

**COMING FULL CIRCLE:
ON THE RETURN OF SYSTEMS THINKING TO
STRATEGIC
MANAGEMENT†**

Gregory A. Daneke*

This conceptual overview tracks the development of the study of corporate strategy from its early beginning and its adolescence of atheoretical empiricism to its current reliance on a range of theories. It is suggested the lack of a unifying paradigm, coupled with the popularity of certain modified economic concepts have produced a significant gap between research and practice. While extremely useful, these concepts fail to fully address the critical issues of turbulence and evolution. This discussion argues for a return to elements of systems thinking and the fashioning of new complex, non-linear dynamical characterizations of strategic choice.

The burgeoning research realm of strategic management (previously planning or policy) has sought for some time to distinguish itself from other domains through the development of its own conceptual elements. Interestingly enough, this quest for a unique identity has led many to embrace the concepts and methods of economics; particularly

† This Research was supported through an ASH Grant from Arizona State University. The author also acknowledges the assistance of the Publication Assistance Center. An earlier version of this piece was a "Best Paper" at the International Conference on Advances in Management in Calgary Canada, 1994; and it has benefitted from a number of comments, not the least of which were provided by the anonymous reviewer. The author would like to particularly acknowledge them as well as the following individuals: David Lemak of Washington State University, Tri-Cities; D. T. Ogilvie of Rutgers, Newark; and, Roch Parayre of SMU.

* Gregory A. Daneke is a Professor of Public Affairs at Arizona State University.

industrial organization (I.O.) economics. While extremely useful in the exploring elements of strategy under “stylized” constraints (markets and/or oligopolies), these notions have proven somewhat less durable in “real world” applications. Thus, they have been continually augmented with conceptual insights from the ongoing enterprise known as behavioral and/or neoinstitutional economics (e.g., resource dependency, transaction costs, and the like), as well as elements from more generic organization theories (especially ecological models). These latter elements have allowed strategic choice theories to overcome some of the limitations posed by economics’ preoccupation with static equilibrium, yet in general they still lack adequate characterizations of turbulent environments. This discussion suggests that turbulence, as well as complexity, can be much better appreciated through the redevelopment of the systems approach to strategic management. Unlike past uses of the systems paradigm, however, this approach would be far less mechanistic and focus on the non-linear dynamics like those found in recent advances in the physical and biological sciences.

A BRIEF HISTORY OF STRATEGY

Curiously enough at about the time that “strategic management” was hitting its stride as a discrete field of academic inquiry (the early 1980s), the practice of corporate policy had fallen on pretty hard times. Major business magazines (e.g., *Business Week*, 1984) began calling down a plague on the entire enterprise of corporate strategizing. Increasingly rigorous studies of the relationship between “strategy” and “performance” not only reconfirmed the practical criticisms, they tended to widen the gap between theory and practice. Given their misperceived concreteness, as well as unifying capability, elements of neoclassical economic theory were retrofitted to fill this void. Yet rather than fully addressing the turbulence which generated much of the performance problem, various economic approaches have, by and large, served to exacerbate the conceptual lacunae.

JOURNAL OF BUSINESS AND MANAGEMENT

Beginning as it did in applied “systems” and decision theories, it is not surprising that much of early academic work on corporate policy was decidedly prescriptive in character. Strategic planning, as a major corporate activity, began as an attempt to merely expand conventional budgeting and control techniques beyond the customary single-year format, through the use of five-year projections. In the late 1940s, von Neuman and Morgenstern introduced the idea of strategic “reacting” (see: Bracker, 1980) to more immediate changes in business conditions. Peter Drucker (1959) introduced the modern version of strategic planning, distinguishing between forecasting and planning, and emphasizing creative dimensions of the latter. In the early 1960s, Alfred D. Chandler (1962), a business historian, developed vital perspectives on the centrality of goal formulation and coined the famous aphorism that “structure follows strategy.” Ansoff (1979) and Ackoff (1981) combined these observations with those of applied general systems theory to codify what is commonly thought of as the standard normative model of strategic planning.

By the 1980s, increasingly turbulent environments, including accelerating cycles of recession, precipitated a radical reassessment of planning practices, especially those that relied on mathematically sophisticated prognostications. *Business Week* (1984) reported that “Clearly, the quantitative, formula-matrix approaches to strategic planning ... are out of favor” (p. 63). However, by this time strategy development in mature firms had evolved beyond mere strategic planning to strategic management. Hax and Majluf (1984) described the evolution of strategic planning involving five distinctive epochs: budgeting and financial control, long-range planning, business policy, corporate strategic planning, and strategic management. By strategic management, they implied a more fully integrated, rather than isolated activity. Meanwhile, “strategic management” as a distinct field of study began to develop rigorous empirical studies. The development of a large scale data base coincides with this emergence (e.g., PIMS; see: Buzzel & Gale, 1987). Yet, as with applied social research generally, the pell-mell pursuit of more rigorous methodologies (i.e., quantitative) created curious conceptual deficiencies. Those who were defining the field back in the 1970s decried the lack of conceptual

development (note: Schendel & Hoffer, 1979), and in a more recent reassessment, Schendel and Cool (1988) concluded that “there still is no central organizing paradigm for the field” (p. 27). Hence, viable theoretical building blocks and important empirical insights often became isolated.

Concern with this malaise of atheoretical empiricism, caused “back to basics” movement of sorts in which several scholars developed useful mid-range theories (note: Barney, 1989; Burgelman, 1988; Mintzberg, 1990; and Venkatraman, 1990); yet, these formulations have proved difficult to integrate into an alternative paradigm. Meanwhile, the ever-popular quantitative studies of the often weak relationship between normative strategies and/or organization characteristics and corporate performance continued to cast a practical cloud over the entire enterprise (Christensen & Montgomery, 1981; Montgomery & Singh, 1984; Reed & Luftman, 1986; Laverty, 1989; Hart & Banbury, 1992).

The extensive volume and high quality of this work notwithstanding, the cumulative impact of most of this mid-range effort, has been pretty disappointing. Daft and Buenger (1990) contend that much of the collective knowledge of strategic management was simply irrelevant (also note: Beer, 1992). Bettis (1991) invokes Daft and Lewin (1990) “straight jacket” indictment of organizational science generally to describe the field. That is to say that strategic management became constrained by its own preoccupation with inductive methods.

On the practical side, some useful conceptual, as well as empirical, studies began to identify reasons for the declining success of specific strategies (e.g., diversification). These reasons were multiple, but generally explained in terms of “core competencies” (Prahalad & Hamel, 1990) and/or “resource-dependency” (see Peteraf, 1991). Yet aside from a few developmental inquiries, the field remained mired in the theoretical midlands, and those managers who paid attention knew more about what *not* to do.

JOURNAL OF BUSINESS AND MANAGEMENT

Meanwhile, of course, a strong countervailing force to the above trends was the fashioning of various economic approaches to strategy. The often overblown prestige (economics being the only social science for which a Nobel Prize is given), largely mistaken practicality, and unified precepts combined with the very real need for deductive speculations to move economics to the forefront of theorizing in numerous specializations. With specific reference to strategic management, Rumelt, Schendel and Teece (1994) offer the following reasons for the rise of economic approaches:

- The interpretive power of economics with regard to mounting bodies of data (e.g., PIMS);
- The importance of the “experience curve” to increasing diversified firms;
- The problem of “profit persistence” in increasing competitive global markets;
- The constant conceptual evolution, embracing various neoinstitutional and behavioral elements (e.g., transaction-costs, agency and game theories); and
- The increasingly academic (e.g., disciplinary) atmosphere within business schools (pp. 527-555).

