Fermenting change: exploring complexity and chaos
Guest Editor: Janice A. Black

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Fermenting change
Capitalizing on the inherent change found in dynamic non-linear (or complex) systems

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Keywords Organizational Change, Competing

Abstract While there is no set definition of what constitutes "complexity," some general classes of definitions have emerged across the writings of several fields of science. The basis for the classifications and a general definition used in this issue are presented. The papers of this issue are classified into the general categories and introduced to the reader.

What sparked this special issue?
Since the early 1990s organizational researchers have seen the increased use of theoretical bases that assume some elements of non-linearity. This may be from the perspective of organizational learning, from the concept that social systems are not readily decomposable and so need to be considered as an entire system as in social network analysis or simply as a gestalt. I found that I became more and more interested in such theories and yet I was dissatisfied in how disjointed the literature was. Although multiple perspectives had been identified as useful in groups dealing with ambiguous or complex decisions, simultaneous presence of multiple theoretical or analytical lenses was less routinely accepted.

In February 1998, I sponsored a small conference bringing together people from various non-linear backgrounds to discuss how viewing organization with the assumption of non-linear relationships both within and between might affect our research. A clear consensus emerged from those present that complexity theories helped researchers to link together previous lines of research that had before been isolated. So while the conference had not originally been organized to focus on complexity theories, all came away recognizing that complexity theories had much to offer each of us. Certainly, complexity theories had at the same time been spawning a large number of books and articles (Emergence, 1999). Yet at the same time, because it was a collection of theories dealing with non-linearly related systems, there was no one definition that could be adopted and built upon. So I sent out the call for papers not using complexity theory in the title but simply presenting the notion that non-linearity and change were intertwined. This combined general and special issue is the result. Again, complexity theory based work tended to dominate the articles submitted and chosen.
What are complexity, complex systems and complexity theories?
Change is an inherent quality of organizational life today. This journal is devoted to understanding ways to manage organizational change. Several theoretical perspectives have been helpful to understand how to get systems either back to a steady state, to understand the system as a whole, to critically evaluate a system and to make a change to a different steady state. Few if any of these theories approach understanding organizational change as an inherent part of the system. Complexity theories and other theories addressing the dynamic non-linear state of a system are theories where the basic assumption is that the system is always in a state of change. The use of complexity theory to address our economic and social systems has been recognized (Anderson et al., 1988; Nicolis and Prigogine, 1989; Lewin, 1992; Byrne, 1998; Arthur et al., 1997) by others, yet this recognition is just now being addressed in a fuller fashion.

Initially, this recognition of economic and business organizations as being complex systems simply meant recognition that the basic qualities of complex systems are found in our organizational systems (Maguire and McKelvey, 1999; Senge, 1990). Specifically, dynamic complex systems are those where the whole system is made up of independently interacting parts where each of the parts acts upon its own local set of decision rules (Black and Farias, 2000; Maguire and McKelvey, 1999; Stacey, 1995, etc). The results of all these independent parts acting and interacting are the emergence of patterns at a collective level. The member parts may or may not be complex systems themselves but, if they are complex systems, they are, in turn, governed by rules that evolve. When the macro-system is composed of levels of complex systems, it is common to refer to the parts as “adaptive agents” (Holland, 1995). The internal rules that each of the adaptive agents follows is called an “internal model” (Holland, 1995). The complexity evidenced in a system can be of a range of types (Maguire and McKelvey, 1999; Cramer, 1993). Many fields have been attempting to define, measure, describe and interpret “complexity” but there is still no single consensus on these issues (Maguire and McKelvey, 1999). Maguire and McKelvey (1999) note that there do tend to be two general clusters of definitions, those based in information measures and those based in ambiguity and interpretation measures.

Information based measures include determining the complexity of a system by the length of the description of the system but each actor’s perspective may have different relevant factors to describe the system (Maguire and McKelvey, 1999). For entities attempting to survive, then the relevant factors are those internal and external (reference point being the entity) factors that, after being described, can be used for prediction and control so that the entity can conform to the selection pressures in the “real world” (Gell-Mann, 1995). This type of an entity is called an adaptive agent. Such agents can at an internal level of focus be “learning,” while at the focus level of the agents’ actions be engaged in “evolution” and at the focus level of an organization be “emerging patterns”
from the actions of the agents (Maguire and McKelvey, 1999). This hierarchical approach can integrate classical views of organizational hierarchy and also include space and time measures relating to information processing.

