

## LESSON 2

# HOW WE LEARN

Human beings are primarily learners. We are born helpless and ignorant. But our capacity to learn is amazing. No wonder the Psalmist wrote: “. . . I am fearfully and wonderfully made . . .” (Ps. 139:14). We can learn as long as we live. Unfortunately most of us use a small part of our learning ability, maybe only fifteen or twenty per cent. Who knows? The first big and fatal failure of humankind was learning from the wrong source and following the wrong direction (Gen. 1-3). No wonder Jesus invited us to learn by saying: “. . . learn from me . . . and you will find rest for your souls” (Matt. 11:29). Learning about God—who He is, and about ourselves—who we are, and learning about science are all important. Therefore, let us first learn how we learn. We must start by understanding and using that wonderful instrument called the brain.

### THE BRAIN

The brain is a highly organized and complex organ that sets humans apart from other forms of life. The human brain is capable of responding to an extensive amount of information, analyzing that information, categorizing and storing it for later use. All of these functions are handled quickly and efficiently with little awareness on the part of the individual.

Divided into two cerebral hemispheres, or two halves, the brain functions as a whole. The right and left sides each function distinctly and differently from each other. However, the brain is also bilateral in that each hemisphere, or each half of the brain, shares the capability of performing many of the same functions. If you receive an injury on the left side of the brain, you would have to learn language and arithmetic all over again. The right half would eventually take over some of the function of the left. Speech is an exception to this. The areas of the brain which basically control the function of speech are located in the left side of the brain and are not easily taken on by the right side. If an injury occurred to the right side of the brain, you could not laugh or recognize a tune. We can learn about the functioning of the brain by using instruments such as the electroencephalograph which measures the waves of the brain. A full understanding of behavior, how it occurs, and the thought process call for a look at the basic structure of the brain as well as how the brain functions.

### Specialization of the Hemispheres

The left hemisphere of the brain controls the move-

Human beings are primarily \_\_\_\_\_ .

(learners)

Most of us use only \_\_\_\_\_ to \_\_\_\_\_  
per cent of our learning ability.

(fifteen, twenty)

We start to learn by understanding and using the  
\_\_\_\_\_ .

(brain)

The brain is \_\_\_\_\_ and  
\_\_\_\_\_. It \_\_\_\_\_,  
\_\_\_\_\_ and \_\_\_\_\_ informa-  
tion.

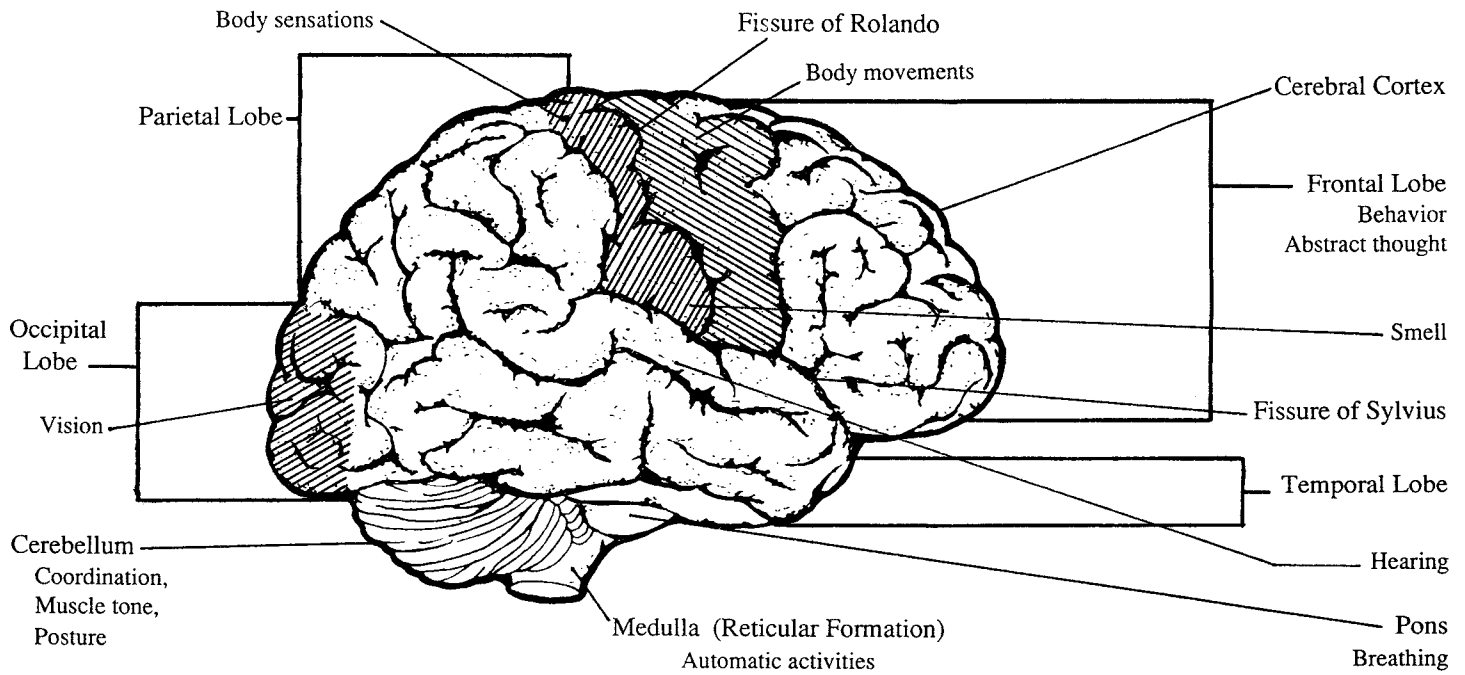
(highly organized, complex, analyzes, categorizes,  
stores)

The brain is divided into two \_\_\_\_\_  
\_\_\_\_\_, each of which functions  
\_\_\_\_\_ and \_\_\_\_\_ .

(cerebral hemispheres, distinctly, differently)