Nowhere perhaps were these trends more profoundly exhibited than in the overwhelming popularity of Michael Porter’s (1980, 1985) so-called “competitive advantage” approach. Hence, it can be used to characterize this recent epoch of theory driven research.

THE PORTER PARADIGM?

The approach popularized by Porter actually predates him by several years, and is essentially the translation of certain simple theoretical speculations from “industrial organization” (I.O.) economics. Generally speaking, I.O. is the subfield of neoclassical (or mainstream) economics which deals with the formation and regulation of “oligopoly” (see: Shapiro, 1987). One of the least glamorous subfields, I.O. has emerged into the

vanguard of microeconomic theory through its development of game-theoretic approaches (see: Kreps, 1990). Game theory, which harkens back to the observations of Cournot (1838) and extended in modern times by systems theorists (see: von Neuman & Morgenstern, 1944), had been largely ignored by mainstream economists until it found increasing applications in I.O.

In a sense, Porter did for I.O. what Marx reputed to do for Hegel—turning it on its head; that is, shifting concern from the social utility of industrial structures to firm level implications. However, this shift of focus has harbingers in Hotelling's (1929) path-breaking work on spatial location, product differentiation, and "contestable markets" (ones with free entry and exit) and von Stackelberg's (1934) modeling of the "first mover advantage." Moreover, current interpretations owe much to the explorations of Rumelt (1974), Hatten and Schendel (1977), Spence (1977), and Caves (1980). The power of Porter's contribution has been in recasting and repackaging these diverse observations for the noneconomist.

The prime elements of Porter's approach are derived, for the most part, from a set of assumptions regarding "industrial structures," "oligopolistic competitive," and firm level positioning. Contrary to conventional models of corporate strategy which focus on consistency and fit with internal and external forces, such as (a) company strengths and weaknesses; (b) implementor values; (c) environmental threats and opportunities; and (d) broader societal expectations, Porter argues that firms should center their attention on the variables of industry structure, and the "five forces" of competition within an industry. These include (Porter, 1980:4):

- Bargaining power of suppliers;
- Barriers to entry;
- Threat of substitution;
- Bargaining power of buyers; and,
- Rivalry among existing firms.

As alluded to above, the goal is to position a firm in such a way that it achieves “rents” in excess of the “floor rate” which accrues to firms within a competitive industry. In essence, the traditional social utility aim of I.O. (perfectly competitive markets) are being subverted by this approach.

“In a sense, Porter did for I.O. what Marx reputed to do for Hegel—turning it on its head; that is, shifting concern from the social utility of industrial structures to firm level implications.”

The most compelling element of Porter’s approach is his detailed analysis of the factors which make up the above elements. For example, entry barriers can be broken down into “economics of scale,” “experience curves,” “capital costs,” and “access to distribution channels,” as well as “government regulation” (which often limit entry). Furthermore, rivalry dynamics are divided into eight distinct patterns as well as intensities. Strategy based upon these structural analyses is aimed at developing a “defendable” position against the competitive forces outlined above. Basically this involves choosing one of the following major generic positions (Porter, 1980:35): “cost leadership,” “differentiation,” or “focus.” The purpose of this choice is, according to Porter (p. 41), avoiding being stuck between clear strategies. However, some find these generics quite limiting (see: Dess & Davis, 1984; and Wright, 1987). Moreover, choosing a specific strategy depends upon a careful analysis of competitors, as well as assumptions of how they are likely to respond to present and future choices.

Despite how tantalizing these repositioning themes had become, discovering one’s competitive niche amid accelerating product life cycles,

extended business cycles, and complex coordination dynamics (e.g., network externalities) became increasingly difficult. In fairness, economics approaches are swiftly adapting to other contingencies. Yet, in the process they further strain, and in some cases even discredit, the basic paradigm. As Mirowski (1989) demonstrates, conventional economics is not only patterned after, it is isomorphically aligned to the models of 19th century physics (e.g. "general equilibrium"); and, these models have a difficult time dealing with change, especially discontinuous change.

"As business environments continue to experience accelerating rates of change and cycles give way to turbulence, patent formulas give way to more fluid strategies."

MANAGEMENT FOR A TURBULENT WORLD

As business environments continue to experience accelerating rates of change and cycles give way to turbulence, patent formulas give way to more fluid strategies. Meanwhile the quest for explanation, let alone prediction, has taken a number of divergent paths ranging from basic modifications of economic parameters to approaches which attempt to incorporate the methods as well as the metaphors of post-modern science (e.g., non-linear dynamics). Intermingled among these are a number of distillations of parochial wisdom aimed at challenging both existing practice and academic preoccupations. What follows is merely a sampling of a few of these diverse perspectives designed to capture the general flavor of emerging concerns.

A NEW ECONOMICS OF STRATEGY

Certain elements of this new economics of corporate strategy predate Porter, while others arise as a critique of contemporary competitive strategy. Still others attempt to apply proven concepts from accounting and finance (e.g., principal-agent models) and/or neoinstitutional economics (e.g., transaction cost analysis). Obviously, applications of modified economic concepts are so ubiquitous that only a few contributions can be cited here.

Those who wish to improve upon Porter would have to include Ghemawat's (1985; 1991) work on "sustainable advantage" and access to resources, as well as Rumelt's reassessment of the "industry perspective" (1989). Similar aspirations appear to be manifest in work aimed at extending the *resource-based* perspective (e.g., Barney, 1989; Grant & Boardman, 1990; Peteraf, 1991), to strategy formation. Further, richness has certainly been added to the narrow notions of the firm via neoinstitutional (e.g., Williamson, 1985) and agency theories (derived from the likes of Fama, 1980). These new transaction and information-based theories produce a number of interesting insights into the nature of strategic choice as well as organizational behavior generally (see: Eisenhardt, 1989). Yet to the extent that the new economics remains rooted in the old economics (e.g., neoclassical theory), inquiry is still somewhat limited. As David Teece (1984) observed when these trends began, there are certain fundamental tensions between orthodox economics and the field of strategic management. These include:

- "treatment of know-how";
- emphasis on comparative statistics and "focus on equilibrium";
- suppression of entrepreneurship;
- use of stylized markets; and
- assumptions about rational behavior. (pp. 80-81)

A few strategy theorists have attempted to address these incongruities. For example, Raphael Amit and Paul Shoemaker (1990) strive to reanchor

the economics of strategic management by building a new conceptual base of practical elements such as “Key Success Factors” (KSF). To accomplish this, they draw upon ingredients from such far-flung corners as traditional institutional economics (e.g., Schumpeter, 1934), and “decision theory” (e.g., Kahneman, Slovic, & Tversky, 1982). Amit and Shoemaker begin weaving this “crazy quilt” of diverse philosophical perspectives by noting the inherent conceptual weaknesses of existing competitive strategy perspectives. They recognize that empirical studies of KSF are, at best, “ex post” explanations of a firm’s past and perhaps fortuitous (rather than strategic) performance. Meanwhile, “ex ante” models say very little about the “dimensions of competition” that are likely to prevail in the future. The missing links obviously involve “uncertainty,” “complexity,” and “organizational conflicts,” as well as required “competencies.” Thus, in addition to “industry analysis” and the “resource” perspective, they call for full-scale integration of the insights of studies of “decisions under uncertainty.” Moreover, they claim that their notion of resources is more akin to institutional (via: De Gregori, 1987) than it is to neoclassical economics. This unabashed borrowing is refreshing, yet one must ask whether these apples and oranges will, in effect, combine. For instance, whose definition of rational choice would they accept, or how can the methodological individualism of conventional economics be reconciled with the holism of the institutionalists? Hopefully, these epistemic inquiries can be answered before the bloodlines are completely lost in the formalization of a new generation of mongrel models.

