dominate as generalists. The more efficient users of these resources survive while many disappear. In environments that do not favor specialists, the overall variety of organisms in the ecosystem declines. In natural systems the mid-point of this stage is signalled by the appearance of a so-called “climax species” that outcompetes all others. In technical systems the process is catalyzed by the emergence of a “dominant design” at the inflexion point of the curve, which signals a change from product innovation to process innovation ([Utterback, 1994](#)).

As structural inertia theory ([Hannan & Freeman, 1984](#)) suggests, for human organizations to survive into this phase, high reliability of performance and high levels of accountability will be required. This is achieved by institutionalization of organizational purposes (which by now are well understood) and the standardization of routines: strategy that was previously autonomous is now deliberately induced ([Burgelman, 1983, 2002](#)). Survivors of the dot-com bust of the early 2000s were companies like Amazon, E-Bay, Google and Yahoo, firms that had developed clear, tested strategies and had invested in the infrastructure and networks necessary to garner resources in a competitive environment. This survival requirement, however, as [Hannan and Freeman \(1984\)](#) point out, is a double-edged sword, with the inertia that accompanies it creating internal constraints on the organization’s capacity to change in the future.

(c) Eventually, growth slows and the patch becomes mature. Organisms become constrained internally as more and more resources are bound up and integrated within the large-scale organizations that now dominate the ecosystem. The carrying capacity (K) of the ecospace has been reached, hence the description by ecologists of organisms in this phase of the cycle as K-strategists ([MacArthur & Wilson, 1967](#)). Now few resources may be

available for new growth: in natural systems the stage is set for a destructive release of resources from the hierarchical structures that bind them.

In human systems this is a period of slower expansion as economies of scale (if any) are achieved, markets become saturated, and the structure of the industry becomes settled. Products that were once considered unique may by now have become generic. Firms and their managers are now constrained by a large scale, tightly connected network of structures, systems, and technology, all of which they have introduced over time to embed the original value-creating process (Foster & Kaplan, 2001). In the new contexts created by changing environments, these structures, processes, and embedded technologies, once considered strengths, may become weaknesses, hampering the efforts of the firm to change (Christensen, 1997). With opportunities for internal organizational adaptation constrained, selection by the environment takes over: organizations in this constrained phase may be vulnerable to sudden changes in the social, political, and technical contexts in which they operate. The well-documented woes of the “Big Three” automobile manufacturers and their suppliers, the so-called “legacy” airlines and many integrated steel mills are illustrative of the daunting challenges that companies and their managers can face in this phase of the ecocycle. The resources they control are being released back into the environment as they abandon products and markets, shutter plants, downsize their workforces and cycle through bankruptcy proceedings.

In these examples, descriptions (a) and (c) are examples of emergent and constrained behaviors encountered in both natural and human ecosystems. Natural systems display only these two phases. In human ecosystems, however, a transitional phase exists between emergence and constraint. It is characterized by increasing rationality – the ability to associate cause with effect and to measure and calculate – while actors retain their ability to act. It is precisely this capacity for participants to think, act and learn that allows intelligent systems to suspend the natural tendency of all complex systems to run to ruin. From an evolutionary perspective Lamarckian inheritance processes trump Darwinian selection mechanisms in this phase of an intelligent system’s development.

Although exploration and exploitation have been presented as separate loops in the ecocycle, both activities occur simultaneously as described below. Indeed a healthy ecosystem will consist of patches containing varying mixes of both activities. Depending upon the relative scales of the system and its observers, this mix of activities may be difficult to spot. Most forests, for example, look darkish green (indicative of the late exploitation phase)

because the destructive precursors to the exploration phase (fire in the case of many forests) work at much finer scales in space and time than the growth processes on the front loop of the ecocycle. This is another example of how exploitation and exploration may function at different levels of analysis.

In the section that follows we use complexity theory to tighten our comparative “mapping” between natural and human systems and to preserve the principle of systematicity, whereby higher order relations (i.e. relations between relations) are preserved while lower order relations are dropped (Tsoukas, 1991).

