**How Does Human Hearing Compare To Other Animals?**

**I. Introduction**

 An animal senses and responds to changes in its environment with the help of its nervous system. Any change inside or outside an animal’s body that causes a response is called a stimulus. Sound is an example of an external stimulus. An animal’s nervous system enables it to hear sounds.

 Sound causes air around it to vibrate. These vibrations are known as sound waves. When sound waves reach your ears, they stimulate nerve cells deep inside your ear. These cells send impulses to the brain. The brain responds, and you hear a sound.

 One way to measure sound is by its frequency. The frequency of a sound is the number of waves that pass a given point during one second. Frequency is measured in hertz (Hz). Low-pitched sounds have a low frequency (a small Hz value), while high-pitched sounds have a high frequency (a large Hz value).

 You may be familiar with a special dog whistle that emits a sound that dogs are able to hear, but humans are unable to hear. This is because the hearing systems of different animals are adapted to pick up sounds within different frequency ranges. Different animals have different total sensitivity ranges the total ranges of frequencies they can hear.

 An animal’s extreme sensitivity range is a subset of frequencies within its total sensitivity range. This includes sound frequencies most commonly produced by its species. An animal’s survival depends on its extreme sensitivity range. Animals monitor their environment for sounds that may provide information about predators, food sources, shelter, water, and environmental changes.

 In this Virtual Lab you will observe how animals react to different frequencies of sound. You will determine their total sensitivity and extreme sensitivity ranges of hearing.

**II. Procedure**

 1. Start the activity by going to the following website :

<http://www.glencoe.com/sites/common_assets/science/virtual_labs/LS25/LS25.html> .

 2. Select an animal to test by clicking a file tab.

 3. Examine the information about how the animal’s range of hearing affects its ability to

 survive in its environment.

 4. Click the arrow on the pitch generator and select a sound frequency.

 5. Click the Play Sound button to play the sound inside the sound booth.

 6. Observe the animal’s response to determine its sensitivity to the frequency of sound being

 played. If the frequency is outside the animal’s total sensitivity range, the animal will show

 no response. If the frequency is within the animal’s total sensitivity range, the animal will

 show a subtle response: the bat will stretch its wings halfway; the crocodile will slightly

 open and close its jaws; the dolphin will move its tail; and the human, mouse, and snake will

 turn their heads. Enter in the Table low and high values of the animal’s total sensitivity

 range. If the frequency is in the animal’s extreme sensitivity range, the animal will show an

 intense response: the bat will fully extend its wings and open its eyes, the crocodile will

 widely open and close its jaws, the dolphin will jump out of the water, the human will wave,

 the mouse will sit on its hind legs, and the snake will show its tongue. Enter in the Table

 low and high values of the extreme sensitivity range.

 7. Click the Pause Sound button to pause the sound in the sound booth.

 8. Repeat the Virtual Lab until all six animals are tested.

**III. Data**

 1. Record your data in the Table below.

|  |  |  |  |
| --- | --- | --- | --- |
|  **Animal** |  **Total Range** **Low Value** **(Hz)** |  **Total Range** **High Value** **(Hz)** | **Extreme Range** **Low Value** **(Hz)** |
| Bat |  |  |  |
| Crocodile |  |  |  |
| Dolphin |  |  |  |
| Human |  |  |  |
| Mouse |  |  |  |
| Snake |  |  |  |

**IV. Analysis & Conclusions**

 **1. What is the total range of hearing for each animal you tested?**

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 **2. Compare the ranges of sensitivity for each animal. How does the total range of**

 **sensitivity compare to the extreme range of sensitivity?**

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 **3. Which animal species that you tested has hearing that is most similar to humans? Why?**

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 **4. Which animal species that you tested has hearing that is most different from humans? Why?**

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 **5. Analyze the Hz values within the total range of sensitivity and the extreme range of**

 **sensitivity for each animal. Explain why some animals are better adapted to hear**

 **particular sound frequencies than others.**

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 **6. Is it possible for any of the earth materials scenes to be affected by both mechanical**

 **and chemical weathering? If so, describe the scene and situations.**

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 **7. Why is hearing such an important adaptation in vertebrates?**

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 **8. What advantages does hearing give an animal in its natural environment?**

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