WHAT CAUSES ORGANIZATIONS TO LEARN?

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Abstract:
Provided that organizational learning (OL) is a self-organizing process, a key lever to foster it is to supply organizations with occasions for learning by stressing events which induce it. This presumes knowledge about the causes of OL. Our paper attempts to contribute to a consolidated understanding about the causes of OL by reinterpreting respective assumptions of OL-concepts from a constructivist perspective on information: Applying Bateson's (1981) definition of information, we show that assumptions of OL-concepts can be transformed into 'differences which make differences'. Referring to Spencer Brown (1969), we then argue that 'differences' do not represent objective degrees of unlikeness, but result from 'drawing distinctions'. In the end, this implies that the causes of OL are self-made, that OL is an entirely - from causes to results - intra-systemic process, that whether or how an organization learns lies in its own hands, as it depends upon the distinctions it draws.

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1   The Problem and Its Significance

The expectations are high: Organizational Learning (OL) is claimed to be indispensable; the "key to coping with change" (Garratt 1987a: 61); at the "heart of organizational survival" (Garratt 1987b: 38); or at least, the "only sustainable competitive advantage" (De Geus 1988: 71). However, while there is widespread unanimity about the importance of OL, among scholars as well as among practitioners, the views about what OL actually is, about the processes involved, and, about what makes organizations learn are rather scattered. Although the concept is meanwhile looking back at more than thirty years of theoretical discourse, the state of theory development still resembles more a Babylonian confusion of languages, than a unified paradigm (Dodgson 1993, Fiol and Lyles 1985, Miner and Mezias 1996).

The multiplicity of theoretical concepts brings about various problems: As long as OL-theory is occupied more with itself than with its object (Argyris 1996) it will not accomplish to strip off the role of the "ugly duckling" and "shift to center stage in organization theory" (Miner and Mezias 1996: 88). Furthermore, taking into account, that there are plenty of examples for organizations, which do not learn, do not learn enough, fast enough, good enough, or, which learn the wrong things, and therefore get into serious trouble (De Geus 1988: 70, Dixon 1994: 5), a design problem becomes visible. It is expressed by the fact that managers have to devise appropriate strategies for making their organizations learn, learn more, faster, better, the right things, while scholars cannot provide unequivocal, reliable and convincing advice.

This paper, therefore, attempts to cultivate a few acres of the 'OL-jungle'. The territory, on which it concentrates, is outlined by the question: 'What causes organizations to learn?' There are two reasons, why, in our understanding, this question is of particular importance with regard to the mentioned design problem:

(1) OL is a systemic process. It is different from individual, management and group learning (Kim 1993: 40, Shrivastava 1983). It refers to changes of the 'cognitive' basis of an organization (Argyris and Schön 1978, Fiol and Lyles 1985, Friedlander 1983), i.e. its programs and procedures, structures and strategies, traditions and norms, values and myths, which guide and instruct actions and decisions, and which are preserved while members and managers come and go. Thus, the learning of individuals, managers or groups within an organization will not result in OL, unless it has consequences on the structures underlying organizational behavior. Although, the learning of an organization is mediated by the people working in it and although, structures, strategies and cultures do not change all by themselves, but are, sometimes consciously - sometimes unconsciously, changed by organization members, groups or managers, the learning of an organization is not simply the cumulative result (Hedberg 1981: 6) of its members', managers', or groups' learning. Following the logic of the concept, it does not even require a foregoing learning process of employees or managers, who drive the OL-process.

With regard to the above problem, this means that providing organization members with new knowledge, or enhancing their individual learning capabilities through large scale educational programs, may not lead to improved OL. Increasing the learning-rate, -speed, or, -performance of an organization, instead, requires different strategies, operating at an organizational level.

(2) Learning is a self-organizing process - and thus a process that cannot be 'managed', at least not in a traditional understanding. The very semantic meaning of the term

'learning' indicates a process, which is organized and controlled by the entity doing it. In most languages, it is impossible to 'learn somebody something'. One can 'teach' him or her, but whether what is learned is congruent with what is taught, is more than doubtful. According to psychology, learning even cannot be directly observed. The process of learning happens within a learning entity and is invisible from the outside. What can be observed, are the results of learning - different behavior or different knowledge - but not the internal processes that produce them.

Concerning our up front problem, these considerations emphasize the futility of attempts to plan and control particular OL-processes. If 'learning' is a self-controlled, self-organized, and unobservable process, its course and its outcome cannot be designed - neither for individuals, nor for organizations.

Taken that OL cannot be directed, management strategies must focus on designing favorable contexts or creating optimal conditions, in which OL is likely to happen. Therefore, a key lever to foster OL must be seen in supplying organizations with occasions for learning, by stressing - not suppressing events that induce OL. This in turn, presupposes knowledge about what kinds of events these are, or in other words, about 'what causes OL'.

The purpose of this article is to contribute to a concerted understanding of the 'causes of OL'. We try to accomplish this goal by means of a three-stage theoretical analysis. This actually means, that we gradually reinterpret assumptions about OL-causes met in OL-concepts (1) within the light of learning theories (2) and cognition theories (3). Consequently, the article is organized into three major sections. In the first section, we collect and categorize assumptions about OL-causes as offered by OL-concepts. In the second section, we unfold what is supposed to cause 'learning' in general by the two main lines of thinking within learning theory, and reinterpret our OL-level findings within this superior frame of reference. In the third section, we elucidate remaining discords by examining them from a theory of cognition position. From that position, we then formulate general propositions about 'what causes OL'. In the final chapter we consider obvious implications of our results on OL-theory and practice.