THE MANAGERIAL CHALLENGE – SEARCHING FOR THE “SWEET SPOT”

Ecosystems can be viewed as complex adaptive systems (CAS) the generic properties of which may be studied under the rubric of complexity theory (Waldrop, 1992). Composed of interacting agents that exhibit emergence and self-organization, CAS are open, dynamic, so-called dissipative systems (Prigogine & Stengers, 1984) that function most adaptively on the boundary between order and disorder, known as the *edge of chaos* (Kauffman, 1995). The use of complexity theory in management (e.g. Stacey, 1991, 1992; *Organization Science*, 1999) represents researchers’ most recent attempt to introduce an explicit systems approach to the study of organizations (*Academy of Management Journal*, 1972; Ashmos & Huber, 1987). Complexity theory stresses the turbulent and unpredictable nature of environments that require organizational flexibility, resilience, and the capacity to both explore and exploit (Crossan, Lane, White, & Klus, 1996). Brown and Eisenhardt (1997, 1998) used it to describe the concept of competing on the edge of chaos, and as a theoretical starting point to suggest that organizational change can arise when “order springs from chaos” (1998, p. 14).

The ecocycle, as a pattern that represents the trajectory of an ecosystem in dynamic equilibrium, may represent what is known in complexity theory as a chaotic or strange attractor. In dynamic systems, attractors are the patterns of a system’s trajectories that seem to act as basins to which the system continually returns, although never in a predictable way. The Lorenz attractor (Lorenz, 1963), one of the best known, has a distinctive “butterfly” shape not dissimilar to that of the ecocycle. As organizations traverse the ecocycle’s double loop, they can become trapped in spirals at either the exploration or exploitation ends of the loop (see Fig. 1).

The management literature supports our claim that organizations are attracted to either exploration or exploitation. Ghemawat and Costa (1993) analyzed the tension between static and dynamic efficiency and found a tendency toward the extremes. Miller and Friesen (1980, 1982) found the same polarization, describing it in terms of the momentum of entrepreneurial and conservative firms. They observed within entrepreneurial (exploration-oriented) firms and conservative (exploitation-oriented) firms that past practices, trends and strategies tend to keep evolving in the same direction, perhaps eventually reaching dysfunctional extremes. They built on this notion to propose innovation strategies for each type of firm, suggesting that the challenges each faces are quite different. This is consistent with the ecocycle model; moving from exploration to exploitation is different than moving from exploitation to exploration.

Levinthal and March (1993, p. 105) describe the repercussions of getting locked into either loop of the ecocycle:

An organization that engages exclusively in exploration will ordinarily suffer from the fact that it never gains the returns of its knowledge. An organization that engages exclusively in exploitation will ordinarily suffer from obsolescence. The basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability. Survival requires a balance, and the precise mix of exploitation and exploration that is optimal is hard to specify.

If managers are to avoid being trapped in either of the two spirals in the ecocycle they have to find a way to have the organization “dwell” in the central “Rational Actor” phase of the cycle. When they reach the stage where strategy is induced rather than autonomous and the requirements for organizational reproducibility have been met, they will naturally want to exploit their ecological niche using their newly developed core competencies. If this is all they do, however, sooner or later (every industry and technology has its own scale and tempo) (Brown & Eisenhardt, 1998), they will be swept into the right-hand spiral, from which escape is extremely difficult. They will need to preempt this process by “tacking” against the prevailing exploitation “wind” to explore. Such an “ambidextrous” organization (Tushman & O’Reilly, 1997) would be able to loiter profitably in what might be thought of as the organization’s “sweet spot,” that elusive epiphany in space and time where minimal effort produces maximal result. Here the single organization can take on some of the protean survival attributes of a polymorphic system rather than remain a specialized entity within such a system: it can become more like a “forest” and rather less like a “tree.” Such an organization would have architectures that uses tight and loose coupling

simultaneously – units are tight-coupled internally but loose-coupled with other sub-units within the same organization (Benner & Tushman, 2003). This suggests that organizations can be capable of taking on a fractal dimension (Mandelbrot, 1983) between specialism and generalism. The trajectory of such an organization is illustrated in Fig. 2.

