

## ***ORGANIZATIONAL LEARNING BY RESISTANCE***

**Theme:** The Nature of Learning and Knowledge

**Jost, M. Gregor**

Department of Social Psychology  
London School of Economics

**Bauer, Martin W.**

Department of Social Psychology  
London School of Economics

**Contact author:** Jost, M. Gregor  
London School of Economics  
Department of Social Psychology  
Houghton Street  
London  
WC2A 2AE

**Telephone:** +44-(0)20 7955 6215  
**E-mail:** G.jost@lse.ac.uk

## Abstract

*This paper develops a specification of internal processes of organizational learning by taking both 'organization' and 'learning' seriously. We establish the multi-level nature of organizing in order to delineate an integrated framework of learning and memory across levels of analysis. Taking learning seriously leads to the recognition of learning by consequences (i.e. single-loop learning) and insight learning (i.e. double-loop learning) as the two dominant concepts. We then use learning by resistance as a researchable functional analogy to learning by consequences, i.e. avoidance learning. The original individual level concept is applied to higher levels of aggregation. Methodological implications for researching this analogy are discussed.*

## Preliminary remarks

Organizational learning and the concept of the learning organization have become a focus of organizational thinking in recent years. In this presentation we conceptualize organizational learning by taking both 'organization' and 'learning' seriously. In our view the talk of 'organizational learning' is one among many conceptualizations to grapple with the complex issue of organizational change. The history of organizational analysis, always concerned with securing efficiency and effectiveness of productive operations, has considered numerous **concepts of change**. Change is a notoriously opaque notion. Some of these concepts went through a fashion cycle, others have endured in the stock of knowledge of how to run a profitable business. To name just a few: planned organizational change, organizational development, production reengineering, organizational transition, change management, and a multitude of pragmatic concepts of a consulting nature taking key variables of organizational performance.

Taking these two things seriously has a number of implications, as we think, for any conceptualization that is both theoretically sound and therefore realistic beyond the notion of pragmatic simplicity.

## Taking 'organization' seriously

### *The multi-level nature of organizing activities*

A key question in the literature on organizational learning is one of different agencies involved, broadly speaking, who does the learning? As a starting point, Fiol & Lyles (1985) spot an implicit confirmation in the literature that organizational learning is distinct from individual learning.

Various authors provide definitions of organizational learning as something "more than collective individual learning" (Daft & Weick, 1984; Duncan & Weiss, 1979; Fiol & Lyles, 1985; Levitt & March, 1988; Senge, 1990) and something more complex and dynamic than a mere magnification of individual learning. Hedberg (1981), for example, states:

"Organizations as such do not learn; members of organizations learn."; [but] "Although organizational learning occurs through individuals, it would be a mistake to conclude that organizational learning is nothing but the cumulative result of their members' learning." (p. 6)

In another account of the same ilk Dixon (1994) claims:

“...each organizational member can learn. An organization learns through this capability of its members. Organizational learning is not simply the sum of all that its organizational members know – rather it is the collective use of this capability of learning.” (p. 36)

There seems to be consensus on the logic that organizational learning can only take place through the learning of individuals or that individuals are the *principal agents* of organizational learning (Argyris & Schön, 1978; Fiol & Lyles, 1985; Hedberg, 1981; Huber, 1991). According to Dodgson (1993),

“... individuals are the primary learning entity in firms, and it is individuals which create organizational forms that enable learning in ways which facilitate organizational transformation” (pp. 377-378)

Yet, organizations quite frequently know less than their members, as, for example, can be illustrated in the case of universities. The discussion in the literature often implicitly addresses either individual or organizational learning, or a hybrid of both, but does not explicitly address how individual learning actually translates into organizational learning.

One of the key features of organizing is to bring individual activity into joint activity by processes of integration and division of roles and labor. Organizations consist of individuals, and individuals operate together in order to achieve tasks that cannot be done by single members alone. In general, organizations are social structures formed by individuals and groups. Individuals work in dyads, groups, and teams within organizations. In addition, groups are connected into what constitutes the organization with its boundaries. The last level has an **internally and externally perceived identity**, a logo, a name, an identity, a public appearance as a unit, and most importantly a **legal status**.