2   Organizational Learning Concepts' Explanations

Consulting some of the numerous OL-concepts, which management literature provides, we receive almost just as many different answers to the question of 'what causes OL'.

March and Olsen (1975), for example, assume that organization members act upon individual cognitions and preferences. In sum, their actions constitute an organization's behavior. Responses by the outside world to this behavior, then, directly affect those cognitions and preferences, bringing forth different individual, and as a consequence, collective behavior. In this approach, OL means the adaptation of an organization's behavior to its environment and is caused by individual experience of 'environmental responses' on organizational actions.

Duncan and Weiss (1979) assume that OL means more than simple aggregation of individual learning, namely a process of growth or change of a specific organizational knowledge base. This process is stimulated by 'performance gaps', which the authors define as discrepancies between how the organization is performing and how it should be performing, in the eyes of its decision makers. Performance gaps indicate failures in the

existing organizational knowledge base and stimulate a search for new knowledge that helps to reduce the gap.

Within the conceptual framework of Argyris and Schön (1978), organization members act upon an organizational theory-of-action with expectations of outcomes, that are either confirmed or disconfirmed by their subsequent experience. Mismatches of outcome to expectation indicate 'errors' in the underlying theory-of-action. OL occurs when organization members, as a consequence, search, detect and correct these errors. In line with our assumptions regarding management strategies for improving OL, Argyris (1990) sees the key lever for facilitating OL in overcoming behavioral patterns that are used to coat errors within the organizational theory-of-action. Only when they are admitted and dragged into the light, and not covered by organizational defenses, such as 'skilled incompetence', 'defensive routines', and 'fancy footwork' (Argyris 1990: 64), errors can stimulate OL-processes.

Although varying with regard to their assumptions about 'what' is changed by OL ('individual cognitions' vs. 'organizational knowledge') and the degree of consciousness, which is ascribed to OL-processes ('affect' vs. 'search'), these three concepts likewise portray 'experience' as the ultimate cause of OL.

In an early work, Cangelosi and Dill (1965) view OL "as a series of interactions between adaptation at the individual or subgroup level and adaptation at the organizational level" (Cangelosi and Dill 1965: 200). They suppose that individual and subgroup adaptation produce divergence and conflict, which they call 'disjunctive stress'. When this disjunctive stress passes beyond certain tolerance levels, it is likely to trigger total-system learning. The release mechanism for OL, thus, is made up by some kind of intra-organizational conflict, arising from contrary courses of adaptation.

This is similar to Kim's (1993) assessment, that OL, which he regards as the development of "new shared mental models" (Kim 1993: 44), requires 'discrepancies' between individual and shared mental models, that have their origin in individual learning processes. It also corresponds with Huff's and Chappell's (1994) view that OL results from the effective solution of 'conflicts'. In contrast to Cangelosi and Dill, however, Huff and Chappell suppose that the conflicts in question arise from different parties' different political interests.

Regardless of whether they name it 'stress', 'opposing interests', or 'discrepancies' of views, these three approaches definitely refer to some sort of 'conflict' as the ultimate trigger of OL.

Proposing a model of organizations as interpretation systems, Daft and Weick (1984) build up on the assumption that organizations are social systems, processing information from their environment. They seek information about trends, events, competitors, markets, and technological developments relevant to their survival and then base organizational action on that information. Although the authors do not explicitly make use of the term 'OL', they implicitly equal the entire process of information processing to it, when arguing that three stages "constitute the overall learning process" (Daft and Weick 1984: 286) of an organization: The first stage, 'scanning', is defined as the process of monitoring the environment and providing environmental data. The second stage, 'interpretation', gives meaning to data and is defined as the process of translating events and developing shared understanding. The process is completed, at a third stage, by 'learning' (in a narrower sense), which in addition involves taking new actions based on the interpretations.

Quite similar, Dixon (1994) conceives OL as a process, by which organizations gain new understanding or correct current understanding, i.e. as a dynamic process of constructing and reconstructing meaning. She claims that OL-processes must be viewed as cycles consisting of (1) the generation of information, (2) the integration of the information into the organizational context, (3) the collective interpretation of the information and (4) the authorization to take action based on the resulting meaning.

We can, thus, identify a third category of OL-concepts (including Daft and Huber 1987, Huber 1991), which, applying an information processing view of learning, assume OL to be 'kicked-off' by new 'information'. Unfortunately, these approaches are not very specific about the kind of information which is important for OL.

Senge's (1990) design oriented work on learning organizations contains yet another possible trigger for OL. He assumes that the basic meaning of a learning organization is - "an organization that is continually expanding its capacity to create" (Senge 1990: 14). The energy to create, he argues, emanates from a gap - called 'creative tension' - between a company's vision and the reality it faces. The driving force of OL, therefore, is constituted by a shared 'vision', which an organization strives to put into reality.

