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Organizational Learning
Mechanisms, Culture, and Feasibility

'Organizational learning' and 'learning organizations' are currently in vogue in the academic and applied discourse on organizations (Levitt and March, 1988; Senge, 1990; Cohen and Sproul, 1991; Howard and Haas, 1993; Argyris and Schön, 1996). The down side of the ensuing outpouring of publications is a confusing proliferation of definitions and conceptualizations that fail to converge into a coherent whole: 'Research in organisational learning suffered from conceptions that were excessively broad, encompassing merely all organisational change . . . and from various other maladies that arise from insufficient agreement among those working in the area on its key concepts and problems' (Cohen and Sproul, 1991: 1; see also Daft and Huber, 1987; Dodgson, 1993; Garvin, 1993; Hawkins, 1994; Huber, 1991; Miller, 1996). The present article tries to clarify this confusion by considering four questions: (1) what are the similarities and differences between organizational learning and individual learning? (2) what conditions promote organizational learning? (3) what conditions promote productive organizational learning? and (4) how is organizational learning related to learning organizations? These questions touch four sources of ambiguity and contention in the literature on organizational learning. Clarifying them may help to reduce the conceptual haze surrounding the twin concepts of organizational learning and learning organizations, thus making them more amenable to study and normative intervention.

Individual Learning vs Organizational Learning

The notion of organizational learning proves particularly slippery in the interface between individual and organizational learning. However defined, organizational learning is clearly mediated by the learning of individual organizational members. Where then lies the border between individual and organizational learning, and to what extent can models of individual learning describe organizational learning?

Researchers take different positions on these issues. Some equate organizational learning with individual learning; others see the two as distinct processes. Representing the former position Hedberg suggests that: 'Organisations do not have brains, but they have cognitive systems and memories. As

individuals develop their personalities, personal habits and beliefs over time, organisations develop their views and ideologies' (Hedberg, 1981: 6).

Taking the contrary view, Cook and Yanow argue that

> What organisations do when they learn is necessarily different from what individuals do when they learn. Specifically, we believe that organisational learning is not essentially a cognitive activity, because at the very least, organisations lack the typical wherewithal for undertaking cognition . . . To understand organizational learning we must look for attributes that organizations can be meaningfully understood to possess and use. (Cook and Yanow, 1993: 378)

Examination of Figures 1 and 2 illustrates the Procrustean bed that appears when models of individual learning are extended to organizational learning. Figure 1 is an adaptation of Kolb's (1984) four-stage model of individual experiential learning, to which we added a fifth phase, retention. This non-essential modification was designed to bring out the similarity between this model and Shaw and Perkins's (1992) six-phase model of organizational learning (Figure 2). Taking 'knowledge and belief systems' in Figure 2 to be

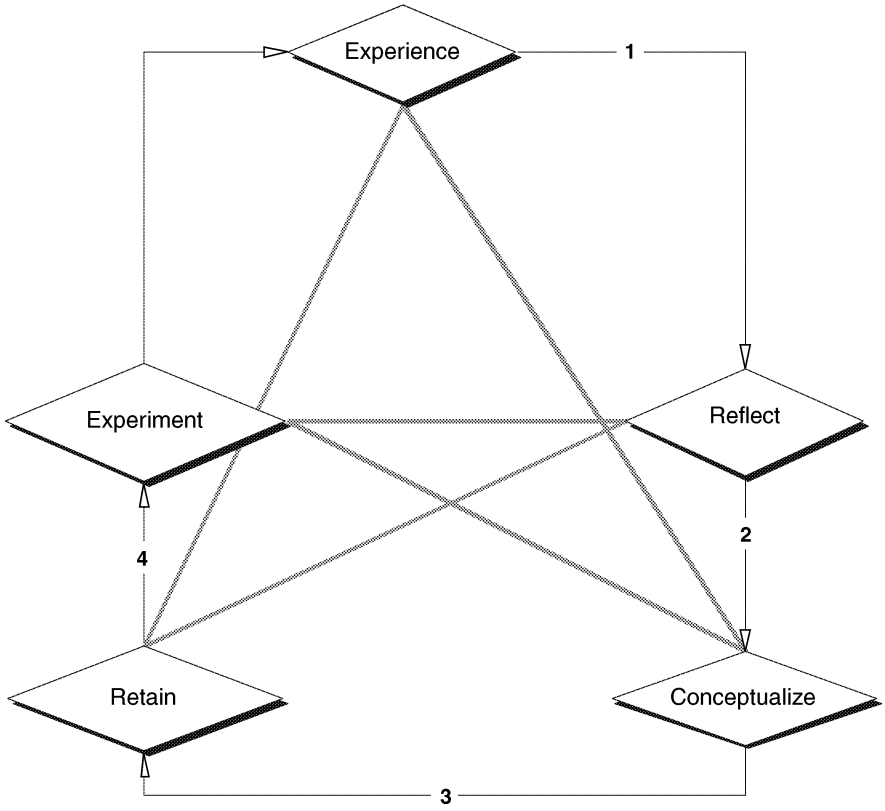

Figure 1 *Experiential learning*

organizational level analogues of 'retention' in Figure 1, the essential identity of the star-shaped configurations in both models shows that models of individual learning can serve, with slight modifications, as models of organizational learning. Note, however, that dissemination is left out of the shared star-shaped configuration in Figure 2, thus showing that some aspects of organizational learning are fundamentally different from individual learning (Weick, 1991).

