

ORGANIZATIONAL LEARNING

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to appear in:

COMPANION TO ORGANIZATIONS

Joel A. C. Baum (editor)
Blackwell Publishers, 2001

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Introduction

From an abstract point of view, organizational learning denotes a change in organizational knowledge. Organizational learning typically adds to, transforms, or reduces organizational knowledge. Theories of organizational learning attempt to understand the processes which lead to (or prevent) changes in organizational knowledge, as well as the effects of learning and knowledge on behaviors and organizational outcomes.

Organizational learning draws much of its appeal from the presumption that organizations are capable of intelligent behavior, and that learning is a tool for intelligence, though sometimes an intriguingly unreliable one. The basic image is that organizations collect experiences, draw inferences, and encode inferences in repositories of organizational knowledge, such as formal rules and informal practices. In this view, organizations are shaped by complex learning processes which combine current experiences with lessons learned in the past.

Notions about organizational knowledge, learning processes, and outcomes of learning vary a great deal in the organizational learning literature. One important reason is probably that many of its concepts are rooted in metaphors about individual learning. This introduces some conceptual imprecision, tension, and even contradictions into the field, but also enriches it, and makes it applicable to a wide range of phenomena.

Current approaches to organizational learning emphasize routines as repositories of knowledge and they conceptualize learning as making and updating of routines in response to experiences (Levitt and March, 1988). Routines are regarded as recurrent sequences of action which span multiple organizational actors and assets. Examples of organizational routines include organizational rules, roles, conventions, strategies, structures, technologies, cultural practices and capabilities. In this view, organizational routines function as the primary form of organizational knowledge. The focus on routines in organizational learning theories establishes a supra-

individual basis of organizational learning. Organizational routines are independent from the individual actors who make and execute them and they frequently persist even after their creators have left the organization. Routine-based learning is thus located on an organizational level, above the level of individual learning.

A dominant notion in this field is that organizational learning is brought about by learning processes which facilitate, impede, or direct the change, dissemination, and use of organizational knowledge. A number of learning processes have been explored. One is performance feedback. It involves a simultaneous adaptation of routines and aspirations to experience. Organizations adjust their routines when performance falls short of aspirations. At the same time, organizations adjust their aspirations to past experiences and experiences of others. The resulting dynamics is one of dampened adaptation, punctuated equilibria, and path dependent evolution.

Literature Review, Summary and Evaluation

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Origins of Organizational Learning

Notions of organizational learning gained prominence in the nineteen fifties when they were thrown into an ongoing debate between behaviorists and economists. Economic models of the firm had become dominant during and after WWII, yet many researchers, especially those with a behaviorist orientation, were dissatisfied with those models. Behaviorists such as March, Simon, and Cyert attacked the classical economic theory of the firm on the grounds that its models were overly simplistic and contradicted empirical evidence.

In their book “Organizations” March and Simon (1958) refuted the claim of economic models that organizational decision outcomes are uniquely determined by environmental constraints. March and Simon amassed an impressive set of arguments which suggest that organizational behavior depends in important ways on organizational processes which introduce massive unpredictability into organizational decision making. They evoked (among others) several organizational learning ideas to support their claim, and in the course of their argumentation pioneered a remarkable number of themes which proved highly important in subsequent research on learning. The core learning-related idea in “Organizations” is that organizations experience recurrent decision situations, and, in response, develop “performance programs” – highly complex and organized sets of responses. March and Simon argued that the main occasion for program adaptation arises from sub-standard performance – when performance declines below aspiration levels. Yet, aspiration levels, as the authors were quick to point out, themselves adapt to many things, including past performance and performance of reference groups. The outcome is that program adaptation is a result of random encounters with improvement opportunities.

The focus on organizational learning was sharpened in the Behavioral Theory of the Firm (Cyert and March, 1963). The firm was now conceived as a complex, adaptive system – a system that, due to its internal complexity, was able to display considerable autonomy because it could produce outcomes not uniquely determined by external constraints. Organizational learning was captured in a “learning cycle” in which organizations responded to external shocks by adjusting the likelihood of reusing specific operating procedures (SOPs), a concept essentially equivalent to March and Simon’s performance programs. SOPs which lead to preferred outcomes would subsequently be used more frequently. On a more abstract level, Cyert and March envisioned a *multi-level hierarchy* of procedures which would accomplish organizational adaptation. SOPs would guide how organizations change their behavior in response to short-run feedback. Higher-level procedures would guide how lower-level SOPs are changed in response to long-run feedback, and so on. Cyert and March proposed that higher-level procedures would adapt less readily and less rapidly than more specific procedures.

At this point, organizational learning theory conveyed a creative tension between two images of adaptation. On the one hand, learning could be seen as a rational organizational trait, compatible

with rationalistic assumptions of economic theories. In this view, learning processes were rational from the perspective of the organization – they were directed toward performance improvement, and, in the long run, could result in an improved match between organizational arrangements and environmental constraints. On the other hand, learning could be seen as contributing to non-rational . In this view, adaptation processes were regarded as complex and slow and sensitive to small variations in organizational parameters – characteristics more compatible with notions of limited rationality (Simon, 1955), or even absence of rationality. Each notion continued to play an important role in subsequent work on organizational learning, sometimes as premise, sometimes as a possibility worth exploring, and sometimes as a thesis to be tested.

Strong support for the limited-rational adaptation perspective emerged with the introduction of the concept of “ambiguity”. March and Olsen, 1975 noted that the rational adaptation inherent in learning models, including Cyert and March’s (1963) learning cycle, is probably unrealistic. Rather, ambiguity prevails – goals are ambiguous or in conflict, experience can be misleading, and interpretations are problematic. The authors explored four situations in which ambiguity enters the learning cycle (see Figure 1): (1) In “role-constrained learning”, individual role definitions prevent that individuals bring their learning to bear on their actions, e.g., when rigid bureaucratic rules inhibit changes of individual behavior. The outcome is inertia. (2) In “superstitious learning” (the term probably originates in Lave and March’s (1975) lucid exploration of mathematical models in the social sciences) the connection between organizational action and environmental response is severed. In this situation the organization learns from an apparent environmental response even though it was not caused by the organization. (3) In “audience learning” the connection between individual action and organizational action becomes problematic, e.g., when individuals in a staff unit develop new, powerful solutions which, however, are not implemented due to cultural inertia. (4) The last situation is “learning under ambiguity” – it is not clear what happened or why it happened. Individuals develop interpretations about causal connections on the basis of insufficient or inaccurate information about the environment, and instead draw on myths, illusions, or ideology. Together, these four possible disconnects suggest that improvement is not a necessary outcome

of learning, even though learning is intendedly adaptive. Instead, when ambiguity is present, beliefs, trust, and perceptions determine what happens.