Another intriguing strain of thinking is what might be called the dynamics of the “stick-to-it scenario.” This realm is well-represented by the work of Pankaj Ghemawat (1985; 1991), and Julio Rotemberg and Garth Saloner (1990). Ghemawat probably goes the furthest in asserting that “persistence in strategy” is the factor which distinguishes between front-runners and also-rans. Moreover, commitment is the means by which firms overcome “the failure of success factors,” and develop “sustainable” strategies (Ghemawat, 1991). If he’s correct, then many conventional approaches are unable to produce strategies which are at once stable over the long haul, yet involve the design of systems which quickly adapt to

JOURNAL OF BUSINESS AND MANAGEMENT

environmental changes. Rotemberg and Saloner (1990) enhance this perspective by demonstrating mathematically that “narrow strategies” (which often entail ignoring certain other “profitable opportunities”), may actually outperformance opportunism in the long run.

Jeffrey Williams’ (1992) contribution to the literature of *sustainable advantage* is also worth noting as it portends a significant theoretical departure. He takes conventional *resource-based core capability* notions into fairly uncharted realms by directing attention to various “fast-cycle resource” domains (e.g., high-tech industries) where “intense rivalry” and “Schumpeterian dynamics,” require “frame-breaking” strategies (i.e., ones which change the basic rules of the game). However, even the most sophisticated game-theoretics (Note: Fudenberg & Tirole, 1991) don’t readily facilitate this level of anticipatory adaptive-learning. Invoking Argyris’s (1982) famed characterization, “single loop” models do not necessarily engender “double-loop” learning.

The Strategic Management Research Group (SMRG) at the University of Maryland gets around this issue by interjecting an elaborate “communication-information theory” model into their assessment of competitive interactions (Smith, Grimm, & Gannon, 1992). Like Williams, “timing” is everything for the Maryland group, and the “competitive event” (“action/reaction”) itself becomes the unit of analysis. But one might argue that this shift, along with the reliance on communications theory, has taken them well “beyond the pale” of all economic thinking. Perhaps.

THE UNCONVENTIONAL WISDOM

A handful of recent depictions of the parochial wisdom, in addition to providing informative observations, point toward novel theoretical domains. In this way, they may have bridged the customary chasm of “problem-focused vs. theory-focused” research (see: Weick, 1992). From the perspective of this discussion, the recent book by Charles Hampden-Turner, (1990) is quite instructive. In addition to taking numerous practical

criticisms of Porter, Turner is acutely aware of theoretical issues. Moreover, his own theory-building is based upon extensive interviews with management personnel from widely diverse firms. The nexus of his approach is the notion of “value reconciliation” (rather than Porter’s value-added chain) through the process of “cybernetic learning.” Increasingly turbulent environments demand a skillful “helmsman,” one who can accommodate conflicting values while keeping an eye on the ultimate course. The course is oriented toward evolutionary viability rather than short-term profitability. Moreover, true “helmsmanship” recognizes trade-offs between “economies of scale” and “economies of flexibility.” In some instances, this may entail steering directly into the middle of Porter’s cost/quality “no man’s land.”

A complementary set of perspectives is distilled from the case analyses compiled by Hinnings and Greenwood (1990). Drawing upon the organizational design perspective (Galbraith, 1975, also note: Mintzberg, 1990), they establish “archetypes” which include “ideas, beliefs and values” that inhibit change. Since these characterizations greatly enhance the picture of “competencies” and “capacities” they could be used to flesh out the dependencies and capacity notions alluded to in the new economics literature. However, the gem of their conceptual explorations is the realization that “change and stability” are two sides of the same coin (p. 191). These notions set the stage for more elaborate inquiries into the internal dynamics of discontinuous forces.

Another prime example of the collective wisdom is Peter Senge’s *Fifth Discipline* (1990). This work is so diffuse that it is impossible to do justice to it in any brief summary. The core concept is a notion of “organizational learning” which goes well beyond traditional characterizations of environmental adaptations, and moves toward “generative learning,” which Senge sees as the crux of human creativity, innovation, and long-term evolution. His notion of ubiquitous change and organizational visioning also anticipate recent developments in the sciences of non-linear dynamical sciences (discussed below). Essentially, this view maintains that amid complex and often chaotic systems, individuals can still choose their own

trajectories, and learn how to bring them about. For Senge, the linchpin of this process of cybernetic self-wiring is the integrative capacities of “systems thinking.” Unfortunately, he forgets that the current generation of strategy scholars (especially those in the U.S.) have lost sight of systems approaches. Moreover, he fails to appreciate that systems thinking cannot merely be grafted onto linear and reductionist theories. Hence while his primary audience of practitioners can comprehend the importance of systems, his secondary aim of academic appreciation may not be necessarily forthcoming.

Perhaps the most far-reaching representation of the parochial wisdom is Edward Deming’s (1993) homey little collection of observations, published just prior to his death. Deming, who was originally trained in physics, is, of course, most famous for his work on quality management in Japan, during the 1950s. This collection, from a long lifetime of experiences, has the rather ambitious title: *The New Economics for Industry, Government and Education*. The message, however, is quite elemental and eloquent. Essentially, Deming argues for a simple systemic view of the world in which non-hierarchical organizations emphasize greater cooperation and less competition (note particularly chapters 3 and 4). In addition, he reiterates a number of well-known lessons about the inevitability of “variation.” These lessons which form the basis of his unique technique tend to contradict various popular “quality control” methods (e.g., zero defects, six sigma, etc.). What is perhaps more interesting is that Deming’s approach has been retrofitted to demonstrate certain applications of “chaos theory” (e.g., Priesmeyer, 1992). Stated simply, this approach strives to discover an organization’s natural rhythms prior to establishing “upper and lower limits.” As more of these simple notions are given theoretical as well as practical relevance, perhaps Edward Deming’s great legacy will continue to grow.

FROM EVOLUTIONARY TO DISCONTINUOUS CHANGE DYNAMICS

The missing link in much of strategic change literature is a process model of radical realignments. Several organization scholars have grappled with the problem (e.g., Greiner, 1972; Quinn, 1980; Nelson & Winter, 1982; and Meyer, Brooks, & Goes, 1990), yet the exact relationship between evolutionary and revolutionary change remains obscure, at best. What is especially cloudy is how strategists creatively respond to the type of turbulence normally characterized as discontinuities.

