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Storytelling, time, and evolution: The role of strategic leadership in complex adaptive systems ☆

Kimberly B. Boal [a,*], Patrick L. Schultz [b]

[a] *Texas Tech University, Rawls College of Business Administration, 15th and Flint Avenue, Lubbock, TX 79409, USA*
[b] *University of North Dakota, ND, USA*

Abstract

Organizations are increasingly being described as complex adaptive systems (CAS). In this view, the behavior and structure of an organization emerges out of the interaction of a collection of organizational agents. Seemingly, there is no role for strategic leadership because the system self-organizes. We argue that strategic leaders play a crucial role in moving organizations to the "edge of chaos" and aid in organizational learning and adaptation by influencing the tags that produce the structure of interactions among organizational agents. Through dialogue and storytelling, strategic leaders shape the evolution of agent interactions and construct the shared meanings that provide the rationale by which the past, the present, and the future of the organization coalesce. © 2007 Elsevier Inc. All rights reserved.

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History matters. It matters not just because we can learn from the past, but because the present and the future are connected to the past by the continuity of a society's institutions.

Douglass C. North (1990, p. vii).

Strategic leaders perform many activities and wear many hats as they carry out their roles, such as: making strategic decisions, creating and communicating a vision of the future; developing key competencies and capabilities; developing organizational structures, processes, and controls; managing multiple constituencies; selecting and developing the next generation of leaders; sustaining an effective organizational culture; and the infusion of ethical value systems into the organization's culture (Boal & Hooijberg, 2000). Taking a cue from Douglass North's view of history suggested in the quote above, we believe strategic leaders play a central role in the organization's capacity to learn from its past, adapt to its present, and create its future.

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* Corresponding author. Tel.: +1 806 742 2150.
  E-mail address: kimboal@ttu.edu (K.B. Boal).

Many consider the field of complexity theory attractive because many practical organizational issues and management problems—handling fast-changing environments and competition, creating and maintaining flexible and resilient organizations, etc.—seem to fit with the concerns of the theory (Begun, 1994; Smith, 1984). However, the concept of complex adaptive systems shows that surprising and innovative behaviors can emerge from the interaction of groups of agents, seemingly without the necessity of centralized control. This begs the question of the role of leadership in such systems. Influencing complex adaptive organizations can be accomplished through intervention in the maintenance and modification of the structure of agent interactions and of the context in which their behaviors occur (Anderson, 1999; Levinthal & Warglien, 1999). The importance of this is seen in that a particular agent's behavior is always guided by the agents in its immediate proximity, and the benefits that arise in the various ways of interacting with them. Viewing organizations as complex adaptive systems, management and leadership is seen as fundamentally involved in a basic process, creation of the context and structure of coordination among members for the purpose of searching out and processing resources vital to organizational survival.

Marion & Uhl-Bien (2001) have suggested that it is useful to start to think about leadership in terms of complex adaptive systems. We suggest that strategic leadership pushes organizations to the "edge of chaos" and out of stasis; without it no significant change can emerge. Strategic leadership promotes "strange attraction" in organizations, providing balance between the inertia of Weberian-style bureaucracy and anarchy, resulting in the ordered and fluid responsiveness of innovative and creative organization. In practice, strategic leaders achieve balance in a number of different ways; as part of complex adaptive systems, they are agents that guide the interactions of other agents and transfer particular kinds of resource flows. Specifically, we argue that in creating complex adaptive organizational systems, strategic leaders channel knowledge (by altering interaction patterns) about organizational identity and vision (by promoting dialogue and organizational narratives).

As far back as 1957 with the introduction of Selznick's (1984) seminal book *Leadership and Administration*, researchers recognized the importance of guiding the entire organization and using it as the context from which individual and group behavior in organizations arises. Thus, it is useful to distinguish between supervisory theories of leadership which focus on leadership "in" organizations, and strategic theories of leadership which focus on the leadership "of" organizations (Dubin, 1979; Hunt, 1991; Selznick, 1984). Supervisory theories of leadership (e.g., path-goal, contingency, LMX) focus on task and person-oriented behaviors of leaders as they attempt to provide guidance, support, and feedback to subordinates, while strategic leadership focuses on the creation of meaning and purpose for the organization (House & Aditya, 1997). Strategic leadership is "marked by a concern for the evolution of the organization as a whole, including its changing aims and capabilities" (Selznick, 1984, cited in Boal & Hooijberg, 2000, p. 5). Based upon a review of the literature, Boal (2004a) recently offered the following description of strategic leadership:

> Strategic leadership is a series of decisions and activities, both process-oriented and substantive in nature, through which, over time, the past, the present, and the future of the organization coalesce. Strategic leadership forges a bridge between the past, the present, and the future, by reaffirming core values and identity to ensure continuity and integrity as the organization struggles with known and unknown realities and possibilities. Strategic leadership develops, focuses, and enables an organization's structural, human, and social capital and capabilities to meet real-time opportunities and threats. Finally, strategic leadership makes sense of and gives meaning to environmental turbulence and ambiguity, and provides a vision and road map that allows an organization to evolve and innovate. (Boal, 2004a, p. 1504)

It is clear from this conceptualization of strategic leaders that they play a more active role in developing ideas and vision, while more traditional management roles work toward implementing them in the structures and processes of the organization (Locke, 1999; Zaleznik, 1977). In advancing a vision, strategic leaders promote organizational learning and innovation as they instill meaning in followers for the roles they play in fulfilling that vision and encourage a motivated response to new situations and challenges. This idea of vision-setting as a device for creating and justifying action in the organization raises another phenomenon that strategic leaders are active in promoting: organizational storytelling. It is through the telling of stories, principally about the organization's past history, that strategic leaders provide a rationale for past actions and a legitimate perspective that guides potential future behaviors. Therefore, strategic leaders should also be intensely engaged in storytelling—specifically around narratives of an auto-biographical nature—in their organizations.

This paper focuses on the impact of strategic leadership and the leader's role in fostering organizational learning and adaptation through the use of dialogue and storytelling. To appreciate the ways in which strategic leadership impacts

organizations, it is useful to discuss organizations as complex adaptive systems with strategic leadership providing the balance between complete stability and unmanageable disorder. Only in the areas between these two opposing positions it is possible to achieve the innovation and flexibility needed by today's organizations. In creating this balance, strategic leaders draw on the past and present as a foundation for a desired vision of the organization's future; their role is that of building an organization that draws on the past for experience, knowledge, and meaning without being held back by complacency, but also shapes the future without being paralyzed by uncertainty or fragmented in disorder.

In this paper, we first explain complex adaptive systems, and highlight a few of the features that characterize them. We also describe how such systems settle into characteristic behavioral trajectories that are known as attractors. The patterns of particular interest here are strange attractors—paths complex adaptive systems take that allow them to operate far from equilibrium and scale rugged fitness landscapes to new levels of system performance. Second, we focus on one particular characteristic of complex adaptive systems—tags—and show that they are essential in producing much of the complex interactions within and between such systems. Because of this, tags and the tagging process are indispensable to strategic leaders in helping promote strange attractor behaviors patterns. Tag-based behaviors involve information flows and access to knowledge, and strategic leaders help channel organization members into patterns of exploitative and explorative learning to promote adaptive behaviors. Third, we argue that strategic leaders promote the sharing of knowledge of a specific type—organizational life stories—which encourages the development of a shared vision and identity as well as the potential for adaptive behaviors. Finally, we advance the idea that information flows in organizations, such as stories, are subject to evolutionary processes, and that strategic leaders play a key role in evolutionary selection processes which allow the structure of agent interactions to change over time.

