# 1. The Problem: How Can Complex Organizations that Have Members with Limited Rationality Learn?

Imagine a store-clerk in a manufacturing organization. His or her task entails watching the materials and parts on stock. As soon as the stock of a material or part reaches its re-order point, he or she has to trigger an order for restocking by filling in a form and sending it to the purchasing department.

Such a simple organizational rule provides a couple of problem solutions: It ensures that the probability of interruptions in the production process remains low, and, at the same time, that inventories are kept on a low level in order not to bind too much capital. The stock-clerk does not need to know about the pending orders or the stocks of finished products, he or she can "produce" acceptable solutions just by applying the rule. Of course, the solutions that are provided by the clerk are appropriate only to the extent to which the re-order points have been set in a way that takes care of these problem dimensions. Leaving aside for a moment the question on how these re-order points are determined, we can state that the rule serves as a storage of organizational knowledge. The store-clerk does not have to calculate solutions by taking into consideration developments of demand, delivery times of suppliers, finished products on stock etc., he or she does not even have to understand the formula behind the rule, but only has to apply the rule reliably. Rules also retain organizational knowledge beyond the tenure of individuals.

Changes of such rules are brought about, to some extent, by applying rules for change. For example, the organizational member who is responsible for determining the re-order points may have developed a formula which tells him or her how to adapt the re-order point if demand increases by a certain rate or the flexibility of production is increased.

In a similar way, the changing of change rules is also, to some extent, accomplished by applying rules: the organizational member in charge has, for example, set up rules and is sharing them with others in the department on which consultant to turn to if problems connected with inventories come up or which general methods to apply (e.g. reengineering). These search rules facilitate OL. Thus it is possible to distinguish rule based OL processes of higher order: rules to support the changing of change rules and rules that

support the changing of rules that support the changing of change rules etc. However, rules do not only facilitate OL, they can also impede it. This aspect of rules is usually subsumed under the concept of bureaucratization. Organizational rules have functional and dysfunctional aspects, something that will be discussed in more detail later. In general, no organization of any complexity can exist without rules. That means that OL is always influenced - positively and negatively - by organizational rules.

In spite of a broad agreement among researchers in organizational theory on the importance of rules for the functioning of organizations, most theories of OL neglect or tend to underestimate the role of organizational rules in processes of OL. However, there is one important exception: James G. March, his cooperators and his students. He and Richard Cyert (1963) developed a theory of OL long before this concept became a management fashion. And since then he and his group have continuously revised and developed this theory. These theories provide fundamental insights into processes of OL, although, so far, they have not yet received adequate recognition in the more popular management literature. These theories assume that complex organizations learn by the ways in which individuals experiment, form inferences and code the lessons of history into rules. OL is based on routines. It is history-dependent and target-oriented. To a large extent OL depends on the relation between observed organizational outcomes and the aspirations set for these outcomes (Levitt and March, 1988: 320).

In this article we try to give an introduction into the theories on learning in the March school and link it with our own conceptual and empirical work. At first we will analyze the role of rules for organizations and organizational members, i.e. their foundings and changes, their functions and dysfunctions. In the following section we try to reconstruct the development of theories of organizational learning within the school of March. Finally, we apply these theories to specific processes of OL.

## 2. Formal Rules as Basic Elements of Organizations

2.1. The Genesis of Formal Rules

In the Middle Ages, the idea that rules can be rationally constructed with regard to certain purposes was completely unknown (Weber, 1978). The dominant institutions at this time were social formations like the guild, the clergy or the nobility, which totally encompassed its members (Kieser, 1989). The rules of these institutions were based on tradition and religion. It was impossible to change these rules only to increase the effectiveness or efficiency of the institution. For instance, guild members who changed the rules of production in their shops were imprisoned. In modern organizations, formal rules specify tasks and decision competences more or less precisely for organizational members, hierarchical relationships, and work procedures. Organizational members who are entitled to introduce or to change formal rules can do so whenever they think that this is appropriate.

> "Originally there was a complete absence of the notion that rules of conduct possessing the character of 'law', i.e., rules which are guaranteed by 'legal coercion', could be intentionally  created as 'norms'. ... But where there had emerged the conception that norms were 'valid' for behavior and binding in the resolution of disputes, they were at first not conceived as the products, or even the possible subject matter, of human enactment. Their 'legitimacy' rather rested upon the absolute sacredness of certain usages as such, deviation from which would produce either evil magical effects, the restlessness of spirits, or the wrath of the gods. As 'tradition' they were, in theory at least, immutable. They had to be correctly known and interpreted in accordance with established usage, but they could not be created. Their interpretation was the task of those who had known them longest, i.e., the physically oldest persons or the elders of the kinship group, quite frequently the magicians and priests, who, as a result of their specialized knowledge of the magical forces, knew the techniques of intercourse with the supernatural powers." (Weber, 1978: 760)

Formal rules enable individuals to be members of several organizations at the same time. In each organization in which a person is a member, he or she only invests limited resources, e.g. the willingness to work a certain number of hours per week, to pay membership fees, to invest capital, or to entitle other organizational members to act on his or her behalf (Kieser, 1989). Without formal rules which define organizational roles, it would be impossible for individuals to manage such a multitude of organizational memberships. Rules that define organizational roles also bring about a decoupling of organ-

izational goals from personal goals of the members. In order to become a member of an organization, it is not necessary to identify oneself with the goals of this organization. It is sufficient when the members accept the membership conditions and regard the inducements that are offered by the organization - pay, chances for advancement etc. - as a fair compensation for their contributions to the organization (Barnard, 1968; Luhmann, 1972).

Within the limits of their formally defined roles, members cannot refuse to respond to organizational expectations without risking their membership. Consequently, the organization can confront its members with highly "artificial roles", i.e. roles which the members do not have to identify with. In principle, this means that, compared to other institutions, organizations can realize a high degree of flexibility. Formal rules also allow an internal differentiation of the organization into specialized departments. A person who works in a specialized department only needs to have cursory knowledge of the tasks that are performed in other departments. The clerk in the bookkeeping department knows very little of work processes in sales or production. Nevertheless, the work performed in different departments is coordinated with regard to the organizational goals. The activities in one department are harmonized to a sufficient degree with activities in other departments. This is accomplished by formal rules that keep the activities of the different departments within certain bounds. A "superrational" organizational designer of rules who is an expert in all the functions of the organizations is not required to construct rules which bring about this coordination. As we will see later in more detail, formal rules develop in an evolutionary way: rules that do not fit together are gradually replaced in an trial and error process by better fitting ones.

2.2. Functions and Dysfunctions of Organizational Rules

*Organizational rules reduce complexity and uncertainty for individuals with limited rationality:* Rationality of individuals is limited (Simon, 1958; March and Simon, 1958; March, 1994): When making decisions, individuals cannot know all the alternatives available for this decision, they are not able to anticipate the consequences of alterna-

tives, and they cannot anticipate the utilities they would attach to possible consequences. In everyday life, individuals deal with their limited rationality by satisfycing instead of maximizing, by basing their decisions on drastically simplified models of the real world and by relying heavily on routine behaviour.

