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Donald L. Gilstrap

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Model of Bounded Chaotic Cycling in Emerging System States**

Donald L. Gilstrap
Wichita State University

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LEADERSHIP AND DECISION- MAKING IN TEAM-BASED ORGANIZATIONS: A MODEL OF BOUNDED CHAOTIC CYCLING IN EMERGING SYSTEM STATES

Donald L. Gilstrap

Wichita State University, USA

This article discusses the results of both intrinsic and instrumental case study investigations of team-based leadership and decision-making in an Association of Research Libraries (ARL) institution undergoing dramatic change and restructuring activities. Since team-based models were used extensively within the organization, systems theory is introduced. Chaos theory is next explained as a more robust theoretical framework for analyzing and describing the turbulence and rapid changes encountered by individuals attempting to make sense of these organizational shifts at both the micro and macro levels. Findings of this research suggest that a paradox occurs during periods of restructuring activities in organizations going through significant change: 1) models which are alternatives to traditional hierarchical bureaucracies are necessary for organizations to break from the status quo when confronted with the need for rapid and inclusive decision-making, and 2) organizational structures heavily influenced by self-organizing teams go through recursive phases of expansion, leading to unbounded chaos in leadership and decision-making processes. Employees identified a lack of individual accountability in team-based decision-making, the challenges of leadership at the individual level, and the need for defined supervisory roles were all issues to be addressed for the continued, successful evolution of the organization. As a result of these findings, the author then introduces an iterative, phase state model of chaotic cycling in emerging system states. This model focuses on bounded chaotic systems that blend self-organization with structural feedback mechanisms in leadership and decision-making processes.

INTRODUCTION

The impact of technology and the change it brings in educational settings drives professionals to make fast decisions with large amounts of information. As a result, our schools and colleges are now confronted with rapidly changing and often turbulent system states which have challenged the "century-long domination of the bureaucratic organization" (Travica, 1998: 1224). Academic libraries are one area of our educational institutions that have seen transformational changes as a result of emerging technologies. People working in these types of libraries have managed the conversion of print to digital mediums while continually focusing on evolving professional skill sets that rely more and more heavily on the creation, management, and teaching of digital systems. Viewing this from the perspective of leadership and organizational dynamics is particularly germane to this journal, since some of these libraries, as leadership organizations, have implemented team-based organizational structures to help lead this transformation in research, scholarly communication, and teaching in a digital age. By investigating the challenges and successes of one complex system in particular at the micro level of an institution, we might be able to understand how team-based models can influence organizational change while positively affecting leadership and decision-making at the macro level of educational systems.

Team-based models introduce an evolutionary perspective of adaptation to a continually changing environment, and they have perhaps received most attention from a systems theoretical framework (Senge, 1994, 2004; Yukl, 2002). And the evolution of systems theories has led to research on quantum-oriented chaos and complexity theories which has grown to incorporate new and emerging team structures, ranging from matrix organizations to purely self-organized and self-managed teams. Many researchers have chosen to bridge these theoretical frameworks in order to provide an epistemology more closely associated with nonlinear decision-making and leadership in organizational development (Lazaridou, 2007; Lumby, 2009; Stacey, 1992; Wheatley, 1994). The number of educational institutions that have incorporated the team-based organizational model are still relatively few, and some might argue team-based models in public institutions are altruistic in nature. However, there is a growing amount of studies of team-based models in educational settings represented in the literature on this subject (Baker, Onyx, & Edwards, 2011; Bazirjian & Stanley, 2001; Fullan, 2001; McLaren, 2001; Phipps, 2004; Travica, 1998; Turnbull, 2005; van Ameijde *et al.*, 2009). In spite of arguments for or against the team environment, oftentimes unpredicted phenomena emerge from these organizational structures and subsequent information decision systems after implementation within the larger university structure.

This concept of an evolutionary process of change and adaptability expands upon our current understanding of phenomena associated with transition in our educational institutions. Scientists studying the natural world, such as Prigogine and Stengers (1984), Jantsch (1981), and Bak (1996), have found evolutionary models in the physical and biological sciences in which systems in turbulence become nonlinear, far-from-equilibrium, and unpredictable. In many cases, the chaotic and complex nature of these systems leads individual units to self-organize and facilitate transformative development of the system—where increasing complexity emerges—and the exponential contributions of information management and decision-making are at the heart of these systems. Several other scientists, ranging from cosmologists to computer scientists, have shared similar observations in the natural world in a quantum science that has come to be referred to through the general term complexity theory (Capra, 1997; Favre *et al.*, 1988; Gell-Mann, 1995; Gleick, 1987; Grover *et al.*, 1997; Hayward & Preston, 1999; Holland, 1998; Liu, 1996; Nicolis & Prigogine, 1989; Petersen, 1993; Waldrop, 1992).

Researchers in organizational theory have also shown that institutions undergoing nonlinear and far-from-equilibrium turbulence exhibit many of the features found in the physical and biological sciences. They argue that individuals within these organizational environments act in manners similar to the observations described by scientists studying the natural world (Gilstrap, 2007; Lichtenstein, 2000; MacIntosh and MacLean, 1999, 2001; Morgan, 1997; Newman, 2000; Stacey, 1992). Extending this perspective to research on libraries, Braman (1994) notes that, “because the key feature of this environment is turbulence, theories about chaotic systems may be the most useful base from which to reconceptualize the state” (p. 358). It is therefore the purpose of this research to examine the case of one discrete entity in the context of a larger educational institution. For this particular case study, a research library that has implemented a non-traditional, team-based structure in order to affect transformative changes was chosen from on site case study and individual interviewing. Guided by the general research question “how do research librarians respond to their organizational structure” (Gilstrap, 2007b), this article identifies specifically the impact and effects of this structure on leadership and decision-making in this organization. Equally, this study analyzes these phenomena through an interpretive framework of complexity theory, and a model of bounded cycling in chaotic systems is then introduced as a method for further research on the outcomes of team-based leadership and decision-making in educational institutions.

LITERATURE REVIEW

Complex systems are systems that have structure with variation and can include dissipative structures and chaotic systems. They are typically nonlinear, and only a limited explanation of a complex system's properties is obtainable by studying discretely its component parts. Complex systems are oftentimes bounded by simple rules which lead to patterns and relationships during the phenomenon of self-organization, frequently occurring at the point just before entering a chaotic phase (Bak, 1996; Prigogine & Stengers, 1984; Waldrop, 1992). They contain simultaneous order and disorder that promote transformative bifurcations in the system state, and it is at this bifurcation point where supracritical self-organization leads system agents to choose collectively the next irreversible path for the system (Bak, 1996; Prigogine & Stengers, 1984) (Figure 1). This presented a paradox within the scientific and social sciences communities, as entropy production is normally considered to be destructive rather than as a catalyst for creating further structure (Gilstrap, 2007; Langlois, 1982; Liu, 1996; Rothman, 1997). And these phenomena have also been documented in the literature on management of information systems and organizational structures in libraries and information agencies, as is the case with this research study (Braman, 1994; Hayward & Preston, 1999; Langlois, 1982; Liu, 1996; Travica, 1998).

Chaos theory, a sub-set of complexity theory, has evolved from the mathematical and geometrical investigations of Lorenz (1963) and Mandelbrot (1975) and has been mainstreamed in the scientific and social and behavioral sciences communities (Grover *et al.*, 1997; Hayward & Preston, 1999; Lazaridou, 2007; Lumby, 2009). In near-equilibrium systems, a very large shock to the system is needed to move it into a non-equilibrium state. However, when a system operates in a chaotic state, the system becomes highly sensitive to initial conditions which can lead to unpredictable, complex structural changes. This concept is most commonly known through the Lorenz



Figure 1 Feigenbaum Bifurcation Diagram
(Adapted from Gerry's Mandelbrot Set)

Butterfly Effect, showing a chaotic system's movement toward a basin of attraction (Figure 2), and Mandelbrot Sets, where recursivity in chaotic geometrical processes contributes to higher order development of the system state (Figure 3).