The oscillation between different organizational forms on the part of managers has been observed empirically but, absent changes in environmental conditions to which they are adjusting, it has usually been seen as indecisive vacillation rather than intelligent adaptation. Nickerson and Zenger (2002) suggest, however, that the challenge for managers is that their choices of formal structure do not define an organization’s actual functionality, which is reflected by the informal structure. Using Tichy and Fombrum’s (1979) metaphor they describe formal structure as comprising the “pegs” on which the emergent network of the informal structure hangs. The work of Siggelkow and Levinthal (2005) shows how under certain conditions different “pegs” (organizational structures) may result in different competency traps or sticking points. Under such circumstances

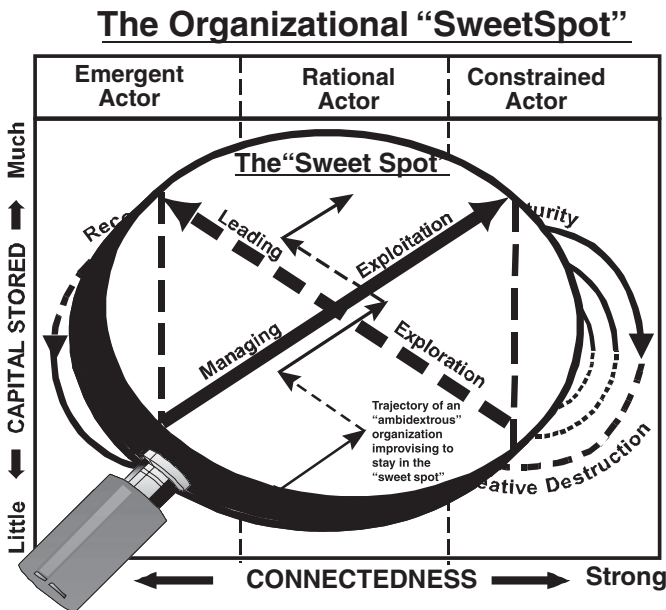


Fig. 2. The Organizational “Sweet Spot.”

a sequence of different organizational structures may be beneficial to the organization's performance.

Strictly speaking the "tacking" trajectory in Fig. 2 implies a sequential approach to exploration and exploitation, rather than the simultaneous approach usually associated with improvisation. Like many apparent contradictions, however, this one is easily resolved by specifying the scale at which the dynamic is being observed – a rapid, fine-grained oscillation between exploration and exploitation, for example, would appear to many observers to be simultaneous rather than sequential. Changes in the organization's formal structure, the "pegs", on the other hand, are discrete moves and may have significant costs associated with them. One of the advantages of improvisation is that it can be used as a fine-grained tool to operate on the informal organization directly, pre-figuring any more formal change activities and enhancing their effectiveness once such changes have been made.

IMPROVISATION

The foregoing discussion serves to describe the tension between the processes of exploration and exploitation using Hurst's ecocycle. Some theorists have responded to this tension by advocating a contingent approach that argues for alignment between the organization, strategy and environment along the lines of mechanistic organizations focusing on exploitation in mature and stable environments or organic organizations (Burns & Stalker, 1961) favoring exploration in more dynamic environments (Rowley, Behrens, & Krackhardt, 2000). Others have suggested "ambidextrous" organizations (Tushman & O'Reilly, 1997) to manage the tension. In contrast, we introduce improvisation as a more fine-grained approach that captures the simultaneous application of exploration and exploitation. While there is a contingent nature to the effectiveness of improvisation it needs to be understood at a finer-grained level than its alignment with stable or dynamic environments, as discussed in more detail below.

With the managerial challenge framed by the ecocycle, we can delve more deeply into the co-existence of exploitation and exploration. As Crossan (1998) points out, improvisation is more than a metaphor; it is both a perspective and a technique that has direct applications in the field of management. In this section we will develop the theoretical links and create a bridge from theory to practice.

