



## Studying Animal Behavior Using Ethograms

**Overview:** Observation is a very important component of the scientific process. Observing animal behavior is crucial to understanding how animals survive in their habitats and can be used to make informed decisions about the management of animal habitat. Students use observation skills and make inferences and while applying the the scientific method to study animal behavior.

**Grade Level:** Upper Elementary, Middle or High School (with extensions). Two options are provided: Option 1 is an entry level activity and Option 2 more advanced.

**Content Areas:** Science: Zoology/Life Science, Environmental Education, Mathematics (with extension)

### **Objectives:**

1. Learn one method an ethologist uses to collect animal behavior data.
2. Learn and apply the scientific method: observe/collect information, develop hypothesis, design experiment, collect data, form a conclusion, accept/reject hypothesis.
3. Understand how studies of animal behavior can benefit animals & their habitat.

**Activity Time:** At least 30 minutes for activity introduction and one short round of animal observations.

**Materials:** Ethogram Data Collection Form worksheet, Frequency of Behavior Graph worksheet (optional), clipboard, pencil, timer with seconds hand, animal to observe (zoo animal, animal on a video, a pet), scientific method diagram (Note: many different versions of the scientific method exist. One is suggested below however instructors may wish to search for one that best meets their educational needs.)

**Vocabulary:** Ethogram, ethologist, behavior, scientific method

### **Procedure – Option 1 – Entry Level**

- 1) To generate interest, have students observe an animal for a few minutes. The animal could be on school grounds, backyard, park, online, etc. Remember animal observation etiquette and to respect an animal's space! Watch from a distance and remain calm and quiet so that the animal feels safe. Resources for online animal viewing are provided in the Resources section below.
- 2) Define "behavior". Ask students to describe what they observed the animals doing. Explain that the students have been observing animal behavior. Behavior is the way an animal acts or is something an animal is doing.
- 3) Review the benefits of studying animal behavior. The more we learn about animals, the more we understand their needs for survival in the wild.
- 4) OBSERVE. Choose an animal to observe. This can be an animal at a zoo, in your backyard, a pet, or watching an online video of an animal in its natural habitat. Observe the animal and its behavior for a few minutes. What behaviors do you see it doing? Sitting? Sleeping? Eating? Remember animal observation etiquette and to respect an animal's space! NOTE: It's important to distinguish between identifying and observing a behavior versus guessing what the behavior means or is

communicating. Example 1: A human smiling usually means that the human is happy. The behavior is “smiling”; what it usually means is that the human is happy. Example 2: A squirrel is running. It may be running because it is running towards its mate (excited to see a mate), from another squirrel (it’s afraid of the other squirrel), from a predator (it’s really afraid of a predator!), to a new exciting food source (happy to find new food), etc. For the purposes of this exercise, we are only concerned that the squirrel behavior is “running” and not why it’s running.

- 5) Using the Data Collection Form, enter the animal species common name and scientific name, date of study, time of day observations began, and observer’ name at the top of the data sheet.
- 6) Begin creating an “ethogram” which is a list of behaviors for a particular individual animal or animal species. Observe the animal for a few minutes and list the behaviors seen or the behaviors you expect to see in the “behavior” column. Example for Gibbons (a type of ape): brachiate (swing from branch to branch using arms), sit, look around, vocalize, eat, defecate, groom, yawn, sleep. Sometimes the animal may not be visible or out of view so include “out of view” in your behavior column.
- 7) Optional: In the Code column, set an abbreviation for the behavior. A code is useful when entering data into a data base. “Out of view” can be abbreviated as “OOV”.
- 8) Determine the amount of time the animal will be observed (10 minutes, 1 hour, etc.)
- 9) COLLECT DATA Every 10 seconds (or interval chosen by instructor), record the behavior of the animal at that very moment (not before or after the 10 second mark) and make a hash mark in the tally column in the row of that behavior. One way to think of observing at intervals process is to imagine taking a still photo of the animal every 10 seconds and recording the behavior of the animal in the still photo. If the animal is out of view (behavior code “OOV”) at the moment of observation interval, make a tally for OOV. Optional: Two people can conduct the observation as a team with one person keeping track of time and the other observing the animal and recording data. When observation time is completed, add up all the hash marks and record that number in the total column.
- 10) ANALYSIS & CONCLUSION. Review the data and determine what this individual animal spent most of its time doing. Write your conclusion.