But how can individuals who are equipped with only limited cognitive capabilities cope with highly complex decisions as they are required in modern organizations? According to Simon (1979: 501), "... organizations ... can only be understood as machinery for coping with the limits of man's abilities to comprehend and compute in the face of complexity and uncertainty." A central function of formal rules is to reduce complexity and uncertainty for individual decision makers. The basic mechanisms by which this is achieved are: departmentalization, standardized operating procedures (programmes), hierarchy, standardized information and indoctrination or, as we would say nowadays, organizational culture. By setting premises these mechanisms facilitate decision-making for individuals:

> "Individual choice takes place in an environment of 'givens' - premises that are accepted by the subject as basis for his choice; and behaviour is adaptive only within the limits set by these 'givens.' ... One function that organization performs is to place the organizational members in a psychological environment that will adapt their decisions to the organization objectives, and will provide them with the information needed to make these decisions correctly." (Simon, 1979: 79)

The premises consist of the following organizational devices, all of which are based on organizational rules:

(1) Departmentalization: Departmentalization requires, as we have seen, the implementation of organizational rules. It reduces the number of criteria a decision maker within a department has to take into consideration. For example, the personnel manager only has to consider criteria relevant to personnel and can abstract from problems of accounting, production or marketing. In this sense, organizations are "loosely coupled systems" (Weick, 1976; Orton and Weick, 1990).

(2) Standard operation procedures: If standard operating procedures are available to solve a certain problem, there is no need for the individual to develop problem solutions creatively each time this problem comes up. The programme or standard operating procedure provides the solution. As long as this solution is appropriate, it is possible to give

difficult tasks to persons who are not able to develop adequate solutions on their own. Thus, standard operating procedures reduce the need to collect information; the "condensed" experience of the organization with regard to the respective problem is stored in programmes. In higher-order programmes knowledge on how to create and revise lower-order programmes is stored (March and Simon, 1958: 149, 190).

(3) Indoctrination or organizational culture: The organizational culture encompasses organization-specific priorities and norms that the members have internalized (Smircich, 1983; Schein, 1985). To a certain extent, internalized norms can substitute written standard operating procedures. The advantage of norms embedded in the organizational culture is that they allow a higher degree of flexibility than written rules. It is also assumed that a higher degree of identification and motivation is brought about by cultural norms.

(4) Communication: Organizational members do not have to find out what kind of information is important for the decisions they have to make. Through its information system the organization provides the members preselected information. Decision makers do not have to define and characterize their environment themselves, the organization defines it for them and thus narrows their focus of attention.

(5) Hierarchy: Some premises are set by members on higher levels of the organization. The organizational members normally cannot and need not question the decisions made on higher levels. This also reduces complexity and uncertainty.

*Formal rules increase efficiency:* Weber (Weber, 1978) has already pointed out that, compared to other forms of administration those bureaucracies or organizations, which are based on formal rules, achieve a high degree of efficiency. They are efficient, according to Weber, because their rules can be constructed in such a way as to interlock smoothly like the cogwheels of a machine. Rules also make organizational reactions highly predictable which allows an increase of efficiency in interactions between organizations (Weber, 1988a: 322).

Formal rules also make it easier for new organizational members to integrate themselves into the work processes; or, seen from the perspective of the organization, by applying formal rules, organizations make themselves independent of specific individuals. Of

course, by enabling individuals with limited rationality to perform complex tasks in a coordinated fashion, organizational rules also contribute to the efficiency of the organization.

The arguments which we have brought forward so far in order to explain efficiency increasing effects of formal rules rest on the assumption of a stable environment. In dynamic environments, formal rules tend to reduce the adaptability of organizations and this decreases effectiveness and efficiency. In the section on dysfunctional effects of organizational rules, we will analyse these consequences in more detail. The appropriate organizational response to this problem is not necessarily a reduction of the number of organizational rules but rather a preference for less detailed rules and a concentration on effective higher-order rules, whose task is to change lower-order rules.

*Formal rules exercise and limit power*: Formal rules prescribe how things have to be done. Organizational members who violate rules have to face sanctions. Therefore, rules exercise power over those who have to follow them. In this respect, the effect of a rule on an organizational member is similar to that of an order from a higher ranking member (Gouldner, 1955). Certain formal rules also legitimize the exercise of power for the holder of offices (Clegg, 1975).

At the same time, formal rules depersonalize power differences between organizational members. It is the office, the decision competences and the formally defined possibilities for the application of sanctions which provide power to the office holder, not his personal characteristics, his "natural authority".

On the other hand, the formality of rules allows subordinates to follow the rules without having to identifiy with them. They can even signal to others that they do not agree with the rules that they have to follow. Rules also protect subordinates against arbitrariness of superiors: Subordinates can, in principle at least, resist demands from superiors which are obviously not in accordance with the rules. In other words: The superior, when issuing orders, also has to observe the limitations which are set by the rules (Weber, 1961).

Formal rules, according to Gouldner (1955) define minimum requirements and, thereby, tend to reduce motivation of organizational members. This tendency necessitates closer supervision of subordinates. Thus, on one hand, formal rules reduce tensions between

superior and subordinate by partially depersonalizing their relationship. On the other hand, by defining minimum standards, formal rules induce closer supervision, which increases these tensions.

*Organizational rules serve as organizational memories:* Organizations store knowledge in standard operating procedures (March, 1991). Organizational rules, like rules of other kinds, are in need of interpretation (Mills and Murgatroyd, 1991). Most organizational rules are useless if not combined with specific knowledge of organizational members who apply these rules. This knowledge often takes the form of scripts (Abelson, 1981; Lord and Foti, 1986; Gioia and Poole, 1984; Gioia and Manz, 1985; Ashford and Fried, 1988).

A script is a cognitive structure that specifies a typical sequence of occurrences in a given situation, such as a formal meeting or an employment interview. Thus, scripts extend formal rules: they contain information which is stored in the minds of the organizational members on how to behave when certain rules apply. They also contain interpretations of rules with respect to adequate behaviour.

Thus, the notion of organizational rules as storages of organizational knowledge denotes the use of rules by trained individuals, i.e. rules and cognitive scripts in their interconnectedness. In organizational units which are characterized by a high density of rules, a higher proportion of script-based behaviour is to be expected (Ashford and Fried 1988).

The concept of organizational routines (Nelson and Winter, 1982) or organizational competences ("comps") (McKelvey and Aldrich, 1983) captures both, organizational rules and individual knowledge that is attached to these rules, i.e. scripts:

> "(T)he knowledge stored in human memories is meaningful and effective only in some context, and for knowledge exercised in an organizational role that context is an organizational context. It typically includes, first, a variety of forms of external memory - files, message boards, manuals, computer memories, magnetic tapes - that complement and support individual memories but that are maintained in large part as a routine organizational function." (Nelson and Winter 1982: 105)

The concept of organizational routines also encompasses "tacit" knowledge, i.e. the application of rules which are not consciously known by the person who exercises certain skills (Polanyi, 1962). (Nelson and Winter, 1982: 124/5) "[r]outines are the skills of an

organization. The performance of an organizational routine involves the effective integration of a number of component subroutines (themselves further reduceable) and is ordinarily accomplished without 'conscious awareness' - that is, without requiring the attention of top management. This sort of decentralization in organizational functioning parallels the skilled individual's ability to perform without attending to the details."