An empirical exploration of OL-processes (Klimecki and Lassleben 1998) confirmed that visionary ideas may operate as triggers for OL under certain conditions. Operationalizing OL as changes of the reality constructions that are shared among organization members and serve as a basis for their actions (similarly Kim 1993), the authors could trace that a prevalent occupation with 'problems' favors the development of new shared insights about an organization's structures, while in the presence of 'visions' a new collective thinking about strategic issues is likely to build up. In both cases, however, it is OL, which takes place.

Consequently, we have to register a fourth category of OL-concepts, which assert that the presence of shared vision is a crucial condition for OL.

Last but not least, Garvin (1994) claims that OL does not only result from contemplation and self-analysis. Instead, many propitious insights are inferred from outside the organization. According to him, therefore, benchmarking, the comparative study of practices, is a most important source for creativity and learning.

Far from being comprehensive, this brief analysis of some OL-concepts demonstrates that there is no common understanding of the causes of OL. Instead, the assumptions are manifold. Even after a first classification, at least five different categories of OL-causes remain: experience, conflict, information, vision and benchmarking. Undoubtedly, this 'state-of-the-art' of OL-theory provides only tottering ground to derive improvement strategies, which aim, as suggested before, on providing an organization with occasions for learning. In our mind, the disparity of assumptions cannot be further concentrated on the level of OL-concepts because: (1) An OL-theory confined analysis fails to unveil further interdependencies or commonalties between the categories. (2) Lacking empirical research, there is no evidence to determine which one, or two, or even more of the above causes, in deed and in practice give momentum to the learning of an organization. (3) Not knowing from which theoretical sources the assumptions about OL-triggers have been obtained, one cannot even judge whether the above enumeration is complete, i.e. whether or not, there are still other reasons that might cause an organization to learn.

To receive answers on those open issues and to further consolidate the four categories of causes it seems befitting to draw upon knowledge about the causes of learning, in general.

3   Learning Theories' Explanations

In the home discipline of learning, psychology, which we consult for that purpose, we do not encounter 'one' unified theory of learning but a variety of learning theories (for an overview see e.g. Biehler and Snowman 1986, Bower and Hilgard 1981, Lefrancois 1982). They all attempt to systematize and organize knowledge about learning. Unfortunately, they arrive at rather contradictory conclusions, including the assumptions about the causes of learning. Complexity can be reduced, though, by discerning two main streams of learning theories (Greeno 1980, Shuell 1986): behaviorist and cognitive learning theories.

3.1   Behaviorist Learning Theories

Behaviorist learning theories conceive learning as the establishment of new stimulus-response links. Putting aside what happens within the learning organism, they directly relate (explain) behavioral responses to (by) environmental stimuli. In this view, learning manifests itself as a change of behavior, behavioral repertoire or probability of behavior.

In principle, four different stimulus-response constellations are possible (Weick 1991): (1) When a same stimulus leads to a same response, there is no learning. (2) When a same stimulus leads to a different, normally improved, response, learning happens. It is typically expressed by the so-called 'learning-curve effect' and caused by skill development through 'repeated exercise'. (3) When a different (new) stimulus gets connected to a same, i.e. well-known behavioral response, there is also learning. This kind of learning is called 'classical conditioning' and caused by 'contiguity': A locally, temporally, logically or otherwise neighboring stimulus substitutes the original stimulus of a well-established stimulus-response chain. When this learning happens, successful behavior is transferred to new but similar situations. (4) Finally, learning is also, when a different (new) stimulus gets plugged into a different (new) response. This, by far most complex form of learning, is covered by the term 'operant conditioning', follows a try-and-error course, and is caused by 'contingency': Facing a new situation, a learner tries out new behavior, i.e. experiments. This behavior effects reactions in the environment, which feed back into the learner. If feedback is positive, the stimulus-response association is strengthened. If feedback is negative, the stimulus-response bond is weakened, or ultimately extinguished. Subsequently, behavior is changed by fresh tries, until the intended results turn up.

In all of these cases, learning is necessarily bound to, i.e. released by, 'experience': According to behaviorist learning theories, one has to (2) undergo some exercise, (3) live through some contiguities, or, (4) suffer some punishment respectively enjoy some reward, in order to learn. Learning is, therefore, inevitably reactive and adaptive, as it is a function of preceding behavior and environmental stimuli.

As OL is expected to enable organizations to better cope with changes in their environment (new stimuli), learning types (3) and (4) are of particular interest. The

coping strategies they imply: (3) try out behavior that has proved successful in similar situations, and (4) try out any behavior and learn from what happens, i.e. particularly from errors, are certainly not very telling - especially to practitioners - as they are quite risky. It is, therefore, not surprising that only few OL-theories overtly refer to a behaviorist understanding of learning (March and Olsen 1975, Levinthal 1991, Lounamaa and March 1987), and that those who do, necessarily conclude that "learning is generally incremental" (Miner and Mezias 1996: 88). Otherwise it would simply be too hazardous.