1. Complex adaptive systems

1.1. Strange attractors

The above view of organization is consistent with emerging perspectives that view organizations as both brains and complex systems (Marion, 1999; Marion & Uhl-Bien, 2001; Morgan, 1986). Levy (1992) describes complex systems thusly:

> A complex system is one whose component parts interact with sufficient intricacy that they cannot be predicted by standard linear equations; so many variables are at work in the system that its over-all behavior can only be understood as an emergent consequence of the holistic sum of the myriad behaviors embedded within. Reductionism does not work with complex systems, and it is now clear that a purely reductionist approach cannot be applied; …in living systems the whole is more than the sum of its parts. This is the result of… complexity which allows certain behaviors and characteristics to emerge unbidden. (pp. 7–8).

Complex systems consist of aggregates of interacting subunits, or agents, which together produce complex and adaptive behavior patterns (hence the term "complex *adaptive* systems"). Aggregation results in systems that exhibit some rather interesting behaviors: collections of actors with simple individual behavioral characteristics combine to produce complicated coordinated patterns of group behaviors that change and adapt to environmental circumstances (Anderson, 1999; Holland, 1995). Such systems are often seen as operating far from any sort of steady state, whether periodic or cyclical in pattern or in a stable resting point. On the other hand, they do not behave in a random pattern either. To contrast them with both stable and chaotic types of behavior, these other patterns were labeled *strange attractors* (Lorenz, 1993; Ruelle & Taken, 1971). When set in a strange attractor, there may be a number of zones of activity that the system regularly visits, providing a broad set of constraints on overall behavior but allowing the system to move between activity zones as the system develops (Williams, 1997). Complex adaptive systems operate in this transition zone between stable equilibrium points and complete randomness. Poised between solidity and precariousness, these regions are typically referred to as the *edge of chaos*. Neither stability nor chaos is capable of exhibiting the characteristics of complex systems—such behavior can only exist balanced at the edge of chaos.

Strange attractors are products of nonlinearity and interactivity. In a sense, falling into attractor patterns produces a constraint on the system behavior; the system of interacting agents loses degrees of freedom in the variety of its activity pattern: "Once the components have entered into this mutual arrangement (attractor), they will tend to 'stick' to it, and

no longer be able to undergo certain types of relative variation" (Heylighen, 2006, p. 3). In the context of a system of aggregated agents, constraint equates to correlation in behavior; attractor patterns emerge because agents are less likely to be acting independently but are instead acting more in concert with one another (Marion, 1999; Prigogine, 1997). Ordinary systems overspecify that behavior correlation and reduce the ability to adapt to changes in the conditions they face. Complex adaptive systems provide just enough constraint to allow agents to cooperate, and thus release energy for adaption and create new system properties. Levinthal & Warglien (1999) put it in more familiar terms when they described how this worked within teams: "… cross-functional teams bring together multiple constraints, increase interdependencies in early design phases, and thus make the design landscape more rugged… the variety of functional background of team members makes it likely that different starting points are initially sampled. As a result, a variety of alternative designs is likely to emerge" (p. 348). The appearance of strange attractors and zones of relatively frequent system behaviors shows that while systems may appear on the surface as behaving randomly, those behaviors mask an emergent order that guides agent-based systems to potential new levels of collective behavior.

While many factors may interact to cause non-linearity in organizational systems, strategic leaders are in positions to bring people, resources, and knowledge together, and thus serve as a catalyst for adaptive systems. Disney exemplifies a company gravitating toward strange attractors through the influence of strategic leadership. Long after his death, employees still ask, "what would Walt do," and act in accordance; the figure of Walt Disney acts as the context of much of the behavior occurring within the company (Morgan, 1986). Their identification with him and his vision bounds but does not predict their behavior. Either because of their identification with the leader, as in the case of charismatic leaders, or because of their world view and cognitive maps, as in the case of transformational leaders, (see Boal & Hooijberg, 2000), they are always trying to "imagine" how they should act in accordance with his wishes and vision as best they understand it. By operating at the edge of chaos, organizations have a variety of distinct alternative responses with which to explore new opportunities.

1.2. Tags, learning, and time

1.2.1. Tags and agent cooperation

Tagging is a process identified by Holland (1995) as one of a number of crucial features of complex adaptive systems. We focus on this aspect of such systems because of its impact on the structuring of connections between collections of agents and how they interact to produce attractor patterns, and also because so many of the other elements of complex adaptive systems emerge from tag-based behaviors (e.g., resource flows, sub-unit diversity, self-organization, etc.). Rather than work against each other in competition over scarce resources, agents can organize their behavior such that synergy occurs, their interactions promoting the acquisition of resources to the benefit of all agents rather than any one individual or group. Heylighen (2006) notes that exploitation of resources may involve competition among agents, but since access to resources is uneven across all of them (because of a lack of knowledge, limited ability to process information, physical limits to accessing resources, etc.) forms of cooperation between agents may replace competition so long as the result is better resource acquisition across the entire system. Rather than directly engaging in resource acquisition, some agents can take on the role of "managers," acting as a source of coordination and conflict suppression among agents. When resources are more accessible to all agents through this arrangement, there will be a selective pressure for the survival of such mutualistic systems. Coordination is more easily accomplished when the agents interactions are complementary, resulting in more differentiation among agents, and ultimately specialization and division of labor. This explains why diversity is so often associated with complex adaptive systems.

Tagging is a mechanism that facilitates the creation of aggregates by permitting agents to distinguish among each other. Tags signal to agents when interactions are possible, resulting in patterns of interactions that define boundaries among a collection of agents. Tags serve as markers (e.g., brands, symbols, protocols, etc.) that identify different agents and control the types of transactions/interactions that are permissible. Like the effect produced among soldiers by flags on a battlefield or the chemical signals that identify cells within the immune system, tags serve to coordinate the activities of different agents by creating "identities" around different agent groupings; tags basically signal differences between agent types and act as mediators between differentiated agents (Holland, 1995). Agents with different tags may not cooperate at all (the difference between tags identifying differences between "bad" and "good" agents, for instance). Similar, but not completely identical, tags may indicate patterns of interaction (a tag may indicate broad similarity across agents, but small differences may signal interactions that occur only at certain times or between certain subgroups of agents).

Examples abound of tags and how they mobilize coordination among agents. Holland (1995) brought up the image of flags that symbolize the members of opposing armies or political parties as examples of tags that rally members to mobilize for action, as well as the chemical scents and display behaviors that govern mating in animals. Gershenson & Heylighen (2004) discussed tags in terms of the transmission protocols that define potential interactions between digital devices along computer networks. Such tags allow e-mail messages to find their way across the Internet, and could allow digitally enhanced devices to combine together to produce added functionality seamlessly in futuristic visions of offices and homes. Within organizations, tags may appear in the form of uniforms that distinguish members from nonmembers or that identify different ranks or status levels, trademarks and brands, or various forms of certification that help determine the pattern of interaction within and between business entities. Tags are a fundamental source of the differentiation among agents, impacting the flows of resources by defining the connections between agents and creating specific niches for them to fill tied to those flows.

