

Unlearning/Learning Organizations – The Role of Mindset

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Introduction

Most learning by adults and organizations occurs when **something** new replaces in the mind that which was previously thought to be known, that is, unlearning. Unlearning must frequently precede or at least occur simultaneously with learning. Nevertheless, the literature on organizational learning has virtually ignored the unlearning process until recently when few authors have given it some attention. Research in the field of organizational learning and knowledge management shows that learning and adaptation takes place much more easily within the prevailing mindset (view of the world) than outside of it.

Unlearning is a challenge because the human tendency to preserve a particular view of the world is very strong and the change to a new paradigm not only requires an ultimate act of learning but also of unlearning.

Our assumptions about the nature of reality can impose the most severe restrictions on our ability to learn. Unlearning these assumptions requires raising them to consciousness and this can occur only when we confront the dilemmas that they create. Therefore, raising our worldview to consciousness is among the most important things we can do to enhance our learning and unlearning. The intention of this paper is to demonstrate that it is possible to design systems that not only facilitate learning and unlearning within the prevailing worldview but it can generate questions about the adequacy of the assumptions that make up that concept of reality.

Mindset/Worldview and Unlearning – A Review of the Literature

Learning *required* is identified by knowledge gaps between intended outcomes and actual results. A lack of information, a lack of skill or a lack of resources may evidence these knowledge gaps. Such gaps could be characterized as *external* to the individual and are therefore often visible.

Unlearning *required* is identified by perceptual gaps between the individual's mindset and actual situations. Mindset, or worldview, for the purposes of our discussion here, is described as the values, beliefs, experiences and assumptions of the individual. Govindarajan and Gupta (2001) discuss the concept of mindset and state that mindset is "also referred to as cognitive schema, mental maps, or paradigms, and mindset can be traced to the research of cognitive psychologists who have addressed the question of how people make sense of the world in which they interact."

These gaps would be characterized as *internal* to the individual and are therefore frequently unseen.

Mindset is further defined as a:

Person's frame of reference that is fixed. A person can have a particular "mindset" that is so strong in a specific outlook that they do not see other perspectives, even though they might hear them and believe they have given them consideration. This prevents looking at new options in a realistic sense. (ag.arizona.edu/futures/home/glossary.html)

A particular point of view through which one experiences reality. A mindset can feel like acting or role-playing during training, but ultimately one simply becomes the mindset that one wishes to have. At that point, it is an honest expression, although it is a chosen point-of-view. (www.questkagami.com/glossary.html)

A mindset, in decision and general systems theories, refers to a set of assumptions, methods or notations held by one or more people or groups of people which is so established that it creates a powerful incentive within these people or groups to continue to adopt or accept prior behaviors, choices, or tools. (en.wikipedia.org/wiki/Mindset)

The complexity and diversity in defining unlearning is clear when completing a review of the literature on this topic which is relatively recent in its development. The influence and importance of mindset specifically on learning – and unlearning – transcends subject matter, specific organizations or systems. In addition to the expected application of unlearning within the intellectual and scientific communities, and the educational and workplace organizations, unlearning is also considered within the spiritual dimension and cyberspace.

Five examples of the diverse groups representative of the work addressing unlearning are summarized below – Marcia Conner (training and continuous learning), Peter Senge (pioneer and educator), Toke Paludan Moller (workplace consultant), Teemu Ari (blogspot author) and Hazrat Inayat Khan (spiritual leader).

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“*Things I know no longer so.*” This is the sign on the “mental” attic that characterizes unlearning, as described by Marcia Conner in *Learn, Unlearn and Relearn*. Conner is currently managing director of *Ageless Learner*, a global advisory practice supporting companies in the learning of and adaptation to new technologies, processes and information. The former senior manager of worldwide training at Microsoft and former editor in chief of *Learning in the New Economy Magazine*, Conner proposes that, while individuals do not have the physiological ability to hit the “delete” button and erase the existing neural pathways that have been created by learning, there is the ability to challenge one’s mindset through new skills, experiences, behaviors and knowledge.