Please insert Figure 1 somewhere here.

Levinthal and March (1981) introduced a comprehensive, thoroughly formalized learning model which incorporated learning under ambiguity. The model focused on search for new technologies. Ambiguity entered the model at two places, first, the effect of an adopted technology on performance was seen as uncertain. Second, adopted technologies were seen as evolving – they could improve or decay over time. By varying the levels of uncertainty the authors could explore its effects in the model. Simulations of the model revealed that (i) Returns from search depend on the time horizon. (ii) In ambiguous environments, identical organizations will learn to specialize on a search strategy. (iii) Organizational trajectories were characterized by intense path dependence. (iv) Fast learners would adapt quickly to correct signals but they would also adapt quickly to false signals. Conversely, slow learners would not as easily be confused by false signals, but they were also slow to respond to correct signals.

Contemporary Research

Organizational learning emerged in the 1950s in reaction to the unreal claims of neoclassical microeconomists, and although a steady stream of research has been produced in the area, research on organizational learning has intensified considerably since the late 1980's. The number of publications increased dramatically, a special issue on organizational learning was published by Organization Science (Vol 2, No 1, 1991), and new, empirical research programs got off the ground. During this time period, the field of organizational learning evolved into a diverse network of loosely interconnected clusters of ideas. The uneven development of the field makes it difficult to cast its recent history as a continuous succession of dominant ideas. Nevertheless, some parts of this network evolved into larger or more distinct clusters than others, and they can serve as anchors for a tentative partitioning of the field.

Production and Adaptation of Rules and Routines

Starting in the late eighties, organizational routines moved into the forefront of research on learning. This development was initiated by an influential paper by Levitt and March (1988) that advanced the notion of organizational learning as encoding of lessons in routines. A remarkable aspect of this conceptualization was the relative autonomy granted to routines. It was based on the observation that routines are capable of surviving considerable turnover or rule makers and rule users. Routines appeared as disembodied imprints of history – they would make the lessons of history, but not the history, accessible to members who have not themselves experienced the history. Evocative notions indeed. The notion of encoding in semi-autonomous routines clearly established a supra-individual basis of organizational learning, retained notions of both limited-rational and rational adaptation, and invited linkages to bureaucracy theory (Schulz, 1998a), evolutionary models (Nelson and Winter, 1982; Miner, 1990), theories of culture (Cook and Yanow, 1993; Weick, 1991), and, a little later, knowledge based theories of the firm (Grant, 1996).

From early on, this line of thought stimulated empirical research on routines. The main approach was to explore how routine-based adaptation would affect the change of organizational routines. A first set of studies was conducted by Miner (1987, 1991). She focused on special kinds of routines, organizational jobs. The main idea was that organizations could adapt to environments by creating jobs at specific occasions, for specific people, or for specific purposes, by retaining these jobs if they produce satisfying outcomes, and by eliminating jobs when they cease serving a useful purpose. Later, Miner (1991) explored rates of job death in a private university and found that jobs in large departments have lower death rates, suggesting that large departments lack the capacity to monitor the value of jobs. She also found that job novelty positively affects job death, consistent with her interpretation that novel jobs contain a higher proportion of ‘bad ideas’.

At about the same time, the intensified focus on routines gave rise to a new research program on organizational rules. From an organizational learning perspective, organizational rules can be regarded as formalized routines, and rule production and change could be regarded as outcomes of organizational learning processes. This recognition led to several studies on organizational

rules which explored how learning mechanisms affect relations between rates of rule change (rates of birth, revision, or suspension) and independent variables, such as rule age, duration (time since previous rule change), number of prior changes of a rule, organizational growth, and environmental influences.

Schulz found rates of rule change and suspension which increased with duration. In order to explain this result, he developed a depletion of assets model of rule change (Schulz, 1992). Inspired by Fichman and Levinthal (1991), he assumed that organizational rules are heterogeneous with respect to “initial assets” – goodwill and belief of rule makers plus compatibility with current conditions. Over time these assets become depleted – problems are discovered, the rule falls obsolete as the environment changes, and commitment and goodwill of rule makers erodes. Schulz explored how such a depletion of assets affects the duration dependence of hazard rates of rule change. He found that the shape of the distribution of initial assets and the rate of depletion of assets determines if the hazard rate increases or decreases over time. The general image arising from this study is that knowledge encoded in rules decays – it falls obsolete as the organization encounters experiences contradicting the rules, leading to rule changes. Yet, the decay can be delayed (and rules stabilized) when the processes of making and processing of contradicting experiences slow down, e.g., when they follow learning curves, or when the experiences are ignored.

In a broad study, Zhou (1993) explored births and changes of academic rules of Stanford University. He tested effects of organizational complexity, rule age, prior changes, attention allocation, institutional pressures, and historical periods. He found that rule births and rule changes (this study did not distinguish rule revisions and rule suspensions) follow different processes. Rule births would be affected by crises or external shocks, while rule changes were affected by internal learning processes. He also found that the rate of rule birth fluctuated across historical time periods, consistent with his interpretation of external crises impinging on the organization.

In a focused study on rule births, Schulz (1998a) explored the role of rule density – the number of rules in a given rule population. He compared arguments from bureaucracy theory,

organizational learning, and population ecology. Bureaucracy theory (or at least its more radical versions) would predict that rules breed more rules – a positive density dependence of the rule birth rate. In contrast, organizational learning theory and population ecology would suggest that rule making is subject to limited resources (e.g., unsolved problems) which would be absorbed as the rule apparatus grows, leaving less resources for new rules – resulting in a negative effect of rule density on rule birth rates. Empirical analysis of university rules indicated strong negative density dependence of birth rates. The findings supported the notion that learning is self-limiting – organizations learn by making rules, but rule proliferation inhibits organizational learning and thereby inhibits further rule production. Schulz concluded that Weber’s iron law of bureaucratic proliferation needs to be amended with a “second law of bureaucracy” according to which the number of bureaucratic rules of a system increases with shrinking increments.