Reinforcing aspects of strange attractors within chaotic systems, such as with the Lorenz attractor, the introduction of the parameters by the observer influences the subsequent phenomena the complex system presents. Consequently, as with wave-particle duality in physical systems, researchers cannot extricate themselves from the emergence of the complex system. From a human behavior focused framework, the interaction between the researcher and the information system extends research such as Schön's (1971, 1991) focus on reflective practice. Equally, Argyris & Schön's (1978) concept of second-order learning in organizations highlights the complex system in individual contributions to learning how to learn about the organization rather than replicating learning models that facilitate further error creation. This focus on an epistemological framework of organizational learning exemplifies the works of social scientists on meaning-making, sense making, and knowledge utilization (Fullan, 2001; Langlois, 1982; Lazaridou, 2007; Lumby, 2009; Piggot-Irvine, 2010; Solomon, 1997) while equally helping to drive this study's findings.

In management literature on chaos and complexity theory, several articles have been written that follow similar interpretive analyses as are used in this study. Levy (1994) was one of the original researchers to introduce the application of the theory in strategic management processes and relies on the scientific works of Per Bak (Bak & Chen, 1991) from which this study also interprets conclusions. Perhaps most importantly, Levy (1994) focuses on a phase-based model of chaos theory that relies

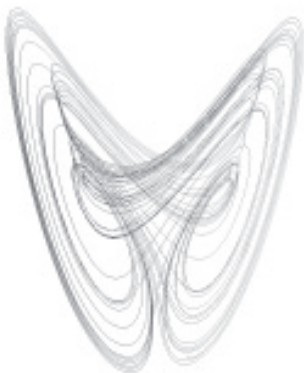


Figure 2 Lorenz Attractor
(Adapted from Gerry's Mandelbrot Set)

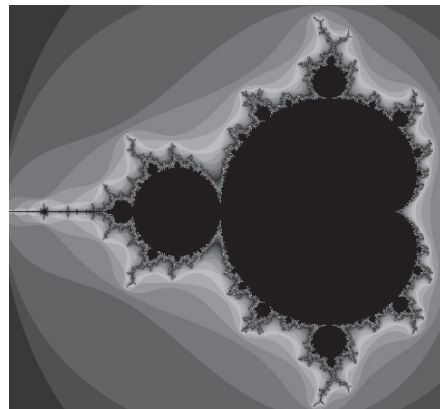


Figure 3 Mandelbrot Set
(Adapted from XaOS)

on the history of experiences among and between system agents for explanation of the organizational state, similar to the case study analysis presented in this research. Moreover, several other leadership and management researchers have utilized complexity theory as a framework for describing organizational transformation. MacIntosh & MacLean, (1999, 2001) have interpreted systemic dissipative structures through conditioned emergence, where organizational parameters are set up in a way to elicit supercritical activities, leading to bifurcations in the system state. Newman (2000) incorporated dissipative structures as a path for returning epistemologically to Argyris & Schön's (1978) theory of second order learning during institutional upheaval. Breu and Benwell (1999) analyzed individual hypercritical states that contribute to organizational nonlinearity, and Stacey (1992) described any organization going through turbulence as exhibiting features and phenomena of chaotic systems. This literature is therefore influential in the interpretation of the phenomena that emerged during this case study.

Although leadership is generally understood by those in administrative positions, an individual's perceptions of and subsequent contributions to knowledge about this construct are usually shallow at best. Since leadership is integral to decision-making processes, an investigation of participant perceptions of leadership in their organization is also included. Furthermore, the epistemological framework for leadership theory is multi-faceted; therefore, a broad literature base is included in this study to provide a foundation for understanding the many ways leadership can emerge in an organization going through change. Blake and Mouton's (1981a, 1981b) attribute theory describes leadership attributes in relation to leadership styles. Hersey and Blanchard's (1993) situational theory matches leadership behavior to follower readiness and skill levels. Burns (1979, 2003) focus on transformational leadership helps the reader to understand wide-scale organizational change. Argyris and Schön's (1978) action research, van Ameijde *et al.*'s (2009) distributed leadership, Senge's (1994, 2004) systems framework, and Checkland's (1999) soft systems each provide a theoretical lens for facilitating organizational learning. Bass (1998) differentiates between and Shamir, House, and Arthur's (1993) integration of transactional, transformational, and charismatic leadership in organizational improvement. And finally, MacIntosh and MacLean (1999, 2001), Pascale, Millemann, and Gioja (2000), Fullan (2001), and Stacey (1992, 2003) each provide a framework of chaos and complexity analysis of leadership and group dynamics in organizations going through turbulent change.

METHOD

An Association of Research Libraries (ARL) institution of higher education using a team-based structure while also undergoing a transformative change process was identified for case study research. The library system in this study falls in the median among ARL peers, is part of a public research institution of higher education with the Carnegie Classification of very high research activity, and has an FTE enrollment of approximately 30,000 students. As a requirement for institutional review board policies, participant responses are treated anonymously, and the library is given the pseudonym "East Coast University (ECU) Libraries" in order to preserve further the anonymity of the participants. Preliminary surveys were sent to approximately 60 professional librarians at this institution that asked participants to describe the concept of change in their library. The completed surveys received by this author helped further narrow participants in the study through purposive sampling, based on the richness of descriptions in participant responses (Denzin & Lincoln, 2005). Seventeen librarians were chosen for on-site interviews, and a nonlinear clustering technique (Pegg, 2007; Rico, 2000) and semi-structured interview guide were integrated into the interviewing protocol. Individual interviews lasted approximately one to one and one-half hours for each participant. Any further detail on selection of the institution, the participants, or data collection would violate institutional review board policies at both the host and researcher's universities.

Instrumental case studies of each research subject were coordinated into an intrinsic case study of the organization, and phenomena that emerged through analysis were aggregated through fractal-based collective case study method (Gilstrap, 2009; Stake, 1995, 2005, 2006). Data were equally analyzed using multiple methods in order to decrease the influence of this researcher, including constant comparison, multiple researchers, and data triangulation (Denzin & Lincoln, 2005). Although this study more broadly incorporated several other areas of investigation, the main focus of this article addresses the general research question, how do these individuals respond to their organizational structure? (Gilstrap, 2007b). Data are then presented in a complex systems analysis specifically focused on leadership and decision-making in this organization in particular.

FINDINGS: DECISION-MAKING IN THE TEAM ENVIRONMENT

Description Of The Organizational System State

In order to capture a representation of this educational organization in the presentation of findings, it is first necessary to describe the current organization in terms of the historical development of the complex system state (Simon, 1985). The ECU Libraries have gone through two identified reorganizations over the past 15 years. Previous to the early 1990s, the library operated with a traditional hierarchical organizational structure. The organization was divided into two main units, technical services and public services, and all librarians reported to one of these two units which were administered by associate deans. Upon the arrival of a new director, during the 1990s, a significant reorganization took place, moving the ECU Libraries to a team-based environment. Library and university administrators, as well as library staff, had identified that departments within the library had become cloistered and were no longer functioning at a progressive enough level to respond to decision-making and information flows imposed by a rapidly evolving and turbulent environment. This new team-based structure shifted reporting lines and opened up communication channels between areas previously seen as isolated from each other. The two main units of technical and public services were replaced with several new units that were oriented toward organizational functions.

The library incorporated several different types of teams, similar to those discussed by Yukl (2002). Cross-functional teams involved individuals from different areas that came together to work on organizational-wide goals and initiatives. Self-managed teams also developed based on identified organizational needs for short periods. Area teams were created to facilitate implementation of the new organizational structure while leading the work in the newly created units through a process of shared leadership and decision-making. And functional teams were designed to focus the shared specialization of particular groups of people toward discrete decision-making tasks. Organizational goals and priorities were also developed primarily by the cross-functional and area teams, and this mechanism was in place to identify and implement the strategic planning process.

In addition to the evolving environment of research, teaching, and learning, the financial crises experienced by institutions across the country during the beginning of the twenty-first century precipitated the need for further organizational restructuring at the ECU Libraries. While university budgets grew static, inflation in the publishing sector, as well as escalating costs associated with maintaining a print and a digital re-

search library, led to further organizational transformation. Financial crises are something that most librarians understand, and the event brings people together out of necessity as one study participant commented:

The inclination is towards maintaining the status quo: entropy. People left to their own devices are, in my opinion, not going to be individual change initiators. So it takes something to jolt them.