1.2.2. Strategic leadership and tags

Strategic leadership in complex adaptive organizations acts through the tagging process to influence the context and structure of agent activity. On a passive level, existing tags define differentiated organization structures and reinforce both independent behaviors within groups and more coordinated actions across the entire organizational system. Tags guide the behavior patterns that produce more frequent interactions among agents within departments and less frequent or different interactions with agents in other departments or outside the organizational boundaries; that is, tags shape agents into organizational structures like "departments," "functions," and "teams." In this manner, tags serve as a form of reference signal against which behavior can be compared and mutual adjustment can occur (Heylighen, 2006). More actively, agents acting as strategic leaders can also carry their own tags that reform the interactions among other agents and transform the activity of the entire organization (acting as a sort of "traffic cop"), disseminating information, spreading new tags, and potentially recreating the entire organizational architecture. These new interaction patterns and activity flows leverage existing agent capabilities into new organizational properties, such as novel behaviors directed at finding new resources. Strategic leader agents may cause further differentiation among groups of agents resulting in new capabilities, or they may modify previous boundary definitions.

General Douglas MacArthur's farewell address to the Corps of Cadets at West Point, May 12, 1962, illustrates how strategic leaders symbolically shape behaviors of individuals through tags and act as reference signals against which one can assess behaviors. In this case, the words "duty," "honor," and "country" powerfully define historical identity and guide behavior for the cadets of the U.S. Military Academy:

> Duty, Honor, Country: Those three hallowed words reverently dictate what you want to be, what you can be, what you will be. They are your rallying point to build courage when courage seems to fail, to regain faith when there seems to be little cause for faith, to create hope when hope become forlorn… The code which those words perpetuate embraces the highest moral laws… Its requirements are for the things that are right, and its restraints are from the things that are wrong… The long, gray line has never failed us. Were you to do so, a million ghosts in olive drab, in brown khaki, in blue and gray, would rise from their white crosses, thundering those magic words: Duty, Honor, Country. (MacArthur, 1962).

1.2.3. Information processing and balancing learning

Complex adaptive systems are often described as dissipative structures—systems that respond to increasingly complex environments by importing greater resources from outside and exchanging more resources within their boundaries to achieve greater degrees of fitness (Leifer, 1989; Prigogine & Stengers, 1984). As opposed to their physical counterparts, Boisot & Child (1999) note an emphasis on information rather than energy resource flows as a key characteristic of complex adaptive social systems, and such systems may handle learning in a much different manner than ordinary systems. Because tags are used to guide the interaction pattern among organizational agents and to define the boundaries of complex systems—and strategic leaders use the tagging process to manage the adjustment of interactions between a system's agents and to promote movement to new modes of activity in response to the environment—it is evident that tags and the structure of diverse but coordinated groups of agents are elements in a complex adaptive system's information handling and learning process. Recognizing information as the critical flow between agents and the emphasis on learning for adaptation in social systems, we might speak of such systems as complex adaptive *social learning* systems that move between exploitative and explorative

learning depending on the way information is processed and disseminate that information through dialogue among members.

As mentioned in the previous section, tag-based interactions cause agent behaviors to coalesce around familiar organizational patterns such as "teams" and "divisions." From a knowledge and learning perspective, it may be useful to conceive of organizations as collections of agent groups producing core competencies, constructed and coordinated by the tags carried by individual agents. "Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies" (Prahalad & Hamel, 1990, p. 82). Boal (2004b) suggested that in the past tense, core competencies represent the actuarial history of the organizations' attempts to survive and grow. In the present tense, core competencies are the platform by which organizations engage the competition. In the future tense, core competencies are the wellspring for growth and evolution. Viewed in this way, organizations are social learning systems. "In a social learning system, competence is historically and socially defined... Knowing, therefore, is a matter of displaying competencies defined in social communities... Socially defined competence is always in interplay with our experience. It is in this interplay that learning takes place" (Wenger, 2003, p.77). It is the acquisition of these competencies that allow actors to modify their ways of thinking or acting when dealing with changing environments, and suggests to us "that by building patterns of rich connectivity between similar parts we can create systems that are both specialized and generalized, and that are capable of reorganizing internal structure and function as they learn to meet the challenges posed by new demands" (Morgan, 1986, p. 95).

Boisot and Child claimed that organizations handle the complexity of the environment and the resulting information processing challenges in two ways. First, they could reduce its complexity through information codification. Codification involves precisely understanding phenomena in detail such that a specific or a few specialized responses can be developed and used. Complexity reduction through codification is the source of organizational differentiation and specialization. Learning is weighted more toward the exploitative over the explorative, as an organization uses and develops existing stores of knowledge (March, 1991; March & Levinthal, 1993). The second approach absorbs complexity through information abstraction; the orientation is toward anticipating a variety of appropriate methods of engaging with the environment, and responding flexibly to the unique needs of the situation as it unfolds. Organizations employ a variety of options in response to challenges rather than focusing on a single optimal approach. Organizational learning emphasizes explorative rather than exploitative benefits, allowing an organization to stretch to potentially higher fitness peaks through the use of novel strategies. Organizational survival and effectiveness require maintaining a balance between flexibility and stability (Brown & Eisenhardt, 1998). Without stability a firm would not be able to accumulate knowledge, and would be in a constant state of flux never being able to move any distance from a random state because improvement would vaporize at every new fad. Organizations that are complex adaptive systems might be seen in those that adopt some of both information handling strategies, gaining the benefits of both exploitative and explorative learning by using prior knowledge as well as exploring potentially beneficial new alternatives by recombining groups of agents and modifying current interaction patterns.

Learning and change are based upon either exploitation of core competencies or exploration for new opportunities (March, 1991). It is in the exploitation of core competencies that firms maintain their trajectory and identity thus achieving stability in the mists of change (Fox-Wolfgramm, Boal, & Hunt, 1998). It is in the exploration for new opportunities that firms overcome the related problems of competency traps, core rigidities or the Icarus Paradox (Leonard-Barton, 1992; Levitt & March, 1988; Miller, 1990). Recall in the story of Icarus how his initial success led him, in his hubris, to fly higher and higher towards the sun until his wax wings melted and he plunged to his doom. Exploitation without exploration can lead to specialization and excess, to confidence and contentment, to dogma and ritual, to death. The ability of a firm to avoid the seduction of success and change, while maintaining performance, is a function of both its capacity to learn and it capacity to change. Strategic leaders are responsible for both (Boal & Hooijberg, 2000).

Proposition 1. *In complex adaptive systems, strategic leaders use tags to organize agents for exploitative and explorative learning.*

Beyond simply processing different forms of information, the dissemination of that information flow is also critically important in complex adaptive systems since knowledge and learning are distributed throughout the organization. Learning in the organization is influenced by its absorptive capacity and the level of procedural and transactive memory (the mastery of organizational routines and an awareness of the range of knowledge available, its

location, and who possesses it) among members (Cohen & Bacdayan, 1994; Liang, Moreland, & Argote, 1995; Wegner, 1987). Strategic leaders enhance collective learning and the development and use of the organization's procedural and transactive memories by promoting intra- and extra-organizational dialogue that provides access to and encourages the sharing of knowledge about history, issues confronting the organization in real time, and possible futures. Jack Welch viewed the dialogue that took place at Crotonville as so important that before he retired, General Electric created a Crotonville—Europe and a Crotonville—Asia (Greiner, 2002).