“The missing link in much of strategic change literature is a process model of radical realignments.”

In contrast, some of the work in organizational change argued for greater awareness of new evolutionary theories emerging in the physical and biological sciences, known as “self-organization” and/or “dissipative structures” (see: Jantsch, 1980; Gemmil & Smith, 1985; Daneke, 1988). In a recent review of revolutionary change theories, Connie Gersick (1991) labels this domain “Grand theory” and suggests that it is a logical extension of an emerging paradigm of “punctuated equilibrium.” While this may be a useful characterization, Erich Jantsch (1980) maintains that “self-organization” is actually a much more radical, yet potentially more powerful, concept of evolutionary change. He contends:

In reaction to the Darwinian image of steady morphological development by ever renewed adaptation, the equally misleading image of a “punctuated equilibrium” has been proposed, a basic equilibrium state in which chance developments occur here and there.

JOURNAL OF BUSINESS AND MANAGEMENT

Both extreme views result from a one-sidedly microscopic view. In the frame of a co-evolution of macro and microsystems there is never equilibrium. (p. 239)

In other words, what one perceives as equilibrium is merely a temporary stability within the dynamics of complex co-evolutionary systems. More to the point, order itself arises out of constant fluctuation (see: Nicholas & Prigogine, 1977). In the natural sciences, these concepts form the basis for what has recently been labeled “chaos theory” (see: Abraham, 1987; for a non-technical discussion, see: Gleick, 1987; Prigogine & Allen, 1982; Nicholas & Prigogine, 1989) and/or “complexity” (for a non-technical discussion, see: Waldrop, 1992). Systems researchers (especially Europeans) have applied these more elaborate evolutionary understandings (non-Darwinian) to engineering and some social phenomena for some time (see: Schieve & Allen, 1982). With specific reference to the evolution of high technology industries, a few have found these notions quite compelling. Gerald Silverberg (1988) elaborates on this research as follows:

Within certain domains, in particular, in the neighborhood of a structural instability, these interactions can often be represented at an aggregate level by a small number of *order parameters* which summarize the net result of the complex of feedbacks constraining the behavior of the subsystems... Moreover, self-organizing systems can undergo a succession of such structural transformations in response to generalized changes in outside conditions coupled with internal fluctuations at the microscopic level (p. 533).

THE CHAOS OF CHAOS APPLICATIONS

Only recently have explorations of this type begun in earnest in the United States, through the auspices of the Santa Fe Institute (see: Waldrop, 1992). A conference held there in September 1987 brought together Noble class economists and physicists to discuss the global “economy as an

evolving complex system” (see: Anderson, Arrow, & Pines, 1988). Waldrop (1992) summarizes the implications of this epiphany as follows:

Instead of emphasizing decreasing returns, static equilibrium, and perfect rationality, as in the neoclassical view, the Santa Fe team would emphasize increasing returns, bounded rationality, and the dynamics of evolution and learning. Instead of basing their theory on assumptions that were mathematically convenient, they would try to make models that were psychologically realistic. Instead of viewing the economy as some kind of Newtonian machine, they would see it as something organic, adaptive, surprising, and alive. Instead of talking about the world as if it were a static thing buried deep in the frozen regime ... they would learn how to think about the world as a dynamic, ever-changing system poised at the edge of chaos. (p. 245)

Unfortunately, only a small handful of economists actually adhere to this so-called “Santa Fe Perspective.”

Nevertheless, for many less preordained realms of social inquiry, these explorations are, in the words of the Ghostbusters, “an event of Biblical proportions.” James Gleick (1987) describes the nexus of this movement as a complete conceptual reversal, where now, “Simple systems give rise to complex behavior. Complex systems give rise to simple behavior. And most important, the laws of complexity hold universally ... ” (p. 304). Essentially, this perspective when applied to the social sciences constitutes a dramatic “paradigm shift,” literally reversing a number of critical elements (see table).

TABLE: SHIFTING PARADIGMS

Conventional	Alternative
<ul style="list-style-type: none"> • Largely static, linear, Newtonian, mechanical worldview; 	<ul style="list-style-type: none"> • Ever-fluid, non-linear, complex, open systems perspective;
<ul style="list-style-type: none"> • At or seeking equilibrium; 	<ul style="list-style-type: none"> • Occasionally orderly but “far from equilibrium”;
<ul style="list-style-type: none"> • Statistics used to separate predictable from random and intractable; with <i>processes</i> as probabilities; 	<ul style="list-style-type: none"> • <i>Chaos and complexity</i> mathematics used to locate the deterministic amid the unpredictable; with <i>products</i> as probabilities;
<ul style="list-style-type: none"> • Focus on quantities and the pricing mechanisms; 	<ul style="list-style-type: none"> • Focus on processes, patterns, potentialities and diverse values;
<ul style="list-style-type: none"> • Reductionist; 	<ul style="list-style-type: none"> • Holistic;
<ul style="list-style-type: none"> • Individual as unit of analysis; with rational choice parameters; 	<ul style="list-style-type: none"> • Synergistic, co-evolving individuals and institutions, with <i>systemic choice</i> parameters;
<ul style="list-style-type: none"> • Decreasing returns; 	<ul style="list-style-type: none"> • Increasing returns;
<ul style="list-style-type: none"> • Forecasting by extrapolating from past trends; 	<ul style="list-style-type: none"> • Creative evolution through alternative trajectories;
<ul style="list-style-type: none"> • “Single-loop” learning; 	<ul style="list-style-type: none"> • “Double-loop,” adaptive learning, and “perpetual novelty”;
<ul style="list-style-type: none"> • Economics as architectonic science. 	<ul style="list-style-type: none"> • Ecology (social/institutional as well as bio-cognitive) as the architectonic science.

These notions are currently being applied in a highly metaphorical fashion in the management literature (see: Wheatley, 1992), and even a few attempts at serious methodological development have emerged (see: Priesmeyer, 1992). These generic applications join a mounting body of primarily anecdotal evidence regarding the presence of “non-linear dynamics” in processes directly related to corporate strategic management (note: Daneke, 1985; DeGreene, 1982; Maruyama, 1982; Morgan, 1983; Gemmill & Smith, 1985; Vertinsky, 1987; Nonaka, 1990; Pascale, 1990; Stacey, 1992; Zimmerman, 1994). Ralph Stacey’s (1992) recent book is the nearest in spirit to earlier efforts, as well as being the most comprehensive. He summarizes the implications of his own version of chaos theory for “strategic thinking,” as follows:

- toward a concern with the effects of the personalities, group dynamics, and learning behaviors of managers in groups;
- toward the creative instability of contention and dialogue ... ;
- toward examining, understanding, and dealing with organizational defense mechanisms and game playing;
- toward an understanding of group learning as a complex process of continually questioning how people are learning;
- toward the opening up of contentious and ambiguous issues;
- toward developing new mental models to design actions for each new strategic situation (pp. 120-121)

This is not to say that his paradigm is complete, or that his characterizations are congruent with the insights emerging from the more rigorous social science explorations (e.g., Schieve & Allen, 1982; Anderson, Arrow & Pines, 1988; and Stein, 1989). Nevertheless, Stacey is highly provocative of future avenues of research. Furthermore, his applications, while primarily metaphorical, are no more tenuous than many

JOURNAL OF BUSINESS AND MANAGEMENT

of the precepts that drive much of neo-classical economic theory, or any other managerial metaphors for that matter. When combined with the prior conceptualizations, a set of strategies for management of turbulent change begins to emerge.