Elsewhere (Popper and Lipshitz, 1998) we argued that treating organizations *as if* they were human beings blurs the distinction between two very different conceptions of organizational learning, *learning in organizations* and *learning by organizations*. Both conceptions lurk in Simon's assertion that 'All learning takes place inside individual human heads; an organisation learns in only two ways: (a) by the learning of its members, or (b) by ingesting new members who have knowledge the organisation previously did not have' (Simon, 1991: 125). The first part of the assertion represents learning in organizations. Equivalent to the star-shaped configuration in Figures 1 and 2,

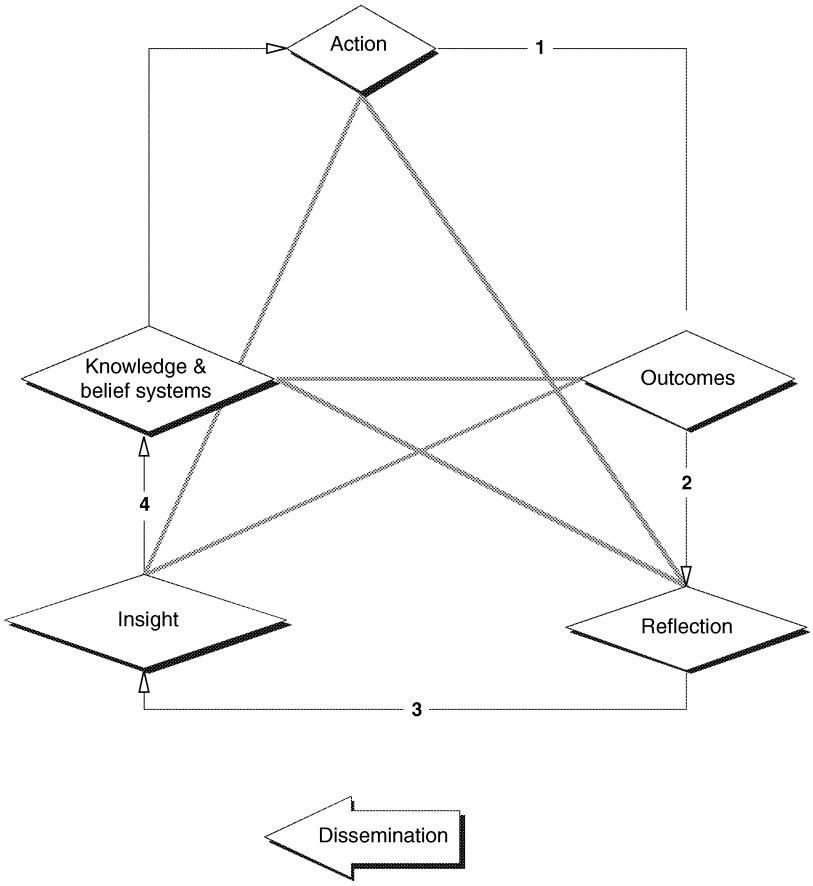

Figure 2 *Organizational learning*

it locates organizational learning in 'individual human heads', reducing organizational learning to individual learning taking place in organizational settings. The second part of the assertion represents learning by organizations. Locating organizational learning in processes (e.g. recruitment and dissemination) that occur outside 'individual human heads', it defies the reduction of organizational to individual learning. Conceiving organizational learning as learning in organizations invites a puzzle as to how the learning of individuals becomes organizational (e.g. how newly acquired insights and skills produce changes in norms and standard operating procedures). Learning by organizations invites a different puzzle: how does learning take place 'outside individual human heads?' These are not mere conceptual niceties. Can we really hope to design effective methods of instituting organizational learning – or 'learning organizations' – without knowing how to go beyond learning by individuals?

Two types of solution to the problem of learning in organizations vs learning by organizations have been proposed in the literature. Argyris and Schön (1978, 1996) fused learning in organizations and learning by organizations by positing organizational theories of action – a hypothetical construct denoting shared (i.e. organizational-level) individual-level theories of action. Following Senge (1990), Kim (1993) uses a somewhat different hypothetical construct – shared mental models. In both cases, organizational learning can be studied – and facilitated – by making individual models explicit and inquiring into their behavioural consequences. Specifically, organizational learning occurs when inventions and evaluations of individual members are embedded in the organization's theory-in-use or shared mental models (Argyris and Schön, 1978).

Positing collective-level hypothetical constructs does bridge the gap between learning in and learning by organizations. A drawback of this strategy is that measuring hypothetical constructs at the individual – let alone collective – level 'involves inferring the existence and nature of entities that cannot be empirically proven to exist' (Rouse and Morris, 1986; Rouse, Cannon-Bowers and Salas, 1992: 1304). An alternative strategy, which does not use hypothetical 'as-if' constructs, relates organizations to the experiences and actions of their members by studying the concrete structural and procedural arrangements through which 'actions by [organizations' individual] members that are understood to entail learning are followed by observable changes in the organisations' pattern of activities' (Cook and Yanow, 1993, p. 375). We call these arrangements organizational learning mechanisms, that is, OLMs.

OLMs are institutionalized structural and procedural arrangements that allow organizations to learn non-vicariously, that is, to collect, analyse, store, disseminate, and use systematically information that is relevant to their and their members' performance (Popper and Lipshitz, 1998). OLMs link learning in organizations to learning by organizations in a concrete, directly observable and malleable fashion. On the one hand they are organizational-level entities and processes. On the other, they are operated by individuals

and, at times, dedicated to facilitating learning in organizations or to disseminating what individuals and groups learn throughout the organization. Thus, OLMs concretize Edmondson and Moingeon's (1998:12) definition of organizational learning as 'the process in which an organisation's members actively use data to guide behavior in a way as to promote the ongoing adaptation of the organisation', and permit one to attribute to organizations the capacity to learn and help them build such a capacity, without using metaphorical discourse or positing hypothetical constructs.