3.2 Cognitive Learning Theories

The vast majority of OL-concepts refers to cognitive learning theories. The main difference between behaviorist and cognitive comprehensions of learning is, that the latter conceive learning to transform knowledge, not behavior[1]. According to cognitive psychology, purposeful actions of a person rest on his/her image of him-/herself in his/her environment, i.e. on his/her knowledge. Behavior is not so much controlled by environmental stimuli, but by "what is in the head" (Bolles 1978: 192) - by images or plans, maps or schemes, or generally spoken, by cognitive structures and processes. Accordingly, cognitive learning theories commonly assume that learning refers to changes of the cognitive basis of action - that what is learned is knowledge and not behavior. Changes of behavior, then, are possible but not necessary effects of learning, while, on the other hand, learning is an indispensable condition for behavioral changes (Stevenson 1983: 214).

The governing model for comprehending processes of knowledge change, i.e. learning, is one of information processing, and can be described in terms of (1) input, (2) computation, and (3) output: An organism receives (1) information from its environment. The received information is interpreted (2), that means, it is integrated into an existing body of knowledge - combined with information that is already at hand. The result of this 'computation' is stored in some sort of memory, and retrieved (3), on occasion to design purposeful actions. From a cognitive viewpoint, the process of learning is thus tantamount to information processing. The only peculiarity distinguishing the two is, that 'learning' is reserved for information processes, that leave their mark on knowledge: Learning enlarges (adds new), diminishes (removes wrong), or, alters (replaces existing) knowledge - in short: it makes a difference with regard to knowledge.

Concerning our research question, we can now substantiate that, from a cognitive perspective - due to the underlying model of information processing - learning is always caused by 'information', which is 'put in' to a learning, i.e. information processing system. Primarily based upon that shift - from 'experience' to 'information' as the main source of learning - the scope of learning is widened: Learning is 'freed' from the tight linkage to experience and 'opened' for processes of insight. It is allowed to be anticipatory (processing forecasts) as well as reactive, creative (processing 'ideas') as well as adaptive, fundamental (overthrowing large areas of knowledge) as well as incremental.

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[1] "The important innovative idea in this development was the conceptualization of learning as discrete changes between states of knowledge rather than as change in probability of response" (Greeno, 1980: 716).

Regarding the expectations that are tied to OL - that it enables an organization to cope with changing environments - it is certainly attractive and seductive to think of a 'way of learning', which does not require to make errors first. It should not be surprising, therefore, that the majority of OL-theories applies a cognitive notion of learning, when developing their concepts of OL. The problem, however, is that in doing so, they either end up with a cognitive reformulation of experiential learning (Argyris and Schön 1978, Duncan and Weiss 1979), or, with a description of OL - so broad, that it can hardly be distinguished from information processing in general (Daft and Weick 1984, Daft and Huber 1987, Dixon 1994, Huber 1991). What is needed, in our view, is an OL-theoretical framework, that goes beyond 'learning from experience' - yet remains specific about learning.

In addition to the prospect of delineating OL as an insight-based - instead of only error-based - process, there are at least two more reasons which let us, too, pursue the cognitive path on our further investigation into the causes of OL: (1) Considering OL to be a genuinely systemic process and not simply the cumulative result of individual learning processes, it is certainly more auspicious to build up on a model of organizations as information processing systems, than to search for some kind of organizational analogy to a nerve center, where incoming stimuli are 'plugged' into available responses. Capitulating ahead of this dilemma, OL-theories, committed to a behaviorist notion of learning, cannot but devise OL as a secondary effect of the learning of organization members (March and Olsen 1975). (2) Even avoiding a detailed discussion of the assessment, that the disagreement between behaviorist and cognitive explanations marks a paradigm shift within learning theory, it can easily be seen that the cognitive approach is of an extended explanatory capacity: It does not reject the possibility of learning from experience, but is able to incorporate it (learning from information about the consequences of one's own actions), while allowing for other forms and sources of learning as well. 'Observational learning', for example, can be interpreted as learning from information about other people's practices and experiences, 'inferential learning' as learning from information which is the outcome of combining other 'bits' of information, and, 'generative learning' as learning from information which is provided by imagination, not reality.

Revisiting our OL-concept based collection of OL-causes from this learning theoretical viewpoint, we can consolidate the five categories into two, by subsuming experience, vision and benchmarking as unlike 'sisters' under the category of information. That this concentration is legitimate is at best certified by the OL-authors themselves: When Argyris and Schön (1978) claim that information about errors guides the rebuilding of an organization's cognitive basis, they provide a perfect cognitive reinterpretation of learning from (negative) experience. And, when Senge (1990) alleges that the creative shift of the corporate mind is informed by its shared vision, he spells the idea of 'generative learning' in cognitive letters and transfers it onto an organizational setting. Despite this reunion, however, one assumption of OL-concepts remains standing apart: 'conflict'. It cannot be seen how 'learning from conflict' can meaningfully be integrated into a cognitive learning framework as another type of learning, caused by another kind of information. This means, that we are still left with at least two categories of assumptions about the causes of OL: information and conflict. Furthermore, we are still not able to judge whether the newly arranged compilation is complete. The problem has, at best, been transferred, not resolved. The question now is: 'What kind of information is especially relevant for OL'? Information about errors (Argyris and Schön 1978) or performance gaps (Duncan and Weiss 1979)?; information contained in a

company's vision (Senge 1990)?; information about an industry's best practices (Garvin 1993)?; information about trends, events, competitors, markets, technological developments (Daft and Weick 1984)?; other, different kinds of information?; or, even, any kind of information, that finds its way into the organization (Daft and Huber 1987)?