“On the other side of right doing and wrong doing there is a field. I will meet you there. – Rumi” (Moller 2004) Toke Paludan Moller is the co-founder and CEO of InterChange, training and consulting company based in Denmark. In his article, *Unlearning: the Art of Letting Go*, Moller poses the question “how do we arrive at a higher level of learning? He believes the answer lies in part in the ability “to suspend [my] previous understandings for the sake of learning something new”. The resulting “chaos” of not knowing, the uncomfortable shifting of the mindset, as a disincentive to unlearning is an important contribution to the discussion made by Moller.

Suspension is also a descriptive term used in *Presence* (Senge, et al 2004). Senge refers to *Presence* as the prequel to his widely read *The Fifth Discipline* because it addresses the state of mind or state of spirit, necessary in order to work with the five disciplines and build a learning-oriented culture. “Most change initiatives that end up going nowhere don’t fail because they lack general visions and noble intentions. They fail because people can’t see the reality they face. Companies are unable to “see” the threats they face and the imperative to change.” (Senge, p. 29). As learning requires the ability to “see” the gaps between our anticipated objectives and the intended results of our actions, “seeing” is the first step in learning and unlearning as well. Senge states that *Presence* “explores the process of continually suspending [your] habitual ways of seeing the world” as the first “basic gesture” of enhancing awareness. Suspending then leads to redirection which, as described by cognitive scientist Francisco Varela, is “turning our attention toward the source rather than the object.” (Senge p.42)

Seeing freshly starts with stopping our habitual ways of thinking and perceiving. According to Varela, developing the capacity for this sort of stopping includes “suspension, removing ourselves from the habitual stream (of thought).” Suspending does not require destroying our existing mental models of reality or ignoring them. Rather it entails hanging our assumptions in front of us. Suspension allows us to “see our seeing.” Until people can start to see their habitual ways of interpreting a situation, they can’t really step into a new awareness. (Senge, p. 45)

In practice, suspension requires patience and willingness not to impose preestablished frameworks or mental models on what we are seeing. If we can simply observe without forming conclusions as to what our observations mean and allow ourselves to sit with all the seemingly unrelated bits and pieces we see, fresh ways to understand a situation can eventually emerge. (Senge, p. 31)

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“Boiling water” is the visualization used by blogspot author Teemu Ari to illustrate conceptual change, her preferred term for unlearning. While Moller describes unlearning as a process, Ari sees it as a change in perception that occurs in an instant. Her premise is that the way in which an individual has constructed “new” “knowledge in the past has already been shaped by one’s worldview. Therefore in order to unlearn, one must change the way in which one views the world. The property of water changes in an instant – when the temperature of the water reaches the boiling point of 100 degrees. Ari believes that a conceptual boiling point in our understanding must be reached if unlearning is to occur.

“Spiritual attainment, from beginning to end, is unlearning what one has learnt.

But how does one unlearn? ... One can do it by becoming wiser. The wiser one becomes, the more one is able to contradict one’s own ideas. In the wisest person, there is the willingness to submit to others.” This is the introduction to mental purification, the only method by which one can reach the spiritual goal, as stated in the Sufi Message of Hazrat Inayat Khan.

While differing in assessment and application, there appears to be at least one common thread in the discussion of unlearning among these five authors, and more broadly, with others studying this topic. Unlearning begins within the individual and requires the intent to change, personal work and courage.

Unlearning and Mindset/Worldview – A Reflection on the Relationship.

If learning is defined as the process whereby knowledge is created through the transformation of experience (Kolb), then unlearning must be triggered by an anomaly relating to that experience. Unlearning is the functional, and perhaps intentional discarding of obsolete or misleading knowledge (Hedberg, 1981). As Peter Drucker once remarked: Every organization has to prepare for the abandonment of everything it does.

Unlearning is a kind of learning that needs to occur if the result you want isn’t achieved even as it is executed perfectly. Unlearning and learning must be dynamic processes that evolve and the adaptive individual and adaptive learning organization must learn how to learn, re-learn and unlearn to make change and embrace a vision of the future. Unlearning techniques includes activities which result in letting go, giving away any prior prejudices and habits, the expulsion of prior assumptions, and forgetting the old in order to get to a new cognitive mindset.