### ***Procedure – Option 2 – Advanced Level***

- 1) To generate interest, have students observe an animal for a few minutes. The animal could be on school grounds, backyard, park, etc. Remember animal observation etiquette and to respect an animal’s space! Watch from a distance and remain calm and quiet so that the animal feels safe.
- 2) Define “behavior”. Ask students to describe what they observed the animals doing. Explain that the students have been observing animal behavior. Behavior is the way an animal acts in response to its environment, surroundings or stimulus (something introduced to the animals’ environment that may cause the animal to react or respond).
- 3) Introduce or have students research and define the term “ethology”. Ethology is the scientific study of animal behavior. Behavior studies can take place in a laboratory setting or in the animals’ natural habitat.
- 4) Review or have students research the benefits of animal behavior research. The more we learn about animals, the more we understand their needs for survival in the wild and for a healthy life under human care. The knowledge we gain is crucial for wildlife conservation efforts. Information gathered by studying animals in their natural habitat will help to:

- i) develop conservation plans that protect and manage habitat for the species
- ii) provides zoos with the information needed to create appropriate zoo habitats and care plans for animals in their care to thrive.

Frequently, animal behavior studies conducted in zoos can also supply useful knowledge about their wild counterparts!

- 5) Optional: Observe video of an ethologist at work. Students can research other well-known ethologists. Resources are given below.
- 6) Introduce or have students research the Scientific Method. The scientific method will be used to study the behavior of this animal.
  - a) For elementary students: Scientists use the steps of the scientific method to study and learn new information about how our world works.
  - b) For middle & high school students: When conducting research, scientists use the scientific method to collect measurable, [empirical evidence](#) in an experiment related to a [hypothesis](#) (often in the form of an if/then statement), the results aiming to support or contradict a [theory](#).
  - c) The scientific method is comprised of the following steps:
    - i) Observe & develop a question
    - ii) Form a hypothesis
    - iii) Conduct and experiment: collect and analyze data
    - iv) Conclusion
    - v) Accept/reject hypothesis
    - vi) Using the knowledge gained, conduct another experiment.
    - vii) Report findings.
- 7) OBSERVE. Choose an animal to observe. This can be an animal at a zoo, in your backyard, a pet, or watching an online video of an animal in its natural habitat. Observe the animal and its behavior for a few minutes. What behaviors do you see it doing? Sitting? Sleeping? Eating? Remember animal observation etiquette and to respect an animal's space!

Optional: Conduct information research to find out more about the natural history of your animal. In what continents or countries is it found? In what habitat does it live? What does it eat? What are some interesting behaviors this animal demonstrates?

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- 8) Using the Data Collection Form, enter the animal species common name and scientific name, date of study, time of day observations began, and observer's name at the top of the data sheet.
- 9) Begin creating an "ethogram" which is a list of behaviors for a particular individual animal or animal species. Observe the animal for a few minutes and list the behaviors seen or the behaviors you expect to see in one column. Example for Gibbons (a type of ape): brachiate (swing from branch to branch using arms), sit,

look around, vocalize, eat, defecate, groom, yawn, sleep. Sometimes the animal may not be visible or out of view so include “out of view” in your behavior column.