OLMs can be classified as *integrated* or *non-integrated* mechanisms, and *designated* or *dual-purpose* mechanisms, depending on *when* and *by whom* they are operated. An OLM is integrated if its 'operators' and 'clients' (i.e. organizational members who are responsible for generating and applying its 'lessons learned', respectively) are identical. An OLM is non-integrated if operators and clients are not identical. Interaction reviews in which fighter pilots in the Israeli Defense Force (IDF) review their own performance (Popper and Lipshitz, 1998) exemplify integrated OLMs. Strategic planning units that prepare their reports for the management of the organization exemplify non-integrated OLMs. After-action reviews additionally exemplify designated OLMs, namely, mechanisms in which learning takes place away from task performance. In dual-purpose mechanisms, learning is carried out in conjunction with task performance. We observed this learning in the weekly patient reviews in a vascular surgery unit in a general hospital. These are principally performed to deliver treatment to the patients. In addition, they are used to assess and improve the effectiveness of treatment in general, in which capacity they result in the adoption of new forms of treatment, establishing new procedures in the work of the medical staff, and other system-level outcomes. Non-integrated and designated OLMs represent the lowest – and easiest to achieve – level of organizational learning. The price of assigning learning to specialists is lower probability of implementation owing to the separation between learning and acting. Integrated and non-designated OLMs represent the highest – and most difficult to achieve – level of organizational learning. The price paid for aiming at this level is greater exposure to numerous threats to validity owing to various cognitive and emotional biases (Argyris, 1982; Brehmer, 1980).

In conclusion, individual learning and organizational learning are similar in that they involve the same phases of information processing; namely, collection, analysis, abstraction and retention. They are dissimilar in two respects: information processing is carried out at different systemic levels by different structures (Roth, 1997), and organizational learning involves an additional phase, dissemination, i.e. the transmission of information and knowledge among different persons and organizational units.

The 'basic equipment' that enables individuals to learn is the nervous system. OLMs constitute the metaphorically equivalent and substantively different system that enables organizations to learn. Neither the nervous system nor OLMs ensure that learning will be productive, that is, beneficial to their owners. This brings the discussion to a second source of confusion in

the literature, namely the dispute over the relationship between organizational learning and organizational effectiveness.

When is Organizational Learning Likely to be Productive?

Is organizational learning necessarily beneficial? The controversy among students of organizations over this question has been another source of confusion in regard to organizational learning (Argyris and Schön, 1996). While it is probably fair to say that a majority of these students answers in the affirmative, a significant minority disagrees. In our opinion, this source of confusion is a pseudo-argument that can be resolved by differentiating between descriptive and normative approaches to organizational learning, and by delineating which form of learning is of interest.

The claim that organizational learning is beneficial rests on an analytical argument and a normative argument. According to the analytical argument, survival in dynamic environments entails a capacity to learn: 'To remain viable in an environment characterized by uncertainty and change, organisations and individuals alike depend upon an ability to learn' (Edmondson and Moingeon, 1998: 9). According to the normative argument, organizational learning creates idyllic environments in which 'people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together' (Senge, 1990: 2). Arguments that doubt the beneficial nature of organizational learning are grounded in the voluminous literature on the difficulties encountered by individuals, groups and organizations who try to draw valid lessons from experience (Brehmer, 1980; Janis and Mann, 1977; Neustadt and May, 1986). Levitt and March (1988: 335) summarized this argument succinctly as follows: 'Learning does not always lead to intelligent behavior. The same processes that yield experiential wisdom produce superstitious learning, competence traps, and erroneous inferences'. Argyris and Schön (1996: 193) resolved the controversy by proposing that 'organisational learning is a meaningful notion but not always beneficent', implying that the question of interest is not 'is organizational learning beneficial to the organization?' but 'when is organisational learning likely to be productive, namely result in the detection and correction of error?'

We suggest that organizational learning mechanisms are likely to yield productive learning if they are embedded in an appropriate organizational culture, that is, a normative system of shared values and beliefs that shape how organization members feel, think, and behave (Schein, 1990). We posit a hierarchy of five values (Figure 3). Situated at the apex of the hierarchy is continuous learning, which in turn requires valid information, transparency, issue orientation, and accountability. These values are manifested either by compatible rhetoric (espoused values) or (more convincingly) by an actual investment of resources and the willingness to incur losses in order to realize compatible outcomes (values in use).