To achieve some more clarity, we continue our investigation, and dig one layer beneath 'cognitive learning theories' into 'theories of cognition', expecting to gain some insights there about the essence of information, its generation and processing, and its relevance to knowledge and learning.

4   Cognition Theories' Explanations

Upon engaging with theories of cognition, we are again confronted with two opposing perspectives:

4.1   Reflectionist Approaches

In traditional epistemological approaches as in every-day understanding, knowledge is seen as a 'reflection' - a 'mirror' of an external, objective reality. It is composed of information. Information denotes messages, which describe the world. It is treated like a substance or a commodity. It can be 'collected', 'processed', 'stored', 'transferred', even 'traded'. To acquire knowledge, information from 'outside' must somehow - through the senses or by way of communication - get into the knowing subject, where it has to be arranged, by means of learning, into configurations, i.e. models, which correspond to the outside world (Heylighen 1995, Varela, Thompson and Rosch 1992: 133ff, von Krogh, Roos and Slocum 1994: 59f).
          To put it more figuratively, one can compare knowledge to a completed 'puzzle', displaying a correct portrait of the world, or at least, of a section of it. Bits of information act as puzzle pieces, which together yield the complete picture. Learning, then, means nothing else than puzzling, i.e. putting the pieces together, so as to form a true copy of reality. Because the pieces are 'input' from the outside, and, because there is only one correct way in which they fit together, this approach suggests an 'instructionist' view of learning (Heylighen 1995).

A reflectionist view of knowledge shines through the information-centered OL-concepts of Daft and Weick (1984), Daft and Huber (1987) and Huber (1991). It is almost perfectly expressed by their demand, that organizations have to 'scan' environments for trends, events, competitors, markets, and technological developments (Daft and Weick 1984: 285). On following this notion of information, however, two issues turn up: The first concerns its practical consequences, the second its capacity to integrate the above identified OL-causes: Concerning practicability, one may justifiably warn that a reflectionist position does not provide criteria for an organization to determine, which information is relevant, and which is not. Accepting that environments of organizations are getting ever more interconnected and complex, one can easily imagine that an 'at random' collection, without pre-selection, of information can easily yield an information 'overkill' ('the puzzler drowning in puzzle-pieces'). Whether Huber's (1991) and Daft and Huber's (1987) solution to this problem, i.e. increasing the information processing power of an organization, suffices to master the dilemma, can, at least, be questioned. The second issue concerns this paper's efforts to unite assumptions

about OL-causes. Even, if we reinterpret errors and performance gaps as 'indicators' of wrong or outdated puzzle-pieces, stimulating re-sensing and subsequent re-placing, and, if we 'bend' visions and benchmarks to broad versus narrow 'search criteria' for OL-relevant information, we find ourselves still not able to integrate conflict, stress and divergence. Induced by this 'performance gap', we turn towards another 'information about information'.

4.2 Constructivist Approaches

Constructivist approaches towards cognition assume that knowledge is a 'construction' of reality, i.e. an 'invention' of a cognizing subject (von Foerster 1984a, Watzlawick 1984). This invention, however, is the only possible cognitive basis of a person's world view and actions. As there is no perception or understanding, independent of the perceiving or understanding subject, it can never be known, whether one's knowledge of reality matches 'true' reality. We can, at best, experience that it 'fits' reality in that it allows the successful execution of purposeful actions (Ford and Backoff 1988: 53, von Glasersfeld 1984, von Glasersfeld and Cobb 1983). Accordingly, constructivist reasoning also objects the idea, that information is 'input' (Maturana and Varela 1980). In contrast, cognitive systems are presumed to be informationally closed. Hence, information, must not be seen as a cargo, taken in from the outside, but as a systemic product. According to Heinz von Foerster (1984b), information is not a commodity but a process - "the process by which knowledge is acquired" (von Foerster 1984b: 19).

Generally, constructivist approaches struggle to locate 'information' within their explanatory systems. Usually, they get along without it (Maturana 1986: 4)[2] in building theoretical frameworks of cognitive development, i.e. knowledge construction. This certainly has to do with the fact that the term 'information' is almost indissolubly connected to an instructionist input-output device. There are, however, routes, that do not require to file 'information' in the 'theory history' folder, but are able to recycle it in a constructivist way. One such way is shown by Gregory Bateson (1981).

4.2.1 A difference which makes a difference

According to Bateson, "what we mean by information - the elementary unit of information - is a difference which makes a difference" (Bateson 1981: 453). One could also say: a significant, i.e. consequential, meaningful difference. It is important to note that only this coupling of two differences constitutes the process of information. Lacking one, there is no information. To repeat it: 'Information' is a two-stroke process (Baecker 1996: 65): a difference (1st stroke) which makes a difference (2nd stroke). What this re-definition of information implies regarding knowledge construction, can, at best, be illustrated by using an example, which Bateson himself provides. To grasp the implications of the example, one has to recall, that cognitive (knowledge) structures of humans but also organizations, are often compared to 'maps' (Langfield-Smith 1992, Weick and Bougon 1986). In his example, Bateson asks:

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2   "... giving up any attempt to make use of the term information, thereby taking a leave of any, even hidden, conception of instructive determination ..." (Maturana, 1986: 4; translated by the authors).