The underlying social systems present within organizations produce powerful effects on organizational learning and the transfer and management of knowledge, and managers often make changes that disrupt the ongoing transfer of knowledge between individuals or have unintended consequences on effective collaboration. Brown & Duguid (2000) chronicled a variety of ways in which the dialogue among members at the foundation of organizational systems affected managerial capacity to manage information flows and change. They dramatized the potential for failure in "virtual" organizations that attempt to link isolated workers through information technology; the work of such employees can be seriously undermined by a lack of access to others around them with critical information or other resources that information systems are not tied to or are not equipped to share. In either "virtual" or traditional organizations, the entire social system plays a role in maintaining a functional and responsive organization:

> The "geek" who understands the network, the secretary who knows the secrets of Word, the one colleague proficient with databases, the other who has learned Java in her spare time, and the one who knows how to nurse the server all contribute. (Brown & Duguid, 2000; p. 77)

As Greiner noted, "Knowledge management depends upon social interaction not computerized information systems" (2002, p.349). The acquisition of knowledge by individuals actively and directly working in concert is enhanced because the information received is typically better then what could be gathered independently.

When acting as complex adaptive systems, information is a primary resource being exchanged among organization members and imported from the environment. A great deal of dialogue, collaboration, and exchange is frequently necessary in order to generate sense making and meaning, and thus the learning effects desired within an organization. Dialogue aids in surfacing one's own and other's thoughts and assumptions, helps create new ideas, and initiates collective action. Because strategic leaders are central in the cognitive networks of organizations and thus the tagging processes that control contacts between organizational agents, they will have a strong influence on the exchange of information and advice and its interpretation. The giving and receiving of information and advice from one's social network forces the individual to think about the issues they are facing in ways that they would not if the information and advice was not offered (Augier & Sarasvathy, 2004). For example, in describing how he analyzed work practices among Zerox service personnel, Orr (1998) found that workers engaged in a great deal of dialogue between themselves and with customers in order to solve inexplicable machine failures; the discourse established common meanings and language between them, and thus a common ground on which to devise solutions from knowledge distributed among many individuals while explicit nowhere in established organizational routines. Dialogue with customers is important. But dialogue within the organization is crucial. It insures that everyone understands the problems and threats facing the organization, as well as opportunities and future direction of the organization. For example, at one of his sessions at Crotonville, a class told Jack Welch that his favorite mantra of "first or second in market share, or fix, sell, or close, was now dysfunctional because the closer you get to 100%, the lower the upside. As a result of this dialogue, Welch changed his approach and at strategy meetings he started asking people to answer the question, "Imagine your market share is less than 5%. Describe your market." (Greiner, 2002, p. 345).

Proposition 2. *In complex adaptive systems, dialogue serves as a primary resource flow among organizational agents.*

Proposition 3. *By encouraging and managing dialogue, strategic leaders promote perspective making, taking, and shaping.*

1.2.4. Conveying history and balancing time

Complex adaptive systems not only structure agent interactions and the flow of organizational knowledge through dialogue, they also link the past to the future through a path-dependent process that builds on existing tags but does not fully specify present behavior or restrict tag evolution in the future. Earlier it was mentioned that core competencies are rooted in the past and serve as a springboard into an organization's future. Learning in organizations and other social systems is situated across the interconnections among system members, but it also emerges in the system's historical

development path. In the management literature, the concept of time has been recognized as playing a role in explanations of organizational activity and strategic management (cf., Bluedorn & Denhardt, 1988). Therefore, in complex adaptive social systems, the role of time and its perception by and influence on organization members should also be highlighted. Discussion of time in the management literature has focused on two competing conceptions: linear and cyclical time. The *linear* view conceives of time as a sequence where a unique past leads to the future. The past is considered in determining behavior, but its effect is constrained to the immediate future that follows since each point in time presents a largely unique set of contingencies to be considered. Learning may be limited to ways in which a distinctive past can be used as an input into a decision-making model of the future. In contrast to this, the *cyclical* view of time depicts a sequence with a broadly recurring pattern of events. This pattern connects the past to the future by presenting organization members with sets of circumstances in the present that can be matched to previously established sets of behaviors. In this instance, organizational learning consists of determining the decisions appropriate at each point in the cycle and securing that knowledge for use in future iterations of the cycle.

As complex adaptive systems, organizational action cannot be sufficiently described using only linear time or cyclical processes that cause behavior to be determined by a simple rhythmic order. As mentioned earlier, such systems exhibit nonlinear relationships among variables, including time, and the future behavior of these systems depends on the their initial starting points and subsequent histories, and the agents in such systems use tagging to define the boundaries of their differentiated responses to help promote adaptive behavior. But that discussion focused primarily on current adaptive behaviors rather than on how such behaviors, created in combination with many other members over time and endowed with social meaning and knowledge unfold over time. Crossan, Cunha, Vera, & Cunha (2005) reconcile linear and cyclical perspectives of time in organizations through the concept of *improvisation*. They claim that organizations often experience both linear and cyclical time simultaneously, and improvisation allows organization members to deal with both time perspectives "because it is a process in which past and future blend together in a deep experience of the present" (p. 139). Members draw on knowledge and experience from the past to create a capacity for action in the present, while also considering how the present fits with or accomplishes members' sense of the organization's future. The tagging process creates peculiar patterns of behavior among agents and differentiated agent groups through the influence of agent interaction and the evolution of the system, while new tags emerge across time to handle novel situations. What is experienced in the present is an organizational template, built on the past and just sufficient to provide orderly activity but also loose enough to allow for flexibility in response to changing circumstances.

Interestingly, this conception of the need to reconcile different time perspectives within an organization is already recognized in Japanese culture though the idea of "makimono time" (Hayashi, 1990; Hinterhuber, 2002). Makimono were a form of scroll painting popular in medieval Japan, and consisted of long horizontal pieces up to dozens of feet wide and perhaps a foot in height. A person viewing the scroll was meant to view it using both hands spread about an arms-length apart, unrolling with one hand and rolling it up in the other, allowing him to control the flow of scenes depicted in the painting, moving forward to continue through the scroll as well as backward to revisit past elements as needed. The structure of the makimono, with its moving series of scenes, encouraged the portrayal of narratives rather than static illustrations, with the drama of the subject unfolding across past, present, and future in the hands of the viewer. In makimono time, the present is represented as a circle in which both the past and future are headed like two streams converging from opposite directions. Here, the present is a result of past thinking, feeling, and acting and an anticipation of future events.

Just as the onlooker controls the tempo of the story as it is conveyed through the makimono scroll to balance the flow of the future to the past in a way that makes sense for the story, strategic leaders must guide the organization carefully across time so that learning takes place and yet does not overly curb organizational responsiveness. Acting as reference signals, they assist in system adaptation by promoting learning through performance feedback for actions and aspirations within the organizational system. Of course, adaptation does not proceed in any random direction; the tags that agents use define the identities—and thus the interaction patterns and organizational knowledge—of organizational systems and subsystems, and so adaptation must build on them to capitalize on explorative learning. Instead, adaptation is manifested in the constrained patterns of strange attractors; the resulting regions of potential behaviors build on what is already known but also allows a flexible exploration of new behavioral approaches. By promoting strange attraction within organizations, strategic leaders manage a delicate balance in time to keep their organizations poised on the "edge of chaos," creating a harmony between past and future while developing the energy for action in the present.