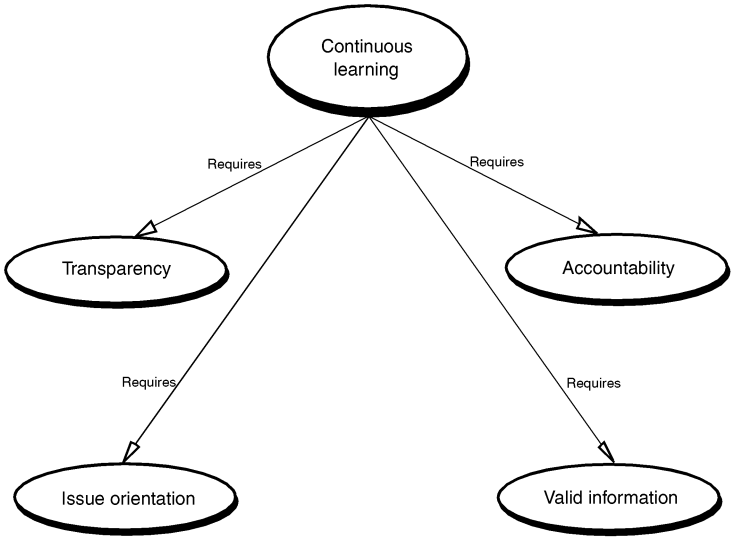

Figure 3 *Values hierarchy of a learning culture*

Continuous Learning

Continuous learning is essential for surviving – let alone prospering – in dynamic and competitive environments (De Geus, 1988; Garvin, 1993; Nonaka, 1991; Schein, 1990; Senge, 1990). As BP's CEO John Browne puts it (Prokesch, 1997: 148):

> Learning is at the heart of a company's ability to adapt to a rapidly changing environment. It is the key to being able both to identify opportunities that others might not see and to exploit those opportunities rapidly and fully . . . In order to generate extraordinary value for shareholders, a company has to learn better than its competitors and apply that knowledge throughout its business faster and more widely than they do . . . Anyone in the organisation who is not directly accountable for making a profit should be involved in creating and distributing knowledge that the company can use to make profit.

Valid Information

Learning at both individual and organizational levels involves the transformation of data (uninterpreted information) into knowledge (interpreted information). To be productive, learning clearly requires complete, undistorted, and verifiable information. Argyris and Schön (1996) suggest that organization members are often pressured to withhold, distort or fabricate information in order to defend themselves and/or others. Holding valid information as a value acts as a countermeasure to such pressures.

We infer that valid information is a value of the Israeli Air Force's culture from the constant efforts that the Air Force makes to improve the objectivity and scope of the information that is available for after-action reviews, and

from the socialization of pilots to surface and rigorously dissect their own and others' performance.

Transparency

Transparency is the willingness to hold oneself (and one's actions) open to inspection in order to receive valid feedback. Transparency serves valid information by reducing the likelihood of self-deception, by countering pressures to distort or suppress threatening information, and by broadening the scope of one's information base and points of view for its interpretation. Transparency is facilitated by technical aids such as VCRs or small-scale organizational designs. Quoting BP's John Browne again:

> We divided the company up [into smaller units] . . . to let everyone see clearly how things are done and understand what each person's role is in getting it done . . . The virtue of [this] organisational structure is that there is a lot of transparency. Not only can the people within the business unit understand more clearly what they have to do, but I and the other senior executives can understand what they are doing. Then we can have an ongoing dialogue with them and with ourselves about how to improve performance and build the future. (Prokesch, 1997: 162–3)

Technical means, such as VCRs and appropriate task and organizational designs cannot in themselves produce valid information if people feel defensive and threatened. The lack of defensiveness that characterizes pilots' behaviour in the after-action reviews that we have observed in the IDF can thus be partly attributed to pilots' willingness to lay themselves open in order to receive the valid feedback required for maximizing the benefits of learning from their experience.

Issue Orientation

Issue orientation is the evaluation of information strictly on its merit without regard to irrelevant attributes such as the social standing of its source or recipient. According to McGill and Slocum (1993), one task of management in learning organizations is to expose failure and constructively promote dissent. This task cannot be accomplished unless information is presented – and received – subject to issue orientation. Issue orientation is related to (but is more focused than) democratization, power equalization, and participation which also open communication channels, thereby enhancing innovation and learning (Kanter, 1991; McGill, Slocum and Lei, 1993). In the Israeli Air Force's after-action reviews the military's rigid hierarchical system is suspended, thus increasing the likelihood that subordinates will express their honest opinions to their superiors. Note that the rigid military hierarchical command structure *is suspended* for the duration of the after-action review, forming a kind of time- and task-bound 'cultural island' in which issue orientation, particularly when modelled by senior officers, promotes learning. Thus this hierarchy is neither cancelled nor undermined in the Air Force's flight units.

Accountability

Accountability is holding oneself responsible for one's actions and their consequences and for learning from these consequences. It facilitates overcoming obstacles to effective learning in the form of action barriers that prevent the implementation of lessons learned (March and Olsen, 1976; Shaw and Perkins, 1992). This value is reflected in the flight instructors' demand that trainees debrief themselves. It also was nicely illustrated to us by the head of the vascular unit of the general hospital that we observed:

> I believe that if a patient dies or fails to heal it is our [i.e. the staff's] fault. This is a healthy attitude, even if factually it may not be true. One can always rationalize that the patient was 80 years old, that his heart was weak, that his wife nagged him to death, and so on and so forth. The list of justifications that one can use to CYA ['cover your ass'] is endless. For me, this attitude is unacceptable. If the basic premise is that we are at fault, it follows that we should find out what went wrong so that next time we will avoid this error. That, in my opinion, is the key to constantly learning and improving.

In conclusion, we suggest that organizational learning is likely to be productive if the organization's learning mechanisms are embedded in a culture of learning. Many, if not most, organizations cannot claim to have this combination. A question that presents itself thus is, what conditions make organizational learning more feasible?