"'What is it in the territory that gets onto the map?' We know, the territory does not get onto the map. That is the central point about which we here all agree. Now, if the territory were uniform, nothing would get onto the map except its boundaries, which are the points at which it ceases to be uniform against some larger matrix. What gets onto the map, in fact, is difference, be it a difference in altitude, a difference in vegetation, a difference in population structure, difference in surface, or whatever. Differences are the things that get onto a map." (Bateson 1981: 451)

It are differences (1st stroke), that spur a cartographer to make differences (2nd stroke), i.e. to paint some spots of the map blue (water) and some not (land); some spots red (settlements) and some not (wasteland); some spots green (valleys) and some not (mountains); and so on. Transferred onto knowledge and learning, this is to say: It are differences that we observe (1st stroke), which make a difference to what we know (2nd stroke): It are differences, which cause us to learn (assuming that 'learning' refers to 'changes' of knowledge, and assuming that what we call 'change' is "difference which occurs across time"; Bateson 1981: 452). All things being equal, no differences in space and/or time, the whole universe, a single, infinite black hole, ever since - nothing could be known and nothing could be learned.

Applying this constructivist reading of 'information', we are now able to re-arrange all of the remaining (having farewelled the behaviorist version of experience and the representationalist version of information) assumptions about OL-causes: As will be seen, all of them can be translated into a 'difference making a difference':
- When Argyris and Schön (1978) affirm that errors cause OL, they indicate that differences between expectations and outcomes of organizational actions make a difference to the organizational theory-of-action.
- When Duncan and Weiss (1979) assert that performance gaps cause OL, they argue that differences between an organization's targeted and actual performance make a difference to its knowledge base.
- When Senge (1990) maintains that shared visions cause OL, he alleges that differences between the aspired and the actual state of an organization make a difference to the corporate mindset.
- When Garvin (1993) claims that benchmarking is an appropriate tool for OL, he insinuates that differences between an organization's practices and its competitors' practices make a difference to organizational procedures.
- When, according to Cangelosi and Dill (1965), disjunctive stress releases total-system learning, this is to say that differences between organizational groups' ways of doing things make a difference to the organization's course of action.
- When Huff and Chappell (1994) uphold that party politics contribute to OL, they say that differences between organization members' interests make a difference to an organization's positions.
- And, when Kim (1993) declares that divergence between individual and organizational mental models causes OL, he implies that differences between individual and collective worldviews make a difference to organizationally shared reality constructions.

To prevent misinterpretations: This is not to say, that (these) differences always make differences, i.e. always cause learning. There are, quite sure, more examples for instances, where knowledge is untouched by differences, where differences between expectation and outcome, targeted and actual performance, aspired and actual condition,

and so on, do not result in changes of organizational procedures, courses of action, positions, and so forth. But then, there is no learning, too. All of the above statements about 'differences making differences' refer to successful OL-processes. So, what they say is, that if an organization's theory-of-action, its knowledge base or reality constructions change due to learning - it always starts with a difference. Of course, it would be useful to study what it is that prevents differences from making differences, that obstructs construction, that thwarts organizations from learning. Not without reason, each of the cited OL-concepts contains statements about OL-impediments and how they can be dealt with. In doing so, they investigate the 'conditions of OL', the circumstances under which differences are likely to make differences. As we, however, have set out to examine the 'causes of OL', we will not join their inquiry of how 'differences make differences' but uphold emphasis on the 1st stroke, i.e. on which 'differences make differences':

Ensuing a constructivist turn on information - as 'differences which make differences' - we have identified a common denominator for the majority of assumptions about OL-causes. Yet, we have but passed half the turn. We still do not know, which state of affairs 'differences' denominate, i.e. what exactly 'differences' are, that they can make differences, i.e. cause learning. This is especially important, as, within a constructivist frame of reference, we must exclude that differences 'represent' some truly given 'unlikeness', or some objective "degree or amount by which things differ in quantity or measure" (Webster's 1995: 280). But, what then, are differences?

4.2.2 Draw a distinction

In order to find an answer to this question, and, to complete the constructivist recycling of information, we turn towards another ancestor of constructivist thinking: George Spencer Brown. His work "Laws of Form" (Spencer Brown 1969) starts with the request: "Draw a distinction" (Spencer Brown 1969: 3). Drawing distinctions, Spencer Brown declares, is the form of construction, i.e. the basic form-building, i.e. in-forming operation (Luhmann 1995: 167). Its result is a 'difference' which then can make a difference to the one who draws the distinction. Without drawing distinctions, there would be no differences, and hence, no information; without drawing distinctions, the world would seem "like shifting sand beneath our feet" (Spencer Brown 1969: v). It is upon this reframing, that the system, instead of the environment, becomes author of information, as drawing distinctions is an act that can only be performed by an observing system. Information, thus, finally converts into a completely intra-systemic accomplishment, and learning to 'construction' instead of 'instruction'. Following this constructivist redesign, we understand that one must draw distinctions in order to produce differences that make differences, i.e. one must distinguish in order to get informed, i.e. one must differentiate in order to learn.