A comprehensive exploration of rules was presented by March, Schulz and Zhou (2000). The study integrated and expanded prior work on rules, developed a broad theoretical frame for understanding the dynamics of organizational rules, and thereby elaborated prior ideas about organizational learning. Organizational rule dynamics was seen as driven by three main factors. The first factor was the generation and recognition of problems. Rules and rule changes would depend on experience with problems, and on processes which control the supply of problems and their recognition by organizational actors (e.g., organizational attention, problem absorption, and external crises). The second factor of rule dynamics focused on rule ecologies. Rules were seen as interdependent with other rules – competing for scarce resources (such as attention and problems) or connected by functional dependence (when rules build on other rules). The third factor of rule dynamics captured the accumulation of competencies in and around rules. Rules would develop competencies with problems, rule users would develop competencies with rules, and rule makers would develop competencies with rule making and changing. Competencies of rules and rule users would reduce incentives for change and thereby stabilize rules, while rule maker’s competencies would intensify rule changes. Subsequent research in this line (Schulz and Beck, 2000) has compared rule changes in a German bank to those of Stanford University and found that rule change patterns were very similar across these two very different contexts, lending support to the idea that rule changes are guided by universal principles.

Performance Feedback

When do organizations learn? Recent research has proposed a few models which describe how organizational learning is induced. One large group of models, performance feedback models, is based on the idea that organizations learn when they experience problems. Organizations would encounter a problem, initiate search for solutions (“problemistic search”, Cyert and March, 1963), adopt solutions which solve the problem, and retain good solutions for future use. Problems were conceptualized as performance shortfalls – situations in which (actual or anticipated) performance would fall below aspiration levels. An important part of this model is the assumption that aspiration levels adapt to past performance, an assumption which breaks with the orthodox economic postulate of exogenous, stable aspirations of decision makers. As a result, performance feedback models treat organizational learning as a two stage process. In the first stage, organizations adapt their behavior when performance falls short of aspirations, and in the second stage, they would adapt their aspirations to achieved performance. Not surprisingly, research on performance feedback evolved into two branches.

The first branch – aspiration level adjustment – describes how targets of organizations (and of individuals) adjust to past experiences and experiences of reference groups. Early formulations of aspiration level adjustment were introduced by Cyert and March (1963), and Levinthal and March (1981). More recently, Lant (1992) presented a focused exploration of this topic. She compared several models of aspiration level updating empirically by means of experiments. The experimental setup consisted of recurrent cycles during which teams of U.S. MBA students would set aspiration levels on the basis of feedback they received about their performance. Using the experimental data, Lant tested several aspiration level updating models. One of her findings was that groups consistently set aspirations above past performance, suggesting that subjects were persistently optimistic about what they could achieve in the future, or, perhaps, relentlessly challenging themselves to perform harder. Curiously, this first branch of performance feedback has found much less attention than the second.

The second branch of performance feedback models – behavioral adjustment – explores how divergence between achieved performance and aspiration levels (“performance gaps”) affects

organizational change, search, and risk taking. The main assumption of these approaches is that behavioral adjustment intensifies when performance falls short of aspirations, and that it subsides when performance exceeds aspirations. In an empirical study on behavioral adjustment, Lant, Milliken and Batra (1992) explored how past performance and characteristics of top management teams affect strategic reorientation of organizations. Analysis of data taken from 10K reports of firms operating in the furniture and computer software industries suggested that poor past performance (relative to industry performance) lead to strategic reorientation. Yet, the authors also found that performance feedback had weaker effects in the more turbulent computer software industry, supporting the interpretation that in turbulent environments the signaling value of past performance is weaker, thereby rendering organizational learning less effective.

Several studies have explored how behavioral adjustment interacts with the assumption of adaptive aspiration levels. For example, March (1988) explored the effect of adaptive aspiration levels on risk taking by means of modeling. He found that when aspirations adapt to past performance, a smoothing of behavior results – organizations become less sensitive to variations in performance. Subsequent work in this vein has elaborated this model by incorporating slack search (an increase of risk taking above the aspiration level) and a survival point at which resources are exhausted and risk aversion predominates (March and Shapira, 1992).

Behavioral adjustment in the context of organizational change was modeled by Lant and Mezias (1992). The main focus of the model was on exploring similarities and differences between convergence and reorientation (incremental and radical change). Prior work on organizational change had emphasized different causes of these two modes of change, e.g., that top managers would create and implement radically new routines in response to substandard performance (Tushman and Romanelli, 1985). Yet, Lant and Mezias, using simulation methodology, demonstrated that the same processes which lead to convergence can also lead to reorientation. Subsequent research in this line of inquiry has explored how convergence, reorientation, and random changes contribute to organizational innovation (Mezias and Glynn, 1993).

More recently, Greve 1998 explored the effect of performance gaps on organizational change of radio broadcasting stations in the U.S.. Performance was measured as market share. Two kinds

aspiration levels were considered: Historical aspiration levels were modeled as a moving average of past performance, and social aspiration levels were modeled as average share of all stations in a given market. Greve found that organizational changes (in broadcasting format or production) would decline when a station's performance exceeded aspiration levels, and increase when performance fell short of aspiration levels, thus broadly supporting the performance feedback model. He also found that effects of performance gaps were stronger above the aspiration level than below, suggesting that decision makers use different adaptation rules above and below the aspiration level. Finally, he found that the effect of performance gaps on changes depended on the type of change, e.g., performance below aspiration levels would intensify innovative changes, but not routine changes.

Types of Experience

All organizational learning directly or indirectly draws on experience. This recognition has given rise to studies which explore how different types of experience affect if, when, and what organizations learn. Performance feedback (the subject of the preceding section) is just one type of experience. Several other types of experience have been explored. One type is learning from rare experiences (March, Sproull and Tamuz, 1991), for example, fatal airplane accidents or nuclear power plant accidents. In such situations, organizations can use a number of strategies to learn, including attention to multiple observers and multiple interpretations, simulating experience, and learning from near-accidents.