At the time of this research, the ECU Libraries had gone through another reorganization within the past two years. This restructuring was less dramatic than the previous reorganization, and several librarians commented that it was a slow incorporation of more hierarchy within an otherwise pure, team-based structure. The organization had again changed its frame of reference for operating and managing decision-making in the twenty-first century.

Decision-Making Challenges With The Team Environment

Several factors contributed to the need to readdress the functionality of the previous pure team organizational structure. In many ways, the creation of the original area teams had been a catalyst for creating new centers for decision-making within the organization. Although the structure that came out of the original reorganization was necessary to respond to rapid information processing in the organization, eventually the areas were susceptible to entropy with some of the same types of habits found in the previous traditional organizational structure. Equally, the first reorganization to the team environment was needed to handle wide-scale information management of both print and digital resources in the library. However, the model did not always work for information processing tasks that required human intervention, as vendors had not yet provided mechanisms for replacement of some of these functions.

The first reorganization contributed greatly to needed changes at the branch libraries by removing them from local isolation, expanding the flow of intra-organizational information, and integrating them further into a library wide system. However, since the branch libraries often performed most of the responsibilities associated with the main library, it was sometimes difficult to replicate the team-based model with small staffs. Additionally, when staff from the branch libraries participated in team-based decision-making in the main library, there were not enough personnel available to attend all of the meetings. Consequently, branch librarians who participated in library wide teams approached team decision-making from the micro view of their own individual libraries, and, as a result, it became difficult for them to focus on the macro level of the system.

The overall strategic planning process of the university sometimes conflicted with the team decision-making structures of the library. In particular, the process of developing library wide goals became increasingly problematic, and the organization had difficulty reconciling this process within the latest organizational structure. Library wide goals are tied to merit pay, which makes the identification and creation of new goals very competitive. Librarians in this study noted that, after the first reorganization, the concept had been used effectively for a number of years to make needed changes while rewarding those individuals willing to take on significant challenges. However, recently, several study participants commented that the goals process had become more of a tool taken out of context by a few individuals to prosper at the expense of others' whose work was affected but who were not equally rewarded. Hayward and Preston (1999) draw attention to Friedman's (1953) work on positivist economics, arguing that strong market forces will move individuals toward "optimizing behavior" (p. 175). Consequently, librarians in this study identified that enough focus was now being placed on the library wide goals by individuals—and associated merit pay—that the ideal of teams working across functions to accomplish system wide decision-making had started to diminish.

The Challenges Of Decision-Making In The Current System State

Organizations operating in a team environment place a large degree of responsibility for decision-making at the individual team level. The concept of an academic unit utilizing a team structure in a campus organizational framework that, overall, maintains traditional strategic planning processes creates an intra-organizational challenge. One of the issues that arose from the team environment at the ECU Libraries pertains to linearity in reversing decisions that have already been made. Since the team environment encourages group decision-making, ultimately decisions affecting the ECU Libraries system have been primarily accepted with consensus among the group, and reaching this point of consensus often involves lengthy dialogue and extended work. After a decision to take on a library wide project had been made, it was viewed as an organizational decision. Therefore, if a project began to suffer from faulty problem-solving structuration, it was difficult in the pure team model to reverse and repeat this entire decision-making process. In effect, as is the case with complex systems, decision-making is irreversible in the sense that it does not follow the same ontological structuration as classical systems. Furthermore, it was difficult for the library's director, who encouraged group decision-making, to provide executive decisions that contradicted the group decision when projects were not reaching their full potential.

System Structure As A Catalyst For Change

Breaking from hierarchical structures to incorporate team-based leadership and decision-making can bring several challenges to a traditional educational environment (Piggot-Irvine, 2010;). The organizational structure of the ECU Libraries has changed in the past two years based on continued information audits of the effectiveness of the team environment. Primarily, the organization has moved toward a blended model of both team-based and hierarchical structures. Accountability within and among teams became a paramount issue during the evolution of the first reorganization. Team-based structures were kept in place during the latest reorganization; however, the most significant aspect of this change pertains to position hierarchy within teams. As one study participant commented:

It used to really be more team-based, and there were rotating team leaders. The ECU Libraries does seem to be integrating more hierarchical structure now, and I appreciate this.

Whereas leaders of teams previously rotated over given periods, area teams in particular now have supervisory team leaders who do not change. Many of the study participants believe that this adds a level of stability to the fast-paced information flows and decision-making structures of teams while shifting how accountability is defined toward this supervisor.

Previous challenges in decision-making have also begun to be addressed through the new organizational structure. Decision-making continues to take place in open forums where the leadership council extends decision processing to the group. However, there is now much more flexibility in changing decisions rapidly. During particularly sensitive issues, or issues that arise during times of project crisis, the directors, as well as the area team leaders, now have much more latitude to step in and make critical decisions that stop projects, move them in different directions, or create new projects based on the changing environment. The hierarchy built into the team decision-making process equally allows for faster changes in strategic planning. Where goals and objectives previously fell on an annual cycle, they now can be modified more easily throughout the year if the environment changes. Equally, while still participating in the overall system organizational structure, branch libraries have been given more autonomy to apply aspects of the team environment that are relevant for their particular location. Where applicable, participation with satellite campus administrative units has also been encouraged as a mutual partnership in the development of these libraries.

Another phenomenon that emerged as a result of the pure team structure was the exponential creation of teams. Self-managed teams typically arose spontaneously in the organization, and, during the beginning phases of the first reorganization, this was viewed as a welcome and progressive change by most study participants. However, over time, it was perceived by several librarians that the number of self-managed teams had saturated the organizational structure. As the director pointed out:

I think when we started, a lot of us were sixties idealists. And we thought that people would buy in conceptually to the idea of being self-leading, self-motivating, self-directing, self-accounting. And the reality was that they liked the idea of not being supervised, but they didn't necessarily like the idea of being held accountable themselves.

In effect, the team-based structure had reached a critical point where the number of self-managed teams being created spontaneously was beginning to interfere with the decision-making of functional and area teams. As a result, the new reorganization dampened the ability to create self-managed teams as easily while integrating more structures for approval of the creation of teams in the decision-making process. Librarians still have the ability to create informal, self-managed teams to investigate the evolving research environment. However, priority and accountability focus more on the work of functional, cross-functional, and area teams. Self-managed teams are subsequently shifting focus toward discovery and dialogue about emerging issues and needs rather than the development and implementation of projects and tasks.

Reactions To The New System Structures

With the two structural reorganizations that have taken place at the ECU Libraries over the past fifteen years, it is expected that librarians might respond pessimistically about these types of major changes. Overall, these study participants' perceptions of both reorganizations have been mostly positive. In some ways, the latest reorganization has put structures into place in areas that needed more definition and emphasis. As an example, the blending of the team-based environment with hierarchical structures has allowed librarians to gain more focus through awareness of supervisory roles. As one participant explained, "to have someone strategically placed who is highly supportive of the work that I do is very important to me."

The new reorganization has also placed a greater emphasis on leadership and decision-making by individuals operating within the organization. During the previous reorganization, the team-based environment was used to break down territorialism

and rigid hierarchies while bringing people together in the decision-making process. The focus had shifted more to the team rather than the individual, as it was viewed as a necessary step in the process to facilitate the changes needed at that time. Now that the team-based environment has had more time to mature, the latest reorganization has encouraged more emphasis on the micro level of individual accountability. In addition to increasing accountability within teams, more accountability for the individual is encouraged, similar to Piggot-Irvine's (2010) evaluation of individual appraisal in learning organizations. And as Solomon (1997) has argued, "the contribution of individuals to the social in sense making and the way that people develop meaning is influenced by their sense making styles, which brings together the influence of organizational norms and roles with the cognitive, affective, and conative (action instincts) of people" (p. 1137). By allowing librarians to reflect critically on the necessity of change for themselves as individuals, they are able to strengthen the core foundation of the originally adopted team-based environment while addressing their individual roles within system wide leadership and decision-making.