An alternative set of definitions relates to ambiguity and interpretation. That is things are only as complex as the actor/observers make them. This emphasizes the fact that complexity is context dependent and in many instances very subjective in definition. Trying to define complexity means being able to define and understand what constitutes information in a particular system (Gell-Mann, 1994, 1996; Bar-Yam, 1997). This issue becomes increasingly important when social systems are the focus of inquiry. The types of systems where agents can communicate in order to coordinate their behaviors places questions of meaning and interpretation central to determining what to pay attention to in order to survive (Phillips and Hardy, 1997). Along with the ambiguities present as meaning is determined are further issues related to power relationships. In particular, this relates to the social structure positioning of the agents or actors in the system. The use of power to manage meaning has been studied in other contexts but is a fruitful consideration here as well (Lukes, 1974; Pettigrew, 1979; Hardy, 1985).

It is evident that understanding our social systems in business from this complexity theory perspective requires that we revisit our assumptions regarding systems and how they interact and to reevaluate whether some of our assumptions need to be changed. Change at all levels is inherent when using complexity theory to understand systems. Individual decision making agents change over time. The behaviors evidenced by such agents change over time. The organizations that emerge from the activities of the changing agents change over time. Change is the natural state of being of the complex system. Using these naturally occurring activities to prolong the survival of an organization, actively cultivating or fermenting change, is the focus of this special issue. This special issue has collected together a series of articles that help us to revisit some of our earlier assumptions about our organizational systems. These articles came both in response to the call for papers and from the general papers submitted for review by the *Journal of Organizational Change Management*.

Collectively, this issue presents papers that are designed to stimulate our thoughts about our basic assumptions regarding organizing and doing business. With the shift in focus from a stable system that runs predictably and smoothly to focusing on a system that only occasionally has times of predictability and even when running predictably has the seeds in that running to shift to times of unpredictability, we can see that many of our decision rules and expectations on how to act no longer are as useful. The lack of long-term predictability and the guarantee of change highlights the ineffectiveness of some of the organizing principles that we have been using for the past hundred or so years. Rethinking and reflecting on just what this change means is what each author in the special issue has done.
While the acceptance of each article was on the merit of each individual piece, the selections typically addressed issues across levels of analysis. Even though various levels were addressed, each article also had a primary focus. There was also a range of perspectives taken on the definition of "complexity". Even though the information processing perspective had the most submissions and acceptances, the ambiguity and understanding perspective was represented in interesting and useful ways. The first two articles address the issue of self-organizing behavior. The second two articles address the issue of how organizations have responded to the acknowledged increased change in and complexity of their environments. The final article addresses the increased need for complexity and application of complexity in the individual (the need for wisdom in individual and organizational learning).

The special issue begins by reviewing an area of complexity theory that addresses self-organizing behavior and the emergence of patterns at the organizational level. Landing into the first category of information based definitions, Lichtenstein's paper provides some basic definitions and shows how these definitions can be operationalized to better understand the dynamics involved in beginning an enterprise. His paper provides some interesting perspectives of critical issues to address as firms engage in growth activities. The second paper in the issue would fall into the second category suggested by Maguire and McKelvey (1999) and presents complexity theory from a phenomenological perspective.

Letiche's paper presents some interesting perspectives on self-organization that arise from examining complex systems where the agents have consciousness. Letiche brings to the front some of the issues of making sense of the world by conscious beings. Such attempts at understanding need to also include perceptions of the process of emerging organization as integral parts of the system as well as looking at the process as one outside of the system. By taking a stronger philosophical approach than the other papers, he provides some provocative and useful points to direct future research and help researchers understand better the emergent processes involved in organizations.

David Boje (2000) provides a provocative response to Letiche's paper. His use of Disney as an example helps ground his comments in the business world. This paper, too, takes a philosophical approach but by doing so stimulates much thought. This pair of papers from Maguire and McKelvey's phenomenological perspective (Maguire and McKelvey, 1999) is followed by papers from other perspectives.

Black and Edwards don't focus on the process of self-organization but rather on the result of such emerging processes in our markets. This paper is classified in the information processing perspective of Maguire and McKelvey (1999). Black and Edwards' paper examines the emerging organizational forms of network organizations and virtual organizations seen in many businesses today. By examining the underlying logic behind most conventional forms of
organizing and the logic needed for ever changing business environment, they are able to demonstrate that these new forms are solidly grounded. In Letiche’s terms, they examine the ground and found it solid.

Their paper is followed by Ashmos, Duchon, and McDaniel’s paper that looks at how organizations respond to drastic changes in their environment. The Ashmos, Duchon and McDaniel paper focuses on how organizations face greater complexity; through absorption or simplification and the resulting impact on organizational performance. They found some interesting surprises from what they had originally expected.

The last paper of the issue takes a whole systemic look at the idea of organizational learning and includes the contextual element of wisdom. To a certain extent, it also falls into Maguire and McKelvey’s second category by incorporating the acknowledgement that in complex systems both the setting and the previous history of the individual agent will impact what he/she sees and how he/she acts. Successful action for each perspective would fall into the category of “wisdom.”

All the papers bring insight and, as may be expected, insight from very different perspectives! Enjoy!

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