The Feasibility of Organizational Learning

A casual review of the literature on organizational learning reveals that much of the empirical evidence regarding either organizational learning or learning organizations comes from organizational settings characterized by at least some of the following factors: a high level of environmental uncertainty, costly potential errors, a high level of professionalism, and strong leadership commitment to learning. Accordingly, we hypothesize that unless some of these factors are present, efforts to institutionalize organizational learning are most likely to fail. We now review existing support for the posited relationships among these factors and the feasibility of organizational learning.

Environmental Uncertainty

Numerous writers proposed that organizational learning is virtually a sine qua non for surviving in uncertain environments (Daft and Huber, 1987; Dodgson, 1993; Fiol and Lyles, 1985; Freeman and Perez, 1988; Garvin, 1993; Pavitt, 1991; Toffler, 1990). The basic rationale is simple enough: dynamism (rate of change), a basic component of uncertainty (Daft, 1989), requires adaptation, and successful adaptation is contingent on effective learning. Hence, organizations that do not learn will not survive, particularly if the environment is competitive – another basic component of environmental uncertainty (Daft, 1989). The relationship between environmental uncertainty and organizational learning was recently refined by Edmondson and

Moingeon (1996). These researchers posit a contingent relationship between two types of environmental uncertainty and two types of organizational learning. One type of uncertainty is due to competitiveness (characterized by clear criteria of success and failure), and the other is due to ambiguity (characterizing interpersonal 'relationships in which such clarity is typically lacking). The types of learning are learning how (which involves the transfer and improvement of existing skills and routines) and learning why (which involves inquiring into the causes of difficulties and problems). According to Edmondson and Moingeon (1996), engaging in learning how is important in situations of market competitiveness, in which criteria for success are relatively clear, and where response speed, product quality, and consistency of service are crucial determinants of success. Engaging in learning why is important for avoiding the dysfunctional interpersonal relationships and defensive routines thoroughly documented by Argyris (1991, 1993).

A recent study (Ellis and Shpielberg, 1998) provides empirical support for the often claimed – and rarely studied – relationship between environmental uncertainty and organizational learning. These researchers tested the relationship between the intensity of environmental uncertainty and the regularity of organizational learning. Three hundred and ninety-five product managers in industries operating in certain or uncertain environments completed two questionnaires, one measuring perceived environmental uncertainty and the other measuring the operation of OLMs in five areas or facets of learning: formal learning, training, information gathering, information storage and retrieval, and information dissemination (Globerson and Ellis, 1996). There were negative correlations between perceived environmental uncertainty and the intensity of use of all the five measured facets of organizational learning. These correlations were higher in industries operating in uncertain environments than in those operating in certain environments. In addition, when perceived uncertainty was regressed on the five organizational learning facets, the regression weight of information gathering was positive, indicating that without the operation of organizational learning (in the form of training, information storage, retrieval and dissemination), information gathering increases uncertainty.

Costly Potential Errors

A high perceived likelihood of potentially costly but avoidable errors facilitates learning. This proposition is based on research showing that failure stimulates risk seeking (Kahneman and Tversky, 1979) and diagnostic behaviour (Wong and Wiener, 1981), and that perceived moderate-sized threats stimulate vigilant behaviour (Janis and Mann, 1977). Consistent with this proposition, some examples of organizational learning come from organizations under crisis (e.g. a general walk out; Rayner, 1993), or from organizational settings in which people routinely face potentially catastrophic (e.g. life threatening) errors such as nuclear power plants (Carrol, 1995; DiBella, Nevis and Gould, 1996); surgery hospital wards (Lipshitz and Popper, in press); and fighter flight units (Popper and Lipshitz, 1998).

Notwithstanding the latter evidence, the effects of failure on organizational learning are controversial. On the one hand Sitkin (1992: 243), claims that 'failure is an essential prerequisite for learning, as it stimulates the sort of experimentation that Campbell (1968) and others (March, 1978; Staw, 1983; Weick, 1979; Wildavsky, 1988) have advocated as fundamental for sound policy development and organizational management'. In contrast, based on an analysis of an organizational failure Clarke and Perrow (1996: 1040), concluded that 'high-technology, high-risk systems do not foster organisational learning'. Careful analysis resolves this apparent disagreement. Sitkin (1992: 243) conceded that:

> . . . not all failures are equally adept at facilitating learning. Those failures that are most effective at fostering learning will be referred to as 'intelligent failures' . . . Five key characteristics that contribute to the intelligence of failure are: (l) they result from thoughtfully planned actions that (2) have uncertain outcomes and (3) are of modest scale, (4) are executed and responded to with alacrity, and (5) take place in domains that are familiar enough to permit effective learning.

And Clarke and Perrow's (1996) data and analysis show that their case of the Shoreham Nuclear Power Station illustrates at least three of Sitkin's conditions (items 1, 4, and 5 above).

Finally, Ellis et al. (1998) compared the relationship between perceived cost of potential error and the existence of a learning culture in two populations characterized by relatively high costs of error (air-traffic controllers and managers in high-tech organizations) and two populations characterized by relatively low costs of error (psychiatrists and physicians in a mental hospital, and teachers). Consistent with the proposition that costly potential errors facilitate organizational learning, subjects in the first two populations obtained significantly higher scores on the sub-scales of a learning values questionnaire measuring valid information, transparency, accountability, and issue orientation.