Naturally, organizations are multilevel (Klein, Dansereau, & Hall, 1994). Hence, the answer to the basic question ‘Who does the learning?’ must be to differentiate between **three levels of analysis**, the **individual**, the **group**, and the **organization**. To examine organizational learning is thus to recognize levels issues. The analysis can focus on any three of these levels, or on a combination of them. Whatever organizations do, individuals will be involved. However, the group level and the formal level are not irrelevant for what individuals do. They form constraints that restrict as well as enable individual activities.

Organizational research has traditionally suffered from a bifurcation concerning levels of analysis (House, Rousseau, & Thomas-Hunt, 1995). As the quotations above indicate, the orientation focuses mostly either on a micro or a macro level, that is, either on the individual or on the organization, without integrating the two. Such exclusive theorizing, however, is quickly rendered inadequate when individual behavior is placed in a larger context, or when organizational functioning is predicted irrespective of human agency. What is needed then is an integrated approach, since no construct is level free. Organizations affect behavior and behavior affects organizations, which elucidates the existence of multiple, reciprocal causalities. In sum, constructs not only apparently span across different levels of analysis, but it must be concluded that there are distinct procedural associations between levels. House et

al. (1995) state that “the distinguishing feature of organizational phenomena is that processes at several levels of analysis are in some way linked” (p. 73). For our purposes, this directly relates to the under-specification of the mentioned crucial link between the individual and the organization in collective learning. Conceptual clarity can only be attained through specification of integral processes at different levels of analysis, and recognition of procedural linkages.

If this multi-level feature of organizing is taken for granted, what are the implications for the analysis of organizational learning? Our strong argument is that all three levels of analysis need to be considered in the definition and analysis of ‘organizational learning’. This leads to a number of conceptual and empirical consequences.

First, we have to ask ourselves how can we identify and say that a group or work team learns or has learnt; and by implication that an organization learns or has learnt? This is the task of identifying empirical markers for the existence of learning on either of these levels.

Secondly, we have to ask ourselves can a group or an organization learn without individual learning involved? How could that be conceivable? The reverse is also a problem: can individuals learn without the group or the organization?

It is common, for complex reasons, to deny conceptually any reality to learning on the level of the group or the organization. This will logically follow some notion of distribution and threshold of individual learning (for example, Argyris & Schön, 1978, deny collective level learning: organizational learning (only) = stimulating individual learning).

$$(F1) \quad OL = \text{learning staff} / \text{number of staff}$$

For example the organization learns when most individuals learn something. This leaves the problem of defining the meaning of ‘most’ as a threshold. Is that 50%, 60% or 87% or anything of that kind? This would also imply that organizational learning is nothing more than a ‘Kindergarten’ where things are arranged and staff intervenes to make most kids learn something, maybe according to some curriculum.

Taking the multi-level reality of organizations seriously would lead to some notion that organizational learning is more than the sum of individual learning, as expressed in the summative formula:

$$(F2) \quad OL = ILL + GLL + OLL$$

(OL = organizational learning, IL = individual level learning, GLL = Group level learning, OLL = organizational level learning)

A simple summative formula (F2) makes the assumption that learning on different levels can be substituted by each other, and the same degree of organizational learning is achieved. This would allow for various combinatorial equivalences, for example no learning on the individual level, but group learning and organizational learning. By simply combining the binary condition of learning/no learning on three levels this would suggest eight different types of organizational learning. It remains to be clarified to what kind of organizational fact these logical combination or learning situations would correspond.

A notion that is more accommodating to individualist bias, but nevertheless considers the multi-level reality is expressed in formula F3

$$(F3) \quad OL = ILL (GLL + OLL)$$

Here organizational learning on the individual level is enhanced by contributions from the group and the organizational level. However, it is confirmed that individual learning must be present on the one hand (if a factor is 0, the total is 0). On the other hand, trans-individual learning must be present in order to detect organizational learning. This reduces the combinatorial logic to a more manageable three

- a) if  $OLL = 0$ , then  $OL = ILL \times GLL$  (group learning, no organizational change)
- b) if  $GLL = 0$ , then  $OL = ILL \times OLL$  (organizational learning type A)
- c) If none = 0, then  $OL = ILL (GLL + OLL)$  (organizational learning type B)

### ***Towards a procedural framework of learning across levels of analysis***

#### **Treating learning as a process**

Organizational learning is conceptualized in the literature in two different ways; some treat it as an outcome, others as a process (Edmondson, 1999). The perspective adopted here is a procedural one with a special focus on learning as a cognitive phenomenon, while it is recognized that cognition and action are tightly intertwined (Crossan, Lane, & White, 1999). A process view of learning facilitates an understanding of behaviors or mechanisms that lead to outcomes. Stressing the notion of learning as a continuous process grounded in experience, Kolb (1984) elaborates this perspective. In the special case of organizational learning, lack of knowledge about processes increases the difficulty of reaching sound empirical conclusions about the causality of outcomes, since many influences in field settings cannot be controlled. A predominantly outcome-focused view therefore limits the scope and validity of findings. In addition, treating learning as an outcome entices researchers to equate learning with performance, a problem that will be discussed below.