THE INSIGHTS OF EARLIER CONCEPTUAL INNOVATORS

Since the concepts of non-linear dynamics have been around for some time (over 50 years), it should not be surprising that a few of its elements filtered into management studies even while it was just gradually taking hold in the sciences. These early applications, while incomplete, provide a number of useful insights into the nature of complex strategic change. Furthermore, they provide vital clues to paths of conceptual reintegration.

One early innovator whom students of management theory would expect to find the forefront of this as well as other movements is Gareth Morgan. The crux of Morgan's work in this area is his assertion of a new logic for the evolution of complex systems which he calls "systemic wisdom" (1983). However, this contribution might have been lost in his overall critique of conventional approaches to corporate strategy. He correctly identifies how a couple of dynamics isolated by modern cyberneticians wreak havoc upon traditional linear planning devices still popular in some corporate circles. Morgan wants students of strategy to take note of Maruyama's (see: 1982) speculations about "deviation amplifying mutual causal processes" (a sort of contextual fungus that arise in complex communication systems). This particular dynamic may, according to Morgan, cause certain strategic adaptations to actually increase the level of turbulence. Interestingly enough, Maruyama's own translation of these notions for strategists (1982) does not lead him to completely despair the possibility of purposeful policy (also note: Daneke, 1985). Furthermore, as Brian Arthur (1990) illustrates, these distortions can produce positive synergism in industries experiencing rapid technical change.

Kenyon De Greene's (1982) evocation of C. S. Holling's work on "resiliency" (1978) in natural systems also supports the prospects of adaptive designs. He uses these observations to produce "rules of thumb" for the effective management of turbulence. Resiliency, essentially, operationalizes Nietzsche's famed dictum: "that which does not kill one makes one stronger." Thus, as De Greene suggests, it may often be advisable to design "safe-fail" systems which build up the firm against large scale shocks, by creating a series of small shocks (334-335). Ilan Vertinsky (1987) further points out that resiliency and other ecological concepts may go a long way toward explaining the enigmatic processes (e.g., tolerance for ambiguity) at work in the successful strategies of Japanese firms.

Similarly curious transformational dynamics may correspond with the uncertainty embracing experimentation of "dissipative structures." As Gemmill and Smith (1985) contend, those organizations which can create new internal configurations in response to environmental turbulence may engender processes of adaptive learning akin to the "symmetry breaking" dynamics currently exhibited for a vast array of natural and artificial phenomena. Ikujiro Nonaka (1988) applies these concepts of "self-organization" to describe the strategy choices of Japanese firms. Furthermore, he (Nonaka, 1990) invokes notions from earlier cybernetics theory, specifically "requisite variety" (see: Ashby, 1955) to explain how such firms use "redundancy" as an innovation strategy. More studies of this type are obviously needed.

ON THE RETURN OF SYSTEMS THINKING

If these bits and pieces of insight have an underlying theory, it is clearly that of systems thinking. Curiously enough, the field of strategic management had its origins in various systems theoretics. Thus, the long-awaited unifying paradigm may have been here all the while. Of course, for current purposes a significant level of refurbishing is required. Reasons why such a rejuvenation process should be undertaken are manifold;

however, beyond being well suited to the current fascination with non-linear dynamics, systems theory provides a viable alternative to the persistent paradigm of neo-classical economics. As Joseph Schumpeter once observed, one “cannot kill a theory with facts” (or folk wisdom for that matter). If one could, the entire pursuit of strategic management might have died long ago. “It takes a theory to kill a theory.”

“Curiously enough, the field of strategic management had its origins in various systems theoretics.”

SYSTEMS REVISITED

It is well to recall that the field of strategic management had its origins in general systems theory. Concepts such as “purposive design,” “adaptive planning,” and “strategic innovation” came out of the work of systems theorists (see Emery & Trist, 1965; Ackoff, 1970; and, Catanese & Steiss, 1970). While systems thinking remains the linchpin of much of operational analysis and advanced mathematical applications (see Casti, 1989), it has not been sustained as a prime source of social and organizational inquiry.

Reasons for the untimely demise of the systems paradigm are complex, yet generally relate to the misapplication of its more mechanistic metaphors (those observed in “closed” or non-living systems). Meanwhile, the complex and highly contextual concepts of “open-systems” often proved intractable (see: Wilson, 1980). More subtle, yet perhaps more profound, the emphasis on holism was ideologically unacceptable in the era of methodological and political individualism.

With specific reference to managerial studies, Ashmos and Huber (1987) outline additional misconceptions about the basic research paradigm of general systems, and a number of “missed opportunities” for enhanced organizational understanding. They also describe how systems thinking could be enhanced through recent advances in organization theory. More importantly, they conclude that such a revised systems paradigm would be especially instrumental in studies of “organizational change” and “strategic choice.” A similar conclusion is reached by Igor Ansoff (1987) who alludes to an evolutionary systems paradigm as a means of integrating diverse empirical observations about “strategic behavior.”

THE BASIC PARADIGM

A good generic source of useful concepts regarding the basic “open” or “living systems” paradigm is sociologist Walter Buckley (1967). His general characterization of the “systems perspective” includes the following elements:

- A common vocabulary unifying the several “behavioral” disciplines.
- A technique for treating large complex organizations.
- A synthetic approach where piecemeal analysis is not possible due to the intricate interrelationships of parts that cannot be treated out of context of the whole.
- A viewpoint that gets at the heart of sociology because it sees the sociocultural system in terms of information and communications nets.
- The study of “relations” rather than “entities,” with an emphasis on process and transition probabilities as the basis of a flexible structure with many degrees of freedom.

JOURNAL OF BUSINESS AND MANAGEMENT

- An operationally definable, objective nonanthropomorphic study of purposiveness, goal seeking, system behavior; symbolic cognitive processes; consciousness and self-awareness; and sociocultural emergence and dynamics in general. (p. 39)

The systems paradigm was initially designed to escape the pull of positivism, but it has never quite reached sufficient escape velocity. As David Wilson (1980) explains, it has always been an alternative view of science. He explains:

[T]hough it shares the same scientific attitude, it is profoundly different from the physicalism, reductionalism, one-way causality, and “truth” of logical positivism and empiricism. By investigating organized wholes of many variables, system epistemology requires many new categories of interaction, transaction, organization, and teleology, as well as a view of knowledge as an interaction between the knower and known. It is thereby dependent on multiple biological, psychological, cultural, and linguistic factors. (p. 135)

This original vision of a broadly interdisciplinary science of common process dynamics has recently been reintroduced by diverse groups of scientists being brought together under the rubric of “chaos and complexity” (see: Stein, 1989, Waldrop, 1992). While much of this work is focused on narrow cybernetic problems within the emerging fields of Artificial Intelligence and/or Cognitive Science, certain strains of research have been expanded to reconceptualize realms ranging from biology to social/cultural to institutional evolution (note: Holland, 1987; Jantsch, 1980; Schieve & Allen, 1982). While extremely varied in applications, the following types of general elements can be distilled from this research.