In a similar manner, Malik and Probst (1984: 110-1) find that the formulation of organizational rules always includes tacit knowledge. They warn organizational designers who are trying to implement a radical change of the organization not to destroy the rules which contain experience of individuals and groups and which came about by trial and error - i.e. rules which represent tacit knowledge or are the result of "spontaneous order" (Hayek, 1967: 24).

*Organizational rules erect facades of rationality*: The institutional school (Zucker, 1986; Meyer and Rowan, 1977; Scott, 1987; Scott, 1992; DiMaggio and Powell, 1983; DiMaggio and Powell, 1991) argues that organizations often adopt rules that are "institutionalized", i.e. rules that in the eyes of important stakeholders represent "good practice". Generally, institutionalized norms define how a "rational organization" should look like, e.g. which departments it should have, how it should calculate profitability of investment projects, which methods it should implement in order to determine the salaries of its employees, etc. By adopting institutionalized rules organizations demonstrate and acquire legitimacy. Legitimacy, in turn, stabilizes internal and external relationships and increases the likelihood that the organizations will secure the resources it needs for survival (Meyer and Rowan, 1977).

If an organization has to adopt organizational rules which it does not consider useful in order to achieve legitimacy, it applies decoupling mechanisms in order to separate the facade from the technical core: It pays lip service, it tries to avoid control by the environment by applying weak formulations of organizational goals, by ritualizing control from the outside as well as statements of account, etc.

In an empirical analysis, Zhou (1991; 1993) found that the rate of changes in the rules that were issued by the senate of an American university decreased during the history of this university. At the same time, the senate issued new rules. In his interpretation of

these findings Zhou refers to the institutional school. Outside pressures force a university to adopt certain rules. The stability of these rules increases over time, either because they are perceived as self-evident (Zucker, 1983) or because they assume a symbolic character and become decoupled from core activities of the organization (Meyer and Rowan, 1977).

Having analyzed the functions of organizational rules we now turn to their dysfunctions:

*Dysfunctions of Organizational Rules*: Organizations, according to Weber, become „iron cages" over time : The machinery of the organization becomes inescapable. It develops its own dynamics which members or external stakeholders can only control to a limited extent (Ritzer, 1993). The organizational members are therefore not able to change rules of the organization if these rules contradict their personal ideas of an appropriate treatment of problems (Weber, 1961; Weber, 1988b).

Formal rules that were originally designed as means for certain ends become ends in themselves (Merton, 1940). When organizational members perceive that programmes no longer solve problems adequately, they realize that they will probably come under attack. Since their possibilities to change the rules are limited, they prefer to leave the programmes unchanged, and they decide to follow the programmes to the letter, in order to immunize themselves against criticism which is very likely to emerge because of the low quality of problem solution (Crozier, 1964). The conflicts that are triggered by inadequate problem solutions within the organization very often do not result in efforts to improve the programmes but rather in power struggles between groups and departments and these conflicts distract efforts from the original problems (Crozier, 1964: 187-194).

The existence of programmes reduces the motivation to develop creative solutions. Organizational members develop a tendency to solve problems by applying standard operating procedures mechanically. Since they are not used to take responsibility and risks they tend to ask higher levels to install more detailed rules, when they discover that they have freedom of choice in some details. Organizational members with these characteristics tend to confound precision in applying rules with quality of problem solution. In the words of Sims et al. (1993: 31): "Rules can become the opium of bureaucratic officials. Without the rules, they are lost, paralysed." In this way, rules can impede OL.

In a similar vein, Nelson and Winter (1982: 110) speak of organizational routines as truce:

> "Conflict, both manifest and latent, persists, but manifest conflict follows largely predictable paths and stays within predictable bounds that are consistent with the ongoing routine. In short, routine operation involves a comprehensive truce in intraorganizational conflict. There is a truce between the supervisor and those supervised at every level in the organizational hierarchy: the usual amount of work gets done, reprimands and compliments are delivered with the usual frequency, and no demands are presented for major modifications in the terms of the relationship."

In systems which combine high complexity and tight coupling of subsystems with high risk, it is not possible for members to anticipate all failures. Tight coupling requires centralization, i.e. unquestioned obedience and immediate response according to rules. Since unplanned interactions of failures are very likely to occur, complexity requires careful search that is not controlled by rules, but by a careful analysis of the system by those who are closest to the problem at question. Since these requirements are incompatible, Perrow (1984) advocates giving up high risk technologies that combine complexity and tight coupling of subsystems.

## 3. Creation and Modification of Rules in Organizations

Recognition that rule-following characterizes much of the behaviour in organizations has directed attention to the processes by which rules emerge, change, and develop over time (March, 1981). In general, in the literature of the behavioural theory, rules are seen as reflecting history. Three major processes by which rules develop are commonly considered (Cyert and March, 1963: 231):

First, the rational paradigm suggests that rules are created in an intentional, calculated process by rational actors. The actors design rules after having analyzed the current situation. The differences among organizations in the rules they follow and use can be attributed to differences in their environments. Specific decision rules are assumed to dominate, because they provide advantages (Cyert and March, 1963). The behavioural theory emphasizes how slow and indeterminate the match between environment and organizational rules often is, i.e., it emphasizes the inefficiencies of history.

A second process of rule development is learning from experience. In this approach, organizational rules emerge and are further modified incrementally on the basis of feedback from the environment either through the organization's own experience or through imitation. This view is in accordance with the concept of organizational rules and routines as storages of organizational knowledge (partly tacit). OL is achieved by scrutinizing the existing rules with the aim of identifying opportunities for improvement (Nelson and Winter, 1982). The firms identify and select new rules by focusing on idiosyncrasies of processes founded on unique aspects of a firm's history. Thus the elicitation and representation of knowledge embedded in organizational rules and routines is crucial in the process of learning.

The third process which can lead to changes in organizational rules is the process of selection among invariant rules. As in the case of experiental learning the rules are dependent on history, but the mechanism is different. Individual rules are seen as invariant, but it is claimed that the population of rules changes over time (McKelvey and Aldrich, 1983).

These approaches which describe the way in which less effective routines are replaced by more effective ones can be classified as early attempts to explain rule-based OL.

By conceptualizing organizational routines as equivalents to genes in biological evolution, Nelson and Winter (1982: 135) also underline the function of routines as organizational memories. They integrate this function into an evolutionary concept. They assume that the future behaviour of organizations, being based on routines, resembles behaviour that would be produced if they would simply follow their routines of the past. In other words: the evolution of organizations does not occur in jumps. Capacity expansion normally takes the form of "faultless replication" of routines. According to Nelson and Winter, imitation of effective routines within the organization can be seen as a powerful mechanism which accomplishes that effective routines spread faster in a given organization than less effective ones. New routines come about when scientists, engineers or managers apply problem solving creativity. In the end, whether attempts of this kind prove successful, is decided by environmental selection.

In their version of population ecology theory, McKelvey and Aldrich (1983) also take organizational routines - they call them "comps" which is derived from competences - as

the basic units of organizational evolution. Variations in comps occur, when organization designers err when trying to copy comps from other organizations or when trying to rationally improve comps. Since organization designers are not able to rationally adapt comps to changing conditions of the environment, the variations that they produce in their efforts for improvement are essentially "blind". It is not the designer who makes the important choices, it is the environment via "natural selection".