#### **Learning and performance**

Organizational learning is usually associated with improvement in performance. Some authors even claim that performance must be enhanced in order to be sure that organizational learning has taken place (Argyris & Schön, 1978, p. 323; Fiol & Lyles, 1985, p. 803). In contrast, many recent works have stated clearly that learning does not always improve performance. As a starting point, it can only do so when the knowledge obtained is accurate and veridical (Huber, 1991; Tsang, 1997), since organizations can also learn things that are incorrect (Miner & Mezias, 1996). Taking into account a necessary prior implementation of new knowledge for performance increases to occur, this is further complicated. Moreover, improvements in performance can also happen due to sheer luck or changes in the environment, leading to possibly erroneous causal inferences. As a result, linking a definition of organizational learning to an imperative improvement in performance, adaptive ability, or target orientation appears to be problematic.

Fundamental definitions of learning at the individual level describe the concept as a relatively permanent change in *potential* behavior (Anderson, 1995; Houston, 1991). Prior learning need not necessarily be expressed in overt, measurable behavior. Thus any exclusive concentration on outcome variables will fail to capture the very part of learning that is not translated into observable action. Maier et al. (2001) illustrate this by saying that it is “helpful to define organizational learning irrespective of changes in performance” (p.17). Given their statement, it seems sensible to assume that at the organizational level, too, there is discordance between prior learning and subsequent performance, and several authors explicitly subscribe to the irrationality of this link (Bood, 1998; Crossan, Lane, White, & Djurfeldt, 1995; Duncan & Weiss, 1979; Fiol & Lyles, 1985; Huber, 1991).

On the basis of the above discussion, it is obvious that any attempt to measure, and especially to quantify, learning by measuring performance is likely to not capture the whole story. In an organizational setting, the expression of learning in subsequent behavior is thought to be dependent on such factors as motivation, culture, power relations or task related features. If these factors act as obstacles learning content will fail to reach the organizational stage. In such cases learning, and knowledge, is *lost* to the organization.

This assumption yields important connotations. First, stating that learning can be lost to an organization implies that it must have been acquired or enacted first. There seems to be a sequence of events, a set of different agencies involved. It must be suspected that there are different stages across which learning and knowledge progress. Second, the necessity for learning to be expressed in behavior in order to affect performance allows us to assume that the notion of sharing is crucial to organizational settings.

### **Conceptualizing learning and memory at three levels of analysis**

In order to delineate our approach towards an integrated procedural framework, we need to briefly outline adequate concepts of learning and memory at different levels of analysis.

On the basis of an interest in processes and a ‘look inside the black box’, learning at the individual level is characterized as **cognition**, that is, a cognitive process related to action (Kolb, 1984). The contents of learning must be stored in individual memory (the cortex) in order to be accessible for further use. At the group level, learning consists of sharing, interaction, and dialogue, that is, **communication** through action (e.g., Weick & Roberts, 1993) or verbalization (e.g., Gibson, 2001). This is closely linked to memory processes, especially to the concept of transactive memory (Wegner, 1987), which puts heavy emphasis on the generative effects of collective retrieval. Further downstream at the organizational level, learning becomes not so much an issue of creation, but more so one of consolidation. Since there is no possible forum where all members of a large organization can interact directly, organizational level learning is constituted by **formalization** processes that make learning contents generated at the individual and group level accessible to all organizational members (Crossan et al., 1999). Hence, organizational memory primarily consists of written documentation and individual members (plus peripheral repositories such as external agencies or organizational structures).

### **An integrated framework**

The adoption of a process view has led to the description of concepts in functionalist terms, with a focus on characterizing **information processing through cognition, communication, and formalization**.