The mindset is the gatekeeper of the learning process in the brain. It must be transcended in order for new learning to set in, thus laying a new foundation for a new mindset. A person can have a particular "mindset" that is so strong in a specific outlook that they do not see other perspectives, even though they might hear them and believe they have been given consideration to those perspectives. This prevents looking at new options in a realistic sense.

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To change or discard old worldviews and mindsets is a difficult and sometimes painful process. What drives some people to be more proficient at it than others and what are the mechanisms that trigger this process?

Few individuals within a culture can articulate its prevailing worldview and its embedded way of thinking because most absorb them unconsciously, by osmosis, while growing up. (Ackoff, 1999) Most of us are not aware of how we arrived at our present mindset or for that matter the existence of a prevailing worldview within ourselves. We were involuntarily conditioned to think like we do. Therefore, changing the mindset requires recognition that what we are doing is not working. The deciding and most important factor is the recognition of what we are doing and not that the environment or position we are in is wrong. Too often individuals and organizations blame the environmental position or status itself and not their inability to deal with the changing landscape as a reason for failure. This is the foremost indicator that a mindset change is needed and learning and unlearning must be instilled in either the individual or the organization.

For each of us as individuals, at any one time, cognitive schemas are a product of our own peculiar and at least partially unique histories. Every mindset represents a theory of what the world is like. And like every theory, a mindset exists in the form of a knowledge structure, that is, it consists of components as well as linkages among the components.... not unlike theories, mindsets evolve through an iterative process. The current mindset guides the collection and interpretation of new information. To the extent that this information is consistent with the current mindset, it reinforces that mindset. From time to time, however, some elements of the new information appear to be truly novel and inconsistent with the existing paradigm. In this event, we either reject the new information or forge a change in our mindset. The likelihood that our mindsets will undergo a change depends largely on how explicitly self-conscious we are of our current mindsets: the more hidden and subconscious the cognitive schema, the greater the likelihood of rigidity. (Govindarajan and Gupta, 2001)

If unlearning is to occur, techniques that support unlearning include letting go, giving away any prior prejudices and habits, the expulsion of prior assumptions, and forgetting the old in order to get to a new cognitive mindset.

The ability to unlearn first requires the skill of “seeing” that thing which needs to be let go of and changed and requires a predisposition and mindset to challenge those assumptions. Unlearning also requires the ability to reflect, to step beyond one’s individual role to see the whole. Unlearning is a process or a set of techniques which should result in a changing mindset in how you see and interact with the world. It should precede learning and in many cases happen at the same time as learning. Unlearning involves resetting and challenging any old assumptions, experience, ideals, values, motives and beliefs that are used consciously or subconsciously in decision making and learning.

Unlearning techniques should be based on “double-loop,” or “generative” learning. Double loop learning leads to the questioning and modification of existing norms, procedures, policies and objectives. Double loop learning is concerned with the why and

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how to change an organization. Unlearning should be focused on the letting go of, or giving away or the expulsion of old ways of thinking and doing. Unlearning in individuals must start from a blank slate. "Forget everything you know," is a key principle of unlearning. Unlearning is forgetting. Unlearning is about the rediscovery of new goals and responses by stepping out of habitual frames of reference and reexamining norms and assumptions (Hedberg 1981).

The reason for unlearning in organizations is not only to *react* to a changing environment but also to *create* new knowledge. Nonaka and Takeuchi's approach is to make the tacit knowledge of the individuals explicit, and share both tacit and explicit knowledge throughout the organization. With this approach they see learning as an interaction of exogenous information structures and endogenous knowledge structures. Unlearning, they claim, takes place on the individual level by "breakdowns, which refers to an interruption of the employees' habitual, comfortable state of being. A sudden change in those habits forces the employees to reconsider their old basic attitudes toward the world" (ibid. p. 80). They also recommend induced breakdowns by management, such as challenging the goals and ambiguous visions to create a "creative tension" in the organization. (Gustavsson, 1999)

How Does Unlearning Occur? - Mechanisms for Unlearning

There have been some attempts at designing a systems approach to unlearning, however the research is the field in its early phases. How does an individual or organization approach the process of unlearning?