Improvisation theory has drawn heavily from the study of jazz and theater improvisation to examine a process that has been variously described as

imagination guiding action in an unplanned way (Chase, 1988), the ability to make do with available resources (Weick, 1993a), intuition that incorporates creation and execution at the same time (Solomon, 1986), and the convergence of composition and execution (Moorman & Miner, 1998a). According to Weick (1998, p. 551) improvisation acknowledges the simultaneous presence of a variety of concepts, including exploration and exploitation that have been treated as dichotomies.

Improvisation is a mixture of the pre-composed and the spontaneous, just as organizational action mixes together some proportion of control with innovation, exploitation with exploration, routine with non-routine, automatic with controlled. The normally useful concepts of routine ... and innovation ... have become less powerful as they have been stretched informally to include improvisation. Thus a routine becomes something both repetitious and novel, and the same is true for innovation. A similar loss of precision ... has occurred in the case of decision making where presumptions of classical rationality are increasingly altered to incorporate tendencies toward spontaneous revision. Neither decisions nor rationality can be recognized in the resulting hodge podge. What is common among all of these instances of lost precision is that they attempt to acknowledge the existence of improvisation, but do so without giving up the prior commitment to stability and order in the form of habit, repetition, automatic thinking, rational constraints, formalization, culture, and standardization.

It is this inherent quality of the simultaneous treatment of exploration and exploitation that is of particular interest as it provides a unique perspective on how these processes can be managed. In pursuit of applying improvisation to understanding organization structure (Hatch, 1998a, 1998b), organization memory (Moorman & Miner, 1997), new product development (Moorman & Miner, 1998b), change management (Orlikowski & Hofman, 1997), organizational redesign (Weick, 1993b), organizational analysis (1998), strategy (Perry, 1991, 1994; Crossan et al., 1996), and organizational learning (Crossan & Sorrenti, 1997) improvisation theory has become much more refined. One critical aspect of the developing theory has been the parsing of its descriptive and prescriptive elements.

Drawing heavily from jazz and theater improvisation where performance has essentially been built into the phenomenon, researchers have largely observed “effective” improvisation. As a result, improvisation theory has tended to blend descriptive and prescriptive elements. In response, Vera and Crossan (2005, p. 205) parsed the descriptive and prescriptive elements of improvisation defining improvisation as the “creative and spontaneous process of trying to achieve an objective in a new way.”¹ They propose five factors that impact the effectiveness of improvisation: expertise, teamwork skills, experimental culture, real-time information and communication and memory.

Improvisation is an activity that takes place on the edge of chaos, on the constraint curves that bound every CAS. Improvisation never takes place in a vacuum: it takes place in a context that comprises both discipline (exploitation) and freedom (exploration). But it is a constrained freedom. Improvisation can be more appropriately characterized as a process through which dichotomies or paradoxes are vetted in action. Through improvisation the apparent paradox between exploration and exploitation is resolved. Routines and prior knowledge (exploitation) are ingredients or inputs to improvisation (Weick, 1998) that are blended in a creative and spontaneous process to produce novel outcomes (exploration). It is a process, which by its nature is able to accommodate the ambiguity, complexity and diversity of inputs.

It is not our intent to cover the domain of improvisation theory, but rather to focus on three areas of particular interest: (1) the meaning of spontaneity; (2) the manifestation of improvisation across levels of the organization; and (3) the challenges associated with improvisation.

Spontaneity

Theorists have suggested that what sets improvisation apart from processes of creativity and innovation is the dimension of spontaneity. Although this dimension has attracted interest for its application to situations where there is no time to plan (e.g. crisis situations) or where the future is so uncertain that planning may be of little value, the implications of spontaneity have wider application. While spontaneity is not a well-understood theoretical construct, it is anchored in one that has deep roots and along with it, much complexity – the study of time. Crossan, Cunha, Vera, and Cunha (2005) delve into the relationship between time and improvisation and demonstrate how improvisation can be used to resolve two major time dichotomies associated with organizational phenomena: clock versus event time and linear versus cyclical time.

