

November 12, 2016

Spider Hearing and Robot Senses

Article-Based Observation

Directions: After reading the article “Jumping spider hears distant sounds,” answer these questions:

1. If spiders don’t have eardrums, which part of their body do they use to hear, according to scientists? What physically happens to this part of their body that triggers a response? Are there other animals that may hear similarly?
2. How did the scientists determine if a spider heard a noise disturbance? Define both the qualitative and quantitative data that the scientists collected to determine when a spider heard a disturbance. Is this data representing the independent or dependent variable in the experiments?
3. What hypothesis was disproved when the researchers tested their ideas on a table protected from vibrations? State the original hypothesis and the new conclusion.

4. Explain why the vibration-protected table was necessary to the experiment. Is sound wave frequency the independent or dependent variable in these table experiments?
5. To share this great discovery with your friends, you post a picture like the one in the article on Instagram. Describe the picture you would post and write the caption you would include to help your friends understand what you learned.
6. Many news sources, including NPR and the *Washington Post*, reported this finding on jumping spiders. Find additional stories and compare and contrast each outlet's approach.

Responses to Article-Based Observation

1. If spiders don't have eardrums, which part of their body do they use to hear, according to scientists? What physically happens to this part of their body that triggers a response? Are there other animals that may hear similarly?

Possible student response: *Scientists have found that these jumping spiders, without eardrums, probably hear with their tiny leg hairs. When a disturbance moves these hairs, a spider responds. Jérôme Casas has observed that the hairs on cricket legs appear to respond to airplanes flying overhead.*

2. How did the scientists determine if a spider heard a noise disturbance? Define both the qualitative and quantitative data that the scientists collected to determine when a spider heard a disturbance. Is this data representing the independent or dependent variable in the experiments?

Possible student response: *Bursts of nerve cell/neuron activity were recorded from probes in a spider's brain and researchers also observed the physical movement of hunkering down motionless. Both data indicated to scientists that spiders heard a disturbance. This data measures the dependent variable.*

3. What hypothesis was disproved when the researchers tested their ideas on a table protected from vibrations? State the original hypothesis and the new conclusion.

Possible student response: *Scientist thought that spiders could hear airborne sounds only at very short distances. The researchers determined that spiders can also hear airborne sound waves from 70 to 200 hertz from distances of several meters.*

4. Explain why the vibration-protected table was necessary to the experiment. Is sound wave frequency the independent or dependent variable in these table experiments?

Possible student response: *Since sound waves can cause objects to vibrate, the researchers had to eliminate the vibrations traveling through objects in order to determine whether spiders could actually perceive sound waves traveling through air. Vibration of the surface on which the spider stood was a confounding variable that needed to be eliminated. Sound wave frequency is the independent variable in the experiments.*

5. To share this great discovery with your friends, you post a picture like the one in the article on Instagram. Describe the picture you would post and write the caption you would include to help your friends understand what you learned.

Possible student response: *I would post a picture of the spider zoomed in on its leg hair with the caption: Spiders use their leg hairs to hear sound waves across great distances!*

6. Many news sources, including NPR and the *Washington Post*, reported this finding on jumping spiders. Find additional stories and compare and contrast each outlet's approach.

Possible student response: *All three sources cover the same core facts, however, each treats the story slightly differently. The Washington Post adds a nod to Spiderman and includes some humor, while NPR focuses more on quotes from the researchers and their study. Science News gets into the details of the study and better summarizes the big ideas.*