Sensation, Perception and Cognition

Sensation and perception are closely connected to learning. We rely on our senses to provide the raw materials the mind must work with. But learning involves more than just gathering sensations. We need to use that data to acquire knowledge. We also have to retain that knowledge in memory so we can apply it again to other situations.

Psychologists use the word **cognition** to describe how we acquire, store and use knowledge. In the following section we will look at how we acquire knowledge through learning. In later sections we will investigate how we store and retrieve information through memory, and how we use our knowledge through the process of thinking.

Activities

Understand Ideas

1. What is the difference between sensation and perception?
2. What three factors influence our perception?

Think and Evaluate

3. **a)** In what ways can human sensation and perception be compared with a video camera? In what ways are they different?
   b) In your own words, explain why human perception is unique and why it is so important.

Apply Your Learning

4. **a)** Imagine yourself walking through a haunted house. Describe the three factors that would influence your perception.
   b) Explain how sensation and perception are related to how you would experience your walk through the haunted house.

Research and Communicate

5. Choose an advertisement for a consumer product from television or in a magazine. Bring your example to class. Analyze the way the advertiser shapes viewer perceptions of the product. Consider how the advertiser presents the object itself as well as the product's surroundings. To what ideas or feelings—from the viewer's point of view—does the advertisement appeal?
6. Using the Internet, find other examples of visual illusions and bring them to class. Explain what the illusion is and analyze its source.

Focus Questions

What is learning?

What are the advantages and costs of our reliance on learning?

Learning

One of the results of organizing the information we collect from our senses is that we learn from our experience. Psychologists define learning as a change in knowledge or behaviour as a result of experience. While this definition may be different from your own concept of learning, its advantage is that it covers a wide range of various kinds of learning.

Most human thought and behaviour is the result of learning. A great deal of learning occurs during the first few years of life, although we continue to learn throughout our lives. Learning takes place in many different ways. We learn in school, of course, but we also learn in everyday encounters with life. For example, think of the difficult skills you learned before

you started kindergarten: walking, talking, riding your bike, playing and getting along with others, to name just a few.

Other living species learn, too. Mammals such as dogs, cats and chimpanzees have a highly developed ability to learn from experience. Perhaps you have had a pet that could do tricks or knew how to get what it wanted by learning a new form of behaviour. Dogs can be trained to help people who are blind get around or to alert people with hearing impairments when the phone rings, a buzzer goes off, or someone knocks at the door.

Learning, however, is not the only influence on our behaviour. An important role is also played by innate drives and instinctive reactions—responses that members of a species are born with and that help them survive. Many species rely largely or completely on innate drives. For example, fish instinctively swim upstream to spawn; bees build hives and communicate messages without being taught. But drives and instincts do not allow individuals of a species to change their behaviour in order to deal with new conditions. The insect that buzzes against the light will continue to do so, despite the fact that it is in danger. The tortoise will insist on slowly crossing the busy road to get upstream.

Overall, the fact that humans rely more on learning than on instinctive responses is an advantage. We can change our thinking and behaviour to meet new situations and to succeed in a variety of conditions. Yet, this adaptability has a cost: compared to other species, our young must learn a great deal before they can look after themselves. For the first few years they depend on others—primarily parents—to protect, support and teach them. Happily, humans have also developed nurturing skills, forming close emotional bonds with their children.

Can an animal be trained to learn like a human being? The following case study describes one attempt to accomplish this feat.

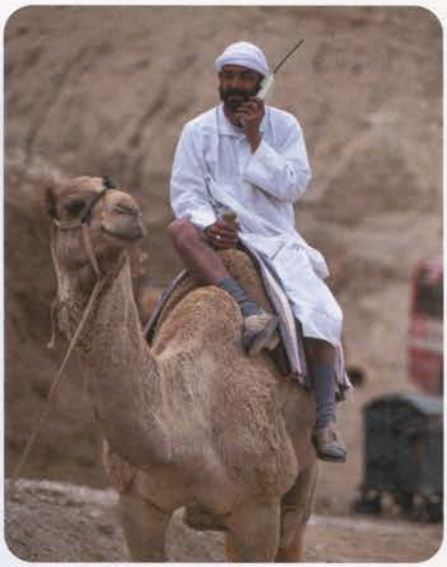


Figure 3–13
Humans have learned to survive in different environments from under the surface of the sea to space. They also learn and adapt continuously. New technology can be a powerful force of change and learning.

instincts—inborn patterns of behaviour that are characteristic of a species

Hans Goes to School

CASE STUDY

At the beginning of the twentieth century, a German schoolteacher, Wilhelm von Osten, became obsessed with the idea that horses could be taught as much as people. He set out to test this hypothesis.