Disrupted experience represents a second type. It was explored in a study of large-scale, strategic change and organizational failure (Amburgey, Kelly and Barnett, 1993). The authors argued that stable, reproducible routines would contribute to reliable organizational performance, and that the change of core routines would cause disruption, loss of competency, and disrupted ties to the environment. Based on data on failures and changes of Finnish newspapers, the authors found that organizational failure rates would increase right after an organizational change event, and then decline thereafter, a pattern which can be described as a re-setting of the liability of newness clock of organizations. The authors also found a positive effect of prior changes on the rate of change of routines, a pattern they associated with "repetitive momentum" which results when

organizations learn from experience with past changes and thereby develop improved change capacities.

A third characteristic of experience, its diversity, is usually regarded as an important facilitator of learning. The main assumption is that moderate levels of diversity are most conducive to learning, while low levels of diversity (e.g., due to stagnant environments) provide too little stimuli, and high levels of diversity (e.g., due to environmental turbulence) lead to sensory overload and lack of comprehension (Fiol and Lyles, 1985). An empirical study on this subject (Barkema and Vermeulen, 1998), explored how product diversity and multinational diversity affect the mode of foreign entry (start-up or acquisition) of Dutch companies. Based on data on foreign ventures of 25 large nonfinancial Dutch firms during the 1966-94 time period, the authors found that multinational diversity had a linear and positive effect on the propensity of firms to expand through start ups, but that product diversity had a non-linear effect (inverted U-shape). The explanation was that diverse multinational experiences would contribute to the development of technological capabilities which, in turn, would make start ups more attractive than acquisitions of existing firms (which would have relatively little new to offer). In contrast, a high level of product diversity would exceed the information processing capabilities of management teams and thereby produce a non linear effect of product diversity on technological capabilities and the propensity to start up.

Limits of Learning (Myopia)

The conception of learning as a self-limiting process is a prevalent one in this field. A prototypical self-limiting learning process is the competency trap, introduced by Levitt and March (1988). Organizations can develop competencies with routines and thereby improve performance, yet they also can become trapped by their own competencies when returns from using a routine are sufficiently large to prevent experimentation with alternatives. Competency traps can explain why organizations adopt, and subsequently stick with, a given accounting method, strategy, or software packet. Subsequent research has expanded the idea to other kinds of traps, including 'failure traps', an escalation of increasingly futile and increasingly desperate change efforts (Levinthal and March, 1993), and codification traps which occur when the

extension and habitual application of old rules to new problems eliminate the perceived need to create new rules (Schulz, 1998a).

The self-limiting nature of learning was explored in a very influential study by March (1991). He distinguished two modes of adaptation, “exploration” and “exploitation”. Exploration would capture experimentation, risk taking, and innovation, while exploitation would capture the re-use of existing knowledge and its incremental adjustment. March argued that organizations face a trade-off between the two modes. Systems that would engage in exploration to the exclusion of exploitation would suffer the cost of experimentation without gaining many of its benefits, and systems that engage in exploitation to the exclusion of exploration would be prone to get trapped in suboptimal, stable equilibria. The main proposition was that exploitation tends to drive out exploration because exploitation has higher certainty, speed, proximity, and clarity of feedback, making it more attractive to decision makers than the slow, imprecise, and uncertain feedback from exploration. March explored some features of the exploration/exploitation trade-off by means of simulation. The models explored how the quality of organizational knowledge and the chances of winning against competitors are improved by cultural diversity and reduced by organizational efforts to increase the reliability of performance. Subsequent research in this vein has explored processes which cause limits to learning, especially how specialization and simplification lead to myopia (Levinthal and March, 1993).

Communities of Learners

Most learning is situated in environments consisting of other learners, a theme recurrently explored by researchers on organizational learning (e.g., Herriott, Levinthal, and March, 1985, Levitt and March, 1988). Mutual adaptation of multiple learners creates unpredictability, and sometimes makes comprehension more difficult. When the participants compete, surprising imbalances can result, e.g., weaker firms will learn to adapt to the dominant ones, while the dominant firms, by virtue of their capability to ignore competition, will not develop such competencies and thereby become incapable of dealing with environments that cannot be arbitrarily enacted. Some implications of this situation were empirically explored by Barnett, Greve and Park (1994). In that study, the authors compared single unit banks with branch system

banks. They found that single unit banks gained strength through exposure to competition, while multiunit banks would not, because they would be able to mollify selection pressures through mutual forbearance, and thereby survive without learning from the market.

Learning communities can also be found within organizations. Rule ecologies (Schulz, 1998a; March, Schulz and Zhou (2000) are a case in point. Individual rules are seen as learning units which form communities, compete for scarce resources, and infect each other with change. A second instance are communities of practice (Brown and Duguid, 1991) which evolve as ‘noncanonical practice’ around formal work processes. These communities learn when members interpolate between formal directives and demands of the situation. Lessons learned are captured in stories about problems and their causes. In this view, stories function as informal repositories of accumulated, collective wisdom which play an important role for innovation.

Dissemination of Organizational Knowledge

Processes which distribute organizational knowledge within or between organizations are an important part of organizational learning. Between organizations, the concept of ‘absorptive capacity’ became important (Cohen and Levinthal, 1990). It captures organizational capabilities to assess, assimilate, and exploit external knowledge. The concept was originally introduced to understand why firms invest in knowledge resources. Firms with more extensive knowledge resources were found to be better able to absorb knowledge and derive benefits from it.

Subsequent research applied the concept to intra-organizational knowledge transfer, where a lack of absorptive capacity was seen as contributing to “stickiness” of knowledge (Szulanski, 1996). The results of that research supported the idea that prior knowledge of a receiving subunit had a positive effect on knowledge flows.

More recently, Schulz (2001) has explored how knowledge production in subunits affects knowledge dissemination between subunits of multinational corporations. The guiding idea was that subunit learning processes affect how much and what kind of knowledge is produced and thereby can stimulate or constrain outflows of knowledge to others. He found that learning which produces new, non-routine knowledge stimulates vertical flows to supervising units, while

production of old, incremental knowledge would intensify horizontal flows to peer subunits. The interpretation focused on the uncertain relevance of new, non routine knowledge. Sending new, non-routine knowledge vertically upwards would provide faster exposure of new knowledge to a wider range of remote and different knowledge, and thereby facilitate a faster and more comprehensive assessment of its relevance. Related research in this vein has explored how relevance of knowledge affects inflows of knowledge into subunits (Schulz, 2000). The core idea was that knowledge travels to, and accretes in places for which it is deemed relevant.