Internal processes as the core of theorizing on organizational learning have received comparatively moderate attention. The few attempts to look ‘inside the organization’ and specify what is to be found create little consensus in the field. In fact, “the nature of learning processes is probably the issue over which scholars still diverge most.” (Bertoin Antal, Dierkes, Child, & Nonaka, 2001, p. 929). But extensive discussions of learning and memory components ultimately call for integration into a dynamic framework. This allows for a clarification of the focal construct as a whole, and comprehensively illustrates theoretical assumptions in a graphic format. We propose such a dynamic process framework of learning across levels of analysis in figure 1.

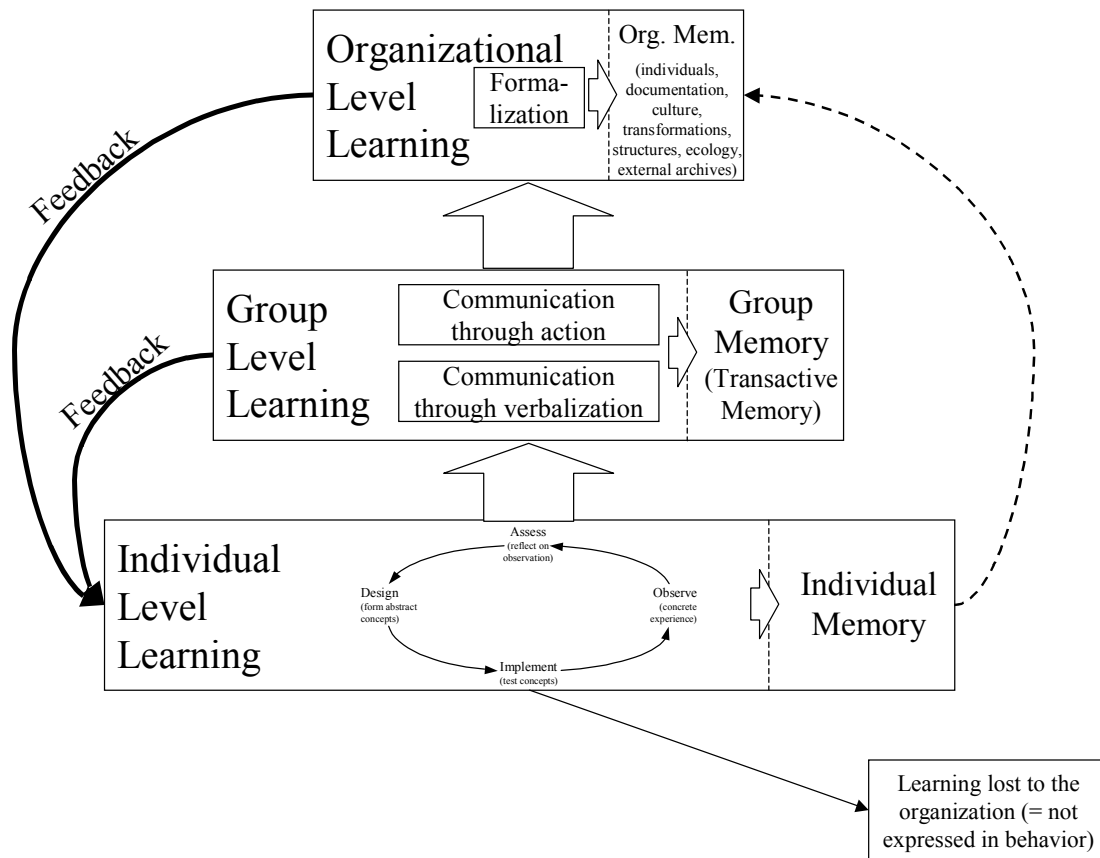


Figure 1: An integrated framework of learning and memory across levels of analysis.

The framework illustrates an integrated sequence of processes that are dynamically interrelated. Learning grounded in experience that occurs at the individual is first retained in individual memory. Kolb's learning cycle is utilized in order to show a clear action relation, as illustrated in earlier models. As individuals form groups and interact, individual knowledge is fed forward by means of communication through verbalization or action at the group level. Dialogue and sharing at this level enables group members to create new knowledge and construct a transactive memory system for storage and further interactive retrieval. Group level contents are then formalized to make them accessible to the entire organization. As a result, organizational knowledge can be retained in individuals as well as in various storage facilities in a formalized format. Through feedback from group and organization-wide sources, the individual as the principal agent of learning is able to base any

new information processing on prior learning within the organizational context. Therefore, the individual is the crucial building block of the sequence, and may or may not translate cognition into overt behavior. The latter case of a missing overt expression to others indicates learning lost to the organization. Individuals can also circumvent or ignore the group level and instead influence the formalization process directly. This might especially hold for powerful individuals such as board members or information gatekeepers (Daft & Weick, 1984; Staw & Sutton, 1992).