Natural selection as conceptualized in McKelvey and Aldrich's version of the population ecology approach results in higher chances of more effective comps getting reproduced in an organizational population. This notion is similar to the basic mechanism in biological evolution: Antilopes, which have gained the ability to run faster through mutation, live longer, and, therefore have more chances to reproduce themselves, so that the ability to run fast - or, to be more precise the genes that provide this ability - spreads in the population. For organizations, the selection process operates in the following way: Successful organizations must necessarily have a higher percentage of successful comps than less successful organizations. Successful organizations' comps also have a higher chance of getting copied by other organizations: Other organizations prefer to hire employees who bring in experience from successful organizations; the solutions of successful organizations are communicated more often in business magazines, management bestsellers, university textbooks and management seminars. Consultants tend to transfer problems solutions - comps - from successful organizations to less successful ones. In this way, effective comps acquire a higher chance to spread in the population than less effective ones.

Hayek (1973) also developed an evolutionary concept of rule- or routine-based OL. His basic thesis is that a "spontaneous order" is preferable over a "planned order". Spontaneous order implies tacit knowledge. In order to explain the emergence of rules as the result of evolutionary processes, Hayek assumes an interaction of two processes (Vanberg, 1986): (1) a *process of variation* in which new transmittable patterns of behavior are continuously generated, and (2) a *process of selection* whereby from all variance (patterns of behavior) generated, those patterns are systematically selected that are actually transmitted, i.e. that become behavioural regularities (routines) in social systems. Hayek stresses the role of those individuals who, by deviating from traditional rules and

by experimenting with new practices, act as innovators and generate "new variance" which may become new behavioral regularities in a social community if these practices prevail in the sense of being imitated by more and more individuals in the group, despite competition with traditional as well as alternative new ways of behavior (1979: 167). Such an argument obviously contains the idea of a process of variations by individual innovations and a process of selection by individual imitation. Thus Hayek's concept is in essence an individualistic, invisible-hand conception of cultural evolution.

Vanberg (1986: 82) criticizes Hayek's basic assumptions of an evolution of routines:

> "When Hayek ... refers to cultural evolution as a process by which adaptations to changing circumstance and solutions to new problems, faced by a group, are brought about, it is obvious that, according to an individualistic, invisible-hand notion, only the individual actors are the ones who perceive 'problems' and who respond to changing circumstances by choosing those practices which they expect to serve their interests. It cannot be simply postulated that from a process of variation and selection, based on *individual* imitation, rules will emerge that benefit the group. Rather, one would have to show *why* and *under what conditions* the process of individual innovation and individual imitation can be expected to generate socially beneficial rules - just as the theory of spontaneous social order does not simply *postulate* that all spontaneously generated social outcomes are necessarily beneficial, but *explains* why this can be expected, given certain 'appropriate' conditions."

Variations in group behaviour cannot only be brought about by a spontaneous interplay of separate individual actions - this is the process that is favored by Hayek - but also by planning. Two modes of planning can be distinguished: (1) the group members agree to accept certain rules - this could be labeled as *"planned self-organization"* - or (2) new rules are imposed on the group by one or several persons who are outside the group - which could be termed *"planned external organization"*.

It is impossible to imagine the emergence of complete formal organizations of a considerable size out of a spontaneous interplay of individual actions. Complex organizational designs for companies such as ABB, General Motors, or Daimler Benz do not emerge out of such a process. There are simply too many individuals whose actions have to form a pattern from spontaneous interaction. What works for tribes does not necessarily work

for large formal organizations. It is also hard to imagine that spontaneous individual actions give rise to accounting systems or information systems (Kieser, 1994).

This criticism does not apply to McKelvey and Aldrich's concept since they do not exclude planning as a source of variation of comps. They only assume that planning is essentially "blind", i.e. that it is impossible for planners to construct solutions which fit the environment. The planners plan and the environment selects.

McKelvey and Aldrich do not analyze which factors induce individuals to change rules or to introduce new ones. Schulz (1993), a student of March, pursued this question by applying event history analysis in order to analyze changes over time in a university administration's rules. He concentrated on the question of whether the knowledge that organizational members have acquired in the application of rules have positive or negative effects on rule changes. His most central hypothesis states that probability of a rule change diminishes with rule age because of habitualization effects. This hypothesis rests on the following argumentation: The use of rules results in an increase of competence with regard to the use of this rule. The development of alternative rules would devalue this knowledge and, therefore, the motivation of organizational members to change rules reduces with the age of these rules. Levitt and March (1988) call this dilemma a "competency trap" - we will come back to this in more detail later. Acceptance of rules by organizational members is a second variable that contributes to the increasing stability of rules. Rules become institutionalized over time. New rules are perceived as preliminary attempts to solve certain problems. This perception invites changes. The longer a rule exists, the more members get used to it. However, Schulz also presents a contradictory hypothesis: The older a rule gets the higher the probability that environmental changes necessitate changes of this rule, because the rules no longer fit the changed conditions, i.e. rules, that have not been adapted to environmental changes become obsolete.

Schulz' data show that the probability of rule change decreases with with rule age. However, the age of a rule *version* - the time that has elapsed since the last modification of the rule - has a positive effect on the probability of further modifications. In his explanation of these results, Schulz points out that rules have stable and instable elements. The instable elements become obsolete after a modification. Other elements of rules remain

stable because they mean security and an accumulation of competences for the members of the organization. This results in a negative effect of rule age on the probability of rule change.

In another project about rule histories and OL (Beck and Kieser 1997) the question of the age dependence of rule changes and suspensions was enriched by taking environmental and organizational changes into account. By analyzing the development of a German bank's personnel rules it was found that the processes of rule change and rule suspension followed rather different patterns. While it could be shown that with increasing age of rule versions the rate of rule change strongly decreased, which indicated the above mentioned habitualization process, the rate of rule suspension slightly increased, which could be due to a process of obsolescence. The first conclusion from this finding was that because changes of the rules' content grew less likely with increasing version age this content became obsolete. The remaining environmental fit of the older rule versions seemed to be so bad that the appropriate organizational reaction was to abolish rather than simply change obsolete rules. However, since the influence of version age on the suspension rate was not very strong, the process of obsolescence was not a dominant one. Moreover, while the habitualization effect on rule change remained stable when additional variables were controlled for, the version age effect lost its significance and almost disappeared when certain shifts within and outside the organization, such as increases in the number of employees or the occurrence of strikes were included into the model of rule suspension. A possible explanation for this finding is that the majority of rule versions which existed up to the periods of organizational and environmental changes had already become a bit old and were in danger of becoming obsolete but also younger rule versions lost their fit because of the changes. Since the increase of the number of employees and the occurrence of strikes had a strong positive influence on the suspension rate but no influence on the change rate, it can be stated that it was mainly changes within the environment of a rule - including the intra organizational structure - which directed the attention of the organization towards the abolishment of rules that were no longer appropriate. These results showed that it is important to separate the organizational activities of changing and suspending a rule because they may represent distinct reactions to different processes.