Picking up the above 'map'-analogy, one can illustrate the implications of this 'Spencer Brown addendum': If a cartographer distinguishes [water/not water], his map will contain rivers, seas, lakes, islands and mainlands. If he does not draw this distinction, his map cannot contain this information. To make it less trivial: If a 'political' cartographer observes the world along the distinction [belonging/not belonging to a country], his map will contain the territories of states. If an 'ecological' cartographer distinguishes [rare species living/not living], upon inspecting the earth, his map will contain information about the living space of dying out species. If, finally, an 'industrial'

cartographer differentiates the globe with regard to [mineral resources present/not present], his map will provide knowledge about the global distribution of mineral resources. The point is, which we have to understand, that in neither case, the information is already 'out there', waiting to be collected. Instead, it is in any case the act of distinguishing, which only first creates it. As long as no one distinguishes (or 'cares about'), for example, [polluting/non-polluting behavior], there is no 'destruction of environment' - at least not in the world of our minds, which is the only world we 'know'. As long as no one draws this distinction, no one has information about it, no one knows about it. In order to learn about it, one has to draw the distinction - at first.

Having completed our passage through cognition theories and assembled a constructivist understanding of information, we come back one more time to the assumptions about OL-causes and round up our discoveries, as follows: In order to learn from important differences, as expressed by errors, gaps, tensions, benchmarks, stress, conflict or divergence, organizations must draw the corresponding distinctions. Only, if the proper distinctions are applied upon observing themselves or their environments, organizations get access to differences that can inform them:

- Only, if an organization observes the consequences of its actions along the distinction [expected/not expected], it can infer differences (expressed by 'errors and performance gaps'; Duncan and Weiss 1979, Argyris and Schön 1978) and let them make a difference to its knowledge. Only then, it can learn from experience.
- Only, if an organization differentiates [where it is (from) where it wants to be], it can infer differences (expressed by 'creative tension'; Senge 1990) and let them direct (make a difference to) its strategic decisions. Only then, it can learn generatively.
- Only, if an organization observes its environment by distinguishing [our practices and their outcomes (from) other organizations' practices and their outcomes], it can infer differences (expressed by 'benchmarks'; Garvin 1994) and let them guide (make a difference to) the design of its policies and procedures. Only then, it can learn from observation.
- Only, if an organization reflects upon itself, applying the distinction [what some in the organization do-want-think/what others do-want-think], it can infer differences (expressed by 'stress, conflict or divergence'; Cangelosi and Dill 1965, Huff and Chappell 1994, Kim 1993) and let them make a difference to its shared routines, objectives and worldviews. Only then, it can learn from internal contradictions - learn dialectically.

If an organization does not draw either one of these distinctions, it has no access to the differences this distinction might yield, i.e. it has no information about false assumptions, better practices, alternative problem solutions, or ways to accomplish a vision. It does not know and cannot learn until it distinguishes.

To our mind, this 'show-down' on OL is important and consequential, especially when taking into account, that the dominant observation mechanisms of organizations are fixed to numbers. Organizations seem to prefer observing earnings over errors, shareholder values over shared visions, prices over practices, and costs over conflicts. However, observing numbers, too, only yields information, when differences occur. To produce differences, therefore, one has to distinguish, e.g. [this quarter's earnings (from) last quarter's], [this year's revenues (from) last year's], [one company's prices (from) one other company's], or [one unit's costs (from) one other unit's]. The problem is, that the differences, generated by those distinctions, are numbers, again. As such, they rather indicate than inform. The mere statement of a decrease in sales or revenues or earnings

can, at best, indicate that 'something' went wrong. It can, however, not inform about what this something was, i.e. about which assumptions were false and led to the poor performance. Instead, the search for information, then, only has to begin.

Arriving at the end of our journey through OL-theories, learning theories and cognition theories now, we can sum up the insights we gained in form of two general propositions about the 'causes of OL', which then read as follows:

P1: Organizations learn, when they observe differences.

According to OL-concepts, these are differences between expectations and outcomes of actions, vision and reality, own practices and those of others, as well as differences between alternative routines, objectives, interests, or worldviews of the organization's units or members.

P2: Organizations observe differences, when they draw distinctions.

Differences, which give rise to OL, are not simply 'there'. Instead, their organizational appearance is subject to the organization's drawing a respective distinction:
• Comparing expectations to outcomes exhibits errors and allows experiential OL.
• Contrasting vision to reality produces creative tension and permits generative OL.
• Measuring up organizations against each other creates benchmarks and gives way for observational OL.
• Discriminating objectives, interests, or worldviews of organization members discloses intra-organizational differences and supports dialectical OL.
Not using one of those distinctions yields no differences and hence no OL - at least no experiential, generative, observational or dialectical.

Taken together, these findings disclose that the causes of OL are 'self-made', that OL is an entirely - from beginning to end, from causes to results - intra-systemic process, and that whether or how an organization learns, lies in its own hands, as it depends upon the distinctions it draws.

5 Consequences for OL-Theory and OL-Technology

We started our investigation into the causes of OL by pointing at theoretical and technological problems which are due to the continued diversity of OL-research. At the end of our journey through OL-concepts, learning theories and cognition theories, we come back and ask for the consequences of our findings with regard to those problems.