The integrated framework organizes all of the fundamental elements discussed so far into a cohesive cyclical structure. It addresses learning and memory issues at three levels of analysis and thereby characterizes a transfer of learning that is sustained and augmented by feedback. Generated knowledge is assessed by individuals and enters the sequence anew. The sequence is continuous, although learning is manifested in different processes for individuals, groups, and organizations. Hence, establishing cognition, communication, and formalization as fundamentally different yet interrelated forms of information processing, the framework systematizes the flow of learning.

## **Taking ‘learning’ seriously**

Following the discussion of the nature of the organization, we then ask ourselves what is involved by taking ‘learning’ seriously.

Learning is traditionally one of the basic psychological processes. Every textbook introducing psychology will have a large chapter on this topic; for many years under the dominance of the behaviorist paradigm learning was nearly the only phenomenon that was considered relevant to study. Our first lesson from this stock of knowledge is that we may have to consider different forms of learning. The basic distinction here is that between learning by consequences and learning by insight.

### ***Learning by consequences***

Learning by consequences is typically identified with classical and operant conditioning: the consequences of a particular behavior, either by positive or by negative reinforcement, strengthens the antecedent behavior, i.e. it makes it more likely. Classical conditioning deals with stimulus discrimination, the fact that different information is taken into account when doing something. Operant conditioning deals with behavior shaping in the face of consequences. This includes **superstition**, in the sense that the association of a particular behavior with desirable consequences leads the organism to form a causal attribution: whenever X, then Y, therefore X causes Y. It leaves the organism with the impression that it is controlling the consequences by its behavior, therefore that behavior is strengthened.

It was later discovered that higher organisms are also learning by consequences, but not only through direct experience. Learning can be based on observing others being reinforced, i.e. the indirect experience of seeing others being successful. This became known as learning by vicarious reinforcement or **vicarious learning** or learning by **imitation**.

Other terms for these basic forms of learning are sensu-motoric learning, rote learning and training, simple learning, and tactical change. The most abstract term came to be known as Argyris & Schön’s **single-loop learning** (1978). The main issue in this type of learning is performance enhancement within a given target, or efficiency gains. This involves the fine-



tuning of sensory inputs and motor activities that are involved in completing a given task in what amounts to a learning curve of improving performance over time both in terms of quantity and quality.

### ***Insight learning***

The second fundamental process of learning is insight learning. Best remembered by the story of Wolfgang Kohler's experiments with chimpanzees on Tenerife during WWI. Only some of the monkeys under observation managed to make use of randomly arranged boxes and wooden sticks to reach a banana hanging outside normal reach of the animal. The problem solution became an indicator of animal intelligence. Here the key phenomenon is considered a 'Gestalt' issue of bringing a set of situational parameters, i.e. boxes, sticks and capability of movements, into a relationship that allows discovering a solution for the problem of how to reach the banana. That this was not to be accounted for by trial-and-error and reinforcements, was shown by the fact that the solution appeared all of a sudden as it out of the blue, after a time of studying and contemplating the situation rather than by wild enacting of particular random movements. This type of learning also comes with different terms: complex learning, conceptual learning, paradigm learning, schematic construction, assimilation and accommodation, strategic change, or, again in Argyris & Schön's language, as **double-loop learning** of assessing the basic assumptions of past solutions in the light of the new situation. The concern here is the effectiveness of a course of activity that includes not only efficiency gains, but a reassessment of all the parameters of an activity including its assumptions, values and targets.

Our conclusion from this stock of knowledge is that a serious development of the concept 'organizational learning' would need to consider at least two, if not three different forms of learning in the concept of organizational analysis: learning by consequences, direct and vicarious, and insight or conceptual learning.

## **Learning by resistance**

### ***Developing a researchable analogy***

The third point of our argument is a plea to go beyond rhetoric. The analysis of organizational learning must go beyond the rhetorical use of 'learning' as a convenient metaphor to convey the omnipresent need for change with just another fashionable way of talking. Talking about learning easily degenerates into its least common denominator, which seems to characterize large sectors of the academic writing on this topic: learning is a good thing, let us have more of it everywhere!