Summary and Evaluation

Organizational learning theory started in the nineteen fifties with a shot across the bow of orthodox economic theory, challenging its simplistic and rationalistic assumptions. Throughout its history it has kept its rebellious spirit, maintaining – even broadening – its claim that organizations need to be considered as causally autonomous forces in this world. Organizational learning is more than a rational adaptation to environmental constraints, nor is it reducible to individual behavior. It resides on its own level of emergence, following a complex, perhaps stochastic, eigendynamics.

Over the years, the field has grown considerably, branched out into diverse directions, and established (and invited) many linkages to adjacent fields. It is a vibrant, active, rapidly expanding, and immensely rich field. Yet it also displays a significant level of fragmentation and lack of integration which makes it hard to draw an unambiguous map of its topology.

A few traits of the field stand out. One is the focus on dynamics. The field is saturated with dynamic notions – behavior is regarded as adaptive, and so are aspirations, routines, and organizational knowledge. Even change is not regarded as constant; rather, it is seen as time varying and path dependent – following different trajectories in each iteration. Stability is not taken for granted, but instead regarded as a curious outcome of perverse, myopic learning processes. This dynamic trait makes organizational learning a primary contender for explanations of social and organizational change and stability. A second trait of this field is its focus on models. A large proportion of work in this field is based either on simulation models or on

analysis of longitudinal data with complex statistical models. To some degree, this trait reflects the efforts of learning researchers to capture the complexity of learning with appropriate symbolic representations. This modeling trait has significantly contributed to the sharpening of main concepts of the theory, but in the case of simulation-based research, can border on model solipsism (Miner and Mezias, 1996). The third trait of the field is the continuous and inspired leadership of James G. March, whose work had deep impact on the field since its beginnings. It is probably due to Jim's influence that organizational learning has become so rich in playful, evocative, and powerful ideas.

Contemporary Issues and Debates

Organizational learning theory is a divisive field. A main cause of divergence is that the dependent variable is unclear. Is the main focus of the field on exploring the sources of organizational learning, is it on different forms of learning, or is it on the outcomes of organizational learning? It appears that organizational learning is about all three. At the root of this perplexing trilogy are divergent conceptions of learning and divergent ideas about the sources of learning. The next two subsections review some of the main conceptions and sources of learning.

Conceptions of Learning

The literature on organizational learning offers many conceptions of learning. In the following review, I will distinguish between notions which understand learning as improvement of outcomes and notions which focus on learning as change of organizational knowledge. I subdivide the latter into notions which focus on recording of knowledge and notions which focus on the evolution of knowledge. The resulting three notions represent neither exhaustive nor mutually exclusive views on learning, yet they capture some of the main divisions of the field.

Learning as Improving

An elementary notion of learning focuses on improvement of outcome measures such as performance, success, or precision. Organizations are assumed to increase behavior which results in favorable outcomes and decrease behavior which results in unfavorable outcomes, a notion similar to stimulus response models (Lave and March, 1975). Such adaptation leads to a positive effect of experience on favorable outcomes, a relationship which is usually captured with learning curves (Lieberman, 1987; Argote and Epple, 1990; Epple Argote and Devadas, 1991; Adler and Clark, 1991; Argote, 1996). The improvement notion is especially prevalent in applied work, where it has led to the widespread assumption that learning automatically benefits organizations (e.g., Senge, 1990; Meen and Keough 1992; Garvin, 1993; Stata, 1989; Fulmer, Gibbs, and Keys 1998; Probst and Buchel, 1997). In contrast to the applied literature, most of the academic literature on learning is less confident about its benefits and more attentive to obstacles, complexities, hazards and “non-traditional qualities” of learning (Weick, 1991). Nevertheless, improvement could be regarded as the null hypothesis of organizational learning which can be compared to more complex and less traditional models.

Research on organizational learning has explored a number of alternatives to the simple improvement model. One is adaptation of the environment. If the environment adapts to a focal unit, its match with environmental conditions improves, even if the unit does not learn, e.g., when small competitors adapt to a dominant company which then does not need to adapt (Barnett, Greve, and Park, 1994), or when rule users develop competencies with rules and thereby stabilize the rules without improving them (March, Schulz and Zhou, 2000). A second complication arises from unobserved population heterogeneity. It can create the appearance of improvement, e.g., in the form of spurious negative age dependence of estimated failure rates, even though the units have unchanging propensities to fail (Schulz, 1992). A number of additional complications have been discussed, including adaptation of aspiration levels (March and Simon, 1958; Cyert and March, 1963; Mezas, 1988; Lant, 1992), scarce experiences (March, Sproull and Tamuz, 1991), exhaustion of improvement opportunities (Schulz, 1992; 1998a; Levinthal and March 1981), myopia (Levinthal and March, 1993), competency traps (Levitt and March, 1988), noise (Lant and Mezas, 1992; Lant, Milliken and Batra, 1992),

superstitious learning (Lave and March, 1975), nested learning (Levitt and March, 1988), and advantages of slow learning (Lounamaa and March 1987).

Learning as Recording

More recent work on learning has increasingly understood organizational learning as recording of organizational knowledge. The basic idea is that organizations make experiences, draw inferences, and encode the inferences into organizational routines, such as rules, procedures, conventions, technologies, strategies (Levitt and March, 1988). By encoding knowledge in routines, organizations can retain, share, and re-use solutions found in the past. Routines thereby can provide organizations with efficiency and reliability. They can even help to repair cognitive limitations of individuals (Heath, Larrick and Klayman, 1998). Implicit in this recording notion is a “process” instead of an “outcome” perspective on learning. Recording of knowledge is seen as a learning activity, regardless of the benefits it might entail for the organization. Some encoding might even be detrimental: Old lessons retained can be inappropriate for new situations (Barnett, Greve, and Park 1994), and their mindless application can contribute to military escalation (Allison, 1971). Likewise, the encoding of valuable lessons in tangible depositories incurs the risk of involuntary transfer of strategically important knowledge to competitors (Winter, 1987; Zander and Kogut, 1995), although the risks appear to depend on the type of knowledge involved, the form of codification used, and the strategic context of the organization (Schulz and Jobe, 2001).