5.1 Theoretical Implications

A first and most obvious consequence concerns the integration of, at first sight contradictory or at least incoherent, assumptions about the causes of OL in a joint framework. Transcending particular OL-concepts, this framework suggests that different kinds of information induce different kinds of OL. Spinning further on this idea, one may conclude that the multiplicity of OL-concepts does not in any case indicate competing explanations of OL, but may also be due to the fact that the concepts grasp different

edges of an ample and multifaceted phenomenon which is OL. The fact that we were able to incorporate multiple assumptions about OL-causes in a joint framework supports this consideration. In the end, this may also imply that a general theory of OL has yet to be developed: One that is able to fully integrate different kinds of OL: experiential, generative, observational, dialectical, and, most probably, other more. The identification of differences as starting points of OL could serve as a starting point for the construction of such an overall framework.

Secondly, the learning and cognition theoretical refinement of the OL-triggers 'errors', 'performance gaps', 'experience', 'disjunctive stress', 'conflict', 'divergence', 'information', 'vision' and 'benchmarks' leads to an enhanced awareness of their momentous role in OL-processes. Reading them as 'differences which make differences' moves the causes of OL from the fringes to the core of the learning process. While they are treated as mandatory but somehow uninteresting prerequisites throughout OL-concepts, they advance to crucial categories for the description and explanation of OL-processes, in the light of our findings.

Finally, a third consequence concerns the differentiability of OL-processes. So far, we are familiar with output-related differentiations. To mention a few: double-loop learning is seen to alter the core of an organizational theory-of-action while single-loop learning to scratch on its surface only (Argyris and Schön 1978); first-order learning supposedly leads to convergence while second-order learning to reorientation (Lant and Mezias 1992); exploitative learning is assumed to result in more efficient while explorative learning in novel behavior (March 1991). Based on our findings, an input-related differentiation is possible, rendering four classes of OL-processes: (1) experiential, (2) generative, (3) observational, and (4) dialectical OL. In particular with regard to the management of OL, a discrimination of its beginnings should be as meaningful as one of its ends. At best, of cause, would be an interrelated one: 'Prima vista', we suspect that experiential learning improves effectiveness ('doing right things'), while observational learning fosters efficiency ('doing things right'), that generative learning touches strategic performance, while dialectical learning results in innovativeness and creativity. At present, however, these associations are mere speculation and require systematical conceptual and empirical work for substantiation.

5.2 Technological Implications

The disclosure that OL sets out when organizations draw appropriate distinctions and infer pertaining differences which inform them about - their errors, ways to accomplish their visions, approaches to improve their practices, or, alternative views of problems and solutions residing within themselves can be used for the analysis of OL-disabilities. Taken that OL is made up by 'differences which make differences', there are two potential blocks to learning: (1) When no relevant differences are noticed, and (2) when relevant differences are noticed but prevented from making differences. Current OL-analysis is biased towards the second option. It presumes that information is principally available but sometimes not correctly processed into new knowledge. To our mind, however, learning disabilities are in many cases due to an organization's inability to generate learning relevant information: When arrogance precludes to see failures, experiential OL is impossible; when a company lacks a clear vision, there is no anchor for generative OL; when other organizations are rejected as objects of comparison,

observational OL is obstructed; and, when internal differences are suppressed, there is no chance for dialectical OL.

The constructivist reinterpretation and integration of the causes of OL also provides criteria for the development of design strategies aimed at improving OL. Based on our findings, we conclude that management interventions must be directed towards the production of OL-relevant information, i.e. towards the utilization of the respective distinctions. To that end, organizations may, for example, establish obligatory evaluation processes to systematically contrast intents and results of their activities, programs and strategies (experiential learning). They may, as another example, set up controlling systems that monitor their paths towards accomplishment of their visions by constantly relating actual to ideal positions (generative learning). They may, as well, continuously engage in benchmarking projects, or anchor in their members' heads the importance of comparing what they see at customers' and suppliers' sites with what they practice 'at home' (observational learning). Or, they may, as a final example, install internal audits, to increase the awareness of different perspectives or standpoints hold by organizations members, or transform the organization's culture, so that divergence is honored as a source of learning and not defeated as a sign of disintegration (dialectical learning). These are just randomly selected and constructed examples. They are not meant to be comprehensive. They shall only indicate that and how - through instruments (systems, procedures, etc.), structures (projects, task assignments, etc.), persons (trainings, awareness, etc.) and cultures (values, role models, etc.) organizations can ensure that distinctions are in use, which generate OL-relevant information.

Finally, it seems to us that the discrimination of different kinds of OL in association with different mechanisms of information generation is able to couple OL-research to management tools and practices that currently enjoy great popularity but lack theoretical foundation. An example is 'benchmarking'. In our point of view its main contribution lies in the fact that it systematically reveals differences between the practices of organizations and thus enables observational OL. A further example is the prevailing discussion about the benefits of 'diversity' (e.g. Krishnan, Miller and Judge 1997, Milliken and Martins 1996, Thomas and Ely 1996, Watson, Kumar and Michaelson 1993, Wiersema and Bantel 1992). In our point of view, the main contribution of a conscious management of diversity lies in the fact that differences of opinion, perspective, approach, or style, etc. within an organization are appreciated and exposed and not swept below the carpet, which is a necessary precondition for dialectical OL.

Summing up, we conclude that the observation of OL from a cause perspective can contribute to the development of OL-theory as it constitutes a difference which makes a lot of differences to many of the assumptions about OL which we took for granted so far.

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