

Learning and Conditioning: A Review

When you hear or see the word "learning", what immediately comes to mind? Do you imagine a classroom full of students listening to an instructor lecture on some subject? Do you picture someone puckering and salivating as they think about a fresh lemon being cut into two halves? Does a dolphin act in a marine life park come to mind? How about a child watching a violent movie or a motorist reading a map, do you associate these with the word "learning"? Do you see a rat pressing a bar for food or a pigeon pecking a disk for grain?

Unless you have studied learning in detail, the first example (the classroom lecture) is probably your foremost image when you think about learning. However, by the time you finish studying this chapter, you should easily associate all of the above examples with some type of learning. The chapter first considers the formal definition of learning used by most psychologists who study it. As you will see, this definition includes more than just what takes place in a classroom. Learning is much more general than that, as it includes adaptation of existing behaviors and the acquisition of behavioral skills as well as knowledge (which, to some psychologists, is also a form of behavior). However, while most psychologists agree on a general definition, there are several alternative conceptual and theoretical perspectives on the mechanisms and principles involved in learning a new behavior.

One of these alternative perspectives focuses on classical conditioning processes, procedures, and applications. First identified and labeled by Ivan Pavlov, classical conditioning is based on reflexive behaviors. The procedures for studying classical conditioning illustrate how someone who normally salivates only when food is placed into their mouth (a reflexive action) can learn to salivate at the thought of cutting a lemon in half. There are also important practical applications of classical conditioning, including techniques for treating simple fears or complex phobias in therapeutic settings.

Operant conditioning provides another perspective on the principles of learning new behaviors. Early research on how cats learned to escape from complex puzzle boxes by E.L. Thorndike demonstrated that problem-solving behaviors depend upon consequences in the environment brought about by those behaviors. According to Thorndike's famous Law of Effect, when problems are solved through trial and error, successful behaviors become strengthened or more likely (learned) because they are rewarded with positive outcomes. But what if, in the trial and error process, the correct behavior never comes about?

Another psychologist who studied learning, B.F. Skinner, asked this very question and answered it through experiments with rats and pigeons. Building on the earlier work of Thorndike, Skinner formalized alternative procedures to trial and error for generating new behaviors and labeled these procedures operant conditioning. Like Thorndike, Skinner stressed the importance of behavioral consequences, which he called reinforcements. However, by using a step-by-step procedure known as shaping, Skinner demonstrated how a new behavior could be more quickly developed in an organism through the reinforcement of gradual changes in what the individual already knows how to do. Shaping is how a dolphin learns the complex behaviors often seen in marine park shows.

Operant conditioning has many educational applications besides animal training, however. Operant principles have been applied in the teaching of academic subjects through the use of teaching machines, and these machines have evolved into today's computer assisted instruction. Appropriate social behaviors can also be developed and maintained through operant conditioning using more secondary forms of reinforcement, which may even collectively define what is called a token economy.

Not all psychologists agree on the importance of observable behavior and reinforcements, however. Those working from a cognitive perspective focus more on mental activities and cognitive, or brain, processes that occur in learning. One of the early researchers taking a more cognitive approach was Edward Tolman. Tolman conducted research with rats where he demonstrated that they could learn successful routes through mazes without rewards. He called this phenomenon latent learning. He also performed experiments on learning about space and locations, which he called space learning. Through these studies he developed his concept of the cognitive map, which he viewed as a mental representation of the layout of one's environment. Tolman believed that animals as well as humans learn to navigate through their surroundings by developing such cognitive maps of environmental arrangements.

Another early researcher who laid the foundation for subsequent cognitive perspectives on learning was Wolfgang Kohler. Kohler demonstrated how chimps suddenly appear to solve problems without shaping or trial and error. He called the sudden recognition of a solution to a problem "insight" and felt this occurred as mental processing of abstract and even potential, as opposed to existant, relationships among objects in the environment.

Building on such early cognitive work, Albert Bandura also believed that humans and some animals do not need contact with consequences or reinforcements in order to learn a new behavior. Through his experiments with adults and children, Bandura developed his theory of observational learning. His research showed how people could learn from merely observing another's behaviors and consequences and then imitating that behavior. This explains, for example, how children can learn aggressive behaviors by watching violence on TV especially if violent behaviors are rewarded in what they watch. As we will see in this chapter, cognitive principles have had successful applications in the treatment of depression and anxiety, as in Aaron Beck's cognitive therapy and Albert Ellis' rational emotive therapy.

The final perspective to be discussed is the ecological view of learning. Those working from this perspective don't completely disagree with any of the other views of learning, they simply seek to understand how animals seem to perform some behaviors without having to learn them and how this impacts new behaviors that need to be learned. The migration of birds and the spawning of salmon are examples of highly complex behaviors that seem to have little basis in learning, but may be modified by experience none-the-less.

Martin Seligman reviewed much of the available literature on learning and proposed that animals had a form of biological preparation for easily learning some behaviors, but also had difficulty in learning other behaviors. Building on this concept, John Garcia, who studied the classical conditioning phenomenon of conditioned taste aversion, found that some stimuli are easier for organisms to associate than others. Thus some behaviors are easier to learn because an organism is prepared through evolution to

make such associations or to acquire such behaviors. For example, it is much easier (ie., shaping is quicker) to teach a rat to press a lever than to peck a key with its nose for food. It is also easier to train a pigeon to peck a disk than to press a lever for food. This is because evolution has prepared a pigeon to peck and a rat to rear and put its front paws on an object.

Martin Seligman also did research on the interaction of classical conditioning and subsequent operant conditioning. In his research he discovered what he called learned helplessness, which illustrates how an organism's prior learning history can interfere with the later acquisition of new behavior. Seligman's work is ecological in the sense that he focuses on the natural evolution of behavioral processes and how these procedures interact across an organism's individual life span. Work on learned helplessness has been applied to understanding the development of depression in humans and biological preparedness has been applied to animal population control through taste aversion treatments.

The general definition of learning as the study of human and animal behavior and cognition, as well as how each perspective interprets this definition, will be discussed in more detail in the various sections of this chapter. As you will discover, learning reaches beyond the classroom and it is a subject of interest to many psychologists.