High Level of Members' Professionalism

Professionals are evaluated by the extent to which they master and keep abreast of the knowledge (both 'knowing that' and 'knowing how') pertinent to their field (Hoffman, 1989). Accordingly, we propose that organizational learning is facilitated by a norm, or mindset, of professionalism. This proposition is consistent with two of Sitkin's (1992) conditions that facilitate learning from failure listed above, thoughtful action in a familiar domain, as well as with British Petroleum's CEO John Browne's suggestion that BP is a learning organization partly owing to the insistence that:

> . . . every time we do something again, we should do it better than the last time . . . One process that we employ to promote learning is not that unusual. It involves understanding the critical measures of operating performance in each business, relentlessly benchmarking those measures and their related activities, setting higher and higher targets, and challenging people to achieve them. (Prokesch, 1997: 147–8)

The example of universities shows that a large proportion of professionals (i.e. people with specialized knowledge, such as PhDs, lawyers, and engineers) among an organization's members does not in itself facilitate organizational learning. Faculty members are professionals of the first order (or, at least, are reputed to be). However, since they are committed more strongly to their profession than to their organization, universities, whose core missions are research and teaching, are prime examples of conservative systems (Weisbord, Lawrence and Charles, 1978). In conclusion, to facilitate organizational learning professionalism must be accompanied by organizational commitment.

Strong Leadership Commitment to Learning

Managers are central figures on a stage watched by all (Carlzon, 1989) and the creators of images that influence organization members' feelings and behaviour (Zaleznik, 1992). It is thus not surprising that management's commitment and support has been found to be crucial for successful change programmes in general (Huber et al., 1993; Rodgers and Hunter, 1991), and for the success of programmes that involve cultural change in particular (Kanter, 1991; Lundberg, 1985; Schein, 1990). BP's CEO Browne aptly summarized the importance of managers' active and visible commitment to learning for instituting organizational learning as follows: 'Leaders have to demonstrate that they are active participants in the learning process. You can't say ''Go do it'' without participating' (Prokesch, 1997: 160).

Organizational Learning and Learning Organizations

Logically there should be a straightforward relationship between 'organizational learning' and the 'learning organization'. In line with this reasoning, Pedler, Boydell and Burgoyne (cited in Hawkins, 1991) define the learning organization as one which facilitates the learning of all its members and continuously transforms itself. More typically, references to organizational learning and learning organizations reflect yet more controversy, a deep, albeit bridgeable, division between

> . . . the practice-oriented, prescriptive literature of 'the learning organization,' promulgated mainly by consultants and practitioners, and the predominantly skeptical scholarly literature of 'organisational learning,' produced by academics. The two literatures have different thrusts, appeal to different audiences, and employ different forms of language. Nevertheless, they intersect at key points: their conceptions of what makes organizational learning 'desirable' or 'productive;' their views of the nature of the threats to productive organizational learning; and their attitudes toward whether – and if so, how – such threats may be overcome. (Argyris and Schön, 1996: 180).
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> Both branches do concern themselves with the capability of real-world organizations to draw valid and useful inferences from experience and observation and to convert such inferences to effective action. But authors of prescriptive bent tend to

> assume, uncritically, that such capabilities can be activated through the appropriate enablers, and learning skeptics tend to treat observed impediments as unalterable facts of organizational life. (Argyris and Schön, 1966: 199; see also Edmondson and Moingeon, 1996).

Pedler et al.'s definition of learning organizations quoted above raises three conceptual questions with serious implications for research and intervention. How can we test whether a particular organization facilitates the learning of its members? Are organizations that transform themselves necessarily learning organizations? Must an organization transform itself in order to qualify as a learning organization? The structural and cultural approach to organizational learning (Popper and Lipshitz, in press), which underlies the present discussion, relates 'organizational learning' to 'learning organization' in a way that avoids these difficulties: learning organizations are organizations that embed institutionalized learning mechanisms into a learning culture. Testing whether a particular organization is a learning organization can be done, therefore, by mapping its organizational learning mechanisms, the culture in which they are embedded, and the contribution of both to improved performance and members' ability to change the organization's mission and values (i.e. single-loop and double-loop learning, respectively). Working within this framework, Popper and Lipshitz (1998) used a standard semi-structured interview and observations to map the OLMs, culture, and leadership styles of two wards of a general hospital. In addition to concrete descriptions of the nature and effectiveness of the organizational learning carried out in the two wards, their findings highlighted general issues attesting to the complexity and contextuality of organizational learning such as what are the relevant organizational boundaries in which organization learning should take place, and what exactly should be learned in particular organizational settings. The structural and cultural approach lends itself equally well to testing general hypotheses on the antecedents and consequences of organizational learning. Ellis and Maidan-Gilad (1997), for example, tested the effect of organizational learning on the success of planned organizational change and found that the intensity of organizational learning (as measured by Globerson and Ellis' (1996) questionnaire described above) was related to various indicators of successful change. For applications of the structural and cultural approach to introduce organizational learning and build learning organizations see Popper and Lipshitz (1998) and Friedman, Lipshitz and Overmeer (in press).

Conclusion

In this article we applied our structural and cultural approach to organizational learning (Lipshitz and Popper, in press) to four controversies on organizational learning: (1) What are the similarities and differences between individual and organizational learning? (2) What are the conditions that promote productive organizational learning? (3) When is organizational learning feasible? and (4) How is organizational learning related to learning

organizations? We advance the answers outlined above not as definitive solutions, but as hypotheses for empirical research that will, we hope, generate as many new questions for further research as new answers for old controversies.

References

Argyris, C. (1982) *Reasoning, Learning and Action*. San Francisco, CA: Jossey-Bass.

Argyris, C. (1991) 'Teaching Smart People How to Learn', *Harvard Business Review* 69(3): 99–109.

