Because there is no “cure” for learning disability, it will continue to affect the lives of learning-disabled people, and the strategies they may have learned to succeed in school must also be applied in their vocation.

Further Reading

Further Information

Learning theory
Theory about how people learn and modify pre-existing thoughts and behavior.

Psychologists have suggested a variety of theories to explain the process of learning. During the first half of the 20th century, American psychologists approached the concept of learning primarily in terms of behaviorist principles that focused on the automatic formation of associations between stimuli and responses. One form of associative learning—classical conditioning—is based on the pairing of two stimuli. Through an association with an unconditioned stimulus (such as meat offered to a dog), a conditioned stimulus (such as a bell) eventually elicits a conditioned response (salivation), even when the unconditioned stimulus is absent. Principles of classical conditioning include the extinction of the response if the conditioned and unconditioned stimuli cease to be paired, and the generalization of the response to stimuli that are similar but not identical to the original ones. In operant conditioning, a response is learned because it leads to a particular consequence (reinforcement), and it is strengthened each time it is reinforced. Positive reinforcement strengthens a response if it is presented afterwards, while negative reinforcement strengthens it by being withheld. Once a response has been learned, it may be sustained by partial reinforcement, which is provided only after selective responses.

In contrast to theories of classical and operant conditioning, which describe learning in terms of observable behavior, intervening variables introduce such elements as memory, motivation, and cognition. Edward Tolman demonstrated in the 1920s that learning can involve knowledge without observable performance. The performance of rats who negotiated the same maze on consecutive days with no reward improved drastically after the introduction of a goal box with food, leading to the conclusion that they had developed “cognitive maps” of the maze earlier, even in the absence of a reward, although this “latent learning” had not been reflected in their observable behavior. Even earlier, Wolfgang Köhler, a founder of the Gestalt school of psychology, had argued for the place of cognition in learning. Based on experiments conducted on the island of Tenerife during World War I, Köhler concluded that insight played a role in problem-solving by chimpanzees. Rather than simply stumbling on solutions through trial and error, the animals he observed seemed to demonstrate a holistic understanding of problems, such as getting hold of fruit that was placed out of reach, by arriving at solutions in a sudden moment of revelation or insight.

The drive-reduction theory of Clark L. Hull and Kenneth W. Spence, which became influential in the 1930s, introduced motivation as an intervening variable in the form of homeostasis, the tendency to maintain equilibrium by adjusting physiological responses. An imbalance creates needs, which in turn create drives. Actions can be seen as attempts to reduce these drives by meeting the associated needs. According to drive-reduction theory, the association of stimulus and response in classical and operant conditioning only results in learning if accompanied by drive reduction.

In recent decades, cognitive theories such as those of social learning theorist Albert Bandura have been influential. Bandura is particularly known for his work on observational learning, also referred to as modeling or imitation. It is common knowledge that children learn by watching their parents, other adults, and their peers. According to Bandura, the extent to which children and adults learn behaviors through imitation is influenced not only by the observed activity itself but also by its consequences. Behavior that is rewarded is more readily imitated than behavior that is punished. Bandura coined the term “vicarious conditioning” for learning based on the observed consequences of others’ actions, listing the following requirements for this type of learning: attention to the behavior; retention of what is seen; ability to reproduce the behavior; and motivation. Cognitive approaches such as Bandura’s have led to an enhanced understanding of how conditioning works, while conditioning principles have helped researchers better understand certain facets of cognition.

Computers play an important role in current research on learning, both in the areas of computer-assisted learning and in the attempt to further understand the neurological processes involved in learning through the
development of computer-based neural networks that can simulate various forms of learning.

Further Reading

## Learning-to-learn

The phenomenon of greater improvement in speed of learning as one’s experience with learning increases.

When people try to learn a new behavior, the first attempts are often not very successful. After a time, however, they seem to get the idea of the behavior and the pace of learning increases. This phenomenon of greater improvement in speed of learning is called learning-to-learn (LTL). There are two general reasons for the existence of LTL. First, negative transfer diminishes. When people have learned to do something, they have often developed schemas or learning sets, that is, ways to approach those tasks. When a new behavior is required, old approaches that may be irrelevant or that may get in the way must be discarded. Learning becomes easier when irrelevant or distracting behaviors disappear. Second, there may be positive transfer of previous knowledge that might be usefully applied to the situation.

Learning-to-learn is most obvious in tasks that are somewhat complicated or varied. LTL occurs when the learner realizes how the various components of an overall behavior fit together. When learners must deal with a lot of information, they can develop the required higher order principles that allow them to develop a general perspective on the behavior. As a result, subsequent learning fits together because it fits in more naturally with the person’s overall perspective. When the behavior to be learned is simple, no such perspective is needed, so LTL is less relevant.

## Left-brain hemisphere

The hemisphere of the brain that specializes in spoken and written language, logic, number skills, and scientific concepts.

The left-brain hemisphere neurologically controls the right side of the body and is connected to the right-brain hemisphere by an extensive bundle of over a million nerve fibers called the corpus callosum. Scientific study of the brain hemispheres dates back to the 1800s. In the 1860s, French physician Paul Broca (1824-1880) observed speech dysfunction in patients with lesions on the left frontal lobes of their brains. Initially, the discovery of specialized functioning of the right and left sides of the brain led to the assumption that all higher reasoning ability resided in the left-brain hemisphere, which was thus regarded as dominant overall. The right-brain hemisphere was thought to possess only lower-level capabilities and was considered subordinate to the left-brain hemisphere.

Interest in the functions of the brain hemispheres was revived in the 1960s, with Roger Sperry’s studies of patients who had the corpus callosum severed to control epileptic seizures. It was discovered that each hemisphere of the brain specialized in performing certain types of functions, a phenomenon now known as lateralization. While the left-brain hemisphere performs functions involving logic and language more efficiently, the right-brain hemisphere is more adept in the areas of music, art, and spatial relations. Each hemisphere processes information differently; the left-brain hemisphere is thought to function in a logical and sequential way; the right appears to synthesize material simultaneously. These differences can also be investigated in normal patients (in whom the hemispheres are connected) by temporarily disabling a single brain hemisphere with sodium amytal, a fast-acting barbiturate, and by other means.

Lateralization varies considerably among individuals. Two factors known to affect it are handedness and gender. In one experiment, almost all right-handed persons were unable to speak when their left-brain hemispheres were disabled. In contrast, the incidence decreased to 20 to 40 percent among left-handed people, indicating that only this percentage had their speech centers located in the left-brain hemisphere. Other left-handed subjects appear to use both hemispheres for speech. In general, each gender is known to excel at certain lateralized functions: women are more adept in language-based skills, perceptual fluency tasks (such as identifying matching terms rapidly), and arithmetic calculations. Men are generally more proficient in envisioning and manipulating objects in space. It has also been found that brain function in males is more lateralized than in females. Men who have had one brain hemisphere disabled are more debilitated than similarly affected women. In particular, men display more language difficulties than women when the left hemisphere is damaged. However, it is also known that the sexes are more dependent on different areas of each hemi-