It is these potentially conflicting time perspectives that underpin much of the discussion about exploration and exploitation. For example, routines and the notion of path dependency in which “history matters” is anchored in a linear concept of time in which the past weighs heavily on the future. Indeed, Garud and Karnoe (2001) offer “path creation” as a contrasting perspective to path dependency in which “entrepreneurs meaningfully navigate a flow of events even as they constitute them” (p. 2). Many of the concepts they touch on – time, bricolage, and mindfulness – are important

elements of improvisation and Garud and Karnoe certainly acknowledge improvisation as “a way of navigating and shaping emerging processes” (p. 24). Essentially, improvisation is the theoretical frame that can be employed to both understand and manage the tension between exploration and exploitation. As Crossan et al. (2005, p. 129) suggest: “through the effective use of improvisation processes, individuals and groups in organizations cope with, and coordinate the conflicting demands of the co-existing time perspectives.”

The spontaneous aspect of improvisation emphasizes the “in the present” orientation of the process. It is a process that blends the past, present and future simultaneously. As Crossan et al. (2005, p. 140) note: “the improvisational process enables individuals and groups to draw on their potential capacity to access the past (without intending to repeat or replicate it) and to enhance and enrich action through a future-oriented vision and a unique collective experience of the present. This is seen in jazz improvisation: group members bring a rich repertoire of musical skill and memory and seek to enhance it through the collective experience of composing and playing in the moment.” Perhaps even more provocative is Tulku’s (1980, p. 37) hint at the possibility of an increased level of “knowingness” when we can “contract more of the space and time that are available in each apparently fixed and limited interval of ordinary time.”

Improvisation Across Levels

A powerful aspect of improvisation theory is that it spans levels of the organization. This is perhaps seen most heavily in the training that underpins theater improvisation. Training at the individual level involves several key areas: being able to simultaneously rely on and break out of existing cognitive structures; being in the present, and being better prepared to risk the 4Cs – the desire to be consistent, comfortable, competent and confident (Claxton, 1984). It is important to note that effective improvisation requires a solid base of technical skills and experience in the domain in which it is employed (Crossan, 1998; Hatch, 1998b; Weick, 1998), often referred to as expertise.

At the group level, there is a focus on listening and communication with a particular emphasis on what improvisers call “yes anding,” which means building on the ideas of others rather than blocking those ideas. Although it was the apparent lack of organization level constructs or artifacts that initially attracted researchers to improvisation, researchers quickly discovered

this was not the case. In particular, there are important organization culture elements that support the risk-taking at the individual level, and collaboration at the group level. Effective improvisation appears to operate with a minimal set of constraints that center on process including being in the present, yes anding, and never leaving a fellow actor hanging. [Table 1](#) provides a summary of the characteristics of improvisation across levels as identified in prior research.

It is this spanning of levels that provides the connective tissue between the individual and organization, providing a fine-grained view of how the organization impacts individuals and groups (exploitation) and how individuals and groups can affect what becomes institutionalized at the organization level (exploration).

To recap: Hurst's ecocycle serves to frame the tension between exploration and exploitation, and improvisation serves to reconcile or resolve it. We view the management of constraints as being a critical aspect of managing the exploration/exploitation tension. Through improvisation, constraints are discovered and vetted. Improvisation itself has a minimal set of constraints, yet there are challenges in managing improvisation. By examining the challenges associated with improvisation we are able to see more clearly the challenges associated with reconciling exploration and exploitation and hence strategic renewal and the conditions under which improvisation is more or less effective.

Challenges to Improvisation and Renewal

We propose four significant challenges associated with improvisation: (1) employing improvisation in high velocity and turbulent environments; (2) identifying and managing the tolerance for error; (3) developing individual and group improvisational skill; and (4) managing memory, since memory both aids and impedes improvisation. We discuss each of these challenges below.