Argyris, C. (1993) *Knowledge for Action*. San Francisco, CA: Jossey-Bass.

Argyris, C. and Schön, D. A. (1978) *Organizational Learning: A Theory of Action Perspective*. Reading, MA: Addison-Wesley.

Argyris, C. and Schön, D.A. (1996) *Organizational Learning II: Theory Method and Practice*. Reading, MA: Addison-Wesley.

Brehmer, B. (1980) 'In One Word: Not from Experience', *Acta Psychologica* 45: 223–41.

Campbell, D.T. (1968) 'Reforms as Experiments', *American Psychologist* 24: 409–29.

Carlzon, J. (1989) *Moments of Truth*. New York: Harper & Row.

Carrol, J.S. (1995) 'Incident Reviews in High-hazard Industries: Sensemaking and Learning under Ambiguity and Accountability', *Industrial and Environmental Crisis Quarterly* 2: 175–97.

Clarke, L. and Perrow, C. (1996) 'Prosaic Organizational Failure', *American Behavioral Scientist* 39: 1040–55.

Cohen, M.D. and Sproul, L.E. (1991) 'Editors' Introduction', *Organization Science* 2(1): 1–3 (Special issue on Organizational Learning – Papers in honor of [and by] James G. March).

Cook, S.D.N. and Yanow, D. (1993) 'Culture and Organizational Learning', *Journal of Management Inquiry* 2: 373–90.

Daft, R. L. (1989) *Organization Theory and Design*, 3rd edn. St Paul, MN: West.

Daft, R.L. and Huber, G.P. (1987) 'How Organizations Learn: A Communication Framework', *Research in Sociology of Organizations* 5: 1–36.

De Geus, A. (1988) 'Planning as Learning', *Harvard Business Review* 66(4): 70–4.

DiBella, A., Nevis, E.C. and Gould, J. M. (1996) 'Understanding Organizational Learning Capability', *Journal of Management Studies* 33 (May): 361–79.

Dodgson, M. (1993) 'Organizational Learning: A Review of Some Literatures', *Organization Studies* 14: 375–94.

Edmondson, A. and Moingeon, B. (1996) 'Organizational Learning as a Source of Competitive Advantage: When to Learn How and When to Learn Why', in B. Moingeon and A. Edmondson (eds) *Organizational Learning and Competitive Advantage*, pp. 17–37. London: Sage.

Edmondson, A. and Moingeon, B. (1998) 'From Organizational Learning to the Learning Organization', *Management Learning* 29: 5–20.

Ellis, S., Caridi, O., Lipshitz, R. and Popper, M. (1998) *Error Criticality and Organizational Learning: An Empirical Investigation*. Tel Aviv, Israel: Recanati Graduate School of Business Administration, Tel Aviv University.

Ellis, S. and Maidan-Gilad, N. (1997) 'Effects of Organizational Learning Mechanisms on Organizational Performance During Planned Change', paper presented at the 26th conference of the Israeli Psychological Association, Tel Aviv University, 27–29 October.

Ellis, S. and Shpielberg, N. (1998) 'Organizational Learning Mechanisms and Managers' Perceived Uncertainty', paper presented at the conference on Managerial and Organizational Cognition, Stern School of Management, New York University, New York, 7–8 May.

Fiol, M.C. and Lyles, M.A. (1985) 'Organizational Learning', *Academy of Management Review* 10: 803–13.

Freeman, C. and Perez, C. (1988) 'Structural Crises of Adjustment: Business Cycles and Investment Behavior', in G. Dosi et al. (eds) *Technical Change and Economic Theory*, pp. 38–66. London: Pinter.

Friedman, V., Lipshitz, R. and Overmeer, W. (in press) 'Creating Conditions for Organizational Learning', in M. Dierkes, J. Child and I. Nonaka (eds) *Handbook of Organizational Learning*. London: Sage.

Garvin, D.A. (1993) 'Building a Learning Organization', *Harvard Business Review* 73(4): 78–91.

Globerson, S. and Ellis, S. (1996) 'Analysis of Learning Profiles in Project Environments', paper presented at Project Management Institute Conference, Boston, October.

Hawkins, P. (1991) 'The Spiritual Dimension of the Learning Organization', *Management Education and Development* 22: 172–87.

Hawkins, P. (1994) 'Organizational Learning: Taking Stock and Facing the Challenge', *Management Learning* 25(1): 71–82.

Hedberg, B. (1981) 'How Organizations Learn and Unlearn', in C.P. Wystrom and W.T. Starbuck (eds) *Handbook of Organizational Design*, 1. Oxford: Oxford University Press.

Hoffman, L.M. (1989) *The Politics of Knowledge*. Albany: State University of New York Press.

Howard, R. and Haas, R.D. (eds) (1993) *The Learning Imperative: Managing People for Continuous Innovation*. Cambridge, MA: HBS Press.

Huber, G.P. (1991) 'Organizational Learning: The Contributing Processes and the Literature', *Organizational Science* 2: 88–115.

Huber, G.P., Sutcliff, K.M., Miller, C.C. and Glick, W.H. (1993) 'Understanding and Predicting Organizational Change', in G.P. Huber and K.M. Sutcliff (eds) *Organizational Change and Redesign*, pp. 215–65. Oxford: Oxford University Press.

Janis, I.L. and Mann, L. (1977) *Decision Making: A Psychological Analysis of Conflict, Choice and Commitment*. New York: Free Press.