Von Osten spent four years teaching his horse, Clever Hans, in the same way German schools of the time taught children. He used repetition, flash cards and other devices. He began with simple problems and moved on to more complex ones. He rewarded Hans for correct answers with praise and carrots. Hans answered questions by shaking his head or stamping his hoof.

After four years, Hans could answer almost any question put to him in geography, history, science, literature, math or current events. Von Osten had total faith in the ability of his horse. Even when his trainer was absent, the horse could answer questions put by others. Von Osten never charged admission or gained in any way from Hans' abilities.

1. **What did von Osten aim to prove?**
2. **Did the findings of Stumpf and Pfungst demonstrate that Hans had not learned anything? Explain.**
3. **What does this case tell us about learning? What does it tell us about proper scientific methods of conducting an investigation?**

Figure 3–14
Wilhelm von Osten with his performing horse, Clever Hans. How did Clever Hans learn?

Connections

To what extent did Stumpf and Pfungst follow the steps in conducting an experiment? (See Chapter 1, page 9.)

A government scientific commission tested Hans and was convinced of his abilities. For example, Hans correctly tapped out numbers written on a board; he gave the correct time and date; he converted fractions to decimals. He responded correctly to questions in many fields of study.

Two psychologists, Carl Stumpf and Oskar Pfungst, were curious. They wondered about the conditions under which testing had taken place and tried their own experiments. They wanted to eliminate possible factors that might have interfered with the testing of Hans.

They soon found that when the tester, even von Osten, did not know the answer to a question, Hans' answers were wrong. They also found that when Hans wore blinders he could not answer correctly. Stumpf and Pfungst concluded that communication was taking place between the testers and the horse. They noted that Hans watched carefully when he was asked a question. They also noticed that the tester unconsciously leaned forward while waiting for the correct answer. When the correct number of taps was done, the tester tended to lean back. "Yes" and "no" answers were also unconsciously cued; a subtle nod by the tester would get the same response from the horse, while a back and forth head movement got a shake of the head from the horse.

Activities

Understand Ideas

1. From what two sources does all behaviour stem?
2. What are the advantages and disadvantages of learned and innate behaviour?

Apply Your Learning

3. Identify five to ten of the most important skills or lessons you have learned in your life so far. How did you learn these skills or lessons?

Kinds of Learning

We learn in many situations and in many different ways. Here we will look at two major types of learning that have been identified in psychology: conditioned learning and observational learning.

Focus Questions

What are the two major types of learning?

What is the difference between classical and operant conditioning?

Why is observational learning so important?

What four processes are crucial to observational learning?

Conditioned Learning

Conditioning is defined as acquiring patterns of behaviour in the presence of an environmental stimulus. In other words, we learn to respond to a particular stimulus in a particular way. Behavioural psychologists believe that most human behaviour is the result of conditioned learning. Conditioning is one kind of learning we share with other species; Clever Hans learned through conditioning. Each one of us is conditioned to smile back when someone smiles at us, to respond when someone says good morning, or to stop for a red light at the intersection. There are two kinds of conditioning: classical and operant.

Classical Conditioning

Classical conditioning was discovered by Ivan Pavlov (1849–1936), a Russian physiologist who was studying digestion. His experiments involved measuring how much saliva dogs produced when they were given food. He noticed, however, that the dogs began to salivate before the food was in their mouths; the very sight of it caused them to drool. Then the dogs began to salivate simply at the sound of the experimenter approaching.

Pavlov set up an experiment to find out why these reactions occurred. He sounded a bell just before the food was brought into the room. After hearing the bell many times before they were fed, Pavlov's dogs began to salivate at the sound of the bell itself. The dogs had been conditioned to salivate in response to a new stimulus. He found that he could train his dogs to salivate at the sound of any number of bells, whistles and buzzers.

In general, classical conditioning involves learning to transfer a natural response from one stimulus to another. Before conditioning, the food automatically caused the dogs to salivate. Pavlov called the food the "unconditioned stimulus (US)" and the salivation the "unconditioned response (UR)." In other words,

unconditioned response—an automatic, unlearned reaction

US → UR

The bell is the "conditioned stimulus (CS)." During conditioning, the formula changed to