Going beyond the rhetorical use of the notion of learning to understand organizational change is to develop a useful metaphor into an analogy that can be empirically researched. Analogy building involves the mapping of a territory, i.e. organizational change, in terms of territory that is well conceptualized by psychological learning theories. This means basically we need to consider different forms of learning.

On the other hand we need to consider where in the unknown territory of organizational change the analogy needs to be extended and where it may break down. Analogy building

then becomes a creative process that builds a conceptual framework, and generates hypothesis that can be tested in the real world, both about types of learning and how to enhance learning.

This is what we set out to do in our research as a contribution to the on-going strife for clarification what could constitute organizational learning if the metaphor is taken seriously.

### ***Learning by resistance = learning by pain***

What we will explore in particular within this emerging framework is organizational learning by resistance. Here it is suggested to consider learning by resistance in analogy to learning by pain or negative consequences. Classical learning theory suggests that learning by pain leads basically to avoidance learning or negative conditioning. This may suggest hypotheses about the impact of resistance in change processes that amount to avoidance behavior in the future. However, mediated by the multi-level nature of organizations and the processes therein, it may well be that the analogy between resistance and pain needs to be developed in particular with regard to the conditions under which resistance does not lead to single loop learning of the avoidance kind, but to insight learning or paradigm shifts within organizational change processes.

### ***Outlining resistance to change***

In order to illustrate the resistance concept, a brief overview of key determinants is provided in the following.

#### **The signal function of resistance**

The first scholar to detect the shortcomings of the traditional paradigm of ‘overcoming’ resistance, at least the first one with a big enough audience to make an impact, was Paul Lawrence (1954). His article in the Harvard Business Review asks the question how to *deal* with resistance, and the basic proposition is that there are two kinds of change, technical change and social change. People do not resist technical change as such, but they might resist its social ramifications. A number of management actions are offered to influence attitudes of staff, the most important of which, we believe, is taking a new look at resistance. Drawing on the self-fulfilling prophecy problem, supervisors are advocated not to generally expect people to resist change. Instead, Lawrence recommends paying careful attention to occurrences of resistance, which culminates in the following seminal quote:

“When resistance *does* appear, it should not be thought of as something to be *overcome*. Instead, it can best be thought of as a useful red flag – a signal that something is going wrong.” (p. 56, italics in original)

Thus, Lawrence acknowledges the potential value of resistance as an informative feedback loop for the change agency. Resistance has a signal function, which clearly adds a prescriptive, functionalist dimension to the concept. The implication for change agents is to reverse their attitude about resistance to change and utilize it rather than fight it.

#### **An analogy to acute pain**

Lawrence's quote above is followed in his original article by an analogy to pain. As a signal that something is going wrong, pain to the body fulfils the same useful function as resistance to the organism. The pain analogy is mentioned again by Klein (1969), but only receives full attention and theoretical elaboration in Bauer (Bauer, 1993, 1995).

The same way an analogy to individual learning is used in the discussion of organizational learning, using an analogy to acute pain as a metaphor in the resistance discussion can provide significant insights about the mechanisms that produce observable phenomena.

An analogy to pain on the level of individual action will be helpful to examine resistance on the level of collective activity. An experience of acute pain in the human organism follows a cycle of events (Wall, 1999): Attention is focused internally, the body image and reflective activity is enhanced, the current state is evaluated and the course of action is altered. As a fifth function before any alteration, pain usually puts a delay to ongoing activity. Through its function of enhancing internal attention and reflective activity, resistance, like pain, has the diagnostic function of indicating the location of a problem. Used pragmatically, resistance, like pain, urges the system to change its intended course or otherwise endanger its own health (Bauer, 1995). There is a clear action implication. A system that has no capacity to experience pain will cease to exist for failure of recognizing threats to survival. Resistance can therefore be understood as 'collective pain', contradicting the traditional dysfunctional connotations.

### **A shift from causes to effects**

The analogy to acute pain clarifies the concept of resistance as a resource in the change process. Through the pain analogy, a shift of attention toward the effects of resistance is prescribed.

The effects of pain on the individual level have been explained. Pain fulfils a (negative) feedback role to the ongoing activity. The theory of self-active systems provides a framework for both individual and group/organizational behavior (von Cranach, Ochsenein, & Valach, 1986).