**4. Learning on OL with the March School**

Rules play a major role in the March school's concepts of OL. In the first of a row of highly influential models of OL, Cyert and March (1963) assume that search for better problem solutions is stimulated as soon as existing programmes do no longer guarantee the achievement of the organization's goals that are formulated as aspiration levels. Search is also controlled by programmes or rules. At first, organizational search proceeds on the basis of a simple model of causality. The model becomes more complex, if this initial search is not successful. Problem solutions that are identified during this search and appear adequate are stored in new programmes that replace the old programmes. However, organizations not only learn by exchanging programmes in the described pattern, they also learn by adapting goals and attention rules. Two forms of adaptation of attention rules are conceptualized: Over time, organizations learn to define more appropriate performance criteria, and they also learn to identify those parts of the environment that are important for them. The basic assumption in this concept of organizational learning is that a rule, be it a decision rule, an attention rule, or a rule that controls goal formulation, that leads to a preferred state at one point is more likely to be used in the future than it was in the past, and a rule that leads to a non preferred state at some point is less likely to be used in the future than it was in the past.

A fundamental problem of this model is that it defines whole organizations or organizational subunits as the units of analysis which means that the link between individual and organizational learning is neglected. In a later model, March and Olsen (1975) overcome this problem by explicitly including the roles of individuals in processes of organizational learning. They conceptualize a complete learning cycle and identify barriers which can interrupt learning at different points in this cycle. The complete cycle consists of four stages (Fig. 1): (1) Individual actions are based on certain individual beliefs. (2) These actions lead to organizational actions that produce certain outcomes. (3) These outcomes are interpreted, i.e. success is distinguished from failure and links are drawn between actions and perceived outcomes. (4) This reasoning leads to beliefs.

The creation or modification of rules that lead to actions are results of experimentation. In this respect, OL consists of three steps: variation through experimentation, selection

by drawing inferences from experiments and retention through formulating rules that produce successful actions and thus can be passed on to other organizational members.

March and Olsen (1975: 155) point out that this complete learning cycle can be interrupted in several ways because:

> "[i]ntention does not control behavior precisely. Participation is not a stable consequence of properties of the choice situation or individual preferences. Outcomes are not a direct consequence of process. Environmental response is not always attributable to organizational action. Belief is not always a result of experience."
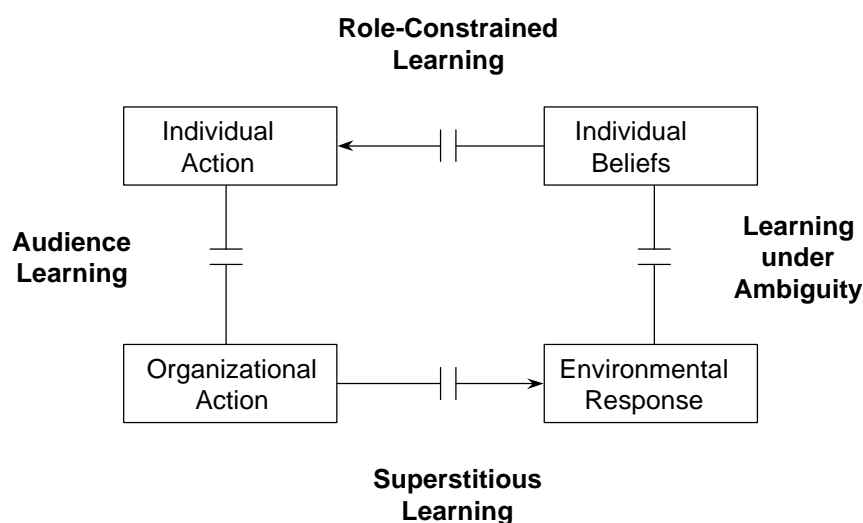


Figure 1: The Cycle of Organizational Learning and Its Interruptions (Source: March and Olsen, 1975)

The first interruption occurs when individuals are prevented by certain organizational conditions - especially by prevailing role definitions or standard operating procedures - from adapting their behaviour to their beliefs. March and Olsen call this impediment *role constrained learning*. Organizational members are convinced that new actions have to be initialized because environmental conditions have changed, but they are not able to change their actions. Their roles within the organization are so fixed by the organizational structure that there is no possibility for them to act in the way they think they

should. The second interruption of the learning cycle is labelled *audience learning*. It occurs when individuals are able to change their own behaviour but cannot affect rule-guided actions of others. A third interruption of the learning cycle is caused by a misinterpretation of the consequences of organizational actions. The organizational members cannot evaluate correctly which impact the organizational actions that have been taken have on the environment and on the results. They tend to interpret data so that the actions taken in response to certain problems that were identified are supported, i.e., *superstitious learning* takes place. The last interruption is called *learning under ambiguity* and occurs when changes in the environment cannot be correctly identified. The organizational members are not able to make sense of the environment or to explain why certain changes took place at all.

A few examples can serve to illustrate the interruptions of OL. Let us assume that one day a controller of a company's profit center comes to the conclusion that the existing transfer price system is severely flawed. She asks herself whether she can at least modify the respective rules for the profit center she is working in. On the one hand, this would mean that she can provide better data for the manager of this profit center, on the other hand, she runs the risk of her "correction" being detected and disapproved by the controllers in the headquarters. If she decides not to implement what she thinks is a necessary correction of the rules of the transfer price system she gives in to *role constraint* learning.

Now let us assume that she implements new transfer prices in her profit center and that she tries to convince the central controlling department to change the system of transfer pricing for the whole company. In doing this, she has to realize that an organizational member who points out weak spots does not make herself popular in the organization, especially when those criticized belong to other departments or to higher hierarchical levels. She cannot be sure that she will be able to convince others with her arguments. If she fails this will eventually negatively influence her career. It is therefore possible that our controller decides to keep what she has learned to herself. This would then be an example of *audience* learning. As we have seen in our analysis of the dysfunctions of organizational rules it is often difficult to change existing standard operating procedures.

Let us now assume that our controller was successful in convincing the people in the central controlling department to change the transfer price system for the whole company. Now everybody is eager to find out whether this was a good idea or not. However, it is extremely difficult to establish the effects of changes in the transfer price system on the performance of the company. Have results improved *because of the changes in the transfer price system*? The proponents of the change are generally in favor of an optimistic interpretation, while the opponents try to get agreement on a negative interpretation of the new transfer price system's influence on the performance of the company. There is always the danger that the interpretations are biased, i.e. that they reflect *superstitious learning*.

If the organizational members are uncertain how to interpret environmental changes at all, apart from the question how they were influenced by the action of the organization, they face the situation of *learning under ambiguity*.

Kim (1993) extended this model. In particular, he reconceptualized the starting point of the March-Olsen learning cycle: the connection between the "states of the world" and the ways in which individuals interpret them. Individuals, according to Kim, interpret the world on the basis of "mental models" (other authors speak of subjective theories). A mental model represents a person's view of the world, including his or her explicit and implicit understandings. It provides the context in which the person views and interprets new information. "Mental models not only help us make sense of the world we see, they can also restrict our understanding to that which makes sense within the mental model" (Kim, 1993: 39).