High Velocity Environments

[Brown and Eisenhardt \(1997, 1998\)](#) see improvisation as ideally suited to high velocity environments. [Crossan and Sorrenti \(1997\)](#) suggest that improvisation is characterized by a high degree of spontaneity – it is by definition a flexible and responsive approach to deal with a rapidly changing environment. However, [Weick \(1998\)](#) notes that under pressure of time, individuals tend to revert to familiar and comfortable patterns of action.

Table 1. Characteristics of Improvisation.

Individual	<p>Willingness to forego planning and rehearsing in favour of acting in real time^b</p> <p>Well-developed understanding of internal resources and the materials at hand^a</p> <p>Proficient without blueprints and diagnosis^a</p> <p>Ability to identify minimal structures for embellishing^a</p> <p>Predisposed to recognize partial relevance of previous experience to present novelty^a</p> <p>High confidence to deal with nonroutine events^a</p> <p>Skilful at paying attention to performance of others^{a,b}</p> <p>Preference for and comfort with process rather than structure, which makes it easier to work with ongoing development, restructuring, and realization of outcomes, and easier to postpone the question, what will it amount to?^a</p> <p>Willingness to risk the “4 Cs” – the desire to be consistent, comfortable, confident and competent^b</p> <p>Solid base of technical skill^{a,b,c,d}</p> <p>Individuals take the lead at different times^{b,c}</p>
Group	<p>Ability to agree on minimal structures for embellishing^a</p> <p>Presents of associates similarly committed to and competent at impromptu making do^{a,b}</p> <p>Skilful at building on performance of others to keep the interaction going and to set up interesting possibilities for one another^{a,b,a}</p> <p>Ability to maintain the pace and tempo at which others are extemporizing^a</p> <p>Focused on coordination here and now and not distracted by memories or anticipation^{a,b}</p>
Organization	<p>Rich and meaningful set of themes, fragments, or phrases on which to draw for ongoing lines of action^{a,d}</p> <p>Common goal^b</p> <p>Tolerance for error within organization – especially reward systems^b</p> <p>Culture of friendship vs. professionalism^b</p> <p>Emotional tension and release^c</p> <p>Real-time information flows^d</p>
Organization-Environment	<p>Communion among players and audience members^c</p> <p>Customer has a tolerance for error^b</p> <p>Environmental turbulence and unpredictability requires improvisational capability^{b,d}</p> <p>Need to be open to cues from the environment^b</p>

^aWeick, 1998.^bCrossan et al., 1996.^cCrossan and Sorrenti, 1997; Hatch, 1998b.^dMoorman and Miner, 1997, 1998.

Therefore, while high velocity and turbulent environments may be ideally suited to improvisation, improvisational action may be constrained by psychological tendencies to rely on familiar routines. To understand why individuals may choose (or choose not) to improvise, it is necessary to examine the other key challenges of improvisation.

Tolerance for Error

To remain on the edge of chaos is to manage the tension between exploration and exploitation. We suggest that one of the primary management tasks is to manage the tolerance for error. Improvisation requires a tolerance for error because error is inherent in the process it comprises: experimentation, innovation and exploration. The challenge for organizations is to assess when and where they can tolerate error (explore) and when and where they must produce and perform (exploit), perhaps flawlessly. For example, Crossan et al. (1996) point out that there is no tolerance for error when a jet takes off, but there is ample tolerance for error in flight simulators.

Crossan and Sorrenti (1997) point out that the environment poses constraints on improvisation. These constraints relate directly to tolerance for error. While these constraints may appear fixed, we argue that they are often negotiable. Creating room for improvisation requires negotiating the constraints and therefore the tolerance for error. For example, organizational constraints, such as compensation systems may create a low tolerance for error if individuals are punished for making mistakes. In contrast, as Trethewey and McDougal (1998, p. 65) describe “when a new product at Owens Corning fails, no one gets fired. The company celebrates the failure by throwing a party and giving each team member a savings bond.” The well-known story of the “failed” glue that transformed into the “Post-it note” shows how 3M manages its tolerance for error by minimizing the constraints that restrict the ability of individuals to improvise.