Marcia Conner suggests applying the following four how-to steps:

Begin at the beginning. "What he knew already wasn't as useful as what he needed to learn fresh." To illustrate this point, Conner shares the story of a husband-wife team who were learning to kayak. The husband was a canoeist and was unable to set aside what he knew about canoeing. As a result, he found himself facing the bottom of the swimming pool more often than his wife, a complete novice.

Stay open. Unlearning requires the willingness to be open to other ways

of thinking and doing. When an individual is open to a new view, prior learning is not de-valued, but is systematically "forgotten" because it becomes no longer useful.

Look for mirrors. The ability to unlearn is hinged to the ability of the individual to be reflective and introspective, as well as their ability to invite and consider the perception of others.

Examine your beliefs. Beliefs determine behavior. Unlearning therefore requires that we question and challenge our beliefs. When new beliefs are adopted, unlearning will occur and behavior will change.

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An attempt at institutionalizing some form of unlearning was created in 1989 by Jack Welch, the CEO of General Electric Welch who launched Work-Out, a problem-solving process modeled after a New England town meeting. He was determined to improve productivity while streamlining the company's slow, cumbersome decision-making process. "Work-Out has a practical and an intellectual goal", Welch told the Harvard Business Review. "The practical goal is to get rid of thousands of bad habits accumulated since the creation of GE. The intellectual part begins by putting leaders of each business in front of hundreds or so of their people, eight to ten times a year, to let them hear what people think. We're talking about redefining the relationship between boss and subordinate. I want to get to the point where people challenge their bosses every day." (Garvan, p. 12)

Dennis Sherwood has studied organizations and was educated at the Universities of Cambridge, Yale and California, and is a Sloan Fellow, with distinction, of the London Business School. Looking at various organizations he established features of an unlearning organization, of which there are twelve characteristics.

1. *The day job-job doesn't get in the way.* Unlearning organizations make time for thinking, exploration, innovation. They don't let the pressures of the day-job stop this.
2. *"If it ain't broke, don't fix it" is not "the way we do things around here".* Unlearning organizations don't wait for things to break before they fix them. They are always searching for better ways of doing things, even if there is no explicit "problem" to solve.
3. *The only rule is "rules are for breaking".* Unlearning organizations recognize that rules, policies, procedures, processes, are artifacts of the time they were originated. All are constantly under review and those that remain fit-for-purpose are retained, those that have passed their sell-by-date are ditched.
4. *Negligence is distinguished from learning.* Unlearning organizations know that "failure" is a very broad term, and embraces many things. In particular, they distinguish between "negligence" (the deliberate departure from an agreed policy) and "learning" (what happens when an outcome differs from expectations). They do not condone the former; nor do they penalize the latter.
5. *They Listen.* To each other, to the outside world. Actively. Bosses do not finish the sentences of their subordinates; peers use their ears more than their mouths.
6. *They Share.* Recourses, information, people, risk. They operate in highly connected networks rather than hierarchical silos; nothing is "mine", for everything is "ours"; everyone is comfortable playing whatever roles are fit-for-purpose at the time.
7. *They say "yes" more than they say "no".* Go to a meeting. Take a blank sheet of paper; draw a vertical line down the middle. Label the left-hand column "yes"; the right-hand column "no". Each time you hear the word "yes", or equivalent positive remark, place a tick in the left-hand column; likewise for "no" and its surrogates. In an unlearning organization, you will have far more ticks on the left than the right.

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8. *They don't rush to judge.* Unlearning organizations know when to evaluate ideas, and do this only when there is a full and well-balanced view. They do not shoot from the hip, or jerk from the knee.

9. *They have a wise approach to managing risk.* Unlearning organizations fully recognize that innovation is all about managing risk. They also know full well that in today's business climate - and especially tomorrow's - to maintain the status quo, though comfortable and familiar, is likely to be more risky than stepping wisely into the unknown. They don't expect every innovation to succeed, nor do they place any foolhardy bets.