Kim distinguishes two levels of learning - operational and conceptual. Operational learning concerns learning at the procedural level, e.g. learning the steps which are necessary to complete a task. This know-how is stored in *routines*. Thus operational learning leads to changes in routines. Conceptual learning concerns the thinking about "why things are done in the first place, sometimes challenging the very nature or existence of prevailing conditions, procedures, or conceptions and leading to new frameworks in the mental model" (Kim, 1993: 40). Mental frameworks provide the context in which events are analyzed and interpreted. A change of frameworks takes place when the individual rou-

tines that are shaped by the frameworks no longer appear suitable to solve a specific problem. In this way, a complete individual learning cycle is generated. Certain routines of actions are implemented and tested because of individual beliefs (frameworks) that these actions have positive effects for the organization. Unsatisfactory results, however, eventually lead to a revision of the mental frameworks that are responsible for the implementation of the routines.

According to Kim, mental models not only exist at the individual but, as "shared mental models", also at the organizational level. These represent, on the one hand, the organization´s consensual view of the world - what Kim calls the organization´s "weltanschauung". Organizational shared mental models also contain the organizational routines which are former individual routines that have proven successful in the organization and have been adopted by others. As a result, the full organizational learning cycle encompasses changes in the shared mental models which, in turn, presuppose changes in the individual beliefs and routines.

This reasoning leads Kim to add three additional interruptions to the March-Olsen model: The first is *situational learning*. It occurs when an individual solves a new problem by improvised action but does not store the solution in his individual mental model for later use. The learning is only coupled to one solitary event. Another friction of the learning cycle is called *fragmented learning*. This type of interruption occurs when individual learning takes place but does not succeed in changing the shared mental models. The organizational view of the world remains the same. The difference between this form of interrupted learning and "audience learning" in the March-Olsen model is not easy to establish. It might be argued that March and Olsen (1975) concentrate on the missing link between individual and organizational *action* while Kim (1993) also takes the link between individual and organizational world views into consideration. The third addition to interruptions of the learning cycle is called *opportunistic learning*. It occurs when organizational members want to take advantage of a rather unique and promising chance but the standard operating procedures or the shared mental models are not yet adapted to the new situation. So the organizational actors have to circumvent the existing rules in order to prevent the chance from disappearing.

The question that such an analysis suggests is: *How* do individuals arrange their way of learning in these ambiguous situations and by which factors are they influenced in their attempts to draw inferences from what they perceive? March and Olsen (1975) argue that the *behaviour of an organizational member is influenced by different patterns of interaction with other organizational members, varying levels of trust and different degrees of integration into the organization.* Dependent on these variables, individuals differ with regard to their patterns of perception of organizational events. The more integrated into the organization an individual is, the greater his or her tendency is to perceive mainly those events which confirm his or her state of integration. That means, it is more likely that what one sees is what one likes and that what one likes is what one sees. An alienated person, in contrast, will mainly perceive things that he or she does not like and will dislike what he or she sees, because this individual will tend to find as much evidence as possible for the differences between him- or herself and other organizational members.

Similar to this pattern of influences on attention is the way in which *trust* among organizational members affects individuals in their way of perceiving organizational events. The more an organizational member trusts his or her colleagues the more likely it is that he or she will like what they like. The more he or she distrusts his or her colleagues the more likely it is that he or she will dislike what they like. In a more trustful atmosphere an individual will be more likely to perceive what other organizational members perceive. The more he or she distrusts his or her colleagues the more likely it is that he or she will not see what the other participants see.

Individual learning which can contribute to the whole organization is therefore strongly affected by integration and trust. The available sources of information that are provided through interactions and discussions are assessed in different ways dependent on integration and trust. The organizational code - the organizational mental model - is not adopted or is adopted only slowly. However, this does not necesserily mean that the organization cannot benefit from deviating members.

In a simulation study, March (1991) found that organizational actors that are slow learners - persons that socialize more slowly into the organizational code - contribute a lot to the benefit of the organization. The slow learner does not take the prevailing beliefs of

the other participants for granted, but explores the outside world for new possibilities of acting instead of just exploiting the experiences already made. Thus a greater amount of knowledge about the "real" states of the world can be achieved and accepted by the organization, which means that the organizational code adapts to the additional knowledge of the deviating organizational member. "Slow learning on the part of individuals maintains diversity longer, thereby providing the exploration that allows the knowledge found in the organizational code to improve." (1991: 76)

However, an organization cannot only benefit from the slowing down of individual learning but also from slowing down the whole rate of organizational adaptation to environmental shifts (Lounamaa and March, 1987; see also Levinthal and March, 1981). Organizations that change too quickly to adapt to new situations might be unsuccessful because they have not gathered enough experience to judge the new situation reliably. In turbulent environments frequent and continuous adjustments can lead to learning false lessons through adaptation to misleading signals. In order to avoid this type of "false" adaptation, it is more intelligent for the organization to wait until there is a greater sample of environmental signals from which to draw inferences about the "real" events in the environment. Furthermore, a high rate of adaptation often means that there is simultaneous learning at different parts of the organization. This also can have a negative effect on the adaptability of organizations because the different adaptations might not be complementary.

Moreover, personnel turnover can contribute to OL (March, 1991). This is the case when mid-level turnover accompanies fast socialization into the organizational code. What has to be learned by the organization is quickly adopted by the individuals. However, because there are always a number of newcomers in the organization, the tendency of exploring yet unknown possibilities, and implementing this new knowledge into the organization, does not vanish. On the other hand, if turnover is too high the individual learning of the organizational code, as well as the implementation of new insights by deviating individuals, is distorted. As a result, the organizational knowledge code cannot be improved. Therefore, modest turnover in connection with fast socializing leads to the highest organizational benefits compared to other combinations of personnel turnover and socialization speeds.

In their attempt to learn from experience, organizations not only take into account their own experience - new or old certainties - they also survey the experiences of other comparable organizations. Hence, another major item of the behavioral theory of OL is the observation of learning in ecologies of other learning organizations. Levitt and March (1988) looked at processes of information diffusion among organizations, a phenomenon which is also of interest for the neo-institutional theory (DiMaggio and Powell, 1983). The first process, which can be called *coercive*, is the recommendation of a new rule by a single agent, e.g. by a professional association or a union. Different organizations are affected by this recommendation to different degrees. Another process of knowledge diffusion, labelled *mimetic*, can be observed when new organizational routines are transferred through communication between organizations which have already implemented this routine and those which have not. The third process, called *normative*, is the teaching of new routines by a small group of influential persons or institutions, like management experts or educational institutions.

In accordance with proponents of the neo-institutional theory (Meyer and Rowan, 1977), Levitt and March (1988) argue that organizations not only copy routines from other organizations in order to achieve technical efficiency, but also come under pressure to adopt practices that are commonly regarded as useful, so as not to loose their legitimacy. As a result, two different consequences for organizations from which practices are copied can be observed. Organizations, whose experiences concerning technological efficiency are transferred to other organizations, mainly suffer from this diffusion because their competitive advantage disappears. Organizations, whose routines are copied to gain legitimacy, basicallly benefit from the diffusion because the more other organizations follow these routines the more their own legitimacy increases.

