

## Studying Elephant Communication

### OVERVIEW

This video case study explores whether elephants can detect, interpret, and respond to signals delivered by underground vibrations. It provides an example of how experiments are designed to test a hypothesis and how individuals can communicate information to others. As students watch the video, they are prompted to answer a number of embedded questions at selected time points.

Videos can be used for teaching by stopping at appropriate time points and asking questions to cue student attention, encourage critical thinking, and make the students part of the story. This interactive video, which was created using BioInteractive's [Interactive Video Builder](#) tool, incorporates embedded questions at automatic pause points. Students can answer the questions directly in the interactive video or in the "Student Worksheet."

After students complete the case study, they will be able to view their answers and add to their written explanations if their thinking has changed.

Additional information related to pedagogy and implementation can be found on [this resource's webpage](#), including suggested audience, estimated time, and curriculum connections.

### STUDENT LEARNING TARGETS

- Describe different methods used by animals to communicate with other members of a group and to interpret their environment.
- Generate a hypothesis to explain observations.
- Design an experiment to test a hypothesis.
- Predict the results of an experiment, based on a hypothesis.
- Interpret the results of an experiment and draw conclusions based on those results.

### PRIOR KNOWLEDGE

Students should be familiar with terms associated with experimental design, including:

- control and experimental condition
- dependent and independent variables

### BACKGROUND

Organisms have adaptations that allow them to communicate in different environments, including the ability to both send and receive signals. To be used to communicate, a signal must be created and transmitted by the sender and be received and interpreted correctly by the recipient.

Organisms are constantly receiving different kinds of signals about their environment. Correctly interpreting these different signals helps organisms respond appropriately to their environment, including to other animals living in that environment.

### TEACHING TIPS

- Students can work on the questions individually or in small groups.
- Students should type responses into the answer boxes that appear during the interactive video.

- If students are not using the interactive video individually (e.g., you are projecting the video to the entire class), they can write their responses in the “Student Worksheet” instead.
- **The interactive video will not proceed until an answer is submitted.** You must type at least one letter into the answer box to continue.
  - If some questions do not fit the context of your course, you can direct students to skip those questions by typing “I am skipping this question.” in the answer box.
- If students are answering questions within the interactive video, they will be prompted to submit their answers at the end of the video. They will have the opportunity to review and add further explanation to each answer if their thinking has changed.
  - Once they are done, they can download a report of their answers. The report can be saved as a PDF or printed. You can have students submit the PDF or screenshots/photos of the report.
- The original video without embedded questions is available under [Studying Elephant Communication](#).

## SUMMARIES AND QUESTIONS

The interactive video has multiple sections. After each section, the video automatically pauses and prompts students to answer an **embedded question**. This document provides additional **extension questions** that do not appear in the video, which can be used for discussion prompts and written assessments.

Below are summaries of the sections and their associated embedded/extension questions.

### Introduction (0:00–0:15)

#### *Summary*

Before the main video, students answer a question that assesses their preexisting knowledge on same-species communication within animal populations.

#### *Embedded Question*

List at least three examples of ways in which animals of the same species communicate with one another.

### Section 1 (0:16–2:00)

#### *Summary*

This section provides background information on the case study and the phenomenon being studied.

#### *Embedded Question*

In a few sentences, describe how you would design an experiment to determine whether elephants can detect and interpret the calls of other elephants through the ground.

#### *Extension Questions*

- What are the controls, independent variables, dependent variables, and manipulations you will include in your experiment?
- What is the difference between a low- and a high-frequency sound?

### Section 2 (2:01–2:52)

#### *Summary*

This section describes the first experiment and the results of testing how elephants respond to sounds traveling through the air.

#### *Embedded Questions*

- What do you conclude from these results?

- So far, O’Connell tested the elephants’ response to a sound traveling above the ground. Which other condition is she likely to test next as part of her experiment?

*Extension Question*

Why do you think O’Connell started the experiment by playing the alarm sound through the air?

**Section 3 (2:53–4:12)**

*Summary*

This section explores the second condition tested: whether elephants can detect low-frequency sounds traveling through the ground.

*Embedded Question*

Predict what will happen when the shaker is turned on if elephants communicate using only sound traveling through the air and not the ground.

*Extension Question*

In your own words, explain the purpose of the watering hole, the shaker, the geophone, and the microphone in this experimental design.