10. *Their performance measures support innovation, rather than discourage it.* Unlearning organizations have enhanced their portfolio of performance measures to ensure that they support, rather than inhibit, innovation. Even to the (unusual) extent of measuring inputs (such as hours spent on idea generation) rather than outputs (number of ideas put into the suggestion box).

11. *They are very good at managing both the line and projects.*

"Did you hear about George?"

"No, I don't think so. What's going on?"

"He's been assigned to a 'special' project".

"Well, he's on the way out then."

That is a conversation you will not hear in an unlearning organization. Managing the line and managing projects exist easily side-by-side; being assigned to an innovation project is symbol of regard; and risk-taking is rewarded.

12. *They don't force closure.* Unlearning organizations know when to push for delivery (for those tasks which are well-understood, and can successfully be planned with high certainty), and when not (for those tasks, like innovation, which are more open-ended and exploratory).

As discussed previously Peter Senge and his colleagues suggest a mechanism for unlearning as "Presencing" – the ability to transform will and the self towards deeper levels of learning. This is a process that individuals need to incorporate in order to change. Presencing allows individuals to move from "reactive learning" – where thinking is governed by established mental models and doing is governed by established habits of action – to deeper levels of learning where individuals get to the point where they have an increased level of awareness of the larger whole – both as it is and as it is evolving – and actions that increasingly become part of creating alternative futures. (Senge, p. 10-11). "Presencing" starts with suspending and then moves through a U shaped figure that includes seven capacities including redirecting, letting go, letting come, crystallizing, prototyping, and institutionalizing. The three areas that incorporate these capacities include:

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Sensing – transforming perception. It includes suspending, redirecting and the first stages of letting go.

Presencing – transforming will and self. It includes the advanced stage of letting go, and the starting phase of crystallizing.

Realizing – transforming action. It includes the envisioning what seeks to emerge, prototyping, and institutionalizing.

Although the concept of mindset applies to individuals as well as organizations, it is useful to draw a distinction between the two. When we talk about an individual's mindset, we are referring to how one human brain observes and interprets the signals it receives. But, given that organizations do not have an equivalent brain, what does it mean when we talk about an organization's mindset? The question of whether or not it makes sense to conceptualize an organization, as distinct from an individual, as having the capability to think has long been debated. The emerging and widely held view is that when a group of individuals is brought together, each with their own knowledge structure about a particular information environment, some kind of emergent collective knowledge structure is likely to exist.

This group-level representation of an information environment would act just like an individual's knowledge structure. It too functions as a mental template that when imposed on information environment gives it form and meaning, and in doing so serves as a cognitive foundation for action. Common experience – confirmed by scientific research – tells us that, although organizations cannot be said to have a brain as such, they do behave as if there exists a collective cognitive paradigm, a paradigm that transcends that of any single individual – including the CEO. (Govindarajan and Gupta, 2001)

Towards Building Organizational Learning/Unlearning model

Learning/unlearning is about making better decisions in choice situations. And better decisions result in improved performance. Of great importance is the ability to examine the causes of errors. For this purpose, a model should be developed that helps organizations to improve decision making and thereby the performance. Applying the model begins with clarifying the decision-making. The first step is to understand what the strategic decisions are and then ask these questions:

What are the expectations?

What are the underlying assumptions?

What information, knowledge, and understanding are being used in this decision?

How will we track the effectiveness of the implementation?

How can we make sure we gain insights into future decisions?

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Learning and unlearning are purposeful acts. For an individual, learning is “having the capability to do something I couldn’t do before.” For an organization, learning is “having the capability of doing something we couldn’t do before.” As mentioned above, organizational paradigms integrate experience and tell employees how to approach questions and problems. In addition, these paradigms control what questions can be asked and what answers are legitimate. At points in time, there are facts, problems, observations that are difficult to fit into the existing paradigm; these anomalies should be detected and worked on and studied. Invariably, some are eventually fitted into the scheme of the organizational paradigm.