- “search” and/or adaptive and creative learning procedures, as well as evolutionary dynamics;
- contextual parameters which include historical, institutional, and cultural factors, as well as individual preferences and activities;

- nonequilibrium processes inducing self-organization, bifurcations, and reordering at higher levels of complexity;
- cybernetic interactions which include “network externalities” and error amplifications, as well as resiliency.

“The systems paradigm was initially designed to escape the pull of positivism, but it has never quite reached sufficient escape velocity.”

This work, which has its origins in early systems pioneers (e.g. Ashby, 1955; von Bertalanffy, 1968; and Wiener, 1948), now generates simplifying algorithms which characterize the behavior of “adaptive-agents” within complex non-linear systems. Since, these systems create their own rules as they evolve via various discontinuous change dynamics, patterns and processes can best be approximated through simulations (see: Holland, 1987). Such simulations could also be used to study the dynamics of strategic choice at the level of the firm, the industry and the nation state. In turn, these studies would go a long-way toward operationalizing concepts drawn from the unconventional wisdom cited above (e.g. “helmsmanship” and “generative learning”). Furthermore, as Kevin Dooley (1994) notes, research methods are not limited to simulation, but include: “case studies,” metaphorical essays,” as well as “complexity time series modeling.”

The most crucial issue to acknowledge when returning to systemic thinking is that this current emphasis is dramatically different than past incarnations, especially these which found favor in engineering and similar applications. An emphasis on open systems coupled with emerging knowledge about the non-linear dynamics of human institutions, greatly

reduces the methodological hubris of earlier efforts. With specific reference to planning, the notion that one can somehow capture the future using linear projections and/or similar forecasting techniques is essentially demolished. As Henry Mintzberg (1989; 1994) so elaborately details, such notions of planning do not square with the actual practice of strategic management. Moreover, increased understanding of how various elements of human intuition, insight and inspiration interact with institutional constraints and opportunities, while less mysterious are not necessarily any more subject to manipulation. The sensitivity of initial conditions and non-linear dynamics combine to make even deterministic systems highly uncertain. However, knowing this shifts the focus of planning from predicting to creating, and awareness of potential bifurcation points allows one to survive and even thrive on chaos. Likewise, the complex coordination problems posed by increasingly fluid organizations or “virtual corporations” (Davidow & Malone, 1993) are also subject to investigation using the notions of synergism and co-evolution derived from recent advances in systems thinking. Again, models which assume that instability is endemic could greatly enhance the managerial mindset required for these agile adjustments.

CONCLUSION

A serious revival of systems thinking will probably await the formalization of a greatly simplified heuristic of *systemic choice* akin to the “microeconomic theory of the firm” in power and recognition. Yet, in the meantime, there are a variety of interesting and potentially useful speculations to explore. These might include:

- How an evolutionary learning reconciles diverse values with conventional competitive strategy;
- To what extent an emphasis on “resiliency” trade-offs “persistence” and short-term profitability;

- Why “human capital intensity” and “flexibility” (including views of competency enhancing processes) are more vital than conventional “success factors.”
- To what extent coordination across industries conflicts or compliments traditional market signals;
- How entrepreneurial behavior fundamentally changes agency relationships beyond those accounted for in transactional and similar analyses; etc.

These, of course, can and have been, investigated without the aid of systems concepts. Yet, they remain isolated insights. As economists have long been aware the value of a unified paradigm is the integration and accumulation of a body of knowledge. This integration also serves a very practical purpose. As Peter Senge (1990) suggests:

This is why systems thinking is the fifth discipline. It is the discipline that integrates the disciplines, fusing them into a coherent body of theory and practice. It keeps them from being separate gimmicks or the latest organization change fads. Without a systemic orientation, there is no motivation to look at how the disciplines interrelate. By enhancing each of the other disciplines, it continually reminds us that the whole can exceed the sum of its parts For example, vision without systems thinking ends up painting lovely pictures of the future with no deep understanding of the forces that must be mastered to move from here to there. (p. 12)

Whether or not students of strategy aspire to normative or explanatory completeness, they would do well to return to their mooring in systems thinking to begin the quest in earnest.

REFERENCES

- Abraham, R.H. (1987). "Dynamics and Self-Organization." In F. Yates, A. Garfinkel, D.O. Walter, & G. Yates (Eds.). *Self-Organizing Systems: The Emergence of Order*. Pp. 599–616. New York, NY: Plenum Press.
- Ackoff, R.L. (1970). *A Concept of Corporate Planning*. New York, NY: Wiley.
- Ackoff, R.L. (1981). "On the Use of Models in Corporate Planning." *Strategic Management Journal*, 2(4), 353–359.
- Amit, R., & Shoemaker, P. (1990). "Key Success Factors: Their Foundation and Application." *Working Papers*. Vancouver, Canada: Policy Division, University of British Columbia.
- Anderson, P.W., Arrow, K.J., & Pines, D (Eds.). (1988). *The Economy as an Evolving Complex System*. Menlo Park, CA: Addison-Wesley.
- Ansoff, H.I. (1979). *Strategic Management*. New York, NY: Wiley.
- Ansoff, H.I. (1987). "The Emerging Paradigm of Strategic Behavior." *Strategic Management Journal*, 8(5), 501–515.
- Argyris, C. (1982). *Reasoning, Learning and Action*. San Francisco, CA: Jossey-Bass.
- Arthur, W.B. (1990, February). "Positive Feedback in the Environment." *Scientific American*, 92–99.
- Ashby, W. (1955). *An Introduction to Cybernetics*. London, UK: Chapman and Hall.

- Ashmos, D.P. & Huber, G.P. (1987). "The Systems Paradigm on Organizational Theory: Correcting the Record and Suggestions for the Future." *Academy of Management Review*, 12(4), 607–621.
- Barney, J.B. (1989). "Firm Resources and Sustained Competitive Advantage." *Working Paper #89-016*. College Station, TX: Department of Management, Texas A & M University.
- Beer, M. (1992). "Strategic-Change Research: An Urgent Need for Usable Rather Than Useful Knowledge." *Journal of Management Inquiry*, 1(2), 111–116.
- Bettis, R.A. (1991). "Strategic Management and the Straight Jacket: An Editorial Essay." *Organization Science*, 2(3), 315–319.
- Bracker, J.S. (1980). "The Historical Development of the Strategic Management Concept." *Academy of Management Review*, 5(2), 219–224.
- Buckley, W. (1967). *Sociology and Modern Systems Theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Burgelman, R.A. (1988). "Strategy Making as a Social Learning Process: The Case of Internal Corporate Venturing." *Interfaces*, 18(13), 74–85.
- "The New Breed of Strategic Planner." *Business Week*, (1984, September 17), 62–68.
- Buzzel, R.D. & Gale, B.T. (1987). *The PIMS Principles: Linking Strategy and Performance*. New York, NY: Macmillan.
- Casti, J.L. (1989). *Alternative Realities: Mathematical Models of Mannature*. New York, NY: Wiley.