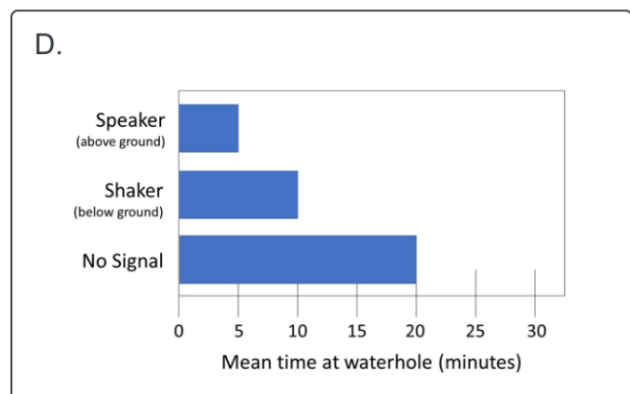
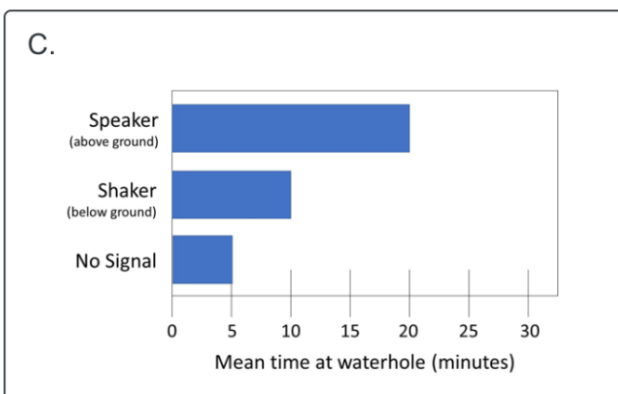
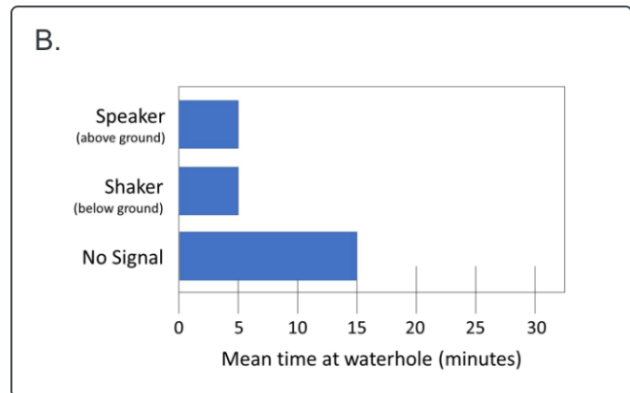
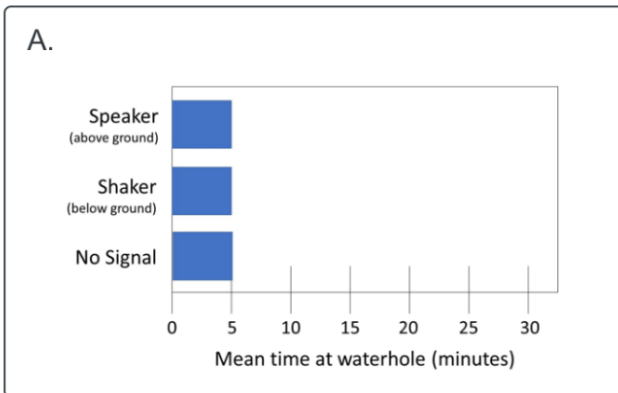
**Section 4 (4:13–4:42)**

*Summary*

This section shows students the response to sound traveling through the ground.

*Embedded Question*

Which of the following graphs best describes the results of the experiment? Justify your answer in a few sentences.



**Section 5 (4:43–4:59)***Summary*

This section reveals the experimental results and asks students to interpret what they mean.

*Embedded Questions*

What do you conclude from the results of this experiment?

**Section 6 (5:00–5:22)***Summary*

This section asks students to consider why elephants would have different responses to the signal transmitted through the air versus ground in O’Connell’s experiment.

*Embedded Question*

What is a plausible explanation for why elephants responded differently to ground and air signals?

**Section 7 (5:23–5:47)***Summary*

This section prompts students to think about why elephants may have different responses to the ground signal as opposed to the air signal.

*Embedded Question*

How could you test the hypothesis that elephants interpreted the ground signal as being farther away than the air signal?

**Section 8 (5:48–6:16)***Summary*

This section summarizes the ongoing research and the ideas of the video.

*Embedded Question*

Communication requires several components:

- a signal with information
- transmission of the signal
- receipt of the signal
- interpretation of the information within the signal

Provide an example of each of these components from the study.

*Extension Question*

Thinking about your own experiences, how do you use different forms of incoming information to interpret your environment? What do you do when the different forms of information are consistent with one another? What do you do if they are not consistent?

**CREDITS**

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