

A Sounding Ovation

by Bernice Hauser, Primary Education Correspondent

Have you ever noticed how a hamburger, a favorite food, is used all over the world but in a slightly different form or in a slightly different style or with different ingredients? The same is true of sound, musical instruments, and music. Different cultures take a sound, a melody, and make it their own. The following background and activities regarding the study of sounds are appropriate for early childhood science programs and primary science programs.

Let's start with the study of sounds. Close your eyes. What can you hear? Even when everything is very quiet, you will still be able to hear some sounds. Maybe leaves rustling, machines humming, someone walking by, a bird singing. Can you hear your own breathing? Your friend's humming? Sounds give us communication, information, messages, warnings, pleasure, and much more.

What is sound? Sound is made when something vibrates. That is, when something moves backwards and forwards very quickly. These vibrations travel through the air and are called sound waves. When you throw a stone into a pond, you can see water ripples moving out into circles. Sound waves spread out through the air in the same way. High-pitched sounds are made when something vibrates very fast. Low-pitched sounds are made when something vibrates slowly.

When you talk, you are making something vibrate. Your vocal cords are two white bands of white "shin" that stretch across your voice box. When you speak, you are making these vocal cords vibrate. You are stretching the cords tightly across your voice box and forcing air from your lungs out between the cords. The cords then vibrate and send out waves of sound. Your voice box is in your throat. It is your Adam's apple. If you put your hand on your throat, then swallow, you can feel your Adam's apple move up and down. Your tongue and lips and teeth help make words out of the sounds your vocal cords make. Try saying "Mary had a little lamb" with your mouth wide open and your tongue held still and you will see that with your vocal cords alone, you cannot talk, you cannot make a sound.

First Experiment: Try this experiment to see sound vibrations. Hold a ruler on the edge of a table and twang the end. The end will move up and down very quickly. These vibrations produce a sound. Now slide the ruler across the table as you twang it. What happens to the vibration frequency as the twanging part of the ruler gets longer? What happens to the pitch of the sound?

Second Experiment: You will need loudspeakers for this experiment. Play some music, then hold an inflated balloon against one of the loudspeakers. What can you feel coming off the balloon through your hands?

Third Experiment: Take a tuning fork. Make it sound by striking the prongs on a soft object and then placing the base on various materials. Try metal, wood, plastic objects, a towel, a

cushion, books, fruit, rubber, cork, and water. Which materials give the best sounds? Why do you think these materials give the best sounds?

How we hear. The ear is an amazing part of the body. Sound waves travel through the air. Your outer ear collects the sounds and they pass down into the inner ear canal. They push against the ear drum, then pass to three bones -- hammer, anvil, and stirrup -- which vibrate backwards and forwards. The vibrations reach the cochlea, which is shaped like a snail shell. It is filled with a fluid that passes the vibrations onto tiny nerve cells. The nerve cells pass signals to the auditory nerve that sends a message to the brain.

First Experiment: Take a bowl and stretch a plastic bag over the top. Fasten it with a rubber band. (The plastic bag must be as tight as possible.) Sprinkle dry cereal or sugar on the plastic. Then take a big pan, hold it near the bowl and strike it with a spoon a few times. Strike the drumhead with your fingers. What happens to the cereal or sugar?

Second Experiment: Get a friend to put an ear to a wall. Then tap out a message on the wall. Your friend should be able to receive the message clearly some distance away or on the other side of the wall. The tapping sounds produce vibrations that travel quickly and easily through the material in the wall. Sound moves more easily through brick, stone, and glass.

Bonus Question: Animal ears are specially shaped to help their hearing. What animal has large ears to catch the smallest sound? What animal swivels its ears to follow a sound?

How does sound travel? Sound waves pass through every material -- air, water, and solid objects. There is only one place where sounds cannot be heard: up in space where there is no air or other matter to carry sound, there is only silence.

Experiment: You will need a watch or kitchen timer, a balloon filled with water, and a table. To show that sound travels through air, place the watch near your ear. To show that sound travels through water, place the filled balloon next to your ear and the watch on the outside of the balloon away from your ear. Can you hear the sound? Now place the watch on a table about a meter from your ear. Place your ear on the table. Can you hear the sound? In which situation did the watch or timer tick the loudest?