The recording of knowledge perspective is intensely historical. Learning inscribes lessons drawn from history onto the organization. Organizations thereby appear as “residue of history” (March, Schulz, and Zhou, 2000). Yet, the encoding of lessons is not likely to be an immediate, continuous and complete mapping of history onto routines. Encoding takes a fair amount of organizational effort and absorbs scarce organizational attention (Zhou, 1993). Organizational agencies in charge of encoding tend to have limited resources and capacities (Schulz, 1998a). The outcome is a discontinuous, delayed, and incomplete mapping of lessons. As a result, the match between current routines and current conditions is attenuated (March, Schulz, and Zhou, 2000). On the level of formal rules, the discontinuity of the encoding process leads to a complex

interplay between knowledge encoded and knowledge not yet encoded in rules. Knowledge encoded captures experiences which have been accumulated in the past history of a rule, while knowledge not yet encoded captures experiences made since the most recent revision of a rule. Both kinds of knowledge evolve differently and have different effects. Empirical studies suggest that knowledge encoded stabilizes rules, while knowledge not yet encoded destabilizes rules (March, Schulz, and Zhou, 2000; Schulz and Beck, 2000; Schulz, 1998b).

Learning as Evolution of Knowledge

A third notion of learning takes an evolutionary perspective on learning. It is related to the recording of knowledge notion, but differs from it by a broader focus centered on processes which bring about change in organizational knowledge, including processes which change the stock of knowledge, or its characteristics or its distribution over subunits. In contrast to the recording notion, change of organizational knowledge is seen as systemic and self-induced, or even as accidental, chaotic, and non-intended (Mezias and Glynn, 1993). Work in this tradition has frequently a distinctive cognitive flavor (Duncan and Weiss, 1979; Sandelands and Stablein, 1987; Weick, 1979; Weick and Roberts, 1993), and empirical studies have explored cognitive structures (Carley, 1990) and knowledge networks of organizations (Klimecki and Lassleben, 1998; Klimecki and Lassleben, 1994; Hansen, 1999). The evolution notion also plays an important role in models of knowledge combination (Nahapiet and Ghoshal, 1998; Buckley and Carter, 1998), knowledge creation (Hedlund and Nonaka, 1993; Nonaka, 1994), and organizational communication (West and Meyer, 1997; Szulanski 1996). It even resonates with approaches which explore how cultural meanings develop within organizations (Cook and Yanow, 1993; Martin 1982).

A core assumption of this approach is that knowledge evolution depends in important ways on actual and potential connections between knowledge elements. Organizational knowledge does not consist of a collection of isolated kernels. Rather, individual pieces of knowledge are embedded in an interconnected network of other pieces which provide an ecological context for changes in knowledge. Changes in some parts of the knowledge structure tend to trigger changes in other, related, or similar parts (March, Schulz, and Zhou, 2000). Growth of the organizational

knowledge base depends significantly on the degree to which connections can be established between prior knowledge and new knowledge. The recognition of such connections can be greatly aided by the degree to which prior knowledge helps organizations to assess, assimilate and exploit new, external knowledge (Cohen and Levinthal, 1990), and frequently this involves connecting to related knowledge domains in order to access new knowledge domains (Lane and Lubatkin, 1998). For the establishment of connections between knowledge elements, it appears that relevance of knowledge plays an important role, e.g., that organizations connect new knowledge with relevant prior knowledge (Schulz, 2000), and that organizational subunits send knowledge with uncertain relevance to supervising units in order to explore potential connections with other knowledge of the organization (Schulz, 2001). The establishment of connections between knowledge elements is probably also one of the most important sources of innovation in organizations (Nelson and Winter 1982). In this vein, work in the knowledge based view has explored how firms can derive competitive advantage from knowledge combination (Nahapiet and Ghoshal, 1998; Buckley and Carter, 1998), and how firms can use knowledge combination to deter imitation by competitors (Kogut and Zander, 1992).

Sources of Learning

What do organizations learn from? A wide variety of sources are considered in the literature, including past experiences (March and Olsen, 1976; Covington, 1985; Huber, 1991), experiences of others (Cohen and Levinthal, 1989; Jensen, 1988; Iwai, 1984), thinking (e.g. Weick, 1979; Sandelands and Stablein, 1987; Pisano, 1994), knowledge recombination (Kogut and Zander, 1992), small losses (Sitkin, 1992), and experimentation (Levitt and March, 1988; Comfort, 1985; Huber, 1991). Most of these sources can play two roles for learning – they can give impetus for learning (e.g., initiate search for solutions) and they can provide the inputs of learning, i.e., the raw material (e.g., experiences, ideas) from which organizations derive lessons. Perhaps because the two roles are empirically correlated, most work on organizational learning has not drawn sharp distinctions between the two.

A primary source of learning is experience. A main distinction can be made between learning from own experience and learning from experience of others (Levitt and March, 1988). The two

are likely to involve different mechanisms. Collecting direct experiences can be very costly, yet is likely to produce more unique outcomes, while learning from experiences of others usually involves less cost, but tends to produce less unique outcomes. Learning from direct experiences depends critically on organizational processes which generate experiences (e.g., stimulate experimentation, or intensify the problem supply, see Schulz, 1998a), the movement of “problem instigators” between activity domains (March, Schulz, and Zhou, 2000), or investment in search activities (Levinthal and March, 1981; Mezias and Glynn, 1993). In contrast, learning from others depends on mechanisms which give access to, or generate exposure to experiences of others, such as networks and institutional mechanisms (Levitt and March, 1988; Hansen, 1999).