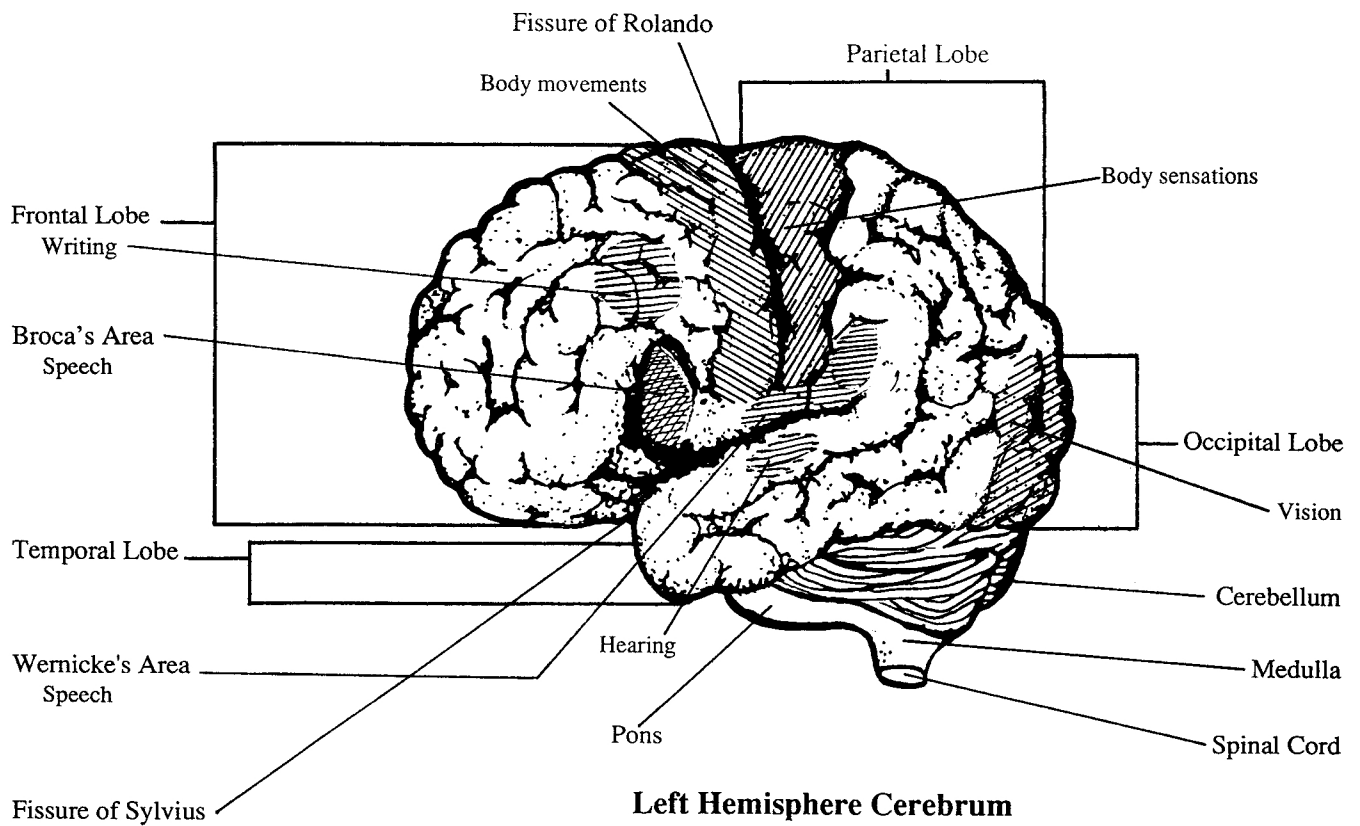
The \_\_\_\_\_  
measures the waves of the brain.

(electroencephalograph)



### Right Hemisphere Cerebrum

Creativity, body image and awareness, recognition of faces  
Musical and artistic abilities  
Complex motor activities, spacial orientation  
Controls movements left side of body



### Left Hemisphere Cerebrum

Analysis, logic, verbal and mathematical functioning  
Organization of ideas  
Controls movements right side of body

ments in the right side of the body. The right side of the brain controls the movements in the left side of the body. Information passes between the two hemispheres of the brain through the *corpus callosum*, which serves as one link between the two hemispheres. The secondary link between the hemispheres is the eyes, which are connected to both the right and the left sides of the brain through a split in the optic nerve.

Predominately involved in analytical, logical thinking, the left hemisphere contains verbal and mathematical functioning. Therefore, symbolically it has been represented as the active portion of the brain. The parts of words, the meaning of words and the structure of this information are all functions of the left hemisphere of the brain. The child who babbles, forms a word and then learns to speak in sentences is utilizing the left side of the brain. Organizing time and patterning information and ideas in sequence are located in the left hemisphere making it possible for us to do work methodically. This is a result of the organization characteristic of this part of the brain. Awareness of time and the ability to put information into a sequence make possible subjective thought and order. An injury or damage to this side of the brain can result in impairment of language ability or other functions taken on by this side of the brain.

The right side of the brain does have language ability, however, it is limited. Both hemispheres can understand language while normally the left side of the brain is utilized for speech. For example, a stroke victim may have damage to the left side of the brain which inhibits the speech capability. However, the person can still understand what is being said to him by using the language resources of the right side of the brain.

Creativity, body image and awareness, recognition of faces and people, musical and artistic abilities are centered in the right side of the brain. Spatial orientation is also a function of the right side of the brain. Typically, the right brain or hemisphere is used, for example, by the musician, craftsman and artist, because it is imaginative and has an understanding of space and objects within that space. The creativity of the artist, how he perceives objects, depth and the abundance of color combinations comes by utilizing the right hemisphere. This part of the brain also controls the more complex motor capabilities such as running, jumping and other physical responses to stimuli. Damage to the right hemisphere may affect the artist's creative abilities, the musician's ear for music and the craftsman's skill.

In a few left-handed people some of the functions of the brain normally associated with the left side of the brain may actually take place in the right side. For example, the main speech functioning may come from the right hemisphere instead of the left. The areas associated with analytical, logical thought, verbal and mathematical functioning may also be located in the right brain, while the left brain is associated with such things as creativity, the arts and music.

In their symbolism, the Hopi Indians of northeastern

The left hemisphere controls \_\_\_\_\_ in the \_\_\_\_\_ side of the body. The right hemisphere controls the \_\_\_\_\_ side.

*(movements, right, left)*

The \_\_\_\_\_ serves as one link between the two hemispheres.

*(corpus callosum)*

The \_\_\_\_\_ has been represented as the \_\_\_\_\_ portion of the brain.

*(left hemisphere, active)*

Answer "left" or "right" to indicate which side of the brain controls the following functions:

mathematics \_\_\_\_\_

speech \_\_\_\_\_

music \_\_\_\_\_

art \_\_\_\_\_

right handedness \_\_\_\_\_

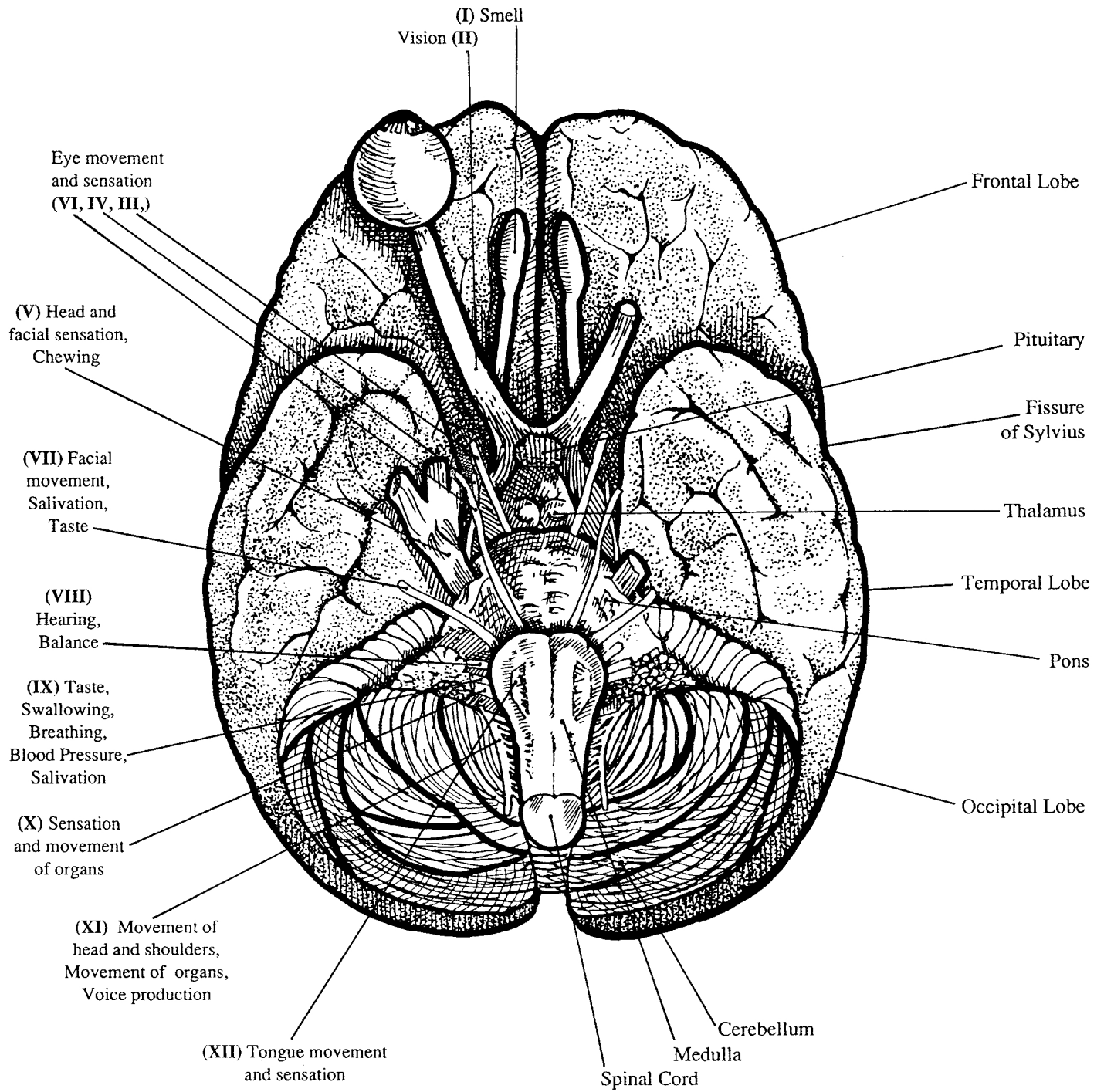
running \_\_\_\_\_

time \_\_\_\_\_

*(Compare your answers with the text)*

Damage to the right hemisphere may affect the skill of the \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.

*(artist, musician, craftsman)*



**Central Nervous System**  
**Brain and Cranial Nerves (I-XII)**  
 From Below

Arizona in the United States consider the right hand to be for writing and the left hand for making music. Using the symbolic meanings also, the Mojave Indians consider the right brain to be the maternal, or the feeling side, and the left brain to be the paternal or active side. Today, as we look at the functioning of the brain, we do not tend to apply maleness or femaleness to it. Instead we rather look at the individual and how each person utilizes the brain. Applying the label of male or female to these characteristics can be difficult because of differences in cultures. In some cultures it is common for women to take an active role in the fighting of wars. In other cultures the role of the woman is associated with caretaking and creative capabilities. Many men have made outstanding contributions in the areas of literature, art and music, for example, Van Gogh, Bach, Brahms and Monet. These people have utilized their dominant mode of functioning in the same way the accountant, mathematician, scientist, plumber, electrician and architect utilize their strengths. Dominance for the use of one preferred way of functioning can be seen in most people.

The brain works as a whole. Information is sent back and forth between the two hemispheres. As information is received from the senses it is processed by utilizing both sides of the brain so that a response comes from the whole. Remember that the work of the *corpus callosum* and the eyes is to coordinate and channel the information between the two hemispheres. Both sides of the brain can function independently and also as a whole.

### Parts of the Brain

A basic understanding of the structure of the brain might be helpful at this point. If you were able to open the skull as you would open a tin can with a can opener you would first see the *cerebral cortex*. You may notice that the cerebral cortex appears to be divided into two halves or hemispheres. As we have said these two hemispheres are attached to one another through the corpus callosum. It is the cerebral cortex which makes humans different from animals. The corticalization, or the wrinkling of the cerebral cortex, is associated with intelligence, that is, the more wrinkling, the higher the level of intelligence. The grayish color of the cerebral cortex is due to the gray color of the cell bodies. Sensory information, movement and some speech capability seem to be housed in this area. If you were to strip off the layer of the cerebral cortex you would find the *cerebrum*.

From this point imagine yourself to be following a road map through the brain to identify its parts and the functions of each part. Looking in from the front you see the *frontal lobes* which are associated with movement and can be considered a guiding force for behavior. The motor area for movement of the feet, legs, thighs, arms, hands, neck, face and tongue can be described as an arch-like path extending from ear to ear following the curve of the skull. Abstract or disassociated thinking takes place here. (Abstract thought is

Applying labels of male and female to characteristics can be \_\_\_\_\_ because of \_\_\_\_\_ in \_\_\_\_\_ .

(difficult, differences, cultures)

The brain works as a \_\_\_\_\_ . \_\_\_\_\_ is sent back and forth between the two \_\_\_\_\_ .

(whole, information, hemispheres)

Both sides of the brain can function \_\_\_\_\_ and as a \_\_\_\_\_ .

(independently, whole)

The \_\_\_\_\_ makes humans different from animals.

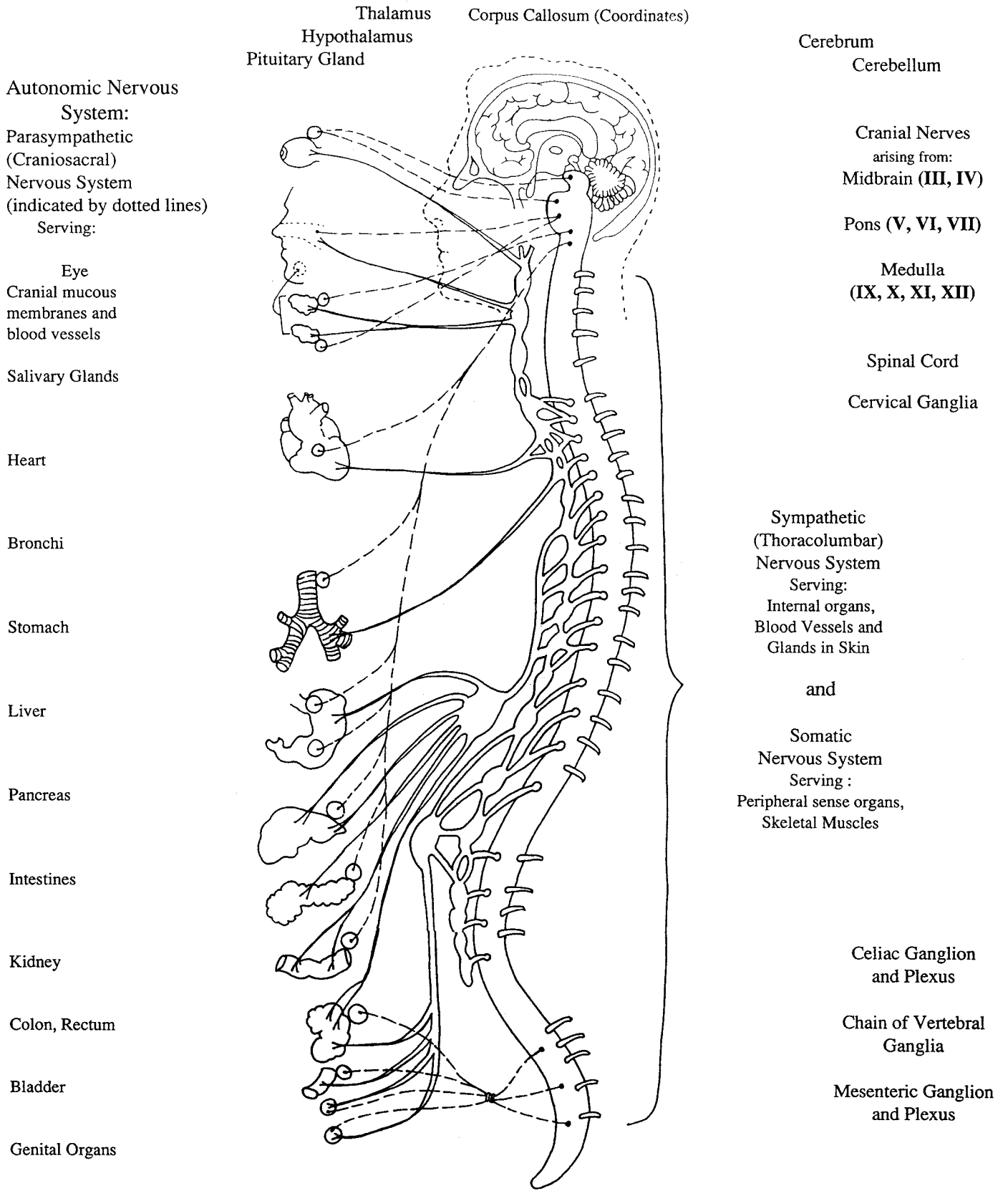
(cerebral cortex)