Proposition 4. *In complex adaptive systems, strategic leaders use tags to balance time and construct meaning for members around its activities.*

2. Storytelling in organizations

2.1. Storytelling and "know-why" learning in organizations

Complexity theorists suggest that organizations and their component parts co-evolve on a fitness landscape, where organizations attempt to climb peaks of higher and higher fitness (Anderson, 1999; Marion, 1999). Simple landscapes with one or a few peaks defining areas of heightened fitness are labeled as *smooth*, while *rugged* landscapes present more challenging situations with many peaks divided by extensive areas of low fitness (Levinthal & Warglien, 1999). Attempts at change by jumping to new landscapes may be based on either exploitation of core competencies or exploration for new opportunities. The example of the Makimono scroll shows that sharing stories helps in the search for new fitness peaks, since stories provide the rationale behind exploitation or exploration, and serve as tags in guiding this co-evolutionary process.

In unstable environments the dominance of rules/routines can inhibit double-loop learning and exploration (March, Schulz, & Zhou, 2000). On smooth or single peaked landscapes, this is not a problem, as exploitation will suffice. But on rugged landscapes, it may sound the death of the organization as the organization fails to adapt. Strategic rules/ routines capture explicit knowledge about know-who and know-how. However, because these strategic routines and rules appear as disembodied imprints of history, they are not sufficient for understanding and knowledge creation. Instructions on what to do on a general level lack a foundation in past behaviors in more specific situations, and may not provide enough feedback to show how to achieve future desired states; rules and routines are too heavily rooted in narrow conceptions of the past and are not tied enough to an organization's future vision. While procedures express a certain level of knowledge about how organizational systems are expected to operate, what is often more important is in what they leave out in their depiction of appropriate activities. These tools explain to organization members what to do, but they often do not explain why; thus strategic rules and routines fail to capture know-why knowledge forms. Novel situations, such as might be encountered when organizations explore new operating modes, are so disruptive to organization members and management because established routines not only do not cover new circumstances but also produce seemingly mystifying or misleading behaviors; they are not only operating off the map, but now their compasses fail them as well.

Dialogue is important because it is an under-recognized aspect of the collaboration that is needed in order to build shared meanings and collective pools of knowledge in an organization, but storytelling gives life to the knowledge being generated and shared among organization members. Expressing the drama of daily organizational life or of an entire organization's competition against arch-rivals provides a number of benefits. As Brown and Duguid mention in their work, stories are valuable "not just in their telling, but in their retelling" (2000; pg. 107). As with dialogue, they provide opportunities to share hard won experience and serve as a point of interaction among members, but they go beyond that by giving members the chance to make sense of events by elaborating on past stories or constructing new ones. By virtue of their narrative structure, stories tend to sort information into coherent patterns, such as the appropriate sequence of events or the causal order of organizational phenomena. Stories make history available and help organizations learn from their past. Stories capture culture and informal learning, and as such, are the "soft" repositories of knowledge (Brown & Duguid, 1991). A powerful way of making outsiders feel like insiders and imparting tacit knowledge or its emotional component is through the telling of stories. Stories help link the past to the present and the present to the future. Stories help employees to see continuity in the face of change and make the radical seem more doable.

Gregory Berry (2001) notes, "Stories are a fundamental way through which we understand the world... By understanding the stories of organizations, we can claim partial understanding of the reasons behind visible behavior" (p. 59). As such the exchange of stories, rather than merely routines, allows participants to develop a new "collective story" through which they can become a social learning system. Stories are thus an important part of organizational learning, and balancing the past, present, and future through storytelling is an essential skill for strategic leaders who hope to promote it. Routines and rules capture only a limited part of explicit knowledge. They do not capture the past and the historical journey of an organization. They don't capture tacit knowledge or the emotional component of knowledge. It is in the creating, telling, and retelling of stories by strategic leaders that the systems and processes of

perspective making, perspective taking, and perspective shaping take on tangible form. It is in the creating, telling, and retelling of key stories by strategic leaders that the past, the present, and the future of the organization are connected. Storytelling is a reference signal in the feedback loops that guides the adaptation of the system. As a process within complex adaptive social learning systems, storytelling achieves information resource flow through dialogue and a balance across time that roots future behavior to an organization's past history; it is both a source of interconnectedness among organizational agents as well as a structure on organizational knowledge flows across the organizational system.

The power of stories can be seen in the experience of the Australasian firm Amcor. In one year five "new" changes were being simultaneously implemented. The changes ranged from work flow and safety changes to new gain share incentive programs to new adding a new shift and changing from a 5-day, 8 h shift, 3 shift arrangement to a 12-hour, 4-day-on/4-day-off shift system. In a change workshop involving 30+ employees, Joline Francoueur and Darl Kolb, the consultants on the change projects, asked the longest serving employee to describe what Amcor was like when s/he first came. Next the second longest serving employee was asked the same. This went on until all of the 30+ employees had told their story. The stories were full of humor and laughter and very few were bitter or full of complaint. The upshot of telling their stories was to connect older workers with younger ones, and the discovery that the "new" was, in fact not "new" at all. Employees discovered that while the proposed changes were not identical to previous ones, they were no more radical than ones the organization and many of those present had successfully lived through. In fact, the telling of stories enhanced the status of senior employees relative to that of their junior managers because they had literally, "been there, done that." The result was that through the telling of stories the employees gained perspective about the proposed changes and this reduced their resistance to change (Kolb, 2003). As Jan Bouwen and Bert Overlaet say, in their retelling of the takeover of a Belgian multinational pharmaceutical company, "There is no continuity without an appreciation of the past. People will experience continuity when they can recognize the past in their present actions and intentions for the future" (Bouwen & Overlaet, 2001, p. 34).

2.2. Organizational life story

As important as stories are to organizations, in order for strategic leaders to take advantage of them as storytellers something must be known about the specific type and structure of organizational stories. It is conceivable that storytelling in organizations shares many of the same structural features as other narrative or dramatic forms; for instance, as stories are told and retold they may take on classic multi-act style with conflict, tension, and climax. However, there may be other general structural forms for organizational stories, and individual cognitive processes will no doubt impact the construction and interpretation of story exchange within the context of the organization. In particular, ongoing storytelling might take an autobiographical character, as organization members recount organizational dramas amongst themselves in attempts to generate a mutually agreeable meaning regarding past behaviors (Czarniawska, 1997). What is needed for storytelling to serve a role in complex adaptive learning systems is a structure that integrates the past and present in a way that generates tags among organizational members that coordinates and guides future behaviors while generating exploitative and explorative learning in appropriate situations.

Recent work on individual-level cognition may suggest a suitable framework for the mental representation of organizational stories: the *life story schema*. Bluck & Habermas (2000) argued that elements of an individual's life are differentially recalled in memory to the extent that they provide meaning within an overall mental representation of that person's life. That mental representation was termed the life story schema, which serves to organize important events over an entire life into a coherent autobiographical pattern; the life story schema of a particular person could be represented to others in the form of a *life narrative*, a written or spoken account of a life structured by a pattern meaningful to that person. In an interesting illustration of this concept applied to leadership, Shamir, Dayan-Horesh, & Adler (2005) recently argued that life story narratives are important elements in the influence processes used by leaders to mobilize the efforts of followers.