OL is an interactive process. Competitors learn similar technologies at the same time, and the learning of one organization depends on the learning of other organizations, because knowledge often diffuses among competitive learners. This has a severe impact on the outcomes of organizational actions which are learned. The returns of learning new strategies or technologies, i.e. the competitive advantage of the implementation of new organizational routines, are not only dependent on the quality of these technologies and

the quality of learning, but also on the competences and efforts of the competitors in dealing with the new technologies (Levitt and March, 1988: 322; Herriott, Levinthal, and March, 1985).

The interactive process of learning in ecologies of competing organizations has another effect that contributes to the overall development of technology. Innovations are necessary for technological progress and for meeting the needs for change of systems of organizations. However, the introduction of new technological elements is risky, for it is not possible to foresee whether these innovations will have positive results. Nevertheless, it is necessary, according to the ideology of good management, to bring new ideas into the shared world of organizational perception. This leads to situations which March (1981) calls "unwitting altruism", because one organization is running experiments with uncertain outcomes and other organzations have the chance to observe whether these innovations are successful before they decide to copy them. However, drawing conclusions from observations is also subject to superstitious learning and to ambiguity, especially, since rhetoric is applied in reports of these experiments (Kieser, 1997).

Levitt and March (1988) are pointing to another consequence of the competitive situation of learning organizations in ecologies of other learning organizations. The ability to adapt to experience accumulated in changing enivironments must itself be learned. Powerful organizations that are able to create their own environment, normally are not in a position in which they have to learn how to learn. As a result, their competence to adapt when environmental shifts take place that have not been created by these organizations are more limited than those of weaker organizations, which are used to having to adapt to changing situations.

The different approaches to OL that we have discussed so far are all based on one assumption: Organizations learn from their experience. However, sometimes organizations face the problem that there are only very few or no cases from which they can draw inferences, but the necessity to learn is nevertheless existent (March, Sproull, and Tamuz, 1991). A very striking example of such a situation is provided by an airline that wants to reduce the probability of future accidents. Since no airline has experienced a large sample of fatal accidents the experiental base for learning is very poor. Organizations have developed different strategies to enlarge their bases of experience. The first is to take more

aspects of experience into account, e.g. to register not only the outcomes of a decision but also the experiences while making that decision: Organizational decisions on a certain issue depend on the outcomes of former decisions on this issue. However, it often takes too much time to wait for the outcomes of former decisions or the outcomes turn out to be ambiguous. In these cases, organizational members tend to make a decision that resembles the former one if they have experienced positive accompanying consequences when making this decision – e.g. a friendly atmosphere (March, Sproull, and Tamuz, 1991: 2).

Another possibility is to attend to the different interpretations of the outcome of one organizational action. The conflicting opinions about what has happened in the past lead to a variety of different lessons that can be learned. Also, preferences are not fixed. Through the process of learning and interpreting the past, organizations modify their opinions of what a success is, and what a failure. This also enlarges the comprehension of history. When there are no events at all to learn from, organizations have to draw inferences from events that almost happened, or they have to create hypothetical histories. Both are techniques to simulate experience. "Near histories" of events that - sometimes luckily - did not take place are very often regarded as if they had taken place, because the differences between the condition of occurrence and the conditions of non-occurrence are very small. If an air traffic accident had just been avoided - only thanks to a lucky circumstance - airlines can learn about the conditions of an accident by pretending that this lucky circumstance had not existed.

Hypothetical histories are quite similar to near histories. However, they not only represent one possible alternative plot of events, but a whole distribution of histories that might have happened if circumstances had changed only a little bit. The construction of hypothetical histories is based on theories which are developed on the basis of the actually experienced sample of events. Thus, an actual incident leads to reflection on the background variables of this incident. These background variables then are used to construct a bigger sample of histories from which the actual plot was only one possible manifestation. This means that organizations enlarge the number of lessons of experience by creating histories that are not actually observable and might never even have taken place.

Apart from the problem of the costs of constructing hypothetical histories and the fact that simulated events are never as compelling as real ones, the difficulty of simulated histories is that their interpretation is often very ambiguous. Judging that an accident is very likely to happen if a special source of failure is not suspended tends to be regarded as too pessimistic in the presence of success. On the other hand, optimistic interpretations of what could have happened, if the outcome had just barely missed the goal, tend to be regarded as too optimistic and unrealistic. Generally, it is is possible to argue that "[i]t is not clear whether the learning should emphasize how close the organization came to a disaster, thus the reality of danger in the guise of safety, or the fact that disaster was avoided, thus the reality of safety in the guise of danger" (March, Sproull, and Tamuz, 1991: 10).

Summarizing the development of concepts within the group around March, we can state that at the beginning there was an approach that took organizations as units of analysis which adapted to experience in reaction to environmental changes. The question of how this adaptation is brought about, was neglected at first. Then, the theory was extended by analyzing interactional processes. Organizations can benefit from individual insights, however they can also make it impossible to transfer individual knowledge to the organizational level. It can be considered an important result that this school has pointed out that deviant behavior of members can substantially contribute to organizational welfare, because through divergent interpretations of reality the chances of exploring new possibilities of action are increased. After having taken a closer look at the micro-mechanisms of interaction, the macro-levels of organizational interaction, the learning of organizations within ecologies of other learning organizations became a focus of analysis. "Unwitting altruism" and different effects of being copied were some results that this analysis produced. How to realize learning in the absence of experience was another important issue which this school took up. Creating hypothetical histories is a strategy of organizations to cope with this dilemma.

## 5. Limits of Rule-based Learning

As there are well-known limits of rationality, there are also limits of rule-based learning (Levinthal and March, 1993). A closer examination of the relationship between organizational success (or failure) and OL suggests that learning is not at all easy to implement. It is only in certain circumstances that it appears as a route to intelligence and success.

Already the early literature of the school around March showed how the same mechanisms of OL and rule-following that lead to improvements could also destroy them (March and Simon, 1958; Cyert and March, 1963). Especially the effectiveness of OL in the short-run, and in the near neighbourhood of current experience, has been shown to interfere with learning in the long run (Levinthal and March, 1993).

5.1. How Success Breeds Failure

The most commonly cited example of limited learning is the process leading to the so called "competency trap".

The process starts from the propensity of successful organizations to accumulate slack in the form of surplus resources. These resources become a buffer against the dangers of unpredictable outside shocks, but may also become a source of organizational inefficiencies.

When management experiences that certain activities appear successful they tend to perform them more frequently, standardize them, and specialize in them. The "success recipe" becomes programmed. Programmes generate activities that resemble those that have led to good results in the past.

However, organizational slack allows management to reduce dependence and that makes the organization less sensitive to outside events in the long run. Management becomes blind vis à vis environmental changes, and if it does perceive them, becomes unable to respond to them beyond the recipes which their programmes provide.

The organizational autonomy, together with overconfidence on their programmed "successful recipe", leads management to accumulate experience mainly in connection with their routines that provide success and to stick to the existing operation rules. Being competent in an activity leads to success, which leads to greater competence. The organizational members become more skilled with a technology and with the programmes which surround it. Efficiency in using one alternative makes trying other alternatives unlikely. The organizational members are locked in into their competencies. Success fosters programming, and programming facilitates success, but mainly in a short run (Starbuck, Greve, and Hedberg, 1978).

