

CONDITIONING & LEARNING

Conditioning is the term used to designate the types of human behavioral learning. Since the 1920s, conditioning has been the primary focus of behavior research in humans as well as animals. There are four main types of conditioning:

- Classical Conditioning
- Operant Conditioning
- Multiple-Response Learning
- Insight Learning

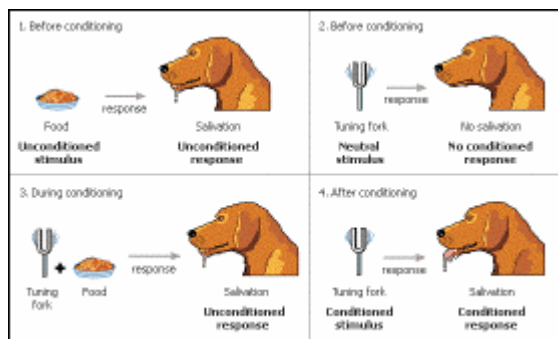
Classical Conditioning

Classical conditioning, also called associative learning, is based on stimulus-response relationships. A stimulus is an object or situation that elicits a response by one of our sense organs, like how a bright light makes us blink. Associative learning allows us to associate two or more stimuli and change our response to one or more of them as a result of simultaneous experience.

According to classical conditioning, learning occurs when a new stimulus begins to elicit behavior similar to the behavior produced by an old stimulus. Studies into classical conditioning began in the early 1900s by the Russian physiologist Ivan P. Pavlov. Pavlov trained dogs to salivate in response to two stimuli: noise or light, and food or a sour solution. The dogs' salivation is automatically elicited by the food and sour solution, so these were called the unconditional stimulus. However, when the noise or light (conditional stimulus) was repeatedly paired with the food or sour solution over an extended period of time, the dogs would eventually salivate at the noise or light alone. This is a prime example of a conditioned response.

Unconditional stimuli, such as the food and sour solution, allow the learning to occur, while also serving to reinforce the learning. Without an unconditional stimulus in his experiment, Pavlov could not have taught the dogs to salivate at the presence of the noise or light.

Classical conditioning is particularly important in understanding how people learn emotional behavior. For example, when we develop a new fear, we have learned to fear a particular stimulus which has been combined with another frightening stimulus.



Operant Conditioning

Operant conditioning is goal-directed behavior. We learn to perform a particular response as a result of what we know will happen after we respond. For example, a child may learn to beg for sweets if the begging is usually successful. There is no single stimulus that elicits the begging behavior, but instead it occurs because the child knows that this action may result in receiving treats. Every time the child receives sweets after begging, the behavior is reinforced and the tendency of the child to beg will increase.



B. F. SKINNER

During the 1930s, American psychologist and behaviorist Burrhus F. Skinner performed several important experiments into operant conditioning. Using what is now termed a Skinner Box, he trained rats to press levers to receive food. A hungry rat would be placed in a box containing a special lever attached to concealed food. At first the hungry rat would wander around the box, investigating its surroundings. Eventually it would accidentally press the lever thereby releasing a food pellet into the box. At first the rat would not show any signs of associating the two events, but over time its exploring behavior becomes less random as it begins to press the lever more often. The food pellet reinforced the rat's response of pressing the lever, so eventually the rat would spend most of its time just sitting and pressing the lever. This type of learning is based on the idea that if a behavior is rewarded, the behavior will occur more frequently.



SKINNER BOX

There are three main types of operant learning:

1. *Positive Reinforcement:* The more often the subject performs the action, the more the stimulus is reinforced (for example, pressing a lever for food)
2. *Negative Reinforcement:* Performing an action removes an undesirable stimulus (for example, studying for an exam removes anxiety)
3. *Punishment:* Performing an action elicits an undesirable stimulus (for example, receiving a shock by pressing a lever)

Multiple-Response Learning

When we learn skills, we must first learn a sequence of simple movement-patterns. We combine these movement-patterns to form new, more complicated behavioral patterns with stimuli guiding the process. For example, efficient typing requires us to put together many finger movements, which are guided by the letters or words that we want to type. We must first learn to type each letter, and then learn to put the movements together to type words and then phrases.

To investigate this type of learning, psychologists have observed animals learning to run through mazes. An animal first wanders aimlessly through the maze, periodically coming to a choice-point, where it must turn either left or right. Only one choice is correct, but the correct direction cannot be determined until the animal has reached the end of the maze. By running through the maze numerous times, the animal can learn the correct sequence of turns to reach the end. It has been found that the sequences of turns near the two ends of

the maze are learned more easily than the parts near the middle. Similarly, when we try to learn a list of items, we usually find the beginning and the end easier than the middle.

An extension of multiple-response learning is latent learning, where learning occurs in the absence of an immediate reward. If rats are allowed to repeatedly run a maze without a reward at the end, they will learn the maze quite slowly. However if they have first been allowed to run the maze without reward, and then food is placed at the end, these rats will learn the maze very quickly. This shows that learning had been occurring the entire time, but did not become evident until it was activated by a reward.