The \_\_\_\_\_ of the cerebral cortex is associated with \_\_\_\_\_ .

(wrinkling, intelligence)

The \_\_\_\_\_ are associated with movement and are a \_\_\_\_\_ for behavior.

(frontal lobes, guiding force)



**Relationship of Brain  
and  
Peripheral Nervous System**  
(P.N.S. exaggerated in size for clarity)

thinking which is not associated with a specific instance. It may be a summary of points or thoughts usually in their raw or skeletal form.) Also located in the cerebrum is the sensation of smell. If you walk by a bakery your senses may detect bread baking in the oven. This information would be identified in the frontal lobes of the brain.

At the rear of the frontal lobes you will find an area which is considered a center of speech. Straight back from there, above and behind the ear, there is a second speech area. The first area is known as the *Broca's area*. The second is called the *Wernicke's area*. The Broca's area functions to remember the movements needed to produce words. This area of the brain received its name from a Frenchman named Paul Broca, who in the late 1800's performed an autopsy on a man who had suffered a stroke several years prior to his death. After the stroke the man was unable to speak. The Wernicke's area was named for a German physician, Karl Wernicke. This area is associated with the memories of the sounds of words. Damage to either of these areas can cause an impairment in language functioning.

Below the motor and sensory areas is the auditory portion of the brain, located in what are called the *temporal lobes*. The temporal lobes are located in both the right and left hemispheres. As you walked into the bakery if you heard the sounds of voices, the ring of a cash register or buzzers from the ovens, this information would be registered in the temporal lobes.

Continuing the journey back through the brain you will find the *parietal lobes* located to the rear of the motor area. Walking by the door to the kitchen of the bakery and feeling the rush of hot air from the ovens would involve the use of the parietal lobes. The parietal lobes house and implement information pertaining to the senses such as temperature, touch, pressure, the kinesthetic senses.

Under the parietal (root word for "wall") lobes are the *occipital* (back part) *lobes* which are located at the rear of the cerebrum and are the primary center for vision. Receive a blow here and you will see stars. This visual portion of the brain is the part which functions when you see the bread in the bakery, the people who work there and other visual stimuli. The occipital lobes are the primary visual portion of the brain. You can see in the example of the bakery experience how the parts of the brain work together to produce a whole experience.

The brain rests on an enlargement of the upper portion of the spinal cord called the *medulla*. The medulla is important because it is the connection for nervous impulses running to and from the brain. Important functions of the medulla are certain automatic activities such as respiration, circulation, and swallowing. Just to the rear of the medulla is the *cerebellum*. The cerebellum makes it possible for humans to walk and run. The main function of this area of the brain is muscle tone, coordination and posture. Located under the medulla is a connecting band of fibers called the *pons*, which connects the two sides of the cerebellum. The pons is thought to help regulate breathing.

---

In the \_\_\_\_\_ is located the sense of smell.

(*cerebrum*)

---

The \_\_\_\_\_ functions to remember the movements needed to produce words.

(*Broca's area*)

---

Wernicke's area is associated with the \_\_\_\_\_ of the \_\_\_\_\_ of \_\_\_\_\_.

(*memories, sounds, words*)

---

The parietal lobes are located to the \_\_\_\_\_ of the \_\_\_\_\_.

(*rear, motor area*)

---

The occipital lobes are the \_\_\_\_\_ for \_\_\_\_\_.

(*primary center, vision*)

---

The brain rests on an \_\_\_\_\_ of the \_\_\_\_\_ of the \_\_\_\_\_ called the \_\_\_\_\_.

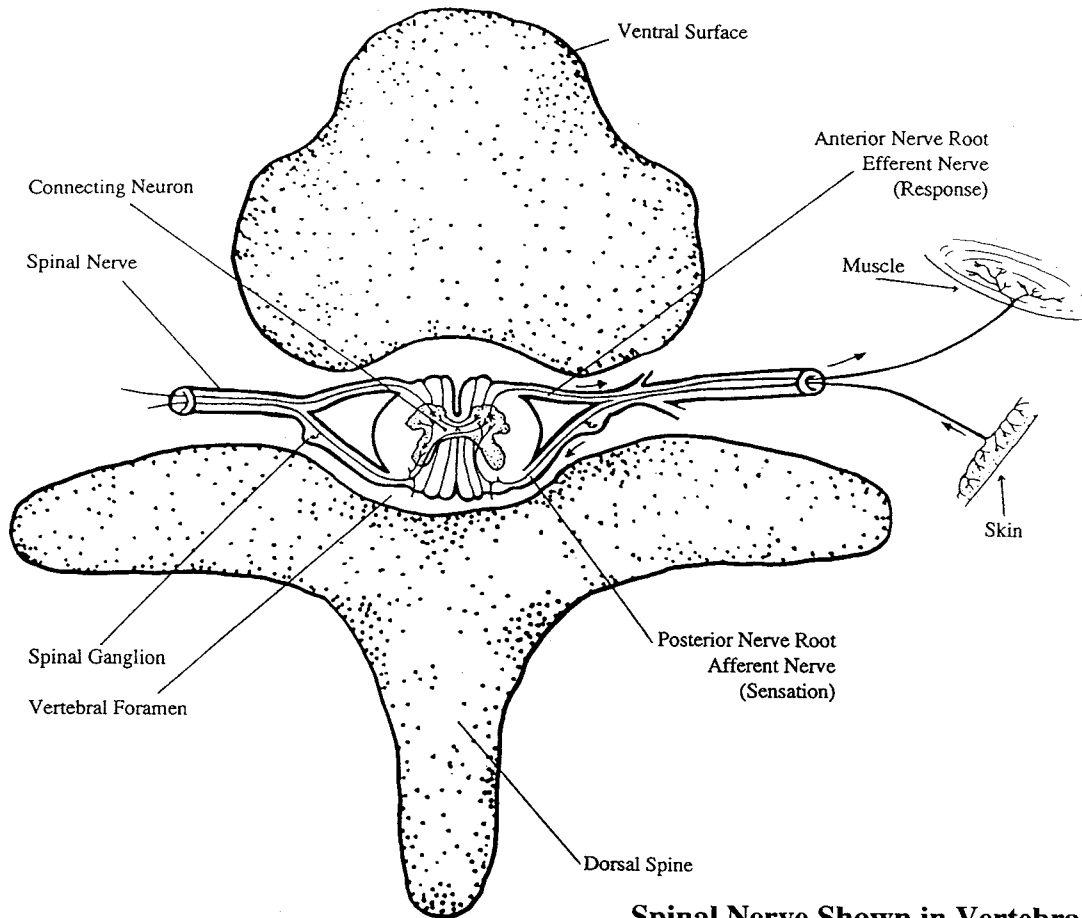
(*enlargement, upper portion, spinal cord, medulla*)