JOURNAL OF BUSINESS AND MANAGEMENT

- Catanese, A.J. & Steiss, A.W. (1970). *Systemic Planning: Theory and Application*. Lexington, MA: D.C. Heath.
- Caves, R. (1980). "Corporate Strategy and Structure." *Journal of Economic Literature*, 18(1), 64–92.
- Chandler, A.D. (1962). *Strategy and Structure: Chapters in the History of Industrial Enterprise*. Cambridge, MA: MIT Press.
- Christensen, H.K. & Montgomery, C.A. (1981). "Corporate Economic Performance: Diversification Strategy vs. Market Structure." *Strategic Management Journal*, 3(2), 327–343.
- Cournot, A.A. (1838). *Research in the Mathematical Principles of Wealth*. New York, NY: Kesley.
- Daft, R.L. & Buenger, V. (1990). "Hitching a Ride on the Fast Train to Nowhere: The Past and Future of Strategic Management Research." In I. Fredrickson (Ed.). *Perspectives on Strategic Management*. Cambridge, MA: Balinger.
- Daft, R.L. & Lewin, A.Y. (1990). "Can Organization Studies Begin to Break out of the Normal Science Straight Jacket?" *Organization Science*, 1(1), 1–9.
- Daneke, G.A. (1985). "Regulation and the Sociopathic Firm." *Academy of Management Review*, 10(1), 15–20.
- Daneke, G.A. (1988). "On Paradigmatic Progress." *Policy Studies Journal*, 17(2), 277–296.
- Davidow, W. & Malone, M. (1993). *The Virtual Corporation*. Scranton, PA: Harper-Collins.

- De Greene, K.B. (1982). *The Adaptive Organization: Anticipation and Management of Crisis*. New York, NY: Wiley.
- De Gregori, T.R. (1987). "Resources are not; They Become: An Institutional Theory." *Journal of Economic Issues*, 21(4), 1241–1263.
- Deming, W.E. (1993). *The New Economics for Industry, Government, Education*. Cambridge, MA: Center for Advanced Engineering Study.
- Dess, G. & Davis, P. (1984). "Porter's (1980) Generic Strategies as Determinants of Strategic Group Membership and Organizational Performance." *Academy of Management Journal*, 27(3), 467–488.
- Dooley, K. (1994). "Research Methods for Studying Chaos and Complexity." *Working Paper*. Minneapolis, MN: Department of Industrial Engineering, Univ. of Minnesota.
- Drucker, P.F. (1959). "Long-Range Planning." *Management Science*, 5(3), 27–31.
- Eisenhardt, K. (1989). "Agency Theory: An Assessment and Review." *Academy of Management Review*, 14(1), 57–74.
- Emery, F.E. & Trist, E. (1965). "Casual Texture in Organizational Environments." *Human Relations*, 18(1), 21–23.
- Fama, E. (1980). "Agency Problems and the Theory of the Firm." *Journal of Political Economy*, 88(2), 288–307.
- Fudenberg, D. & Tirole, J. (1991). *Game Theory*. Cambridge, MA: MIT Press.
- Galbraith, J. (1975). *Organization Design*. Reading, MA: Addison-Wesley.

JOURNAL OF BUSINESS AND MANAGEMENT

- Gemmill, G. & Smith, C. (1985). "A Dissipative Structure Model of Organizations." *Human Relations*, 38(8), 751–766.
- Gersick, C.J.G. (1991). "Revolutionary Change Theories: A Multilevel Exploration of the Punctuated Equilibrium Paradigm." *Academy of Management Review*, 16(1), 10–36.
- Ghemawat, P. (1985). "Sustainable Advantage." *Harvard Business Review*, 64(1), 53–58.
- Ghemawat, P. (1991). *Commitment: The Dynamic of Strategy*. New York, NY: The Free Press.
- Gleick, J. (1987). *Chaos: Making a New Science*. New York, NY: Penguin.
- Grant, R.B. & Boardman, A.E. (1990). "Realizing the Potential of Corporate Resources and Capabilities: A Resource-based Approach to Strategic Analysis." *Working Paper*, Vancouver, Canada: Policy Division, University of British Columbia.
- Greiner, L. (1972). "Evolution and Revolution as Organizations Grow." *Harvard Business Review*, 50(1), 46-77.
- Hart, S. & Banbury, C. (1992). "Strategy-making Process Capability." Paper presented at the annual Academy of Management Meeting, Las Vegas, Nevada.
- Hatten, K.J. & Schendel, D.E. (1977). "Heterogeneity Within an Industry." *Journal of Industrial Economics*, 26(4), 97–113.
- Hax, A.C. & Majluf, N.S. (1984). *Strategic Management: An Integrative Perspective*. Englewood Cliffs, NJ: Prentice-Hall.

- Hinnings, C.R. & Greenwood, R. (1990). *The Dynamics of Strategic Change*. London, UK: Blackwell.
- Holland, J.H. (1987) "Genetic Algorithms and Classifier Systems: Foundations and Future Directions." In J.J. Grefenstette (Ed.). *Genetic Algorithms and Their Applications*. Hillsdale, NJ: Lawrence Erlbaum.
- Holling, C.S. (1978). *Adaptive Environmental Assessment and Management*. New York, NY: Wiley.
- Hotelling, H. (1929). "Stability in Competition." *Economic Journal*, 39(1), 41–57.
- Jantsch, E. (1980). *The Self-organizing Universe*. New York, NY: Pergamon Press.
- Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment Under Uncertainty: Heuristics and Biases*. Cambridge, MA: Cambridge University Press.
- Kreps, D.M. (1990). *A Course in Microeconomic Theory*. Princeton, NJ: Princeton University Press.
- Laverty, K. (1989). "Market Share-Profitability Puzzle: A Structural Equations Approach." Paper presented at the annual Meeting of the Strategic Management Society, San Francisco.
- March, J.G. (1986). "Bounded Rationality, Ambiguity, and the Engineering of Choice." In J. Elster (Ed.). *Rational Choice*. Pp. 142–170. New York, NY: New York University Press.
- Maruyama, M. (1963). "The Second Cybernetics: Deviation amplifying Mutual Causal Processes." *American Scientist*, 51(2), 164–179.

JOURNAL OF BUSINESS AND MANAGEMENT

- Maruyama, M. (1982). "Mindscapes, Management, Business Policy and Public Policy." *Academy of Management Review*, 7(4), 612–619.
- Meyer, A.D., Brooks, G.R., & Goes, J.B. (1990). "Environmental Jolts and Industry Revolutions: Organizational Responses to Discontinuous Change." *Strategic Management Journal*, 11(32), 93–110.
- Mintzberg, H. (1989). *Mintzberg on Management: Inside Our Strange World of Organizations*. New York, NY: The Free Press.
- Mintzberg, H. (1990). "The Design School: Reconsidering the Basic Premises of Strategic Management." *Strategic Management Journal*, 11(3), 171–196.
- Mintzberg, H. (1994). *The Rise and Fall of Strategic Planning*. New York, NY: The Free Press.
- Mirowski, P. (1989). *More Heat than Light: Economics as social physics, physics as nature's economics*. Cambridge, MA: Cambridge University Press.
- Montgomery, C.A. & Singh, H. (1984). "Diversification and Strategic Risk." *Strategic Management Journal*, 5(2), 181–191.
- Morgan, G. (1983). "Rethinking Corporate Strategy: Cybernetics Perspective." *Human Relations*, 36(4), 345–360.
- Nelson, R. & Winter, S. (1982). *An Evolutionary Theory of Economic Change*. Cambridge, MA: Harvard University Press.
- Nicholas, G. & Prigogine, I. (1977). *Self-organization in Nonequilibrium Systems: From Dissipative Structures to Order Through Fluctuation*. New York, NY: Wiley-Interscience.