A related debate concerns the quality of experience. While applied and economic approaches frequently take experience at face value, academic and behavioral approaches emphasize that experience is confounded by ambiguity and thereby disrupts learning cycles (March and Olsen, 1975). A considerable number of causes of ambiguity are discussed. In the presence of noise in the stream of experience, learning degrades (Lant and Mezias, 1992; Carley and Lin 1997), or even gives rise to superstition (March and Olsen, 1975). Feedback from actions taken tends to be delayed and remote (March, 1991; Lomi et al, 1997), and frequently is biased by “post-decision surprises” (Harrison and March, 1984). Learning from experience in one part of the organization is often confounded by simultaneous adaptation of other parts (Levinthal and March, 1993; Lounamaa and March 1987).

A final issue is that experiences are frequently not exogenous. Experiences can become endogenous when outcomes of past organizational learning determine what the organization experiences subsequently. Frequently, this narrows the range of alternatives considered. Competency traps (Levitt and March, 1988) are a prominent case in point, because they inhibit collecting of new experiences with alternative technologies. Similar cases include learning substitution (Levinthal and March, 1993), codification traps (Schulz, 1998a) and coercive bureaucracies (Adler and Borys, 1996; Shrivastava, 1983). Yet, prior learning can also broaden the range of organizational experiences and stimulate learning, e.g., when prior learning increases the absorptive capacity of organizations (Cohen and Levinthal, 1990), or when rules stimulate making of experiences, and rule makers develop rule making competencies (March, Schulz, and

Zhou, 2000), or when organizations establish search rules (Levinthal and March, 1981; Hey, 1981; Hey 1982) or change routines (Mezias and Glynn, 1993). In either case, when experiences become endogenous, organizational learning becomes path dependent. Although such path dependencies can benefit organizations because they limit the chances of competitors to imitate a focal organization (Cohen and Levinthal, 1990), they can also hurt organizations because they severely constrain organizational capabilities to adapt to new situations.

Some Central Questions That Remain Unanswered

Although the field of organizational learning has made significant progress in understanding what organizational learning is, much less progress has been made on the question of what organizational learning theory is about. The field lacks a unified dependent variable, and given the strengths of its diverse branches, it is unlikely that a unified focus will emerge. More likely is that researchers will draw stricter boundaries between subgroups of arguments, and thereby contribute to the emergence of different schools which pursue separate agendas. However, drawing those boundaries will not be easy.

A large number of unanswered questions emerge from the relatively young research program on formal rules, and only a few can be discussed here. One set of questions concerns the internal composition of rules. Rules usually consist of a number of related provisions. How does the homogeneity and the relatedness of rule provisions affect rule changes? Perhaps internal homogeneity stabilizes rules, because such rules offer a more narrow target for emerging problems and challenges? Perhaps a high level of interdependence between component provisions impedes incremental changes and instead produces radical changes? A second line of inquiry concerns the effect of prior changes on subsequent changes. A number of learning mechanisms have been proposed here, including refinement, tinkering, repetitive momentum, and notoriety. However, the effects confound each other, and it appears that disentangling these mechanisms is very challenging. A third question regards rule implementation. It is conceivable that strict implementation generates experiences which can induce rule changes. How does rule implementation and rule use affect rule changes? A fourth area concerns the effects of knowledge not yet encoded in rules. Although the basic proposition is that knowledge not yet encoded

destabilizes rules, rules can become increasingly stable when knowledge not yet encoded is not monitored. What determines the degree to which rules are monitored? How does monitoring of rules affect their propensity to change incrementally or radically? How does the organizational context affect the level of monitoring of rules?

Another underexplored area is dispersed learning. Learning in organization occurs simultaneously, in many places, on different subjects, and with different speeds. How does dispersed learning affect the distribution of knowledge in organizations? How do organizations manage this uneven, distributed knowledge production process, and how do they derive strategic advantage from it? A related question is, How does dispersed learning aggregate to induce larger changes (e.g., of strategies or structures)? The result is not necessarily a random jumble. When learning processes are interdependent, external shocks can trigger cascades of learning which can aggregate to form large waves of change. Even when learning processes are independent, large external shocks can start cohorts of simultaneous learning processes which subsequently can intensify rates of change (Schulz, 1992), and thereby produce escalations of change events (the mechanism is similar to a set of flashlights running out of battery power). Research in this area is in very early stages, and much is left to be done.

Closely related is the issue of dispersed aspirations. Most research on performance feedback is based on organization-level aspirations. Only very limited attention has been paid to situations in which aspirations are dispersed and heterogeneous. How do aspirations of subgroups or individuals aggregate to form organizational aspirations? Organizations are typically not democracies, so simple majority rules will not suffice to adequately model organizational aspiration formation. It is possible that such models could make good use of ideas borrowed from theories of coalition formation, social networks, institutional contagion, and status expectations (Greve, 1998). Furthermore, when individual and organizational aspirations differ, it is conceivable that members with deviant aspirations become frustrated and decide to leave, while members with conforming aspirations stay – a vicious cycle of conformity. It is not entirely clear that such a narrowing of the distribution of aspirations benefits organizations – on the one hand, it might create stronger consensus and stronger cultures, perhaps even improved coordination of tasks, but on the other hand, it is likely to drive out innovation.

New and Emerging Directions for Future Research That Appear Promising

Routine-based notions of organizational learning have stimulated a fair amount of research on written rules, but much less research on informal and tacit routines. Yet, informal routines are important for organizations, e.g., because they tend to be less imitable, and because they sometimes complement or even substitute for formal rules. A few promising approaches have emerged which explore informal routines empirically. One approach examines routines in laboratory studies, exploring connections between organizational and psychological models of procedural and declarative memory (Cohen, 1991; Walsh and Ungson, 1991; Cohen and Bacdayan, 1994). Another promising approach identifies the grammars which underlie the sequential patterns of action which make up routines (Pentland and Rueter, 1994). Although the role of routines is widely acknowledged in economic (Axelrod, 1984; Kreps, 1990), evolutionary (Nelson and Winter, 1982; Hannan and Freeman, 1984), and cultural (Douglas, 1986) work, little empirical research has explored how informal routines are formed, changed, replicated, abandoned, and recombined with other routines. It is possible, but not necessary that routines follow patterns similar to those found in formal rules. Hopefully, future research will shed some light on these issues.

A few new directions have emerged in research on formal rules. One direction is the comparative study of rule making and rule changing, e.g., comparing rule change in different organizational and societal contexts, and comparing different kinds of rule change (e.g., Schulz and Beck, 2000). A second direction is related to the legal context of organizational rule making (Edelman, 1990; Sutton and Dobbin, 1996; Sitkin and Bies, 1994).