---

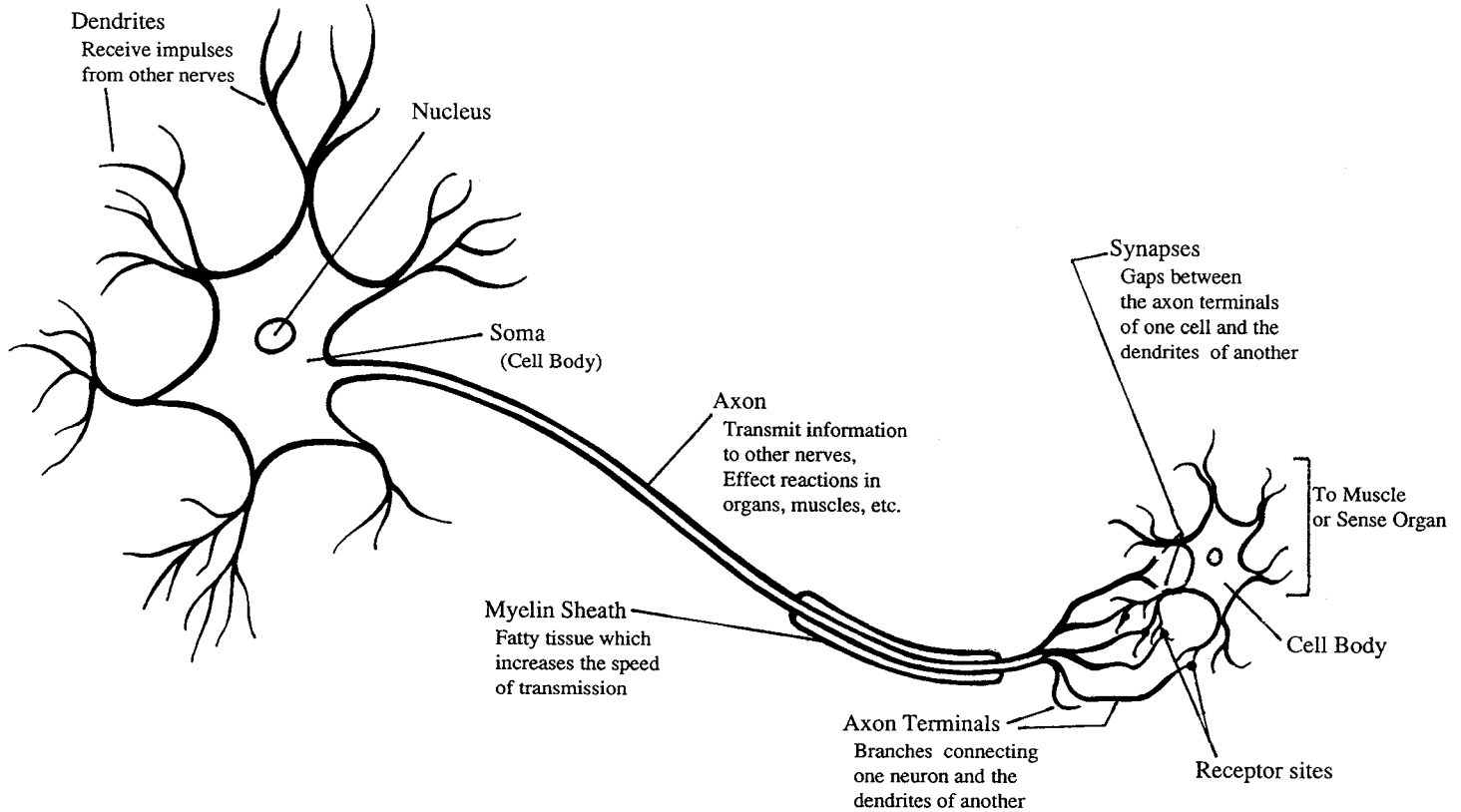
The medulla is the \_\_\_\_\_ for \_\_\_\_\_ running to and from the \_\_\_\_\_.

(*connection, nervous impulses, brain*)

---



**Spinal Nerve Shown in Vertebra**



**Relationship of Spinal Neuron and Peripheral Neuron**

How does all the information coming through the senses in the body get access to the brain? Within the medulla is the *reticular formation* which serves as a clearinghouse for information coming into the brain. Information coming in is prioritized or sometimes restricted from immediately entering the brain. Also important in relaying information to the brain is the *thalamus*, which relays the sensory information. Here incoming information goes through initial analysis before being sent on.

One other area that needs to be identified is the *hypothalamus*. The hypothalamus is important in numerous emotional and motivational aspects of behavior. The hypothalamus can be considered a final decision point for behavioral information leaving the brain. Thirst, eating, drinking, sexual urges, hormone release, feelings of emotion, sleepiness and waking are all behaviors associated with the hypothalamus.

## THE NERVOUS SYSTEM

Now that you have learned the parts of the brain and their functions, you may wonder how information from the environment gets to the relay stations so it can enter into the brain? The first step in this process is the experience of a stimulus or an event, for example, burning one's hand on a hot pan. The information in this case stimulates a receptor, which changes physical energy into nervous energy so that the information about the burned hand can be sent through the nervous system to the brain. *Afferent* (meaning, "to carry toward") *nerves* carry the message through the spinal cord toward the brain. The nervous energy enters the relay station and then is sent on to the appropriate part of the brain. The response is then carried from the brain through the *efferent* (meaning "to carry outward") *nerves* to the muscles and glands. This results in feeling pain and pulling the hand away from the hot pan. As you can imagine, this whole process takes place quickly and automatically.