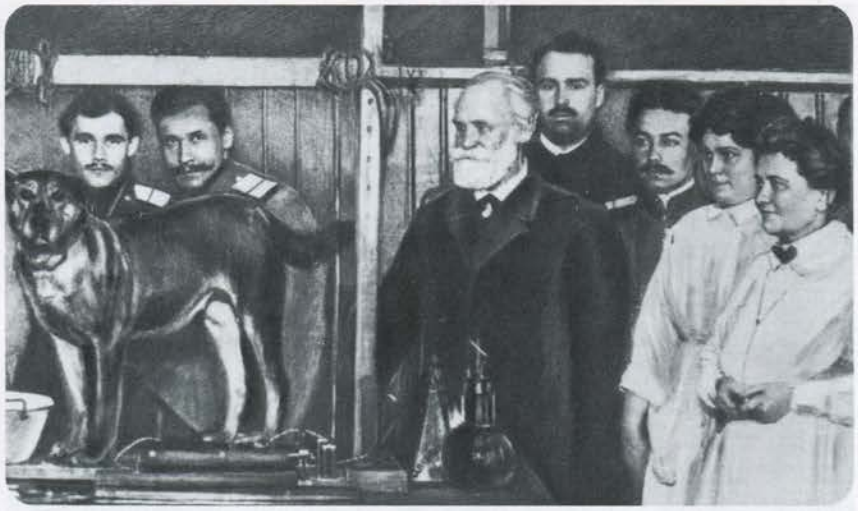
US + CS → UR

When the dogs began salivating in response to the bell alone, Pavlov called this a "conditioned response (CR)." The formula became

conditioned response—a learned reaction

CS → CR

Figure 3–15
The Russian scientist Ivan Pavlov discovered the principles of classical conditioning by accident while investigating digestion.



Do you find yourself getting hungry at the smells wafting from the kitchen? Do you look forward to spending pleasant times with your friends after school? Are you anxious at the thought of writing exams next week? Each of these reactions can be explained in terms of classical conditioning. Even our associations with different foods, colours, situations or people are often the result of classical conditioning. The following case study describes some early experiments with classical conditioning in humans.

CASE STUDY

1. **Refer back to the APA Code of Ethics on page 45 to explain why the experiment with Albert would be considered unethical by today's standards.**
2. **Why did Peter lose his fear of the rat?**

Learning to Fear

In 1920 behavioural psychologist John Watson performed an experiment. He showed Albert, an 11-month-old boy, a white rat. At first, the boy displayed no fear of the rat. But every time he approached it, the experimenter made a loud noise by rapping a steel bar. Soon, Albert began to cry and crawl away when he saw the rat. Classical conditioning caused him to associate the rat with an unpleasant situation and to feel fear. The conditioned stimulus, the rat, brought about a conditioned response, fear.

Another experiment was conducted by psychologist Mary Cover Jones who discovered how to use classical conditioning to reduce, or unlearn, fears in children. Three-year-old Peter had a fear of white rats. (You have to wonder where he acquired this fear.) Peter was put in a room with a caged rat but was also given his favourite dessert—ice cream. The next day, the cage was brought a little closer and more ice cream was offered. Eventually, Peter showed no fear of the rat at all.

Similar experiments have been done since to cure people of various fears, including fear of flying, heights and enclosed places. We also use classical conditioning regularly in our everyday lives. For example, you can

learn to associate studying with a particular environment, such as a quiet corner of the library or a particular room in your house. Once you have made the association (and if the association is a positive one), you will likely find it easier to concentrate when you are in that environment.

Operant Conditioning

The behavioural psychologist B.F. Skinner wondered if Pavlov's ideas of stimulus and response could explain more complex human behaviour. Most behaviour, he noted, takes place voluntarily before being triggered by outside events. For example, you wave your hand to call a cab and it stops; a child asks for more juice and receives it; a driver slows down at a red light in order to avoid an accident. Classical conditioning did not explain these kinds of behaviour.

Skinner put a rat into a cage. The cage was rigged with a bar that, when pushed, allowed a pellet of food to fall into a dish. As the rat moved around the cage, it eventually pressed the bar and received a food pellet. The next time it pressed the bar, it got another pellet. Soon the rat was pushing the bar constantly. This is an example of operant conditioning.

Operant conditioning has had a powerful impact on how we look at learning in a number of areas. In training animals, for example, we recognize that a reward, or positive reinforcement, is crucial in bringing about desired behaviour. In raising children, parents often reinforce desired behaviour by smiling; they may also discourage undesirable behaviour by ignoring it. Those convicted of crimes or misdemeanours are subjected to punishment, or negative reinforcement, in the form of fines or incarceration. It is believed that these consequences will shape behaviour in desirable ways.

positive reinforcement—an event, a situation or a condition that increases the likelihood that certain behaviour will recur

negative reinforcement—an event, a situation or a condition that decreases the likelihood that certain behaviour will recur

Behavioural psychologists suggest that rewards are more effective than punishments in changing behaviour. Punishments may stop undesirable behaviour for the moment, but are less successful in the long term. Once the threat of punishment is removed, the undesirable behaviour may return. Moreover, negative reinforcement does not indicate what behaviour is desired; it only teaches the subject what not to do. Positive reinforcement may have a more lasting impact.