We believe that a similar concept—an organizational life story schema—exists as a widely shared mental representation which draws attention to, elaborates, and arranges the many tales and legends told among members into a consistently patterned, autobiographical account of the organization over time. This schema is an interactive construction, built through exchanges between both followers and leaders. The process is a reciprocal one, where each brings their own life story into the picture, and through social exchanges over time, each affects the other and creates a third, socially constructed organizational life story that integrates the identities of both leaders and followers (Czarniawska, 1997). The history or life story of organizations has often been explained in terms of life cycles; such

models use the logic of a passage through a succession of developmental stages shared by many, if not all, organizations. For instance, in the widely known life cycle model proposed by Larry E. Greiner in the *Harvard Business Review* in 1972, the identity of a particular organization is given meaning by perceiving life history events through the lens of a dialectic between crisis and growth; only those events seen as part of this path are viewed as important to the development of the company. Furthermore, given the image of the organization as embedded in a particular life cycle phase, the identities of both leaders and followers also become defined, producing behavioral responses believed to be appropriate for the circumstances (e.g., in life cycle stage X, a manager sees his or her task as Y but not Z). We suggest that strategic leaders take part in building an autobiographical pattern on historical accounts of their companies to produce a coherent picture of an organization's identity, their own roles within their organization, and the realities of organizational life while also preparing the organization to effectively respond to future environmental changes.

There are a number of possible ways in which an organizational life story schema might organize events into a coherent pattern producing an overarching organizational narrative. In their work on the individual-level life story construct, Bluck & Habermas (2000) suggest four structural forms that we believe are likely to also operate in the development of a shared lifestory schema: temporal coherence, cultural concept of biography, thematic coherence, and causal coherence.

2.2.1. Temporal coherence

One way strategic leaders produce meaning for organization members is by grouping different events together in the sequence of occurrence, creating a *temporal coherence* in the narrative. Meaningfulness for managers and employees emerges out of their ability to recall particular events and the specific order of their occurrence; the history of the organization is then cast in terms of the unfolding of this chronology along a path from the past to the present. In some circumstances, events may be seen by those in an organization as requiring a certain timing sequence, where one event necessarily follows another; in other situations, different events may need to coincide to maintain the proper perceived order. Much of the meaning attached to a temporal coherence among remembered events may stem from a commonly held view of time as a resource that requires management to ensure efficient allocation to achieve organizational goals (Bluedorn & Denhardt, 1988). Strategic leaders create a drama that resonates with members when they recount the demands on existing resource stocks and the development of current resources and capabilities as an inevitable consequence of confrontations with various contingencies across their organization's history.

2.2.2. Cultural concept of biography

Along with temporal coherence, there may be normative effects on beliefs regarding the transitions between events or stages in organization's life history. At the individual level, cultural differences may explain what events are attended to and the meanings attached to those events and to the entire life course. Cultural norms are the basis for meanings commonly ascribed to biological development stages such as adolescence, middle age, and old age (e.g., "teen angst," "mid-life crisis," etc.). Bluck & Habermas (2000) called this structuring effect on the life story schema the *cultural concept of biography*. In terms of organizations, there may be culturally rooted norms that help delineate phases in an organization's life as well as define their historical meaning. Returning to Greiner's (1972) well known organizational life cycle model, periods in an organization's history such as the creativity-leadership or coordination-red tape phases, while perhaps stereotyping what is a unique historical path for a company, may indeed reflect widely held beliefs by managers on the evolution of organizations. In this model, an organization's life story is defined in terms of the cycle between growth and crisis and the tension between control and discretion in management, and the transitioning from one phase to other marks a major milestone for an organization. Of course, other cultures may see meaning in organizational life through norms defining different cycles and tensions. As a result, strategic leaders operating in different cultural contexts might promote very different organizational histories, and might interpret each other's narratives.

2.2.3. Thematic coherence

Coherence among events across the history of an individual or a company should also provide a sense of understanding and identity about the life lived. *Thematic coherence* provides a unifying and recurrent idea at the core of interpretations of organizational life events. Rather than just a chronological sequence, thematic coherence ties events across the entire existence of an individual or organization through a common subjective metaphor, moral, or

truth; the thematically coherence life schema then can demonstrate the meaningfulness of a diversity of experience in terms of overarching themes.

Thematic coherence maybe useful in comprehending periods of organizational transition, such as Andrew Grove's concept of strategic inflection points (1996, 1997). "Strategic inflection points are caused by fundamental industry dynamics, technologies, and strategies that create new opportunities for strategic leaders to develop new visions, create new strategies, and move their organizations in new directions as they traverse through turbulence and uncertainty" (Boal & Hooijberg, 2000, p. 520). Strategic inflection points may be virtually impossible to detect a priori, but by maintaining thematic coherence, strategic leaders impose their own sense on successes and failures in the face of extreme uncertainty.

Another example of a life story theme that seems to be used by leaders frequently to establish meaning for their followers is the concept of the hero's journey. Coined by Joseph Campbell (1972) in his book, *The Hero With a Thousand Faces*, he argued that all myths, regardless of the culture that produced them, shared the same basic narrative features and structure. Central to his view of myth is the figure of the hero, his or her journey or struggle in adventure, and eventual return or arrival in victory. Shamir et al. (2005), in their analysis of the narrative accounts, found that the theme of struggle was common among leaders. Through battles and ordeals, leaders saw themselves transformed, thereby attaining the power to assume the task of leadership.

2.2.4. Causal coherence

Beyond merely temporal coherence, organizational life story schemas should also exhibit a *causal coherence* among events. In this case, event patterns may be temporally related such that it is expected they should form specific event sequences. However, they are also connected by cause–effect relationships, going beyond simply indicating a synchrony of events to a more complete explanation of the trajectory of circumstances. Causal coherence provides an opportunity for strategic leaders to explain the paths taken by the organization in the past and the goals and actions chosen for the present to create the future. It motivates by creating a sense of control over the life course of the organization and the efficacy of the strategic leadership at work.

2.2.5. Connecting the life story and organizational vision

One of the insights that Bluck & Habermas (2000) provide is that one source of an individual's motivation is the sense of self that the life story schema provides. The themes and order that structure life events in the creation of the life story schema set the rationale for behavior across time, and guide future goals and actions by their linkage with that life story model. Beyond being an expression of their own identity, strategic leaders use their life stories in an effort to influence their followers, by framing expectations and impressions, serving as a role model, showing the legitimacy of their leadership role, and shaping collective expectations and meanings (Shamir et al., 2005). By extension, a shared organizational life story schema provides the inspiration for collective behavior among members by connecting it with the past through the organization's history. In establishing the rationale behind the organization's life story, the schema generates an organizational identity that insures continuity between past and future goals and actions. Looking at the development of effective leader vision, Strange & Mumford (2005) found that vision emerged in a process where leaders reflected on the fortunes of past goals and behaviors in deriving mental models for the future. The vision formation process causes leaders to use a descriptive mental model of the organization—one that articulates the themes and relationships between actions and outcomes—and by assessing that model in light of organization members' experience, to then devise a prescriptive model for situations yet to be encountered. Storytelling and the coherence demanded by the structure of the life story schema combine in the ongoing vision formation process occurring within organizations.

The enduring values, expectations, and responsibilities that maintaining coherence produces for the organization—and which are manifested in its vision—show the opportunity that strategic leadership has in defining an organization's approach to future circumstances. Although all individual members are "coauthors" of an organization's life story (Czarniawska, 1997, p. 14), powerful individuals, such as strategic leaders, can produce narratives for which the rest of the organization is more of a passive audience. That is the special role of strategic leaders as agents within an aggregate of agents in a complex adaptive system; they promote the proliferation of life story narratives as a tagging process which encourages the emergence of diverse functions among members while also coordinating interactions between them within the system. Control over storytelling and the way members interpret an organization's path over time allow control over the vision formation process, and should significantly influence the character and effectiveness of

organizational vision. Although many individuals may possess experience relevant to the development and evaluation of past mental models of the organization, strategic leaders have a unique position from which to influence this critical feedback mechanism in the vision formation process. Leader background and experience from the past are influential in developing descriptive mental models, and leader experience with those models as they confront the demands of current organizational situations influence prescriptive mental models. Therefore, a strategic leader's own life story enters into the vision formation process along with the life story of the organization itself and its members. The requirement for coherence in both organizational and leader life stories means that a strategic leader imparts much of their own meaning and sense making onto the organization; actions and events are interpreted through the lenses of thematic and causal coherence in the context of the histories of both the organization and the strategic leader.