The brain and the *spinal cord* together make up the *central nervous system*. We have previously identified the makeup and functions of the brain. The spinal cord runs up the back through a hollow set of bones called the *vertebrae*. The spinal cord plays a vital role in that it carries impulses from the body up to the brain. It also is the vehicle through which responses are sent from the brain back to the various parts of the body. Information traveling to and from the central nervous system utilizes the *peripheral nervous system*. The peripheral nervous system has two parts: the *somatic system*, which carries information to and from the sense organs and the skeletal muscles; and the *autonomic nervous system*, which carries information to and from the internal organs and glands. The autonomic nervous system is divided into two parts, the *parasympathetic nervous system* and the *sympathetic nervous system*. The parasympathetic system is that which is activated during relaxation, when the body is in a restful state. Sitting quietly under a tree beside a peaceful, quiet lake would activate the

MATCH the following:

pons	emotions
medulla	vision
cerebellum	regulates breathing
occipital lobes	walk
hypothalamus	swallowing

(Compare your answers with the text)

The \_\_\_\_\_ and the \_\_\_\_\_  
make up the central \_\_\_\_\_ system.

(brain, spinal cord, nervous)

The spinal cord carries \_\_\_\_\_ from the  
\_\_\_\_\_ up to the \_\_\_\_\_.

(impulses, body, brain)

Information traveling to and from the central nervous  
system utilizes the \_\_\_\_\_.

(peripheral nervous system)

Name the two parts of the peripheral nervous system.

(Compare your answers with the text)

The \_\_\_\_\_  
\_\_\_\_\_ is activated during  
relaxation.

(parasympathetic nervous system)

parasympathetic system. The sympathetic system would be activated if, while you were sitting under the tree by the same lake, you were to see a boating accident and people screaming for help. The sympathetic system would call the body into action as a response to the specific stressor observed.

Learning is a result of the functions of the brain and nervous system as they interact with the world outside the body.

## HOW LEARNING TAKES PLACE

Learning is a process in which relatively permanent changes in behavior are made as a result of practice or experience. Experiences alone do not always lead to learning. However, if those experiences are associated with reinforcement or a reward, learning is more likely to occur. A reinforcement is anything which increases the probability that a response will occur again, and learning will take place.

A good example of how we learn through the use of reinforcement can be seen in the way you train your pet. For example, everyday at feeding time you whistle for your dog to come. You then give the dog food. The dog learns that if he responds to your whistle, he will receive food. Eventually, the dog will begin to salivate each time he hears you whistle, before he sees the food. The dog can also learn to discriminate between the whistle of the owner, the whistling of children playing or the whistle of a train or tea pot.

Learning sometimes occurs when we prefer it did not. For example, if a little girl is talking while sitting in church, the parent may give her a piece of gum or candy to quiet her. What has the child learned from this experience? She has learned that if she talks, she will be rewarded with candy. Therefore, the talking behavior will probably continue each time the child goes to church.

To gain full understanding of how learning takes place you need to understand what surrounds the learning experience. Events or actions which happen before a behavior (response) are called *antecedent events*. The learning process is called *classical conditioning*. The example of the dog illustrates an antecedent event. That is, the man whistling for his dog (antecedent event) followed by the dog receiving food results in learning. Events which happen after a behavior (response) are called *consequences*. The learning which takes place is called *operant conditioning*. The consequence for the child talking during church is receiving gum.

### Classical Conditioning

As we said in the preceding paragraphs, learning which takes place by utilizing antecedent events is called *classical conditioning*. Quite simply, antecedent events are those events which occur prior to the response of the human

The \_\_\_\_\_  
\_\_\_\_\_ calls the body into action.

(*sympathetic nervous system*)

Learning is a result of the \_\_\_\_\_ of the  
\_\_\_\_\_ and \_\_\_\_\_ as  
they \_\_\_\_\_ with the \_\_\_\_\_ outside  
the body.

(*functions, brain, nervous system, interact, world*)

Learning is a process in which relatively \_\_\_\_\_  
\_\_\_\_\_ in \_\_\_\_\_ are made as  
a result of \_\_\_\_\_ or \_\_\_\_\_.

(*permanent changes, behavior, practice, experience*)

Reinforcement is \_\_\_\_\_  
which \_\_\_\_\_ the \_\_\_\_\_  
that a \_\_\_\_\_ will occur again and  
\_\_\_\_\_ will take place.

(*anything, increases, probability, response, learning*)

Events or actions which happen before a behavior  
response are called \_\_\_\_\_  
\_\_\_\_\_. The learning process is called  
\_\_\_\_\_.

(*antecedent events, classical conditioning*)

Events which happen after a behavior response are  
called \_\_\_\_\_. The learning is  
called \_\_\_\_\_.

(*consequences, operant conditioning*)

body. Much of the learning which takes place in classical conditioning involves a reflex response. The *reflex* is a simple, unlearned reaction which is mechanical in nature, that is, it does not involve choice. It is referred to as the *unconditioned response*. The meat powder in the example below is referred to as an *unconditioned stimulus* because the dog responds to it naturally.

This type of learning through antecedent events, or events occurring prior to the response, was discovered at the beginning of the twentieth century by a Russian physiologist, Ivan Pavlov, as he was studying digestion. Pavlov observed that meat powder placed on his dog's tongue produced salivation. The following diagrams help us understand the process:

US	UR
Unconditioned stimulus (meat powder)	Unconditioned response (salivating)

Then Pavlov rang a bell at the same time he gave the dog the meat powder.

CS	US	UR
Conditioned stimulus (bell)	Unconditioned stimulus (meat powder)	Unconditioned response (salivating)

The dog learned to associate the bell with salivating. Therefore, the bell is referred to as a *conditioned stimulus*, meaning, one that must be taught.

Eventually the bell alone without the meat powder produced the salivating.

CS	CR
Conditioned stimulus (bell)	Conditioned response (salivating)

A common example of classical conditioning is the pain caused when one puts a hand too close to a hot stove, which results in the automatic reflex action of pulling one's hand away from the heat. Another example of a reflex response is blinking as a ball comes toward your eyes.

How does classical conditioning work? Look at this example. Some families place a bell outside the back door. When it is time for the children to come home, the parents ring the bell. This saves them the frustration of hunting for their children. The children come when they hear the bell ringing because they know dinner is ready. Learning occurs because each time the bell rings a meal is served. As the children run home their mouths may begin to water as they anticipate the meal. The mouth watering occurs as a natural response or reflex response to the ringing of the bell. It is called classical conditioning.

Suppose the meal were no longer served when the bell rang. Eventually, the behavior of responding to the bell

The reflex is a \_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_ which is \_\_\_\_\_  
in nature and does not involve \_\_\_\_\_.

(simple, unlearned reaction, mechanical, choice)

---

Two examples of classical conditioning are the \_\_\_\_\_ caused by a \_\_\_\_\_ resulting in \_\_\_\_\_ one's hand and the \_\_\_\_\_ of the eyes as a ball comes toward them.

(pain, hot, stove, pulling away, blinking)

---

would extinguish itself or stop. *Extinction* takes place when the reinforcement for a specific behavior is discontinued.

Emotional responses in humans can also be conditioned responses. A good example is a phobia or fear. A person may hear the hiss of an angry cat, then be bitten by the cat. This produces pain and a feeling of fear. This fear response may then be experienced the next time the person sees the cat or hears the hiss. The tensing of the muscles and change in breathing and heart rate have then become a conditioned response to the sight of the cat.