Figure 3–16

When coyotes in one area of the country began to attack sheep, local farmers were determined to hunt them down. However, one farmer tried another approach. He strewed the area with several sheep carcasses that contained a substance that made the coyotes sick. As a result, the coyotes began, once again, to feed on their natural prey. What kind of conditioning was used in this instance?

Try This!

With a straw held several centimetres from a partner's eye, blow a puff of wind gently at the same time as you tap the desk with your other hand. After several repetitions, put the straw in the usual position, but this time, while tapping the desk, do not blow into the straw when you put your mouth to it.

1. List your observations.
2. Explain these observations in terms of classical or operant conditioning.

Observational Learning

Conditioning explains only some kinds of learning. For example, how did you learn to play a musical instrument, drive a car, play a sport, make a presentation in class or behave in a socially acceptable manner? Behaviourists would say that much of what you learned was the result of shaping through conditioning. But you would never have been able to grasp the overall idea of how to perform a new task unless you had watched someone else do it. You learned by observing people who acted as models. The psychologist Albert Bandura identified four processes crucial to observational learning:

1. **Attention.** To learn through observation, you pay attention to the behaviour of others. To master a musical instrument, you listen carefully to those who play it well; to become a good basketball player, you watch others who play the game with skill and grace.
2. **Retention.** You store a mental representation of what you observe in your memory. You note how the person performed the task, what worked well and what results were produced by the behaviour.
3. **Reproduction.** You convert your stored memory into action. You may need to practise to do this well, whether it is playing a guitar or driving a car. You may have to return to the attention or retention process in order to clarify your mental representation.
4. **Motivation.** You must be motivated in order to practise the skill. You will have to believe that the skill is useful or important to you. Sometimes the motivation comes from outside, from an event or another person; sometimes you can develop your own motivation.

Observational learning is particularly important in children. Most of our early skills are learned through observation. Bandura devised many experiments to investigate how observational learning affects children,

particularly the effect of observed violence. The following case study describes one such experiment.

Imitating Violence

Bandura had a nursery school child draw a picture in one part of a room. An adult, in another part of the room, would approach an inflatable clown toy that pops back up when struck. The adult would punch, kick and sit on the clown, saying things like, "Kick him" and "Sock him in the nose."

The child was then taken to another room where there were several toys, including another clown. Bandura and his colleagues watched through hidden windows and noted the child's behaviour. They found that the children who had seen the adult acting aggressively tended to copy the behaviour. They beat up the clown, often using the same words as the adult did. Children who had not observed this violence were less likely to behave aggressively.

In later experiments, the adults were rewarded or scolded for acting aggressively toward the clown. Children who watched adults being rewarded became aggressive. Those who watched adults being scolded for aggression were less likely to show aggression than those who had seen no model at all.

Bandura's experiments have important implications for our society. The results imply that children who watch violent behaviour in their own homes, on television or in sports may be more likely to act aggressively. Recent research indicates that while television violence does not always cause viewers to act aggressively, it increases the likelihood of aggression in certain situations. When young children saw realistic violence, such as violence in a news clip, they tended to behave more aggressively than when they watched fantasy violence in a movie. Both groups were more aggressive than the group that did not view any violence. Other research shows that children who see violence modelled in their everyday lives by parents or friends are more likely to be affected by television violence.

CASE STUDY

1. **Why did the children imitate aggressive behaviour toward the doll?**
2. **Sometimes adults were either rewarded or scolded for their behaviour. Why did these consequences affect the children's own behaviour?**

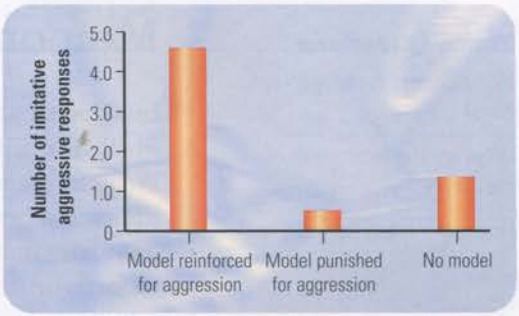


Figure 3–17
This graph shows how the number of responses was influenced by whether the children had observed a model and whether the model was rewarded or punished for aggressive behaviour.

Activities

Understand Ideas

1. In a brief paragraph, explain the difference between operant conditioning and classical conditioning.
2. What are the major elements of observational learning?

Think and Evaluate

3. Which form of learning—conditioned or observational—is more important when learning how to dance or play tennis? Give reasons for your choice.