Bauer (1991; 1993) proposes this as an adequate theoretical background and elaborates on its implications for the analysis of resistance. A view of social organizations as self-active systems manifests that organizations are acting entities whose behaviors are steered, controlled and energized by internal communication. Coordinated group actions, based on individual behavior, constitute the behavior of organizations. In the same way as execution-monitoring and feedback is essential for individual action, organizations maintain crucial self-monitoring subsystems as a source of information. While feedback for the individual can stem from outside sources, self-monitoring subsystems gather information primarily internally, as they play a role in adapting actions to the internal requirements of the system. These subsystems include, for example, communication networks, accounting systems and resistance to change. Since resistance is communicated within the organization and serves diagnostic and pragmatic functions, it can be identified as a self-monitoring subsystem. Consequently, resistance is a normal occurrence. It can appear on all levels of the system because self-monitoring processes span the entire hierarchy.

Resistance as a self-monitoring subsystem shifts the analysis from causes to effects. The pain analysis in combination with the theory of self-active systems paves the way for the study of the effects of resistance, mainly its informative functions. Thus, a functional analysis

perceives resistance as an independent variable, providing feedback to the organization, as shown in figure 2 below.

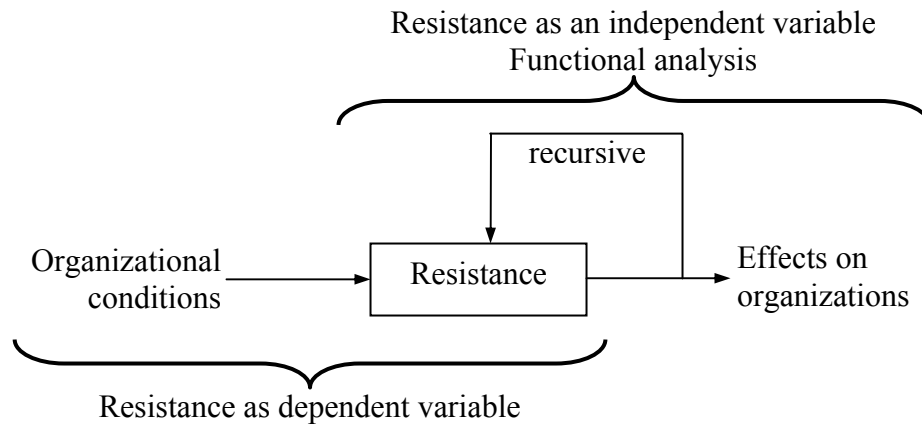


Figure 2: Conditional versus functional analysis of resistance (Bauer, 1991, p. 185)

In addition to feedback provision to ongoing activities, resistance has recursive effects, that is, it changes its own course. As changes in the ongoing activities are triggered, this results in modulations of resistance. If process alterations meet original demands, resistance will vanish. If alterations are insufficient or non-existent, resistance might increase or become chronic.

In sum, resistance serves the function of a reality principle of changes and indicates necessary alterations as adaptive requirements.

## Implications for a research methodology

On the basis of our theoretical development some clear methodological implications arise for researching the focal constructs.

First of all, a true acknowledgement of the multilevel nature of organizing necessitates a methodological approach that clearly distinguishes between three levels of analysis. In addition, the essence of information processing at three levels as cognition, communication, and formalization must be accounted for. This indicates a multi-methodology approach (Mingers, 2001), that allows for validation through triangulation, and recognizes the multidimensional character of learning and resistance. As the intent is the exploration and mapping of processes that are fluid and difficult to observe in a standardized format, i.e. cognition and communication, data collection should concentrate on qualitative assessment at first. At the organizational level, analysis of written documentation can provide detailed accounts of formalization processes as well as chronological descriptions of emergences of resistance and their subsequent impact.

In sum, a methodological approach would follow the rationale of using learning by resistance as an analogy to learning by pain, i.e. learning by negative consequences or avoidance learning. The latter has been elaborated on the individual level, but lacks clarity and probably consistency at higher levels of aggregation. The single-loop learning pattern inherent in avoidance learning appears too limited in an organizational context. Given the outlined

functional and diagnostic qualities of resistance, we suspect a shift towards higher proportions of double-loop learning at the group and organizational levels (if resistance is understood in functional terms), as shown in figure 3. To explore this both conceptually and empirically is the challenge of this research project.




	Single-loop Learning	Double-loop Learning
Individual Level		
Group Level		
Organizational level		

Figure 3: Learning by resistance at different levels of analysis

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