In some ways, this latest reorganization has been a more difficult process for employees. During the original reorganization to a team-based environment, a systems-oriented method was implemented to help the library grow as a learning organization. After the latest reorganization, more emphasis was placed on determining what roles librarians would continue with, add to, or remove from the organization. Faced with a changing research environment and limited resources, librarians now have had to choose which work they will stop doing in order to focus on the adaptation of the organization. And unlike in the past, where technology was integrated along side print resources, librarians now visually see print collections disappearing from the physical library to be replaced by new technology, areas that promote collaborative research among students and faculty, and instructional places to help guide students toward the virtual research environment. In spite of any criticisms librarians might have about the blended organizational structure, most all participants in this study expressed their satisfaction with this structure, as exemplified in the statement by one librarian:

I think those changes—the organizational structure, change in the culture, empowerment—those are all the pieces that are moving us towards a better place.

The consecutive reorganizations have also challenged professional thinking and subsequent decision-making to explore the deeper levels of meaning making around the purpose of the library as an organization while helping position the organization for continual adaptation in the future.

LEADERSHIP AS A SHARED EXPERIENCE

The role of leadership has received increasing scrutiny in both business and higher education communities over the past several years. During recent times when higher education budgets in the United States have suffered from funding decreases at both federal and state levels, institutional administrators have been placed in situations where they must provide new, student oriented programs and services with fewer resources. This has placed the need for increased contributions for the leadership of the university at more organizational levels than were previously expected many years ago. Along these same lines, another theme that emerged from participant interviews in this study dealt with the contributions of the librarians as individuals to the leadership of the ECU Libraries. Several librarians identified the roles individuals play in leadership, and some also identified their contributions to the leadership of the library in lesser, discrete ways. Still others struggled with the concept of leadership in a team-based environment while suggesting the need for a better understanding of leadership at the individual level. And a few participants identified that the concept of leadership is very important to the future of ARL libraries in general while, at the same time, noted that professional values and organizational structures of progressive institutions contribute to an impending leadership crisis.

Identification Of Leadership Roles At The Individual Level

Leadership is a difficult concept to understand and is frequently misunderstood as the more general terms of management or administration in higher education. Since this focus reserves leadership for administrative levels, it is understandable that identification of leadership roles at the individual level can be problematic. Interestingly, several of the participants noted that they feel they contribute, and sometimes significantly, to the leadership of the ECU Libraries. Since the organization utilizes a blended team-based environment, the generation of cross-functional teams combined with autonomy in budgeting by these teams enable librarians from seemingly disparate areas of the organization to take on the leadership of significant projects collectively. However, Bill, who works in administration, stated that it becomes difficult to assess one's own leadership skills, because "people don't really tell you when you aren't doing well, where you are failing, or when you are not living up to peoples' expectations." As a result, while leadership is tacitly expected among librarians working in a team environment, the contributions to leadership at the individual level are difficult to assess in this organization.

In the absence of formal assessment mechanisms, other librarians self-identified that they are participants in the leadership of the library. Several study participants noted that leadership is revealed in the projection of an individual's desire to reflect the same level of commitment and professional attitudes he or she would like to see colleagues exhibit. Other participants identified that maintaining a scholarly level of knowledge in their own areas at the national level contributes to the leadership of the library by serving as an expert in a particular field. And still other librarians found that synthesizing their individual experiences with the descriptions of their colleagues' experiences leads to a process of shared leadership. As an example, Lisa, who serves as an administrator, stated that the people in her area work very well both within their area and with others throughout the organization by increasing the understanding of individual experiences. She argued that this is one of the leadership skills she is most proud of, because people are able to make these connections and come together as a group to solve problems and initiate change. Understanding leadership also involves the influence of the organization in which a person works. For some librarians, their participation in the ECU Libraries' organizational structure has led them through a transitional process of leadership recognition. As an example, Laura stated that she used to view leadership as associated primarily with the person at the top of the organization. Now she believes leadership deals much more with empowerment and support. As a result, practicing leadership through helping others distribute work and contributing to organizational changes is viewed as one component of leadership in this organization.

Leadership In Small Ways

The identification of the self in the role of leadership can prove illusive in higher education, especially for those individuals who do not supervise others. The most common example of this is, when asked about leadership, an individual responds with descriptions of his or her supervisor. In a team-based organization this becomes more problematic, since the absence of traditional hierarchies conflates the paradox of leadership in an organic environment. Several study participants expressed this confusion with the concept of leadership. As one example, Christina, who works in a non-supervisory position, noted that she has difficulties disassociating "leadership" from "administration," but she also commented that she is very effective at initiating change and guiding the change process. James stated that, although he does not have supervisory responsibilities, his work on cross-functional teams with librarians from other areas of the organization in the past helped him to lead in ways that directly contributed to achieving system-wide goals. Equally, Katherine felt that she contributes to

the leadership of the library by trying to help her colleagues see things in terms of possibilities. Each of these cases alludes to the idea that individuals are contributing to the leadership of the organization, but many do not recognize it in themselves.

Connecting Leadership To Decision-Making In The Team Environment

As shown earlier, decision-making serves as a primary venue for librarians to participate in the leadership of the organization. Several study participants identified that decision-making provides them with leadership opportunities that might otherwise be difficult within which to participate. As examples, Lisa felt she brings expertise in certain areas that other librarians rely on for decision-making and goal accomplishment. She argued that when others see her engaged in the change process, they transfer leadership roles to her. As a result, when individuals see their colleagues promoting the success of the organization, they transfer their own power to those they feel will be most able to achieve goals.

Critical reflection and mentoring are other components of the leadership of the ECU Libraries in decision-making. A few participants commented that they contribute to the leadership of the library by helping their colleagues critically reflect on organizational development, as well as professional development at the individual level. As an example, Richard stated that he consciously tries to learn the work styles and personalities of his colleagues and subsequently caters his communication patterns toward their styles in order to help them reflect critically on opportunities to make projects work successfully. Equally, a few participants believed they serve in a mentoring capacity for their colleagues they feel need help adjusting to all the changes that take place in the organization. Quite poignantly, Richard commented on the steps he has had to go to in order to save a colleague during an open decision-making meeting who might be jeopardizing his or her own credibility:

It might be vulgar to say, but sometimes I feel I have reduced my colleagues to the level where I thought they might pee on the floor if I didn't get them out of that meeting [laughing]. Then I worry, do I need to spend even more time with these people to help them reach this level?

So although mentoring can be critical to the leadership and decision-making within the organization, critical reflection at the individual level must accompany these opportunities for professional guidance.

A challenge to leadership in a team-based organization also arises from the expectations of consensus as well as accountability in decision-making. Study participants noted that, when consensus breaks down due to polarizing issues, someone is still expected to make a decision upon which not everyone agrees. Still other participants find that leadership in decision-making places more emphasis on holding people accountable for actually making decisions. Patricia felt that, in a team-based environment, everyone believes consensus must be reached during the decision-making process, or, consequently, the decision must be modified or tabled until people can all agree. What Patricia identified as particularly frustrating is that people who do not serve in administrative roles sometimes do not believe they are leaders and subsequently feel that they should not have to make difficult decisions.

The Challenge Of Leadership At The Individual Level

Leadership continues to be a challenge for these study participants when viewed in the context of the individual. Even the director finds issues of leadership particularly problematic in research libraries. As an example, Philip stated that, in spite of the team-based environment, it becomes difficult for librarians to comprehend and engage in shared leadership when so much of their knowledge of "leadership" is associated with previous experiences with traditional administration and hierarchy during much of their lives. Additionally, librarians new to the profession often have difficulty adjusting to leadership positions. Formal reporting lines have allowed them greater access to needed mentoring from their supervisors, while supervisors have had more direct authority to point new professionals toward projects which they feel will give them greater opportunities to succeed in leadership roles. Equally, new reporting lines seem to "make more sense" to study participants who previously might have been directed by team leaders who had little knowledge of an individual's day to day work.