Proposition 5. *Organizational storytelling is an important aspect of dialogue and promotes the transfer of knowledge among organization members.*

Proposition 6. *Stories by strategic leaders promote perspective making, taking, and shaping.*

Proposition 7. *Organizational stories often have an autobiographical form, producing organizational life stories.*

Proposition 8. *Strategic leaders use organizational life stories to create and manage vision-setting in organizations.*

3. The process of knowledge creation

Gioia & Sims (1986) describe the process of creating shared schemas, such as those like the organizational life cycle schema described above, as "cognitive consensuality." In this process, individual cognitive structures evolve through interaction with others into shared schemas. Going even further, Klimoski & Mohammed (1994) claim that cognition is a social process, where an individual's set of schemas arise from the social interaction with other individuals within a particular context. Over time, this social interaction results in shared knowledge structures among the individuals involved, and a shared understanding and meaning of ongoing phenomena.

Previously, Boal and colleagues (Boal, 2004b; Boal & Schultz, 2005) suggested that strategic leaders are responsible for creating the context within which collective learning can occur, and, by extension, play a major role in the creation of cognitive consensuality. Collective, organizational identities are constructed from the tags that define organizational activities, and emerge out of the interaction of both leaders' and followers' own life stories and identities. However, strategic leaders are essential parts of the tagging process in complex adaptive systems; because they are in unique positions to act to enhance employees' access to knowledge, learning strategies, and networks, strategic leaders play a pivotal role in creating, shaping, and reinforcing shared schemas. While schemas, knowledge, and learning are distributed throughout the organization, because of their centrality in the nexus of the organization's cognitive networks and their unique ability to change or reinforce existing action patterns within the organization, strategic leaders are responsible for providing the mechanisms by which individuals are brought together within and across the firm's domain. Engaging in dialogue and exchanging stories are two mechanisms by which cognitive consensuality is achieved producing an organizational identity and a shared life story. Strategic leaders enhance cognitive consensuality by promoting intra- and extra-organizational dialogue, encouraging the surfacing of thoughts and assumptions, the creation of new ideas, and initiating collective action; they also actively shape the process by using their own life story as an influence tool. The giving and receiving of information and advice from one's social network forces the individual to think about the issues they are facing in ways that they would not if the information and advice was not offered (Augier & Sarasvathy, 2004). Through storytelling, strategic leaders influence the promotion and interpretation of information and advice by matching events to the context of both the organization's life as well as their own. They not only interpret and make sense of their environment, more importantly they act as sense givers to other members of the organization who act as sense takers. Sense making, sense giving, and sense taking result in the genesis and/or reinforcement of cognitive consensuality regarding organizational purpose (know-why), organizational meaning (know-what), and organizational methods (know-how) (Garud, 1997).

By being central in the tagging process, strategic leaders influence the structure of interconnections within and between organizational systems and thus influence organizational adaptation. Strategic leaders serve as cognitive network brokers (Burt, 1992). By interaction with a wide range of networks, inside and outside the boundaries of the firm, individuals are encouraged to bring new ideas/schema to old problems as well as discover new problems to which known or knowable shared schema can be applied. In this way the organization evolves as it increases not only the store

of knowledge and procedural memory, but transactive memory as well. The availability and access to divergent information are crucial to solve complex problems. Organizational creativity is related to the leaders' personal networking behavior or the encouragement of subordinates' networking (Amabile, Schatzel, Moneta, & Kramer, 2004; Shalley & Gilson, 2004).

One important role the strategic leader can play in developing the organization's procedural and transactive memories, achieving cognitive consensuality, and facilitating creative problem solving is that of providing access to and encouraging the sharing of knowledge and information: knowledge about history, knowledge about issues confronting the organization in real time, and knowledge about possible futures. Under Jack Welch, the Crotonville training facility of General Electric grew in its offerings and had, over the course of a year, as many as 10,000+ managers and customers attending sessions. Jack Welch himself taught a course on Leadership and Values seven times a year to high-potential middle managers. In addition, courses were taught by the vice-chairman and the CFO. In fact, corporate leaders taught 60% of the senior-level courses, with Welch often standing in front of the group (Greiner, 2002). While dialog and storytelling are useful tools for developing shared conceptions of the organization, strategic leaders must also use those tools to promote the acquisition of knowledge responsiveness to the competitive environment.

Proposition 9. *Strategic leaders and followers mutually construct organizational life stories, and by extension an organization's vision.*

Proposition 10. *Strategic leaders are strong sources of influence on the context for organizational learning, and thus strongly influence the transfer of knowledge and the sharing of organizational schemas.*

3.1. Memes: replicators of cognitive consensuality

Discussing the nature of knowledge and its spread through social systems, Richard Dawkins' (1976/1989) applied an evolutionary logic rooted in biology to explain the selection and propagation of information. He proposed that evolutionary processes are a general form of change that operates in many areas outside of the more typical context of biology and genetics. From a biological perspective, genes represent discrete bits of information that combine to define the characteristics of organisms; changes in those organisms occur over time as a result of changes in the underlying configuration of genes. More broadly, genes are replicators—the individual unit of reproduction on which the evolutionary forces of variation, selection, and retention act; just as the gene is the replicator in biological evolutionary processes, replicators other than genes should exist in evolutionary processes in non-biological circumstances. In Dawkins' book *The Selfish Gene*, he proposed the word *meme* as the label for another type of replicator, the individual bits of information that combine to define an individual's store of knowledge:

> We need a name for the new replicator, a noun that conveys the idea of a unit of cultural transmission, or a unit of imitation. 'Mimeme' comes from suitable Greek root, but I want a monosyllable that sounds a bit like 'gene'. I hope my classicist friends will forgive me if I abbreviate mimeme to meme... Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain (1976/1989; p. 192).

3.2. Memes and cognition

We suggest that the tags that underlie an organization's identity and value system, and help define the strategic leader's vision are also examples of memes, and that the tagging process is subject to evolutionary pressures. Analogous to genes, memes are units of knowledge transmission or imitation that form the basis for an evolutionary process perspective of shared knowledge systems. They are the unit of knowledge and meaning used to explain the transmission and evolution of ideas. As the basis for shared knowledge structures, the picture of memes created by Dawkins can be understood in terms of current cognitive views of organizations, but with the added imagery of evolutionary dynamics at the level of the organization as drivers of change in collective beliefs. Memes have also been

described as "roughly equivalent to ideas or representations, that is, the internal aspect of knowledge" (Plotkin, 1994; p. 215); essentially, they are beliefs with a relatively constant core meaning shared by all who are "infected" by them. Various individuals coming together bring different understandings about the world that govern their responses to the environment; through the replication and spread of memes, common understandings of social behavior evolve that go beyond the influence of any one individual and define the unique character of the organizations in which they are members. Carrying the gene analogy further, just as genes combine their effects through interaction and mutual reinforcement, memes might also come together in higher level knowledge structures, or a "bundles" of ideas. The role of the strategic leader in reinforcing shared values/beliefs, and articulating new visions (schema) is thus crucial in understanding the creation and evolution of an organization when viewed as either a brain or a complex adaptive social learning system.