An adult who becomes petrified with fear when asked to speak in front of a group of people may be experiencing this type of learning we call conditioning. For example, a boy is asked to give a speech to the class which results in his being laughed at by the other children. The boy's reflex response to this includes becoming tense and losing his voice. When he becomes an adult, he may have this same physical response when asked to speak in front of a group. His body is reacting in the same way it reacted when he gave the speech as a child, even though the circumstances are different.

### Operant Conditioning

*Operant conditioning* is the learning that takes place through the association of consequences and behaviors or responses. Any behavior followed by reinforcement is likely to occur again. Eventually the person learns to operate on the environment in order to receive the reinforcement. The child in church has learned to operate her environment by talking, which results in a consequence of being given candy. She has learned that, if she is to receive the candy, she must first talk. Operant conditioning is the name for the technique parents often use in raising their children when they give consequences for the children's behavior.

The concept of operant conditioning was first studied by B. F. Skinner in the 1930's. He used a rat and an empty box with a lever on the side which, when pushed, released a food pellet. The rat learned by chance that if he bumped the lever, a pellet would fall down. Eventually, after chance and practice, the rat learned to push the lever to get the pellet. Learning had taken place when the rat learned to operate on his environment to receive a reward or reinforcement which was food.

Behavior that is not reinforced every time it occurs will take place only at random intervals. If the little girl at church were only occasionally given candy when she talked, she would talk only at random. If the child were never given candy during the church service, the talking would probably begin to extinguish itself or occur at random and less frequently.

Teaching the child not to talk during the church service could be accomplished by using this principle of withdrawing the reinforcement of candy or gum. After some time has passed the child may once again begin to talk during the service. This is called *spontaneous recovery*. Spontaneous recovery is the reappearance of a conditioned

Extinction takes place when the \_\_\_\_\_  
\_\_\_\_\_ for a \_\_\_\_\_  
\_\_\_\_\_ is \_\_\_\_\_.

(*reinforcement, specific behavior, discontinued*)

Operant conditioning is learning that takes place through the \_\_\_\_\_  
of \_\_\_\_\_ and \_\_\_\_\_  
or \_\_\_\_\_.

(*association, consequences, behaviors, responses*)

The concept of operant conditioning was first studied by \_\_\_\_\_ in the \_\_\_\_\_.

(*B. F. Skinner, 1930's*)

Behavior not reinforced every time it occurs will take place only at \_\_\_\_\_.

(*random intervals*)

\_\_\_\_\_ is the reappearance of a conditioned response after a period of time has gone by.

(*Spontaneous recovery*)

response after a period of time has gone by. If this reappearance behavior is not reinforced, it will quickly extinguish itself once again.

Anger is a type of learned behavior. People can learn that anger works for them. As a result they use the anger to make other people do what they want them to do. A good example of this is a manager in a business who never feels heard by his subordinates until he becomes angry and yells. Perhaps in the past the employees had not finished projects on time. They did not turn their projects in until the manager became angry and yelled. By their behavior the employees had begun to teach the manager that he is more likely to get quick responses if he yells.

Children also are excellent at learning that they do not have to respond to their parents' directions until the parent becomes angry. Look at the mother who tells her daughter to wash her hands for dinner. She calmly asks the daughter three times to wash her hands, but receives no response. She then yells loudly at her daughter. Her daughter will then wash her hands. Both people in this situation have learned. The mother has learned if she wants immediate results she needs to yell. The daughter has learned she does not need to respond until the mother yells.

We are learners. We learn from our own experiences, and we learn from watching other people. Parents model behavior for their children, and children learn how to act by watching their parents. Numerous times in my practice I have seen a father (or mother) display anger by talking loudly, hitting a fist against the chair, or by verbally attacking another family member. These parents have brought their child to counseling because he or she has been expressing anger. They want the child to learn not to be angry. The parents are oblivious to the fact that they are expressing anger. It is often evident that the child has learned this behavior by watching how his or her parents act.

### Rewarding or Reinforcing Desired Behavior

Two types of reinforcers can be used to reward specific wanted behaviors. *Primary reinforcement* satisfies a natural want or need or produces comfort. An example of a primary reinforcer is food and water. *Secondary reinforcement* is any reward in which the significance is learned. Examples of secondary reinforcers are praise, success, attention, grades and approval. Money is also a strong secondary reinforcer since it can be used to purchase food and water which are primary reinforcers.

Many times we have heard parents say they do not believe in rewarding children for doing work the parents think they should do on their own. Neither do they believe in rewarding them for behaving as they should. Yet the pay check the adult receives is the perfect example of positive reinforcement for work accomplished.

Behavior you want to see a child change needs to be followed by a consequence at the time it occurs. In this way the child learns to change the behavior you want to

Primary reinforcement satisfies a \_\_\_\_\_  
\_\_\_\_\_ or \_\_\_\_\_ or \_\_\_\_\_  
\_\_\_\_\_ .

*(natural want, need, produces comfort)*

A secondary reinforcer is any \_\_\_\_\_ in which  
the \_\_\_\_\_ is \_\_\_\_\_ .

*(reward, significance, learned)*

Behavior you want to change needs to be followed by  
a \_\_\_\_\_ at the time it \_\_\_\_\_ .

*(consequence, occurs)*

extinguish. A daughter may talk back or argue every time you ask her to do something. There needs to be a consequence every time she does this. A good example of this is asking her to clear the table after dinner. If she argues, say to her, "Now you can also wash the floor because you argued with me, and if you continue to argue, I will add another consequence." If a child comes home thirty minutes late from a date, that behavior should be followed by a consequence, if you want to stop the coming home late. The consequence should fit the situation, as we discussed earlier. The important factor to remember is consistency. A teenager who comes home thirty minutes late could be required to be home thirty minutes before the curfew the next night. Always put a consequence on the behavior you want to change. Likewise, behaviors which you want to see continue should be rewarded. The closer the reward or reinforcement occurs in relation to a behavior the greater the effect of the reinforcer. Reinforcement which occurs within five to ten seconds after a behavior is more likely to have more effect on learning than reinforcement which is given thirty minutes after a behavior.

Various schedules of reinforcement are used to reward behavior and bring about learning. Reinforcement that is given after every response is called *continuous reinforcement*. For example, every time a child picks up a toy and puts it on the shelf he or she can be rewarded with a piece of candy (primary reinforcer) or praise (a secondary reinforcer). This will increase the probability that picking up the toys will become a learned behavior. *Partial reinforcement*, or rewarding only a set number of responses, results in a strong learning response. If a child is rewarded with candy after every third toy he or she puts on the shelf, the parent would be using a partial reinforcement called a *fixed ratio*. Another type of partial reinforcement for learning is a *variable rate* of reinforcement. For example, the child would be rewarded for every third toy he or she put on the shelf, then for the second toy and then again after the fourth toy. Adults receive variable or fixed reinforcement when they are paid for a job they do instead of being paid by the hour. The variable rate of reinforcement brings about the strongest learning response.

Reinforcement can also be given at fixed and variable intervals. Fixed and variable interval schedules involve the passage of time. The reinforcement is scheduled for time periods rather than the amount of work done. An example of this is to reward the child for every three minutes of picking up toys (a fixed interval reinforcement) or to reward the child first for two minutes of picking up toys, then for four minutes, and then for three minutes (a variable interval reinforcement). The adult who works for an hourly wage is receiving a fixed interval reinforcement each time he or she receives a pay check.