- 10) In the Code column, set an abbreviation for the behavior. A code is useful when entering data into a data base. “Out of view” can be abbreviated as “OOV”.
- 11) Determine the amount of time the animal will be observed (10 minutes, 1 hour, etc.)
- 12) **FORM A HYPOTHESIS.** A hypothesis is a prediction or possible explanation for a question that needs to be investigated. A hypothesis can also be described as an “educated guess” of what might be expected to happen as a result of the experiment. For this activity, the question is “What does the animal I’m observing spend most of its time doing?” Since students have spent some time observing the animal’s behavior, they can now formulate a hypothesis. For example: “I’ve noticed that the squirrel seems to spend most of its time resting. My hypothesis is ‘Squirrels spend most of the time resting during this time of day.’”
- 13) **COLLECT DATA** Every 10 seconds (or interval chosen by instructor), record the behavior of the animal at that very moment (not before or after the 10 second mark) and make a hash mark in the tally column in the row of that behavior. One way to think of observing at intervals process is to imagine taking a still photo of the animal every 10 seconds and recording the behavior of the animal in the still photo. If the animal is out of view (behavior code “OOV”) at the moment of observation interval, make a tally for OOV.

Optional: Two people can conduct the observation as a team with one person keeping track of time and the other observing the animal and recording data. When observation time is completed, add up all the hash marks and record that number in the total column.

- 14) **ANALYSIS & CONCLUSION.** Review the data and determine what this individual animal spent most of its time doing. Write your conclusion.
- 15) **ACCEPT OR REJECT HYPOTHESIS.** Was the hypothesis correct? Did the animal spend it’s time doing the behavior that was expected or did it spend more time doing another behavior? Why? Write your answer.

### **Assessment**

Appropriate assessments will vary depending on instructor’s goals. The following questions can assist in guiding assessment.

- 1) Was student engaged and focused on animal observations?
- 2) Was student able to distinguish “behavior” from “what behavior means”?
- 3) Did student list several behaviors and able to describe or define each behavior?
- 4) Did student collect and record data accurately?
- 5) Can student communicate, either verbally or in written form, the hypothesis and, based on the data, offer a conclusion and/or support the hypothesis?
- 6) Can student define the following terms: ethologist, ethogram, scientific method?

### **Extensions**

- 1) Create a graph of your data using a program such as Excel or by using the provided frequency of behavior graph sheet.
- 2) Calculate percent individual behaviors of all behavior observations:

$$\frac{\text{Total of behavior \#1}}{\text{Total of all behaviors}} \times 100 = \% \text{ of each individual behavior}$$

For the given Duck example with swimming behavior:

$$\frac{7}{11} \times 100 = 63\%$$

- 3) Conduct the activity with a different species and compare results.
- 4) Research ethograms for the chosen animal species for this activity or another species and compare them to student results. Use key words for the search such as “ethogram giraffe”.
- 5) Make a wildlife management recommendation. Information learned from studying animal behavior can be used to help animals. Based on their conclusions, ask students to make a recommendation about the animal’s needs to a zoo or wildlife manager. For the provided example of a duck, the recommendation might be “Since ducks spent most of their time in the afternoon swimming in water, I recommend that the duck exhibit at the zoo have enough water for a duck to swim.”
- 6) **FORM ANOTHER HYPOTHESIS AND CONDUCT ANOTHER EXPERIMENT.** Based on the conclusion from this experiment, what is an experiment that could be conducted next? Perhaps observations could be conducted at a different time of day to determine if the animal’s behavior changes depending on time of day and results could be compared. For example, observations could be conducted early morning, noon, and late afternoon. If observing a pet, observations could be compared when the animals is inside or outside, before feeding time and after feeding time, when around one family member compared to another family member, etc.
- 7) **REPORT RESULTS.** After conducting experiments, scientists will share what they have learned with other scientists and organizations such as:
  - a) Government legislators and the community to help update wildlife management policy.
  - b) Zoos so they can update their animal care practices to meet animals’ needs.
  - c) Scientist professionals’ groups such as the Animal Behavior Society.