The ECU Libraries are also unique in their culture and organizational structure compared to most other ARL institutions of higher education. It is interesting that, in a team environment, the concept of leadership at the individual level is still unexplored to some extent. As an example, David stated that many librarians cannot seem to grasp how much this organizational model "requires and expects them to share in the leadership of the library." Some librarians, however, hold on to engrained structures of the past that focus on hierarchy, implying that only a few people at the top should actually make decisions. As contrary as this might seem to the team environment, David noticed that, "Librarians want administrators to tell them what to do, and administrators just can't do that. It would be silly. It's the X theory of management." Librarians at ECU have been trying to escape from the grasp of the Theory X organizational structure, but it still

encompasses so much of human thinking. As a result, David argued that part of the reason hierarchy has been reintroduced into the team-based organizational structure is to provide a frame of reference for librarians when challenged by the concept of individual leadership which seems so foreign to them. As another example, Paul, who manages a branch library, noted that the practice of leadership focuses on helping other individuals to become their own leaders, stating “I’m kind of like the sherpa [laughing]—I take people up the mountain, but they have to carry their own load.”

This process of critically reflecting on leadership at the individual level becomes paramount to the success of the team structure. During the first reorganization, the librarians easily learned to embrace the concept of empowerment. After the second reorganization, librarians are now learning to act on that empowerment by learning to practice shared leadership. However, the process of reflecting on the self during the investigation of the organization must contain an introspective view of leadership as a phenomenon. As an example, Richard notes the tendency in all research libraries is to direct complaints about the functional aspects of the organization toward people in higher positions in the hierarchical structure as a way to place blame:

Like many people, I don't think I'm suitably recognized by my ultimate boss for my true value, and I feel his contempt. And then I realize that that's probably irrational. And then I think, "do people who work with me feel like they get recognized for their true value?" And then I realize that I'm probably not as good at that as I might be. So I say to them, "you know you could lighten up on your boss" [laughing].

By critically reflecting on their own experiences, while integrating the experiences of others, librarians are therefore able to grasp the realistic demands of leadership as a shared experience at the ECU Libraries.

ANALYSIS AND DISCUSSION

The Complexity Of Leadership In An Emergent Organization

Leadership was viewed differently among the study participants, and some individuals are still struggling with the concept of shared leadership. This is indicated in the responses where participants tended to identify supervisors over self as leaders in the organization or where they noted that the team model has led people to believe leaders do not exist in this type of environment. Equally, the challenge of leadership was identified by some study participants to be important for the future of research libraries, because “horizontal opportunities” in both library and professional

organization settings limit opportunities to mentor new library leaders in the future. Moreover, study participants' general understanding of leadership, its difference from management, and its contribution to the development of the organization were observed by this researcher to still be in nascent stages. Study participants believed that a return to foundational leadership knowledge needs to be explored in order to understand more fully the concept of shared leader as a frame of reference for future organizational development.

Attribute theory in leadership proved to be a problematic finding during the course of this research. At the highest levels of the library's administration, librarians identified that research on attribute theories of leadership in library science (Hernon, Powell, & Young, 1991, 1992) had reached unrealistic levels of expectations. Moreover, the concept of matching the leadership attributes of individuals based on issues of concern for people and production, as suggested by Blake, Mouton, and Williams (1981; Blake & Mouton, 1978, 1981a, 1985), emerged idiosyncratically or as consensus balance between the two factors in the instrumental cases of the study participants. Analysis of this observation might suggest that, when leadership activities did contribute to attribute theory, it reflected the constituency-centered plot 5.5 on the Managerial Grid III (Blake & Mouton, 1985: 12). This finding is not strongly supported, as the consensus approach to leadership typically reflects maintenance of the status quo in organizations (Blake & Mouton, 1985). Alternate interpretations of this finding might also suggest that the "status quo" at the ECU Libraries is one of constant change or that leadership takes place among many individuals within the organization, thereby reflecting the consensus attribute of the group rather than a few administrators.

This interpretation, however, does support Blake and Mouton's (1981b) normative decision model in that convergence toward group norms has taken place. Since attribute theory tended to be identified idiosyncratically and less commonly among the study's participants, it is difficult to assess to what extent this theory contributed to leadership during this research study. Of the participants who commented on their contributions to the leadership of the organization, some librarians did identify that they adapt their own leadership styles to the readiness and willingness levels of particular individuals with whom they work. Furthermore, the incorporation of a blended organizational structure might imply that individuals arriving new to the ECU Libraries, and who are unfamiliar with the team environment, have lower situational leadership readiness levels which therefore requires more directive leadership within the organization (Hersey & Blanchard, 1993). These findings suggest that situational leadership is being practiced in the ECU Libraries despite formal training or understanding of the theory.

Transformational and charismatic leadership, however, were observed to be taking place during the course of this research. Albeit, the intentional use of simultaneous transactional and transformational leadership factors (Bass, 1998) was not strongly supported in this study. In particular, issues generally associated with transactional leadership, such as contingent reward and management by exception, primarily emerged as a result of group decision-making rather than as individual leadership methods. This finding also supports Bass's (1998) own findings that transactional characteristics correlate far less than transformational leadership with follower evaluations of leaders when many organizational variables are involved. In the case of the ECU Libraries, however, transformational and charismatic leadership were identified by study participants as leadership attributes of mid-level managers and senior level administrators in the library. These participants commented on the high levels of praise and motivation their bosses would inspire in them as followers with one librarian stating, "it just makes you want to achieve—it makes you want to work for him." These types of comments relate to Burns' (1979, 2003) and Bass' (1998) work on leadership theory, where transformational and charismatic leaders seek out ways not only to support followers but to inspire them to find purpose beyond individual needs in an effort to move the organization toward change.

It can also be argued that the librarians exhibit qualities of complexity leadership, whether intentionally recognized or by serendipitous discovery. The organization has for many years moved toward a systems framework for understanding similar to the learning organization described by Senge (1994, 2004). Equally, the study participants seek out ways to foster communication at all levels on issues that do not have clear goals and objectives, or as Checkland (1999) describes as Soft Systems methodology. It would seem, therefore, that a natural evolution from this systems frame of reference would include aspects of complexity leadership theory. These findings suggests might suggest that, ultimately, an integrative theory of charismatic leadership, such as that proposed by Shamir, House, and Arthur (1993), might be in process in this organization. However, more research testing this hypothesis would be needed to conclude this position with certainty.

Bounded Chaos:

Blending Self-Organizing Systems With Structural Feedback Mechanisms

The findings of this study suggest that the organizational transformations that have taken place at the ECU Libraries have been accompanied by watershed events. These events have included radical reorganization, changes in information access and ownership, and financial exigency as precipitators. As Prigogine and Stengers (1984) have

found in dissipative structures, a significant catalyst is needed to move individual agents away from equilibrium, creating enough turbulence that the system bifurcates towards new levels of development. Otherwise, the equilibrium-oriented aspects of the system will return individual agents to a stable environment. In participants' descriptions of the first organizational restructuring that took place during the 1990s, the massive impact of a significantly different organizational structure became the catalyst for this type of dissipative bifurcation. Organizational decision-making, as well as leadership and professional expectations, among librarians changed dramatically from the traditional organizational structures that had existed previously.

The second organizational restructuring that took place in recent years was much more subtle. Several participants noted that aspects of this new, blended organizational style are starting to take hold. The language used to describe this phenomenon parallels the response mechanisms within a chaotic system where sensitivity to initial conditions can lead to transformational outcomes. In Lorenz's (1963) description of phase sequences in non-conservative systems, it must be noted that bounded chaotic systems moving toward equilibrium have the potential to fluctuate in quasi-periodic behavior that resembles the history of the system, or what Prigogine & Stengers (1984) describe as self-referencing in dissipative structures. Much like observations of fractal patterns, which can exhibit characteristics of complexity at both the micro and macro levels (Mandelbrot, 1975), in the case of this organization, this phenomenon can be interpreted as two levels of the university system. In the first observation, librarians had moved toward a cycle of unbounded, far-from-equilibrium activity as a result of the first reorganization which had produced so much change in organizational structures, culture, and thinking. However, increasing cycles of self-organization processes made it more and more difficult to control for the accomplishment of organizational objectives. The blending of hierarchy and the team model, therefore, allowed for system parameters to bound the system and avoid the possibility of organizational drift as a negative consequence of operating in an environment of unbounded instability.