Insight Learning

Insight refers to learning to solve a problem by understanding the relationships of various parts of the problem. Often insight occurs suddenly, such as when a person struggles with a problem for a period of time and then suddenly understands its solution. Therefore insight learning is solving problems without experience. Instead of learning by trial-and-error (such as in maze running), insight learning involves trials occurring mentally.

In the early 1900s, Wolfgang Kohler performed insight experiments on chimpanzees. Kohler showed that the chimpanzees sometimes used insight instead of trial-and-error responses to solve problems. When a banana was placed high out of reach, the animals discovered that they could stack boxes on top of each other to reach it. They also realized that they could use sticks to knock the banana down. In another experiment, a chimp balanced a stick on end under a bunch of bananas suspended from the ceiling, then quickly climbed the stick to obtain the entire bunch intact and unbruised (a better technique than the researchers themselves had in mind). Kohler's experiments showed that primates can both see and use the relationships involved to reach their goals.

Learning Modalities

There are three basic modalities to process information to memory: visual (learning by seeing), auditory (learning by hearing), and kinesthetic (learning by doing). Most people have one predominant modality, but some have a balance between two or even all three. Many students are aware of their preference, which helps them approach their own learning more efficiently.

Personality Characteristics of the Learning Modalities

| Visual | Auditory | Kinesthetic |
|--|---|--|
| <ul style="list-style-type: none"> • Mind wanders during verbal activities • Has trouble following or remembering verbal instructions • Doodles | <ul style="list-style-type: none"> • Is easily distracted • Quickly loses interest in visual demonstrations | <ul style="list-style-type: none"> • Taps pencil or foot while thinking, studying, or writing tests • Enjoys doing experiments |
| <ul style="list-style-type: none"> • Prefers to observe rather than actively participate in group activities and discussions | <ul style="list-style-type: none"> • Enjoys listening activities • Is active in group activities and discussions | <ul style="list-style-type: none"> • Enjoys handling objects • Uses excessive hand gestures and body language • Makes physical contact with people when talking to them |
| <ul style="list-style-type: none"> • Likes to read silently | <ul style="list-style-type: none"> • Likes to be read to • Prefers reading aloud to silent reading • Listens to music while studying or doing homework | <ul style="list-style-type: none"> • Tends not to enjoy reading • Enjoys hands-on activities • Enjoys problem-solving |
| <ul style="list-style-type: none"> • Is neat and organized • Pays attention to detail • Has neat handwriting | <ul style="list-style-type: none"> • Has sloppy handwriting | <ul style="list-style-type: none"> • Is unorganized |
| <ul style="list-style-type: none"> • Is a good speller | | <ul style="list-style-type: none"> • Is a poor speller |
| <ul style="list-style-type: none"> • Easily memorizes by seeing pictures and diagrams • May have a "photographic memory" | <ul style="list-style-type: none"> • Memorizes lists and sequences easily • Remembers faces | <ul style="list-style-type: none"> • May have trouble memorizing lists, numbers, etc. |
| <ul style="list-style-type: none"> • Is usually quiet, shy, or reserved | <ul style="list-style-type: none"> • Is fairly outgoing | <ul style="list-style-type: none"> • Is outgoing • Easily expresses emotions |

Depending on their preferred learning modality, different teaching techniques have different levels of effectiveness for the student.

Effective Teaching Techniques for Each Learning Modality

| Visual | Auditory | Kinesthetic |
|---|--|--|
| <ul style="list-style-type: none"> • Guided Imagery • Demonstrations • Copying Notes • Highlighting Key Ideas in Notes/Textbooks • Flash Cards • Color Coding • Diagrams, Photographs, Charts, Graphs, Maps • Filmstrips, Movies, TV • Mind Maps, Acronyms | <ul style="list-style-type: none"> • Auditory Tapes • Reading Aloud • Oral Instructions • Lectures • Repeating Ideas Orally • Using Rhythmic Sounds • Poems, Rhymes, Word Association • Group Discussions • Music, Lyrics • TV | <ul style="list-style-type: none"> • Experiments/Labs • Plays, Acting Scenes Out, Role Playing • Games • Problem-Solving • Field Trips • Writing Notes • Making Lists • Props, Physical Examples • Associating Emotions with Concepts |

Gregorc's Learning Styles

Anthony Gregorc's "Style Delineator Approach" is based on studies into the functions of the left and right brain hemispheres. His system of learning takes into account the different ways of perceiving and ordering information. We either perceive things in methods that are concrete-oriented (from our physical senses) or abstract-oriented (from logical, deductive reasoning). Ordering is making sense out of what we perceive. Ordering can either be sequential (organized, systematic) or random (unorganized).