### Reinforcement and Punishment

*Positive reinforcement* is any response to a behavior which is pleasurable or desirable. Candy or praise can be

The \_\_\_\_\_ the reward or \_\_\_\_\_  
 \_\_\_\_\_ occurs in relation to a  
 behavior, the \_\_\_\_\_ the \_\_\_\_\_  
 of the \_\_\_\_\_.

(closer, reinforcement, greater, effect, reinforcer)

Reinforcement given after every response is called \_\_\_\_\_.

(continuous reinforcement)

The \_\_\_\_\_ of reinforcement  
 brings about the strongest learning response.

(variable rate)

\_\_\_\_\_ and \_\_\_\_\_  
 \_\_\_\_\_ involve the  
 passage of time.

(Fixed, variable interval schedules)

Positive reinforcement is any \_\_\_\_\_  
 to a \_\_\_\_\_ which is \_\_\_\_\_  
 or \_\_\_\_\_.

(response, behavior, pleasurable, desirable)

considered pleasurable reinforcement. Pleasant rewards increase the response rate of the behavior being taught. *Negative reinforcement* can be described as the removal of an unpleasant event which, as a result, increases the probability that a response will occur. An example of negative reinforcement would be to turn off a bright light shining in your eyes and producing discomfort for you. Taking an aspirin for a headache is negatively reinforcing. If the headache leaves after you take the aspirin the likelihood increases that the next time you have a headache you will take an aspirin. In this situation you are removing the uncomfortable or unpleasant event.

Punishment can be distinguished from negative reinforcement. Punishment brings about learning through decreasing the likelihood that a behavior will occur again. Punishment may involve adding an uncomfortable or noxious response following a behavior. The goal in mind is to decrease the likelihood of the behavior occurring again. The withdrawal of a pleasant event may also be classified as punishment. If a teenage boy has a 11:00 p.m. curfew and he stays out until 11:30 p.m., punishment for this behavior might be to require him to come home at 10:30 the next time. Another form of punishment might be to give him a noxious task, such as scrubbing the bathroom floor on his hands and knees. Punishment may also involve the removal of a positive event. In the case of the boy who stayed out thirty minutes past his curfew, the punishment might be to require him to miss going to a party with his friends the next night. The goal of all punishment should be learning. It should not be punishment for the sake of punishment. Learning will more likely take place if it fits the situation, is not excessive, but is significant enough to make the point. I prefer to use the word "discipline" instead of "punishment", since discipline promotes the idea of teaching the person (child or teenager in this case) to discipline himself.

Problems can arise when punishment is used because it is aversive in nature, that is, it is usually painful and done in anger. This provokes a type of response which encourages escape or avoidance learning and often fosters fear and aggression. For example, the child who is afraid he is going to be punished may stay away from home to avoid facing the punishment.

Punishment may increase aggression on the part of the person being punished. A good example of this is a father standing in the kitchen window watching his son play outdoors. He sees his son hit a playmate. Immediately, the father rushes out, brings the boy inside and spansks him for hitting the playmate. In this case, did the child learn not to hit? Or did the child learn it is okay to hit, but only if you are stronger or are an adult? How many times have you been in a store shopping and have seen a frustrated mother with a crying child? You overhear the mother say, "If you don't stop crying I am going to spank you." Now the very consequence given for the crying is going to produce more pain with a response of more tears. Has the mother's punishment alleviated the problem? What has the child learned? If the mother had ignored the child or had taken

Is the following statement true or false?

Punishment is the same thing as negative reinforcement. \_\_\_\_\_

(false)

---

Punishment may increase \_\_\_\_\_ on the part of the \_\_\_\_\_ being \_\_\_\_\_ .

(aggression, person, punished)

---

the child outside to sit on a bench until the crying stopped, the mother would have decreased the chances that crying would occur every time they came to the store. If the mother were to continue that same response every time they came to the store, eventually the behavior would probably extinguish itself.

### CONCLUSION

All the information on learning could not be put into one chapter. We needed first of all to learn about the mechanism of the brain and how we learn from our environment. As you can see, there is a coming together of the mind and body, both working as a whole to experience, identify and respond to the vast amount of stimuli experienced every day. Within each person are the resources to create, learn and live. The child and the adult are the products of genes since biology gives the basis from which we work. To this biological base is added learning, which comes from the interaction of the person with the environment.

Each of us and society as a whole are products of what we have experienced and learned. The influence of parents, brothers, sisters, teachers, governments, churches, books and the media all work together to shape us into the creation we will become. Learning is a lifelong process which never stops. We continue to experience and learn as long we live.

Name six persons or things which help shape us into the persons we become.

---

---

---

---

---

---

*(Compare your answers with the text)*

### Home Study Exercise

**Basic activity** (*Levels 1, 2, and 3*). Read the study guide and answer the following questions:

1. Name four ways in which the brain functions to handle information.

---

---

---

---

2. How do some Indians use the right and left sides of the brain in their symbolism?

---

---

---

---

3. How does the brain process information received from the senses?

---

---

4. What two parts of the body coordinate and channel information between the two hemispheres?

---

5. In what area of the brain are sensory information and movement housed?

---

6. In what part of the brain is the sense of smell located?

---

7. Discuss the contribution of Paul Broca to psychology.

---

---

---

8. Where are the parietal lobes located and what is their function?

---

---

9. Discuss the importance of the medulla.

---

---

---

10. List behaviors associated with the hypothalamus.

---

---

11. Explain how, if you burn your hand, the information enters the brain to stimulate response.

---

---

---

---

12. Why is the spinal cord important?

---

---

---

---

13. Discuss the two parts of the peripheral nervous system and their functions.

---

---

---

---

14. Compare the parasympathetic nervous system with the sympathetic nervous system.

---

---

---

---

15. What is reinforcement?

---

---

16. Explain the following terms: antecedent events; consequences.

---

---

---

---

17. What is a reflex?

---

---

18. Give two examples of classical conditioning.

---

---

---

---

19. What is meant by extinction of behavior?

---

---

20. How does operant learning take place?

---

---

21. How can a person use anger as a type of learned behavior?

---

---

---

---

22. Name two types of reinforcers used to reward specific wanted behaviors.

---

---

23. Why should a consequence be placed on behavior you want to change?

---

---

---

---

24. Define positive and negative reinforcement.

---

---

**Supplementary activity** (*Levels 2 and 3*). Read the study guide and the article entitled "Learning," pp. 634-638, *Baker Encyclopedia of Psychology*. Answer the following questions:

1. What are the functions of the left and right hemispheres of the brain?
2. How is learning defined?
3. How does reinforcing behavior increase the possibility that learning will occur?

**Advanced activity** (*Level 3*). Read the study guide and the following articles in *Baker Encyclopedia of Psychology*: "Classical Conditioning;" "Operant Conditioning," pp. 206-209. Answer the following questions:

1. Write a one-page essay comparing classical conditioning and operant conditioning.
2. Why might a program of reinforcement be more beneficial than punishment?
3. What problems can occur when punishment is used as a means of teaching a child?

### **Seminar Discussion**

1. Discuss learning by observation.
2. Discuss the importance for parents to model the behaviors they want their children to exhibit.
3. What do you see as the limitations of man studying the brain?