In the second observation, study participants described limitations in decision-making and in their abilities to move the organization forward in terms of external control mechanisms primarily associated with the university structure. Inference can be made that the ECU Libraries are still bounded by the traditional hierarchical structures of the university system at large even though librarians operate in a self-organizing manner and exhibit many characteristics of individual agents interacting within a complex, nonlinear system. This latest reorganization could be viewed as one aspect of an internal response mechanism to the university system and subsequent state

agency control parameters. In both cases, this movement away from far-from-equilibrium conditions might have been necessary to respond to influences both within the library and the university system.

On one hand, the blending of hierarchical with team models could provide an organizational framework for educators to operate and manage decision-making in cycling states of bounded chaos (see Figure 4) while limiting system parameters from moving the organization toward unbounded, far-from-equilibrium conditions. On the other hand, human systems have a natural tendency to move toward the previous stable system state, even when it conflicts with the survival of the system (Ashby, 1956; Blake & Mouton, 1981b; Cummings, 1980; Pascale, Millemann, & Gioja, 2000; Simon, 1985; Stacey, 1992). Consequently, the control mechanisms or responses to the environment can allow the organization to drift towards equilibrium conditions. Furthermore, several participants identified that the control mechanisms of autocracy are ingrained in the profession and that librarians at ECU have to work extremely hard to move away from this framework. In dissipative structures, a return toward equilibrium is often a result of transformative events that occur due to far-from-equilibrium conditions (Prigogine, 1980; Prigogine & Stengers, 1984). Similarly, as Lewin (1956) suggested in field theory, the latest organizational restructuring may be emphasizing a “refreezing” stage. However, what distinguishes complexity theory from field theory is that the critical nature of self-organization moves individuals toward what Guastello, Dooley, and Goldstein (1995) describe as a constant framework of change given the existence of far-from-equilibrium conditions. After organizational restructuring activities, the newly emerging environment observed at the ECU Libraries might provide

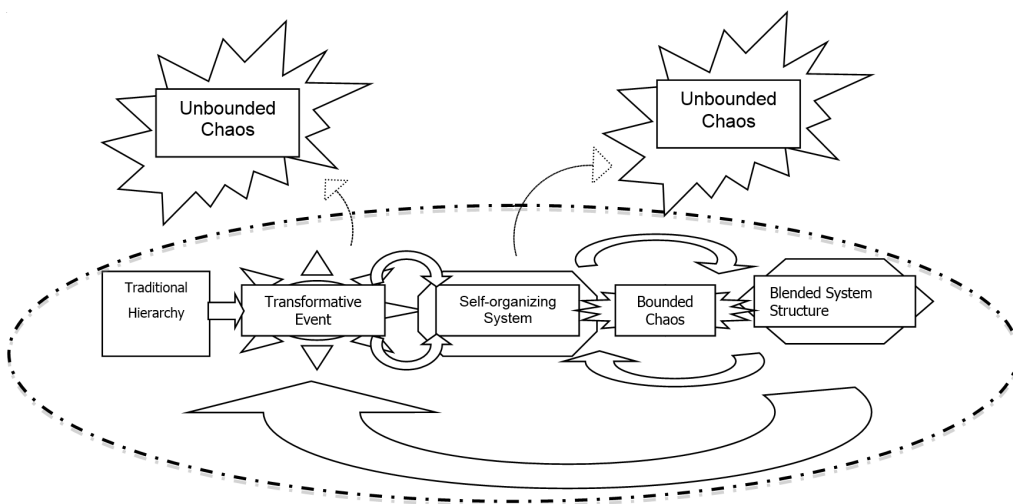


Figure 4 Model of Chaotic Cycling in Emerging System States

an example of a necessary phase state for individuals at other educational organizations to “catch their breath.” Continual evaluation of an organization from the frame of reference of moving away from equilibrium and toward the positive impacts of self-organization is necessary in educational settings, such as in this case, to prevent the reestablishment of outdated professional practices from which individuals originally tried to escape.

This latest blend of the team environment with hierarchical structures at ECU also leads to a further observation for decision-making and organizational development in the future. At one end of the spectrum, traditional hierarchies can contribute to how individuals apply normative decision-making models and subsequently move their organization toward equilibrium. At the other end of the spectrum, self-organizing systems move organizations toward far-from-equilibrium conditions. With this type of transformative organizational shift, significant turbulence and stress arise from individuals interacting and managing decision-making in this environment. As the director noted, the purely self-managed team environment might be an ideal to which all educational institutions should strive, but its application and subsequent decision-making are very difficult to achieve in practice. At the same time, this environment might be considered utopian, particularly when viewed within the framework of traditional university bureaucracies.

Consequently, the results of this study might imply that transformative organizational shifts are necessary to move educational organizations away from the structures that limit their abilities to respond and adapt to change at a rate that keeps pace with the external environment. However, new team-based structures with limited hierarchy might eventually lead organizations toward unbounded instability. Additionally, an organization might need to integrate hierarchical structures into a team environment to prevent the negative effects of unbounded chaotic activity. And at the same time, these hierarchical structures could drift cyclically in and out of organizational and decision-making structures over a period of time until the next transformative development contributes to environmental adaptation. The results of this study also imply that traditional hierarchical decision-making structures conflict with the emerging dynamics of organizations that continually respond and adapt to the changing external environment. A model is presented (Figure 4) that suggests a new description of educational organization system phase states that reflect these emerging transformative and iterative processes.

Describing this model in further detail begins with the traditional organizational structure. Hierarchical supervisory lines follow discrete functions arranged by depart-

ment. It is suggested from the literature and findings of this research that traditional bureaucratic organizational structures limit individuals operating within a system from moving away from equilibrium-oriented conditions. As Prigogine and Stengers (1984) have discussed, a system that operates with a stable structure has a tendency to reject the introduction of foreign ideas and will inhibit the ability of these new ideas to survive. This implies that an approach to organizational restructuring and decision-making that implements small incremental changes over a period of time might prove unsuccessful, as individuals will hold onto existing structures and limit the ability of new system structures to take hold. Furthermore, the equilibrium-oriented system moves toward a closed system framework which limits the ability of system agents from communicating and interacting with their external environment, thereby jeopardizing system survival (Ashby, 1956; Braman, 1994; Maturana & Varela, 1980; Prigogine, 1967, 1980; Stacey, 1992).

Another phase state in the model represents transformative events that impact all individuals operating within a system that can be needed periodically to move individuals away from a closed organizational and decision-making framework. Several scenarios can emerge at this stage, and, in the case of the ECU Libraries, the event can happen due to unintended external influences (Breu & Benwell, 1999; Lichtenstein, 2000; Smith & Comer, 1994), such as the movement of university constituents away from the printed object, or due to intentional external influences (MacIntosh & MacLean, 1999, 2001), such as university budget crises. The transformative event can also occur due to unintended internal influences, such as the self-organized criticality that arrives from individuals reflecting on practice at a second order learning level (Argyris, 1990, 1992; Argyris & Schön, 1974, 1978; Bak, 1996; Braman, 1994; Schön, 1991; Senge, 1994, 2004). Or the transformative event can take place due to intended internal influences, such as with the case of conditioned emergence in dissipative structures (MacIntosh & MacLean, 1999, 2001), where restructuring activities move the equilibrium-oriented system away from discrete functions and subsequent hierarchical leadership and decision-making toward a system that exhibits far-from-equilibrium conditions.

Following this, the model presents a complex system's ability to introduce self-organization among individuals at the micro level interacting in management of leadership and decision making as a collective whole at the macro level of the organization. Prigogine (1980) has described this phenomenon through the concept of Order through Fluctuations, where the far-from-equilibrium state that results from the transformative event leads to internal fluctuations that create "new non-equilibrium transitions not predicted by the phenomenological laws of evolution" (p. 147). This places the system in a

continual flux between order and disorder: what Carver and Sheier (1998) in human behavior describe as critically damped self-regulation among individuals within a system. If boundary conditions for the educational organization as a system do not exist or are unclearly defined, the system has the potential to move toward unbounded chaos (see Figure 4) where positive and negative outcomes are unpredictable or uncontrollable.

