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Unlearning: A Critical Element in the Learning Process

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Prior knowledge is arguably the single most important factor in learning. Unless we as instructors engage prior knowledge—the good, the bad, and the ugly, we risk sabotaging the new learning we work so hard to put in place. Don't we marvel at the misunderstandings students embrace with conviction, despite ample classroom instruction and readings to the contrary (e.g., Harvard University's Private Universe project)? And any tennis player who has attempted to retool her backhand or golf player his golf swing will attest to the recalcitrance of prior learning. Before the new and far more devastating backhand can emerge, the older, less effective one must wither and die. Paradoxically, unlearning allows new learning to take hold.

The Underlying Theory

The major learning theories and theorists all have something to say about the role of prior knowledge and unlearning in learning. For behaviorists learning represents new stimulus- and-response sets forged through powerful external reinforcements. Unlearning occurs in two ways: 1) through a process of "extinction" or the removal of reinforcements (Ever try sticking to a diet when the pounds stop coming off?) and 2) the apposition of "reciprocal behaviors" or the introduction of a stimulus that evokes a response different from the usual response in a given situation (Why do pediatricians wear child-friendly ties?). In contrast, early cognitive theories examined the role

of "proactive interference and inhibition" or the interference of old with new knowledge in the context of successive memorization of word lists. (During my Peace Corps/Sri Lanka language training, high-school French words would somehow find themselves mixed into halting lines of Sinhala.)

Three major cognitive theorists also explored the role of prior knowledge in learning, each with a slightly different emphasis. Piaget, the great Swiss developmental psychologist, stressed the role of knowledge structures (or "schemata") and their reformulation through the processes of assimilation (i.e., incorporating new information into existing structures), accommodation (i.e., incorporating new information by revising existing structures) and equilibration (i.e., the overall interaction between existing ways of thinking and new experiences). Through successive reformulations we achieve states of more complex, satisfactory, and stable equilibria with the environment. The American philosopher and educator John Dewey explored the role of problematic experience in stimulating inquiry. During such experiences we feel confused and uncertain, unable to coordinate prior knowledge and habit to meet the demands of the present moment. A new mode of being, different from customary use and enjoyment, ensues—the reflective transformation of existing perception, thought, and action into ever more satisfactory wholes. And finally Vygotsky, the Russian psychologist, highlighted the role of social interaction in the reconstruction of prior knowledge. He explored the "zone of proximal development" or the difference between what a learner can do without help and the capabilities of the same learner in interaction with others.

Types of Unlearning

Often when we think of learning, we think in terms of content: the various facts and concepts we know in a particular knowledge domain (e.g., history, physics, psychology). In fact, much of the research on the role of prior knowledge in learning has taken place in the context of conceptual misunderstanding in the sciences. While so-called "declarative knowledge" (i.e., knowing that) is certainly important, there are other areas of learning as well. "Procedural knowledge" (i.e., knowing how) refers to the various ways of operating on and acting upon information in any number of situations: for example, solving a math problem, carrying out

emergency protocols, executing a play in football. Unless we are in the early stages of learning (e.g., a new driver learning manual transmission), such knowledge is often tacit and well out-of-reach of conscious awareness. And in crisis situations newer and less stable learning will cave into older learning, however misguided it is. Attitudes and their reflection in how we behave also represent an important domain of learning. For example, if students believe that learning is a matter of natural ability rather than effort, they will be unlikely to try very hard in the face of the slightest adversity.

Ways of Promoting Unlearning

Behaviorist Tradition. Researchers and practitioners have suggested a variety of ways of promoting unlearning in the service of new and better learning. In educational psychologists Gagne and Briggs' classic eight-point lesson plan, a fusion of the behaviorist and cognitive traditions, instructors engage students' prior knowledge early on before introducing new material.

*Cognitive Tradition***.** In the cognitive tradition, instructors have exploited the explanatory power of analogies to address students' misconceptions, particularly in the sciences. The general idea is this: instructors develop two related analogies to a desired "target" or new learning that a student does not initially accept. The first analogy is an "anchor," an example comparable to the target, but one that the student can accept based on intuition or day-to-day experience. The second analogy is a "bridge," an intellectual midway point that shares features of both the target and the anchor. For example, many introductory physics students cannot accept initially the existence of an upward force on a book resting on a table (target). They typically view the table as a rigid barrier rather than an elastic upward force. In the physicist's view, however, a hand or heavy-duty spring holding up the book are both analogies that the student, too, could accept (anchor). Two sawhorses supporting a board with a book resting on it provides a possible bridge. Rather than simply pointing students to these analogies in a textbook (the traditional approach), the instructor actually engages students in a process of analogical reasoning in an interactive teaching environment. And the instructor uses the analogies to enrich students' view of the target rather than helping them view the target more abstractly.

In contrast a range of approaches exploit the cognitive dissonance between prior misconceptions and contemporary understanding to stimulate unlearning. In the absence of instruction people construct "plausible theories" of a range of natural phenomena based on their observations of these phenomena over a long period of time. Often these theories represent different models from those accepted by the scientific community or other professional bodies. To help dislodge these misconceptions, instructors can exploit discussion and questioning strategies to identify student misperceptions and then contrast these with actual scientific explanations. Students can also become conscious of their preconceptions by making predictions based on them and then comparing their predictions to actual results and the accepted scientific explanation.

Finally mediational learning theory provides a distinctive pedagogy which addresses the major issues of unlearning and relearning when individuals face change in their prior habits, skills, or concepts. It explains how instructors can control and redirect proactive inhibition and thus control the unlearning process. The multi-step process proceeds as follows: presentation to students of a learning model that explains the need for mediational learning strategies; eliciting of students' knowledge, beliefs, and ideas of a concept; differentiation of words used in a technical manner from their common sense usage; explicit instruction of the concept with opportunities for students to rehearse important aspects of it; and comparison of old and new concepts from multiple perspectives and the generalization of the new concept to at least six novel applications or problem solving situations.

Summary

Noting the "learning pervading other activities," Mary Catherine Bateson observed, "Mostly we are unaware of creating anything new, yet both perception and action are necessarily creative" (p.6). In fact micro-cycles of unlearning and relearning punctuate the lives of the aware, making each moment an opportunity for excitement and growth. As instructors we can help students become more aware of and thus take control of this life-enriching process.

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