This is the normal process in organizations: problems are solved, discoveries are made, and change in understanding occurs within the context of the existing paradigm (single-loop learning). When there is a qualitative change in the external and internal environment of the organization, the existing paradigm will not provide adequate answers to the challenging situation. It should be noted that there are two types of change that could take place: change that occurs as part of the process of "normal day-to-day operations" and that, which occurs in periods of transformational change. In the period of transformational change progress does not occur incrementally. Instead, change is triggered by a set of dilemmas. That is, a recognition of the existence of a problem which cannot be solved within the current worldview. Obviously, there are always a certain number of anomalies and dilemmas that stubbornly resist being reconciled to the existing paradigm. These accrete and become increasingly troublesome, until the authority of the paradigm itself comes into question (double-loop learning). Eventually, a new paradigm is promulgated which relates these anomalies to all other known observations in a new paradigm.

Therefore, the learning/unlearning model should be designed to support the organization in the following activities:

Tracking decisions, i.e., surfacing and monitoring expected outcomes, and the validity of the assumptions on which the expectations are based.

Identifying any significant differences between the performances observed and expected outcomes and assumptions.

Determining the causes of mistaken expectations.

Initiating changes in the system and its environment based on the diagnosis.

Assess the impact of the prescribed changes.

Collect lessons learned and make them easily accessible to all those authorized.

In the organizational memory (system repository), replace the old information, knowledge and understanding with the new information, knowledge and understanding.

We believe that a model, such as the one explained above, will improve the organization’s performance. The purpose of such a model is to help the organization

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address the right problems and address them in a way that works. Specifically, the purpose is to do things that provide a measurable impact to the bottom line.

References

- Ackoff, Russell L. Re-Creating The Corporation: A Design of Organizations for the 21st Century. Oxford University Press, 1999.
- Ari, Teemu. Unlearning, wtf? Infedelic Ideas Blogspot. Espoo, Finland, 2005
- Barrett, Frank Session on Destiny: Living on the Appreciative Edge. Appreciative Inquiry Commons. September 22nd, 2004.
- Clarke, Martin. Smart Management: How To Be A Good Corporate Politician. Cranfield School of Management. February 21, 2006.
- Conner, Marcia Learn, Unlearn and Relearn. Fast Company. August 2005.
- Garvan, David A. Learning In Action, Harvard Business School Press. Boston, Massachusetts, 2000. p 12
- Gustavsson, Bengt. “Three cases and some ideas on individual and organizational re- and unlearning.” School of Business, Stockholm University, 1999.
- Hedberg, Bo. 1981. How Organizations Learn and Unlearn. In *Handbook of Organizational Design: Adapting Organizations to Their Environments*, ed. Paul C. Nystrom and William H. Starbuck, 3-27. New York, NY: Oxford University Press.
- Khan, Hazrat Inayat. The Sufi Message of Hazrat Inayat Khan Volume IV. Healing, Mental Purification and the Mind World. Part III: Mental Purification. Chapter III Unlearning. (2005)
- McKenna, Patrick J. Brainmatter Lessons From Insightful Friends. <http://www.patrickmckenna.com>
- Moller, Toke Paludan . Unlearning: The Art of Letting Go. Fieldnotes: A Newsletter of the Shambhala Institute. Issue 5. April 2004.
- Mustonen-Ollila, Erja, Lappeenranta. Is Process Innovation Unlearning In Organizations, University of Technology, Department of Information Technology, P.O. Box 20, FIN-53851 Lappeenranta, Finland,
- Pourdehnad, John: “Building Corporate ‘Black Boxes’: A Different Perspective on Organizational Learning.” Proceedings, International Conference on Systems Thinking in Management, November 2000, Deakin University, Geelong, Victoria, Australia

Unlearning/Learning Organizations

Senge, Peter, Scharmer, Otto C. Jaworski, Joseph, Flowers, Betty Sue. Presence. Random House, New York, 2005.

Sherwood, Dennis – The Unlearning Organization (2002)
<http://www.patrickmckenna.com/PatrickJMcKennaBrainmatterLessonsFromInsightfulFriend13.aspx?ID=52&NavID=23907>

Vaijyanthi, P. Learning to unlearn –The paradigm of 21st century change management.
<http://intranet.iimk.ac.in/GCabstract/P%20Vaijyanthi.pdf>