In similar ways, the blended organizational structure can be generated in order to create further boundary conditions if the library system is moving increasingly toward unbounded chaos. This blending incorporates hierarchy within a team-based organizational structure that limits the possibility for the creation of an exponential amount of self-organization during the chaotic cycle, such as with the example of the emergence of many self-organized teams in the case of the ECU Libraries after the first reorganization. In the case of bounded chaotic activity, the self-organizing team-based structure continues to operate within the boundary conditions of chaotic cycles that continually fluctuate between the system moving toward and away from the control mechanisms of hierarchical leadership and decision-making.

Over time it is assumed that the boundary conditions of the blended structure have the potential to move the organization back toward an equilibrium-oriented phase state. As MacIntosh and MacLean (1999) have noted, humans operating within a system differ from other living systems in that they have the capacity of "consciously creating the conditions in which successful transformation can occur" (p. 305). During this period, individuals operating within the system can either choose or respond to another transformative event, resulting from intended or unintended external and internal influences. Equally, individuals have the choice to move the system back toward the traditional organizational structure, reinforcing how Prigogine (1980) and Lorenz' (1963) observations of phase sequencing toward the history of the system can move the system agents toward their original state.

CONCLUSION

This study has shown that the current team-based organizational and decision-making structure to which the ECU Libraries have evolved has relied on a developmental process of two successive restructuring activities. The first restructuring included a radical reorganization to a team-based structure and serves as an example of transformative change in an educational institution. The second organizational restructuring synthesized hierarchy within a team-based organization, and a model is presented that highlights an organization that is open to its external environment, operates with self-organization, and still contains boundary parameters. For

study participants, the first restructuring served as a transformative event where novel organizational and individual thinking contributed to an environment of continual change. The latest blended organizational structure is highly valued by the study's participants, and, the thinking in general is that this model is the best organizational structure within which most of them have ever worked.

Although the first reorganization was viewed as the most turbulent, individual references to the history of this restructuring suggest that it was needed to facilitate a perspective of continual organizational change amidst a rapidly changing technological environment. Further implications for those teaching management and leadership, and for those administrators implementing organizational change at their educational institutions, suggest that the blending of hierarchy within the team model provides a frame of reference with which individuals can identify within the larger context of institutional organizational structures. Moreover, the use of hierarchical decision-making within a team framework infers that methods of accountability and assessment of the organizational structure are difficult to sustain within a pure team environment yet are critical for continued organizational development (Piggot-Irvine, 2010). Conversely, this current model suggests that, over time, this organization could move closer toward stability and equilibrium, potentially jeopardizing the progress that has been made so far in affecting transformative changes within the organization.

This research shows that leadership as a shared experience among individuals within this team environment appears to be in its nascent stages. Although normative models of leadership were not observed to be in use among study participants, transformative and charismatic leadership theories emerged as strongly supported theories in use that contribute to the evolution of the organization during the course of this study. Moreover, the differing levels of understanding about leadership, and the perception by research participants of widespread scientific management (Taylor, 1911) viewed by these individuals be pervasive in the broader profession of academic librarianship, suggest a problematic condition for these professionals in general. Equally, the results of this study challenge leadership theorists to question how prevalent first order learning structures exist and limit complex and systemic learning from taking place in educational settings. Moreover, analysis of findings from this study suggests that many theories in use regarding leadership and decision-making among educational organizations may not be designed to respond rapidly to changing external environments.

Most importantly, this research study shows how this team-based organization has evolved into a highly developed complex system of bounded chaos in leadership interactions and decision-making. The organizational structure blends the self-

organizing qualities of a dissipative structure with boundary conditions that include supervisory and decision-making hierarchies. Complex systems leadership was also observed to have occurred during two successive reorganizations, showing how the natural qualities of complex systems emerged either as intended or unrealized phenomena during this study. This evolution leads to two observations of the organization as a complex system. The first observation suggests that boundary conditions were put into place to keep the organization from moving into unbounded chaos. The second observation suggests that these boundary conditions have the potential to create an environment where individuals move toward increasing stability and equilibrium, thereby limiting further organizational learning and development. Most significantly for researchers in the social and behavioral sciences reviewing this case study would be the difference in approaches to leadership and decision-making during the two reorganizations. This study's organizational evolution shows that participants have experienced both conditioned emergence (MacIntosh & MacLean, 1999, 2001) and bounded chaos models of organizational transformation (Fullan, 2001; Pascale, Millemann, & Gioja, 2000; Stacey, 1992) whether by intent or as a result of the natural qualities inherent in complex systems.

REFERENCES

- Argyris, C. (1990). *Overcoming Organizational Defenses: Facilitating Organizational Learning*, ISBN [9780205123384](#).
- Argyris, C. (1992). *On Organizational Learning*, ISBN [9781557862624](#).
- Argyris, C. and Schön, D.A. (1974). *Theory in Practice: Increasing Professional Effectiveness*, ISBN [9780875892306](#).
- Argyris, C. and Schön, D.A. (1978). *Organizational Learning: A Theory of Action Perspective*, ISBN [9780201001747](#).
- Ashby, R.W. (1956). *An Introduction to Cybernetics*, ISBN [9780416683004](#).
- Bak, P. and Chen, K. (1991). "Self-organized criticality," *Scientific American*, ISSN [0036-8733](#), 264(1): 46-53.
- Bak, P. (1996). *How Nature Works: The Science of Self-Organized Criticality*, ISBN [9780387947914](#).
- Baker, E., Onyx, J., and Edwards, M. (2011). "Emergence, social capital and entrepreneurship: Understanding networks from the inside," *Emergence: Complexity & Organization*, ISSN [1521-3250](#), 13(3): 21-38.
- Bazirjian, R., and Stanley, N.M. (2001). "Assessing the effectiveness of team-based structures in libraries," *Library Collections, Acquisitions, and Technical Services*, ISSN [1464-9055](#), 25(2): 131-157.
- Blake, R.R., Mouton, J.S., and Williams, M.S. (1981a). *The Academic Administrator Grid: A Guide*

- to *Developing Effective Management Teams*, ISBN [9780875894928](#).
- Blake, R.R. and Mouton, J.S. (1981b). *Productivity: The Human Side*, ISBN [9780814456927](#).
- Blake, R.R. and Mouton, J.S. (1978). *The New Managerial Grid*, ISBN [9780872014732](#).
- Blake, R.R. and Mouton, J. S. (1985). *The Managerial Grid III*, ISBN [9780872014701](#).
- Braman, S. (1994). "The autopoietic state: Communication and democratic potential in the net," *Journal of the American Society for Information Science*, ISSN [0002-8231](#), 45(6): 358-368.
- Breu, K. and Benwell, M. (1999). "Modelling individual transition in the context of organizational transformation," *Journal of Management Development*, ISSN [0262-1711](#), 18(6): 496-520.
- Capra, F. (1997). *The Web of Life: A New Scientific Understanding of Living Systems*, ISBN [9780385476768](#).
- Carver, C.S. and Scheier, M.F. (1998). *On the Self-Regulation of Behavior*, ISBN [9780521572040](#).
- Cummings, T.G. (ed.) (1980). *Systems Theory for Organization Development*, ISBN [9780471276913](#).
- Denzin, N.K. and Lincoln, Y.S. (2005). *The Sage Handbook of Qualitative Research*, ISBN [9780761915126](#).
- Favre, A., Guitton, H., Guitton, J., Lichnerowicz, A., and Wolff, E. (1988). *De la Causalité à la Finalité: A Propos de la Turbulence*, Paris: Maloine.
- Friedman, M. (1953). "Methodology of positive economics," *Essays in Positive Economics*, ISBN [9780226264028](#).
- Fullan, M. (2001). *Leading in a Culture of Change*, ISBN [9780787987664](#) (2007).
- Gell-Mann, M. (1994). *The Quark and the Jaguar: Adventures in the Simple and the Complex*, ISBN [9780805072532](#).
- Gilstrap, D.L. (2007a). "Dissipative structures in educational change: Prigogine and the academy," *International Journal of Leadership in Education*, ISSN [1360-3124](#), 10(1): 49-69.
- Gilstrap, D.L. (2007b). *Librarians and the Emerging Research Library: A Case Study of Complex Individual and Organizational Development*, Doctoral dissertation, University of Oklahoma, Norman, OK.
- Gilstrap, D.L. (2009). "Collective case study method and fractal geometry: Instrumental and intrinsic cases in organizational research," *Emergence: Complexity & Organization*, ISSN [1521-3250](#), 11(4), 1-14.
- Grover, R., Achleitner, H., Thomas, N., Wyatt, R., and Vowell, F.N. (1997). "The wind beneath our wings: Chaos Theory and the butterfly effect in curriculum design," *Journal of Education for Library and Information Science*, ISSN [0748-5786](#), 38(4): 268-282.
- Guastello, S.J., Dooley, K.J., and Goldstein, J.A. (1995). "Chaos, organizational theory, and organizational development," in F.D. Abraham and A.R. Gilgen (eds.), *Chaos Theory in*

Psychology, ISBN [9780313289613](#).