These different means of perceiving and ordering information form Gregorc's four categories of learning styles:

| Gregorc's Learning Styles | How We Learn |
|---------------------------|---|
| Concrete-Sequential | Learning is linear and sequential. |
| Concrete-Random | Learning is concrete and intuitive, and the person thrives on problem-solving. |
| Abstract-Sequential | Learning is abstract and analytical, and the person thrives on a mentally challenging but ordered learning environment. |
| Abstract-Random | The person is emotional and imaginative, and prefers an active, interesting, and informal learning environment |

CONDITIONS REQUIRED FOR LEARNING

- Motivation
- Interest
- Transfer of Training
- Environment

Motivation

Motivation is anything that affects the state of the nervous system to determine behavior. It is the driving force for the activation and persistence of behavior, and helps explain why some behavioral patterns occur more frequently or at certain times. Motivation generally relates to a psychological drive or need which pressures us into behaving accordingly. There may also be external stimuli or incentives that contribute to motivation by rewarding appropriate behavior.

Motives themselves also direct behavior in that different motives cause us to act in different ways. There are three types of motives: homeostatic, nonhomeostatic, and learned motives. Homeostatic motives include things such as hunger, thirst, and breathing. They work to keep the body in the state of homeostasis (internally balanced). Nonhomeostatic motives include required activities, such as seeking shelter, and curiosity. Learned motives include the desire for novelty, achievement, power, and approval. These motives develop through experience, and once developed, they continue to influence behavior throughout life. The three types of motives may also overlap. For example, the desire for new experiences or challenges may be homeostatic as well as learned. Since people differ as to the level they are affected by homeostatic mechanisms, some people are always looking for something new to try while others are content with the familiar.

Research has also shown that approval and achievement are important factors. In social situations, people with a need for approval tend to agree with other people's suggestions and opinions even if they disagree with them. Achievement motivation is affected by the desire for personal reward or success. People with a high need for achievement tend to choose tasks that are intermediately difficult, for a moderate probability and higher degree of success. People with a low need for achievement tend to select either very easy or very hard tasks, since the completion or outcome of the task is not important. People with the need for high achievement attribute their success and failure to internal factors, whereas people with little need for achievement attribute success to external factors and failure to internal factors. This explains why people with a high need for achievement persist even in the face of difficulty and failure, while people with a low need for achievement give up relatively easily.

Interest

Interest is important to learning, since it facilitates thinking and attention. We cannot effectively think about a topic that we find boring and purposeless, nor can we learn something that seems tedious. Interest guarantees that we will focus on what we are supposed to be learning. We think and learn when we read the newspaper or a novel, watch television or a movie, or solve a problem - but only if we are interested in it.

When we are not interested in something, we tend to think of something else or "daydream". These distractions shield us from boredom while allowing us to try to find something else to

think and learn about. Not understanding something also tends to lead us away from critical thought, and eventually destroys our interest in that topic.

Thinking and learning are inseparable because our brains strive to think all the time, meaning that learning occurs whenever there is meaningful thought. Only rote learning involves little thought, but it is also inefficient and uninteresting.

Interest does not guarantee that we will think efficiently, but it does ensure that we will put ourselves in situations where relevant thought occurs. When we find something interesting, we try to involve ourselves with that topic or activity. We will read books or watch movies about the topic, and talk to experts in the field. These activities help facilitate effective learning.

Transfer of Training

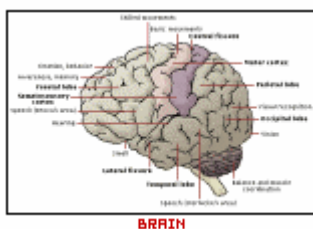
The recognition that new learning can profit from old learning because learning one thing helps in learning another, is called transfer of training.

Currently, the viewpoint regarding transfer of training is that both concrete and abstract knowledge can be transferred from one situation to another. Recent studies have shown that the most important factor in transfer of training is the quality of the person's organization of prior knowledge.

Environment

Research with laboratory animals has revealed that exposure to sensory-enriched environments can change the structure and chemistry of the brain. Rats raised in environments containing toys, stimulating objects, and other rats exhibited increased thickness of their neocortex. Their cell bodies and neuron nuclei were larger, dendrites were longer, and the area of synaptic contacts were greater. These rats also had more protein, more glial cells, larger capillaries, and an increased ratio of RNA to DNA.

The most prominent change in the stimulated animals was in the visual association.



However, most areas of the cortex were affected, including the cerebellum and hippocampus. Except for the frontal cortex, where the right hemisphere is affected more than the left, both brain hemispheres appear to be almost equally influenced by an enriched environment.

The more varied the enriched environment and the longer the rat stayed in the environment, the longer it retained its increased cortical dimensions after being moved to a less stimulating environment. These effects were found in both young and old rats. Research also showed that the rats exposed to enriched environments performed tasks such as maze running significantly better than those raised in less stimulating environments.