- Nicholas, G. & Prigogine, I. (1989). *Exploring Complexity: An Introduction*. New York, NY: Freeman.
- Nonaka, I. (1988). "Creating Organizational Order out of Chaos: Self-Renewal in Japanese Firms." *California Management Review*, 30(1), 57-73.
- Nonaka, I. (1990). Redundant, Overlapping Organization: A Japanese Approach to Innovation. *California Management Review*, 32(3), 27-38.
- Peteraf, M.A. (1991). "The Cornerstone of Competitive Advantage: A Resource-based View." *Discussion paper* (90-29). Evanston, IL: Kellogg Graduate School of Management, Northwestern University.
- Porter, M. (1980). *Competitive Strategy*. New York, NY: Free Press.
- Porter, M. (1985). *Competitive Advantage*. New York, NY: Free Press.
- Prahalad, C.K. & Hamel, G. (1990). "The Core Competence of the Corporation." *Harvard Business Review*, 90(1), 70-93.
- Priesmeyer, H.R. (1992). *Organizations and Chaos: Defining the Methods of Non-linear Management*. Westport, CT: Quorum Books.
- Prigogine, I. & Allen, P.M. (1982). "The Challenge of Complexity." In W. Schieve & P.M. Allen. (Eds.). *Self-organization and Dissipative Structures*. Pp. 3-39. Austin, TX: University of Texas Press.
- Quinn, J.B. (1980). *Strategies for Change: Logical Incrementalism*. Homewood, IL: Irwin.
- Reed, R. & Luftman, G.A. (1986). "Diversification: The Growing Confusion." *Strategic Management Journal*, 7(1), 29-35.

JOURNAL OF BUSINESS AND MANAGEMENT

- Rotemberg, J.J. & Saloner, G. (1990). "Benefits of Narrow Strategies." *Working Paper #3217-90-EFA*. Cambridge, MA: Sloan School of Management, MIT.
- Rumelt, R.P. (1974). *Strategy Structure and Economic Performance*. Cambridge, MA: Harvard University Press.
- Rumelt, R.P. (1989). "How Much Does Industry Matter?" *Working Paper*. Los Angeles, CA: Anderson Graduate School of Management, University of California, Los Angeles.
- Rumelt, R.P., Schendel, D., & Teece, D.J. (1994). Afterword In R. Rumelt, D. Schendel, & D.J. Teece. (Eds.). *Fundamental Issues in Strategy*, Pp. 527–555. Boston, MA: Harvard Business School Press.
- Schendel, D.E. & Cool, K.O. (1988). "Development of the Strategic Management Field: Some Accomplishments and Challenges." In J.M. Grant (Ed.). *Strategic Management Frontiers*. Pp. 27–32. Greenwood, CT: JAI Press.
- Schendel, D.E. & Hoffer, S.W. (Eds.). (1979). *Strategic Management: A new view of business policy and planning*. Boston, MA: Little Brown.
- Schieve, W. & Allen, P.M. (Eds.). (1982). *Self-organization and Dissipative Structures*. Austin, TX: University of Texas Press.
- Schumpeter, J. (1934). *The Theory of Economic Development*. Cambridge, MA: Harvard University Press.
- Senge, P.M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York, NY: Doubleday/Currency Press.
- Shapiro, C. (1987). "Theories of Oligopoly Behavior." *Discussion Paper #126*, Princeton, NJ: Woodrow Wilson School, Princeton University.

- Silverberg, G. (1988). "Modeling Economic Dynamics and Technical Change: Mathematical Approaches to Self-organization and Evolution." In G. Dosi, C. Freeman, R. Nelson, G. Silverberg, & L. Soete (Eds.). *Technical Change and Economic Theory*. Pp. 531–559. London, UK: Painter Publishers.
- Smith, K.G., Grimm, C.M., & Gannon, M.J. (1992). *Dynamics of Competitive Strategy*. Newbury Park, CA: Sage Publications.
- Spence, A.M. (1977). "Entry, Capacity, Investment, and Oligopolistic Pricing." *Bell Journal of Economics*, 8(3), 534–544.
- Stacey, R.D. (1992). *Managing the Unknowable*. San Francisco, CA: Jossey-Bass.
- Stein, D.L. (Ed.). (1989). *Lectures in Complex Systems*. Redwood City, CA: Addison-Wesley.
- Teece, D.J. (1984). "Economic Analysis and Strategic Management." In G. Carroll & D. Vogel (Eds.). *Strategy and Organization: A West Coast Perspective*. Pp. 78–101. Boston, MA: Pittman.
- Turner, C.H. (1990). *Charting the Corporate mind: Graphic Solutions to Business Conflicts*. New York, NY: The Free Press.
- Venkatraman, N. (1990). "Strategic Orientation of Business Enterprises." *Management Science*, 35(8), 942–962.
- Vertinsky, I. (1987). "An Ecological Model of Resiliency Decision-making: An Application to the Study of Public and Private Sector Decision-Making." *Ecological Modelling*, 38(1), 141–158.
- Von Bertalanffy, L. (1968). *General Systems Theory*. New York, NY: Braziller.

JOURNAL OF BUSINESS AND MANAGEMENT

- Von Neuman, J. & Morgenstern, O. (1944). *Theory of Games and Economic Behavior*. New York, NY: Wiley and Sons.
- Von Stackelberg, H. (1934). *Marktform und Gleichgewicht*. Vienna, Austria: Springer.
- Waldrop, M.M. (1992). *Complexity: The Emerging Science at the Edge of Order and Chaos*. New York, NY: Simon & Schuster.
- Weick, K. (1992). "Agenda Setting in Organizational Behavior: A Theory-Focused Approach." *Journal of Management Inquiry*, 1(3), 171–182.
- Wiener, N. (1948). *Cybernetics: Or Control and Communication in the Animal and the Machine*. Cambridge, MA: MIT Press.
- Wheatley, M. (1992). *Leadership and the New Science*. San Francisco, CA: Barrett-Koehler.
- Williams, J.R. (1992). "How Sustainable is Your Competitive Advantage?" *California Management Review*, 34(3), 29–51.
- Williamson, O.E. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting*. New York, NY: Free Press.
- Wilson, D. (1980). *The National Planning Idea in Public Policy*. Boulder, CO: Westview Press.
- Wright, P. (1987). "A Refinement of Porter Strategies." *Strategic Management Journal*, 8(1), 93–101.
- Zimmerman, B. (1994). "The Inherent Drive Toward Chaos." In P. Lorange, B. Chakravarty, J. Roos, & A. Van de Ven. (Eds.). *Implementing Strategic Processes: Change, Learning and Cooperation*. Pp. 373–393. Oxford, MA: Basil Blackwell.