- Hayward, T. and Preston, J. (1999). "Chaos theory, economics and information: The implications for strategic decision-making," *Journal of Information Science*, ISSN [0165-5515](#), 25(3): 173-182.
- Holland, J.H. (1998). *Emergence: From Chaos to Order*, ISBN [9780201149432](#).
- Jantsch, E. (1981). *The Evolutionary Vision: Toward a Unifying Paradigm of Physical, Biological, and Sociocultural Evolution*, Boulder, CO: Westview Press for the American Association for the Advancement of Science.
- Langlois, R.N. (1982). "Systems theory and the meaning of information," *Journal of the American Society for Information Science*, ISSN [0002-8231](#), 33(6): 395-399.
- Lazaridou, A. (2007). "Values in principals' thinking when solving problems," *International Journal of Leadership in Education*, ISSN [1360-3124](#), 10(4): 339-356.
- Lewin, K. (1951). *Field Theory in Social Science*, New York: Harper & Row.
- Lichtenstein, B.B. (2000). "Self-organized transitions: A pattern amid the chaos of transformative change," *Academy of Management Executive*, ISSN [0896-3789](#), 14(4): 128-131.
- Liu, Z. (1996). "Dissipative structure theory, synergetics, and their implications for the management of information systems," *Journal of the American Society for Information Science*, ISSN [0002-8231](#), 47(2): 129-135.
- Lorenz, E. (1963). "Deterministic non-periodic flow," *Journal of Atmospheric Science*, ISSN [0022-4928](#), 20: 130-141.
- Lumby, J. (2009). "From simplicism to complexity in leadership identity and preparation: Exploring the lineage and dark secrets," *International Journal of Leadership in Education*, ISSN [1360-3124](#), 12(2): 95-114.
- MacIntosh, R. and MacLean, D. (1999). "Conditioned emergence: A dissipative structures approach to transformation," *Strategic Management Journal*, ISSN [0143-2095](#), 20(4): 297-316.
- MacIntosh, R. and MacLean, D. (2001). "Conditioned emergence: Researching change and changing research," *International Journal of Operations and Production Management*, ISSN [0144-3577](#), 21(10): 1343-1357.
- Mandelbrot, B.B. (1975). *Les Object Fractals: Forme, Hasard, et Dimension*, Paris: Flammarion.
- Maturana, H. and Varela, F. (1980). *Autopoiesis and Cognition: The Realization of the Living*, ISBN [9789027710161](#).
- McLaren, M. (2001). "Team structure: Establishment and evolution within technical services at the University of Kentucky Libraries," *Library Collections, Acquisitions, & Technical Services*, ISSN [1464-9055](#), 25: 357-369.
- Morgan, G. (1997). *Images of Organization*, ISBN [9781412939799](#) (2006).
- Newman, K. L. (2000). "Organizational transformation during institutional upheaval," *Academy of Management Review*, ISSN [0363-7425](#), 25(3): 602-619.

- Nicolis, G. and Prigogine, I. (1989). *Exploring Complexity: An Introduction*, ISBN [9780716718598](#).
- Pascale, R.T., Millemann, M., and Gioja, L. (2000). *Surfing the Edge of Chaos: The Laws of Nature and the New Laws of Business*, ISBN [9780609808832](#).
- Pegg, A. (2007). "Learning for school leadership: Using concept mapping to explore learning from everyday experience," *International Journal of Leadership in Education*, ISSN [1360-3124](#), 10(3): 265-282.
- Phipps, S.E. (2004). "The system design approach to organizational development: The University of Arizona Model," *Library Trends*, ISSN [0024-2594](#), 53(1): 68-111.
- Piggot-Irvine, E. (2010). "One school's approach to overcoming resistance and improving appraisal: Organizational learning in action," *Educational Management Administration & Leadership*, ISSN [1741-1432](#), 38(2): 229-245.
- Prigogine, I. (1967). *Thermodynamics of Irreversible Processes*, ISBN [9780470699287](#).
- Prigogine, I. (1980). *From Being to Becoming: Time and Complexity in the Physical Sciences*, ISBN [9780716711070](#).
- Prigogine, I. and Stengers, I. (1984). *Order Out of Chaos: Man's New Dialogue with Nature*, ISBN [9780553340822](#).
- Rico, G.L. (2000). *Writing the Natural Way*, ISBN [9780874771862](#).
- Rothman, T. (1997). "Irreversible differences," *The Sciences*, ISSN [0036-861X](#), (July/August): 26-31.
- Schön, D.A. (1971). *Beyond the Stable State*, ISBN [9780393006858](#).
- Schön, D.A. (1991). *The Reflective Practitioner: How Professionals Think in Action*, ISBN [9780465068746](#).
- Senge, P. (1994). *The Fifth Discipline: The Art and Practice of the Learning Organization*, ISBN [9780385517256](#).
- Senge, P. (2004). *Presence: Human Purpose and the Field of the Future*, ISBN [9780385516303](#) (2008).
- Simon, H.A. (1985). *The Sciences of the Artificial*, ISBN [9780262691918](#) (1996).
- Smith, C. and Comer, D. (1994). "Self-organization in small groups: A study of group effectiveness within non-equilibrium conditions," *Human Relations*, ISSN [0018-7267](#), 47(5): 553-581.
- Solomon, P. (1997). "Discovering information behavior in sense making, III: The person," *Journal of the American Society for Information Science and Technology*, ISSN [0002-8231](#), 48(12): 1127-1138.
- Stacey, R. (1992). *Managing the Unknowable: Strategic Boundaries between Order and Chaos in Organizations*, ISBN [9781555424633](#).
- Stacey, R. (2003). *Complexity and Group Processes: A radical Social Understanding of Individuals*, ISBN [9781583919200](#).
- Stake, R. (1995). *The Art of Case Study Research*, ISBN [9780803957671](#).

- Stake, R. (2005). "Qualitative case studies," in N.K. Denzin and Y.S. Lincoln (eds.), *The Sage Handbook of Qualitative Research*, ISBN [9780761915126](#), pp. 443-466.
- Stake, R. (2006). *Multiple Case Study Analysis*, ISBN [9781593852481](#).
- Travica, B. (1998). "Information aspects of new organizational designs: Exploring the non-traditional organization," *Journal of the American Society for Information Science*, ISSN [0002-8231](#), 49(13): 1224-1244.
- Turnbull, B. (2005). "Evaluating school-based management: A tool for team self-review," *International Journal of Leadership in Education*, ISSN [1360-3124](#), 8(1): 73-79.
- van Ameijde, J.D.J., Nelson, P.C., Billsberry, J., and van Meurs, N. (2009). "Improving leadership in higher education: A distributed perspective," *Higher Education*, ISSN [0882-4126](#), 58(6): 763-779.
- Waldrop, M.M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*, ISBN [9780671767891](#).
- Wheatley, M.J. (1994). *Leadership and the New Science: Learning about Organization from an Orderly Universe*, ISBN [9781881052012](#).
- Yukl, G.A. (2002). *Leadership in Organizations*, ISBN [9780135271766](#).

Donald L. Gilstrap is Professor and Dean of University Libraries and Professor of Educational Leadership at Wichita State University, Wichita, KS, USA. He has written on chaos and complexity theories for a number of years, and his research includes nonlinear dynamics, leadership, organizational change, research methods, and curriculum theory. He may be reached at donald.gilstrap@wichita.edu

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