While there is much to be managed internally, one of the major constraints on tolerance for error lies externally with the customer. In the arenas of jazz or theater, where improvisation was first studied, customers or audiences expect that, while there will be moments of genius in composition, there will also be many less-than-flawless performances. This kind of error tolerance is not as prevalent when the same customers attend more traditional productions and concerts, which are designed to perform as flawlessly as possible, that is, to exploit.

In the management arena, there is a need to negotiate with the customer to ensure that exploitation requirements do not drive out exploration requirements. A tangible example of this is in the area of “quality.” Where

quality was once defined more narrowly around product specifications, the definition has been adapted to incorporate areas such as innovation, thereby providing greater flexibility in action (Sobek, Ward, & Liker, 1999). Learning from failure not only occurs within an organization, but also across organizations. However, Greve and Rao caution that “when managers avoid strategies that are associated with the failure of other organizations or strategies that other organizations have withdrawn from, they forfeit opportunities to tinker with those strategies” (Rao, p. 23, 2006).

Developing Individual and Group Improvisational Skills

Tolerance for error manifests itself at both the individual and group levels. Improvisation requires risking what Claxton (1984) referred to as the four Cs: the desire to be consistent, comfortable, competent and confident. In rapidly changing and unpredictable environments, individuals are drawn out of their comfort and competence zones. Given the strong psychological tendency to try and preserve these comfort zones, one of the key challenges of improvisation is to develop the individual and team skills to risk the four Cs.

Research on improvisation in music and theater suggests individual and group techniques to develop improvisational skill. At the individual level, improvisation training teaches individuals to access creative thinking and silence overly analytical orientations (emphasize exploration over exploitation) by carrying out contradictory actions (Crossan et al., 1996). The tendency to rely on the familiar is actively managed by purposefully avoiding familiar patterns.

Individuals will only be willing to escape familiar patterns if they are prepared to take some psychological risk. While the organizational tolerance for error will impact this willingness, individuals must also possess a comfort level with making mistakes. Improvisers call this “developing the psychological risk muscle.” In addition, this willingness also depends on the group’s willingness to engage improvisation. Key to improvisation is building on the offers of others through a process called “yes-anding.” Actors are trained to be open to the “offers” or opportunities presented by their fellow actors, and by members of the audience.

The importance of the individual and group process to improvise, and in particular to break out of familiar patterns, is heightened when the role of memory in improvisation is examined.

Memory

Mezias and Glynn (1993), drawing on the work of Cohen and Levinthal (1990) and Damanpour (1991), suggest that “organizations with more

expansive knowledge bases are better able to take advantage of opportunistic search and the serendipitous discoveries it may yield” (p. 94). While this may be true, improvisation reveals a paradox or tension associated with the role of memory.

Just as improvisation builds on memory or structure, it also works to escape it in order to innovate and renew. In their study of new product development [Moorman and Miner \(1998b\)](#) investigated the incidence and effectiveness of improvisation. They found improvisation to be prevalent and to occur when organizational memory is low but environmental turbulence high. They also found that when organizational memory is low, improvisation has a negative effect on design effectiveness, cost efficiency and time efficiency. When organizational memory is high, however, improvisation has a positive effect on the same outcomes. They suggest that memory may be an impediment to improvisational activity, but may facilitate its effectiveness.

Low memory may be associated with young organizations that have little institutional history and with organizations that fail to institutionalize learning ([Crossan et al., 1999](#)). [Sorensen and Stuart \(2000\)](#) contend that growth and age lead to increasing amounts of innovation of decreasing relevance to external issues. Young firms produce fewer innovations, but are far more likely to be working on relevant external issues than their older counterparts. In the case of young firms, memory does not impede improvisation and its associated innovation. However, as discussed previously, young firms are more likely to be trapped in the innovative exploration loop.