Kahneman, D. and Tversky, A. (1979) 'Prospect Theory: An Analysis of Decision under Risk', *Econometrica* 47: 263–91.

Kanter, R.M. (1991) 'Championing Change: An Interview with Bell Atlantic's CEO Raymond Smith', *Harvard Business Review* 69(1): 119–30.

Kim, D.H. (1993) 'The Link Between Individual and Organizational Learning', *Sloan Management Review* 34(1): 37–50.

Kolb, D.A. (1984) *Experiential Learning*. Englewood Cliffs, NJ: Prentice Hall.

Levitt, B. and March, G. (1988) 'Organizational Learning', *Annual Review of Sociology* 14: 319–40.

Lipshitz, R. and Popper, M. (in press) 'Organizational Learning in a Hospital', *Journal of Applied Behavioral Science*.

Lundberg, C.C. (1985) 'On the Feasibility of Cultural Intervention in Organizations', in R. Pondy, R. Frost, P.G. Morgan and T. Dandridge (eds) *Organizational Symbolism*. Greenwich, CT: JAI Press.

McGill, M.E. and Slocum, J.W. (1993) 'Unlearning the Organization', *Organizational Dynamics* 22: 67–79.

McGill, M.E., Slocum, J.W. and Lei, D. (1993) 'Management Practices in Learning Organizations', *Organizational Dynamics* 22: 5–17.

March, J.G. (1978) 'Bounded Rationality, Ambiguity and the Engineering of Choice', *Bell Journal of Economics* 9: 587–608.

March, J.G. and Olsen, J.P. (1976) 'Organizational Learning and the Ambiguity of the Past', in J.G. March and J.P. Olsen *Ambiguity and Choice in Organizations*, pp. 54–68. Bergen: Universitetsforlaget.

Miller, D. (1996) 'A Preliminary Typology of Organizational Learning: Synthesizing the Literature', *Journal of Management* 22: 485–505.

Neustadt, R.E. and May, E.R. (1986) *Thinking in Time*. London: Collier.

Nonaka, I. (1991) 'The Knowledge-creating Company', *Harvard Business Review* 69(6): 96–104.

Pavitt, K. (1991) 'Key Characteristics of the Large Innovative Firm', *British Journal of Management* 2: 41–50.

Popper, M. and Lipshitz, R. (1998) 'Organizational Learning Mechanisms: A Cultural and Structural Approach to Organizational Learning', *Journal of Applied Behavioral Science* 34: 161–78.

Prokesch, S.E. (1997) 'Unleashing the Power of Learning: An Interview with British Petroleum's John Browne', *Harvard Business Review* 77(5): 147–68.

Rayner, B. (1993) 'Trial-by-fire Transformation: An Interview with Globe Metallurgical's Alden C. Sims', in H.R. Howard and R.D. Haas (eds) *The Learning Imperative*, pp. 277–97. Cambridge, MA: HBS Press.

Rodgers, R. and Hunter, J.E. (1991) 'Impact of Management By Objectives on Organizational Productivity', *Journal of Applied Psychology* 76: 322–36.

Roth, G. (1997) 'From Individual and Team Learning to Systems Learning', in S. Cavaleri and D. Fearn (eds) *Managing in Organizations that Learn*. Cambridge, MA: Blackwell.

Rouse, W.B., Cannon-Bowers, J.A. and Salas, E. (1992) 'The Role of Mental Models in Team Performance in Complex Systems', *IEEE Transactions on Systems, Man and Cybernetics* 22: 1296–1308.

Rouse, W.B. and Morris, N.M. (1986) 'On Looking into the Black Box: Prospects and Limits in the Search for Mental Models', *Psychological Bulletin* 100: 349–63.

Schein, E.H. (1990) 'Organizational Culture', *American Psychologist* 45:109–19.

Senge, P. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday.

Shaw, R.B. and Perkins, D.N.T. (1992) 'Teaching Organizations to Learn: The Power of Productive Failures', in D.A. Nadler, M.S. Gerstein and R.B. Shaw (eds) *Organizational Architecture*, pp. 175–91. San Francisco, CA: Jossey-Bass.

Simon, H.A. (1991) 'Bounded Rationality and Organizational Learning', *Organization Science* 2: 125–34.

Sitkin, S.B. (1992) 'Learning Through Failure: The Strategy of Small Losses', *Research in Organizational Behavior* 14: 231–66.

Staw, B.M. (1983) 'The Experimenting Society: Problems and Prospects', in B.M. Staw (ed.) *Psychological Foundations of Organizational Behavior*, pp. 421–37. Glenview, IL: Scott-Forseman.

Toffier, A. (1990) *Power Shift*. New York: Bantam Books.

Weick, K.E. (1979) *The Social Psychology of Organizing*. Reading, MA: Addison-Wesley.

Weick, K.E. (1991) 'The Non-traditional Quality of Organizational Learning', *Organization Science* 2: 116–24.

Weisbord, M.R., Lawrence, D.R. and Charles, M.D. (1978) 'Three Dilemmas of Academic Medical Centers', *Journal of Applied Behavioral Science* 14: 284–304.

Wildavsky, A. (1988) *Searching for Safety*. New Brunswick, NJ: Transaction Publishers.

Wong, P.T.P. and Wiener, B. (1981) 'When People Ask Why Questions and the Heuristics of Attributional Research', *Journal of Personality and Social Psychology* 40: 650–63.

Zaleznik, A. (1992) 'Managers and Leaders: Are they Different?', *Harvard Business Review* 72(2): 126–35.