> "A competency trap occurs when favorable performance with an inferior procedure leads to an organization to accumulate more experience with, thus keeping experience with a superior procedure inadequate to make it rewarding to use." (Levitt and March, 1988: 322)

Organizations pursue routines and procedures, which in the past have produced success, too often and too long. It is difficult to escape the competency trap since the exploration of alternatives is getting less certain, more time consuming and more distant from the present actions than returns from exploitations of the present technologies are. When the conditions change, organizations find themselves in trouble and suffer from obsolescence. The competency trap is a potentially self-destructive product of organizational learning.

However, it is not inevitable. The danger of the trap can be reduced by rewarding experiments, by changing the adjustment of aspirations to performance, and by changing ideologies (Levinthal and March, 1993).

An important measure which can guard against falling into the competency trap is the encouragement of exploratory activities and a systematic evaluation of the results. In order to achieve these goals, it is necessary to motivate organizational members to experiment. Experimentation has to become attractive for them. This means: Large rewards have to be provided for successful explorations and negative consequences of exploratory mistakes have to be avoided for the organizational members.

The degree of exploration also depends on the relation between performance and aspirations. Exploration is more likely to be undertaken when the absolute difference between

performance and aspiration grows (unless survival is threatened) (March and Shapira, 1992). Also, for equal absolute differences, a greater tendency towards exploration can be expected with failure than with success. Normally, aspirations are optimistic moving averages of past performance. That means that in most cases aspirations are not far above or below performance. This constellation only leads to modest experimentation of the refinement type or to little experimentation. If aspirations were stable or only changed slowly, performance would deviate - positively or negatively - substantially from aspirations and these deviations would induce more substantial exploration.

Therefore, in order to encourage experimentation, a policy of slowing down the adaptation of organizational aspirations is advantageous. The same effect is achieved by linking organizational aspiration levels to performance of other organizations that do much better or much poorer.

Creating ideologies (visions) can also help to reduce the natures of the competency trap. New ideologies systematically change the mental models and thereby encourage experimentation. Success is thus not "deterministically" bringing about inferior rules or organizational failures. In the behavioural literature some observations indicate that success which leads to slack resources, enables management to become less vulnerable of its environment, relax its controls and existing rules, increase experimentation, reduce the fears of failure, and improve performance. Occasionally, success increases self-confidence of managers, and, thereby risk-taking (March and Shapira, 1987). Slack generates manouevering space, and it creates an "experimenting atmosphere" which may result in unintended innovations (March, 1981; Levitt and March, 1988: 334). However, in the majority of cases, success seems to be the enemy of experimentation.

## 5.2. How Failure Breeds Failure

Organizations in a crisis tend to avoid those rules and procedures that have led to failures. Several studies have indicated that organizational crises tend to lead to a tightening of controls, a centralization of authority and a low level of risk taking (Staw, Sandelands, and Dutton, 1981; Czarniawska-Joerges and Hedberg, 1985) As a result, the organiza-

tional rigidity as well as competition within the organization tend to increase. Under these *conditions it is likely that resistance against stricter controls will rise, and the internal conflicts will increase in the organization* (Tainio, Korhonen, and Santalainen, 1991). This will spread fear and defensiveness around the organization which will deteriorate the organizational crisis, lead to managerial paralysis, and propel the organization further towards failure. Thus, the failure often becomes accentuated and results in an endless cycle of failure and unrewarding change.

This "failure trap" can also emerge from another process (Levinthal and March, 1993). Attempts to avoid existing procedures often trigger search for change. However, these failure-driven search efforts are often found to be relatively narrow, focused mainly on the improvement of productive efficiency with known technologies and procedures (Cyert and March, 1963). A genuine renewal of routines is a rare event. The organizations, in which this occurs, often suffer from the difficulties of gaining the returns of continuous experimentation and innovations. An organization that is heavily engaged in experimentation often has difficulties to exploit the results of this experimentation since not enough time or energy is left.

Failure leads to search and change which leads to failure which leads to more search and so on. This pathology of failing new rules and procedures are due to the following pervasive features of organizational life (Levinthal and March, 1993):

(1) Most new ideas are bad ones and most innovations are unrewarding.

(2) Even succesful innovations, when first introduced, are likely to perform poorly until experience has accumulated in using them.

(3) Aspirations are adjusted downward more slowly than they are adjusted upward and they exhibit a consistent optimistic bias.

However, this "failure trap" can also be broken (Levinthal and March, 1993). Failure may lead to search and change, by which an exceptionally good new alternative can be found and introduced. Although these failure-driven search efforts are often found to be relatively narrow, focused mainly to improve productive efficiency with known technologies and procedures (Cyert and March, 1963), they still may be critical in stopping the deterioration process and in creating a turnaround.

In general, success seems to decrease search and increase rule-following, and failure tends to increase search and the questioning of old rules and procedures. Reverse tendencies are possible, but require special efforts. The same mechanism of learning that leads to improvements also leads to limits of those improvements.


## 6. Concluding remarks

Behavioral theories of the firm, as represented by James G. March and his collaborators during the last four decades, portray organizations as target-oriented and rule-based systems that adapt incrementally to past experience. This view is sharply distinct from the conventional doctrine of rational choice, which assumes that organizational action is based on preferences, expectations about future outcomes, and choices made based on these expectations (March, 1988: 2-3).

In the tradition of the behavioural approach OL is viewed as a continuous process involving experimentation, monitoring of results, and modifying future behaviour on the basis of those results. Routines and rules are developed as experience about different contingencies accumulates. These routines become a foundation for future rule-driven behaviour and learning. This view of history-dependent learning processes has provided a serious empirical as well as theoretical challenge to the notion of an anticipatory choice as a basis for organizational intelligence.

Behavioural theories of organizational learning challenge also a traditional psychological view of learning, where the sign of learning is defined as a change in response or performance when the stimulus-situation and the motivation of an individual are essentially the same (Weick, 1991).

Behavioural theories of OL observe that stimulus-situations in organizations are mostly unstable and subject to change. Second, the centrality of routines in organizational life tends to make responses of organizations relatively constant and similar. The routines themselves encode and perpetuate what has been learned in the past, but individual routines are slow to change. When they do change, this typically occurs through the addition of new subroutines. This suggests that the portfolio of routines is an important site of organizational learning (Weick, 1991).

Organizational learning is a process rather than an outcome. The process view of learning portrays both organizations and their environments in a constant flux from which a variety of stimuli can be identified at different levels (Cohen, March, and Olsen, 1972).

Under these conditions organizational learning is essentially based on limited rationality. Individual agents have limited ability to process information in uncertain and continuously changing environments. The search for satisfying solutions tends to emphasize either refinements of existing knowledge or exploration of new knowledge. This depends, to a large extent, on how organizational performance is related to achieved targets.

Behavioral perspective highlights that organizational learning does not need to be conscious and intentional, but there are numerous and varied subprocesses that contribute to changing of an organization's intelligence. Organizational learning may often result in new and significant insights and awareness of different alternatives that dictate no behavioral change. This new self-reflection may not result in observable changes in short-term behaviour (Huber, 1991).

Summing up, the behavioral theories redescribe the phenomenon of OL by specifying processes by which the range of organizations' potential behaviors are changed (Huber, 1991). They clarify some of the fundamental issues in understanding human behavior in modern organizations.

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