3.2.1. Dialogue and stories as meme phenotypes

Dawkins emphasized memes as the primary focus of the evolutionary process. As in biology, where the focus is on sustained patterns of genes rather than phenotypes (i.e., the physical expression of an organism defined by the genes), with respect to learning the focus of survival and replication in an organization is on the meme; while organizational membership changes over time, organizational learning produces a relatively persistent stock of knowledge within a company. Dawkins described phenotypes as devices in which genes "ride around in"; that is, they are a type of physical embodiment of the effects produced by the genes that define them, providing a means through which genes engage with the environment. Memes should also have an analog to the phenotype, a social or behavioral expression of a meme. These are also referred to as sociotypes (Grant, 1990).

From an organization communication perspective, memes are viewed as the content of messages (including organizational narratives) transferred through the organization (Tompkins, Daniell, & Tompkins, 1997). However, rather than the content of the messages, we see memes as the underlying logic of information, dialogue, and stories transmitted between leaders and followers and among organization members as well as protocols that determine when particular stories are invoked. Memes provide a core set of definitions and cause–effect relationships that form the basis of managerial activity in an organization. Within a specific context, organizational memes clarify the appropriateness of management techniques and organizational technologies and the efficacy of firm strategies and structures; they define the means–ends logic of established activities, the set of crucial organizational values, and an organization's identity. Since stories and dialogue between organizational members are ways in which individuals develop these mental models in companies, they should serve as the memetic phenotypes; the life story schema is a critically important meme that shapes the expression of specific information and narratives that circulate throughout an organization.

Since memes were conceived as a way to apply an evolutionary logic to the spread of information among people, selection pressures are critical in explaining the flows and distribution patterns of knowledge that help shape the character of organizations. The existing logics created by strategic leaders and followers, and shared by organization members, serve as an important selection force on new ideas; as individuals encounter and try to make sense of new information and experience, it is likely that its degree of coherence with existing understandings and expectations will influence its adoption and influence on organizational life. The prevalence of certain mental models among leaders and followers—the degrees to which understandings are shared across a firm—will also influence their selection success. For instance, through socialization processes, recruits repeatedly encounter existing members in an organization who operate under shared assumptions regarding appropriate actions; the result is behavioral convergence across the two groups as those assumptions are replicated in the minds of the newcomers, perpetuating existing norms and values.

As mentioned earlier, due to their position within organizations, whether it is based on formal or informal bases of authority, strategic leaders act as reference signals which provide organizational agents with feedback for their actions, and thus play a central role in the creation and/or perpetuation of memes defining broadly accepted, guiding principles for organizational behavior and action. Because they play a large role in setting the context of the organization, leaders have a significant influence over the types of memes that individuals are repeatedly exposed to, and thus they are important shapers of the selection environment within the organization. They reinforce existing memes by the promotion of dialogue and the telling of stories about significant organizational events, but they also introduce new memes into the organization—by telling new stories or modifying old ones—as they advance their vision of the organization's future. From a meme evolution point of view, strategic leaders are a primary cause of the differential selection of some memes over others; they help define the stories and dialog that support learning by encouraging the survival of their underlying mental representations. Managers can create a context that either supports or prevents

learning, but strategic leadership promotes the evolution of memes that produce a rationale for action that extends beyond an organization's current repertoire of behaviors and routines. The propagation of such strategic leadership-enhancing memes produces an organizational logic that expresses a coherent picture of what the organization could be in the future, and how the future embodies the present and the past.

Proposition 11. *Memes are the mental representations underlying organizational dialogue and stories, and are subject to evolutionary selection forces.*

Proposition 12. *As a significant influence on the context of organizational learning, strategic leaders are viewed as a major source of selection pressure on memes, and are thus a significant influence on the direction of evolution in organizations over time.*

3.3. Caveats

Although the picture presented here shows strategic leadership as a major factor in encouraging organizational learning, a number of issues arise in organizations that actually keep them from changing or that prevent strategic leaders from acting out their roles. First, not all organizations enable/recognize the functional capacity of a complex adaptive system. Frequently, they are structured to operate instead as stable bureaucracies, in the mold of the Weberian-ideal type, defined by stable attractors such as the hierarchy of authority, specialization of tasks, and the formalization of activities into routines. However, the presence of a strategic leader as a "strange attractor, " or through the strategic leaders use of tags and the tagging process, organizations can take on the characteristics of a complex adaptive system.

Second, while strategic leaders may promote dialogue, they also may not fully understand that dialogue. Given their positions within their organizations, their distance from work activities may not give them the perspective needed to fully evaluate the content of dialogue among organization members. One of the implications of the work on communities of practice is that observers of workers on the job may interpret their interactions as not work-related, or even counterproductive, when in fact they may be critically important to accomplish the task at hand. Allowing dialogue to occur unfettered by management editorial control may be difficult to accept but is inevitable given that organizational storytelling is always a joint production between leaders and followers.

Third, stories are never unequivocal accounts of reality. They may not be truly classified as fiction, but they emphasize some aspects of reality over others in building coherence. The autobiographical structure of the stories strategic leaders promote certainly encourages selective attention to events. The act of storytelling also produces outcomes that depend heavily on the situation in which the process occurs. Storytelling produces meaning by focusing the attention of both the storyteller and the listener, and is embedded in the storytelling act itself, the context surrounding the process, and the particular organizational constituencies involved (Boje, 1991, 1995).

Finally, being subject to memetic evolutionary processes, the development of stories is subject to mutation and variation, perhaps in unintended directions. As mentioned above, storytelling efforts throughout an organization are influenced by the context in which they occur. Therefore, the potentially large number of individuals involved in any organization suggests a significant source of inputs and variation in the formation of the organizational life story. There is no guarantee that counter-narratives will not also arise, providing coherent but distinctive accounts from a variety of other voices in an organization, and producing alternative identities and visions. While strategic leaders have a great deal of control over the evolving life story and vision in an organization, they do not have direct and complete control over the generation of organizational narratives. Storytelling is only a loosely determined process for vision formation in organizations.

4. Conclusion

In complex adaptive systems, strategic leaders affect organizational learning and adaptation through their use of tags and the tagging process. By accessing the tagging process, they influence the structure of interactions among organizational and outside agents. In doing so, strategic leaders provide access to new resources and opportunities, explore new ranges in the fitness landscape, and express their vision for the organization. Strategic leaders articulate their visions by telling stories and promoting dialogue in which an organization's past, present, and future coalesce: stories and dialogue about our history; stories and dialogue about who we are; stories and dialogue about who we can become. Storytelling allows individuals to share their explicit knowledge and their implicit understandings, and over time, builds up a cognitive consensuality that

identifies and defines the organization as an entity with a history and future. While an organization's storytelling process provides a strong influence on its direction, the underlying logics of that process and the interaction patterns that support it transform over time through meme evolution. Strategic leaders serve as a reference signal in that evolutionary process, providing a significant selection force in the development of new tags, and consequently, new organizational stories. Through the evolving process of storytelling, strategic leaders achieve innovation and change by demonstrating its legitimacy and consistency with the past. Maintaining this balance—between the past and future, between stability and disorder—allows organizations to evolve and learn, and is the essence of operating successfully at the "edge of chaos."

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