Diversity of experience is a theme which seems to find increasing attention in the field of organizational learning. Apparently, diversity is beneficial to learning – at least up to a point (Barkema and Vermeulen, 1998). Diversity also affects the way how organizations learn, e.g., diverse experiences appear to stimulate exploration learning (Moorman and Miner, 1998; Luo and Peng, 1999). At the same time, it seems that learning from diverse experience might require

matching organizational capacities to interpret, assess and assimilate diverse experiences (Cohen and Levinthal, 1990; Lane and Lubatkin, 1998). This would suggest that diversity of experiences is positively related to the diversity of organizational knowledge. However, how these two exactly interact is not too well understood. Nor do we know how diversity of organizational knowledge translates into organizational performance, although simulation-based research suggests that there might be a positive effect (March, 1991).

Another emerging direction is related to transactive memory. Transactive memory tells members of a group the range of knowledge available in the group and which group members are experts in specific domains of knowledge (Wegner, 1987). Although the concept has mainly been applied to knowledge sharing in small groups (Liang, Moreland, and Argote 1995; Liang, Zaheer and Anderson 1998; Liang and Rau, 2000), it appears that transactive memory plays also a role for organizational learning. In this connection, Kieser and Koch (2000) have pointed out that organizations, when making or changing rules, face the problem of efficiently integrating across dispersed, specialized knowledge bases related to a rule proposal. How do organizations identify specialized relevant knowledge and incorporate it into rules? Clearly, even for moderately sized organizations, pooling the knowledge of all organizational participants is not an option. Instead, it appears that organizational rule making processes rely extensively on high-level transactive memory – on “directory specialists” (Wegner 1995) who know best which departments would be affected by a rule change and where the relevant experts are located (Kieser and Koch, 2000). The study by Kieser and Koch establishes a very promising connection between notions of organizational knowledge and rule-based notions of organizational learning. At the same time, it raises a number of new and intriguing questions, e.g., How do organizations appoint directory specialists? How do directory specialists stay up to date? How do organizations identify or anticipate serendipitous interactions between dispersed knowledge domains? How do organizational cultures, hierarchies (Hollingshead, 1996), and organizational politics modify the link between transactive memory and rule making?

Connections Across Hierarchical Levels

Conclusion

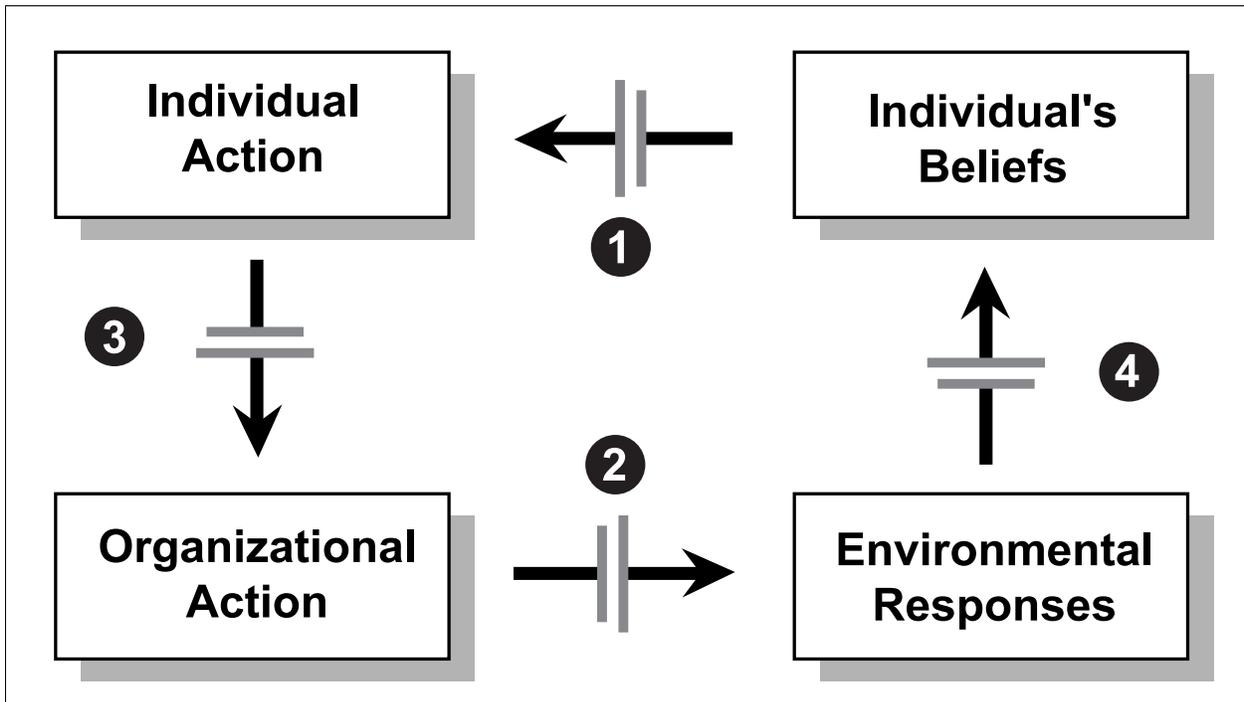


Figure 1 Four possible disconnects in the learning cycle: (1) role-constrained learning, (2) superstitious learning, (3) audience learning, and (4) learning under ambiguity.

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“Organizational learning”, “knowledge management”, and “intellectual capital” are terms commonly used in today’s business environment and usually associated with large-budget projects pursued by firms convinced that the only competitive advantage the company of the future will have is its ability to learn faster than its competitors (DeGeus, 1988). Although early discussions about these concepts date to the 1960s (Cangelosi & Dill, 1965; Galbraith, 1967; Polanyi, 1967), it was not until the 1990s that these topics For organizational learning to be implemented effectively, it is important to take a strategic, multi-pronged approach that evolves with changing corporate learning needs and internal/external challenges. Organizational learning needs to be both a formally supported strategy and an integral part of the organization's corporate culture. The learning and development strategy must recognize both employees' individual talent development needs and the company's needs in terms of functional team strengths.