It appears that memory may create a selective perception and reliance on familiar ways that impedes seeing things in new and different ways. [Barr, Stimpert, and Huff \(1992\)](#) nevertheless propose that “organizational renewal requires managers to change their mental models in response to environmental changes and that delays in this process will be associated with decline” (p. 16). Improvisation reconciles the tension between reliance on memory and escape from it through a process that acknowledges expertise but, as discussed previously, attempts to ensure that the expertise does not drive out innovation. Nevertheless, improvisation varies in degree based on the extent to which it relies on current thinking. In this regard [Weick \(1998\)](#) cites [Konitz](#) to suggest a continuum that ranges from interpretation, through embellishment and variation ending in improvisation.

In summary, improvisation is a process structured in a way that enables individuals and organizations to discover and manage constraints that, we claim, are critical to managing the exploration/exploitation tension. The improvisation process has its own restrictive and enabling constraints,

apparent in the efficacy of memory, the demands of high-velocity environments, the level of tolerance for error, and the development of individual and group improvisational skills. While several management processes encompass aspects of improvisation, we are aware of no process as comprehensive or essential to our understanding of how the tensions between exploration and exploitation are managed.

IMPLICATIONS FOR RESEARCH AND MANAGEMENT

The perspective offered in this paper suggests several key points. Exploration and exploitation do not represent a dichotomy. A more relevant analysis emphasizes their concurrent existence and their relative proportions (Weick, 1998). The exploration and exploitation loops are attractors and to avoid getting locked into a dysfunctional spiral, organizations need to actively manage both processes. Strategic management over-emphasizes the process of exploitation and fails to address how firms manage the tension between exploration and exploitation. The concept of the ecocycle aptly frames this tension, and the concept of improvisation provides an approach to manage it.

While researchers have not looked at mechanisms to manage the exploration/exploitation tension, managers have tended to resolve the tension using an approach similar to that of researchers: the separation of exploration and exploitation in time and space. On a functional basis, exploration has often been reserved for research and development, with exploitation being the domain of manufacturing. However, innovative Japanese manufacturers demonstrated the pitfalls of this false dichotomy (Womack & Jones, 1996). Firms have also tended to set up different organizational structures and systems to deal with the two as separate entities, spinning off many new businesses in the process. Few businesses, however, can focus solely on either exploration or exploitation; separating the two may reinforce or feed the negative aspects of the two processes that lead to dysfunctional attractors.

For 90 years the U.S. Parks Service suppressed fires in national parks, intending to preserve the forests in their pristine state. The policy seemed to work in the early years, but fires grew more difficult to suppress as the forests aged and the ecosystems became brittle and dry. Despite abandoning the policy in the early 1970s the Parks Service was unable to avert massive

fires such as those that devastated Yellowstone National Park in 1988 (Jeffery, 1989). Forestry managers now understand that fire cannot be kept out of forests indefinitely. Mature forests need fire to break the constraints on new growth; fire suppression only makes the inevitable blazes catastrophic. Though it seemed obvious and perfectly rational to put out fires, foresters were actually doing more harm than good in their attempts to manage the forest. Similarly, in organizations, management may be doing more harm than good if they fail to understand the underlying system and the constraints that need to be managed.

Although strategic management researchers recognize the importance of managing on the edge of chaos (and thereby managing the tension between exploration and exploitation) there has been little in the way of theory to guide them. This paper has attempted to pursue one of the promising areas advocated by Brown and Eisenhardt: improvisation. Distilling the literature on improvisation, we presented four key challenges associated with implementing improvisation. We know there is a need for a strong technical base to improvise effectively, yet it is difficult to escape it, particularly under time pressure. We discussed how individuals (through developing the risk muscle), groups (through “yes-anding”), and organizations (through managing the tolerance for error) could develop and manage improvisation.

Foresters now prescribe fire as a way of creating open patches for renewal on their scale and timetable. In mature organizations improvisation can be seen as a prescribed burn, a process that managers can use at several levels to create open patches in space and time for exploration and renewal. Their consequent ability to control their own destinies is the central vision of evolutionary engineering (March, 1994).

NOTES

1. For a comprehensive list of definitions see Moorman and Miner (1997).

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