To share results, write a paper and/or provide a presentation with a summary of the following sections:

1. Introduction: Why you chose to study a particular animal and the question you were trying to answer.
2. Hypothesis: Write the hypothesis.
3. Experiment: The experiment you conducted which was observing the animal. Provide details such as location of observations, how long the animal was observed, weather conditions, etc.
4. Analysis & Conclusion: Present the data collection sheet, graphs, and your review of the data: What was the behavior observed the most? Least? State your conclusion.
5. Hypothesis: State whether the hypothesis was accepted or rejected.
6. Next steps for research. State ideas and recommendations for what experiments or observations could be conducted on this species.

Students can hold an animal behavior conference where several students present their research.

## Resources

NOTE: Instructors should view the videos prior to providing to students to find behavior that is appropriate for the audience age level. Videos may contain behaviors such as predators hunting & eating prey, courtship/mating, aggression and poaching that may be challenging to some viewers.

- 1) Video: Jane Goodall Study of Chimpanzees  
<https://www.youtube.com/watch?v=DlmjF39vziY>  
Provides several segments of continuous chimpanzee behavior for this activity; one useful segment begins at 10 minutes.
- 2) Video: 60 Minutes featuring Jane Goodall <https://youtu.be/k5Q6-hh49mU>
- 3) Association of Zoos & Aquariums – Behavior Research Methods.  
<https://www.aza.org/methods-for-animal-behavior-research-dvd>
- 4) Ethologists
  - Dian Fossey
  - Konrad Lorenz
  - Ivan Pavlov
  - Karl von Frisch
  - Sarah Hrdy
  - Martin Moynihan
  - Patricia McConnell
  - Erich Klinghammer
  - Frans de Waal
  - Oskar Heinroth
  - Marc Bekoff
  - Barbara B. Smuts
  - Kevin Richardson
  - Irene Maxine Pepperberg
- 5) Animal Live Webcams. Conduct a web search for “animal live webcams” or “wildlife webcams” to find a variety of animals in action around the world!
- 6) Scientific Method Diagrams.
  - a) Science Buddies – Accessed 4/22/2020  
<https://www.sciencebuddies.org/science-fair-projects/science-fair/steps-of-the-scientific-method>
  - b) Wikimedia – Accessed 4/22/2020  
[https://upload.wikimedia.org/wikipedia/commons/c/c7/The\\_Scientific\\_Method.jpg](https://upload.wikimedia.org/wikipedia/commons/c/c7/The_Scientific_Method.jpg)
  - c) BioLogos Forum – Accessed 4/22/2020  
<https://discourse.biologos.org/t/definition-of-science-and-the-scientific-method/40110>
  - d) Biology Dictionary – Accessed 4/22/2020  
<https://biologydictionary.net/scientific-method/>
- 7) Ever the Ethologist – Lesson Plan – Accessed 4/22/2020  
Provides advanced, multi-day ethology lesson for middle school students.  
<https://betterlesson.com/search?q=ever%20the%20ethologist&from=header>
- 8) Interactive Case Study for Studying Animal Communication – Lesson Plan – Accessed 4/22/2020  
Provides animal behavior lesson for high school students focusing on elephants.  
<https://www.biointeractive.org/classroom-resources/interactive-case-study-studying-elephant-communication>

**ETHOGRAM**  
**Data Collection Form EXAMPLE**

Animal species – common name Mallard Duck

Animal species – scientific name Anas platyrhynchos

Date: 4/12/2020 Time observed 3:00pm-3:30pm

Name of Research Scientist & Observer Me

Observation time intervals every 10 seconds

Hypothesis Ducks will spend most of the time sleeping

Behavior	Code	Tally	Total
Swimming	S		7
Resting/Floating	R		2
Eating	E		4
Flying	F		0
Out of View	OOV		0
<b>TOTAL</b>			<b>13</b>

Frequency of Behavior Graph for Animal Species Mallard Duck

EXAMPLE

Frequency of Behavior

41										
40										
39										
38										
37										
36										
35										
34										
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1										
	S	R	E	F	OOV					

Behavior



**ETHOGRAM**  
**Data Collection Form**

Animal species – common name \_\_\_\_\_

Animal species – scientific name \_\_\_\_\_

Date: \_\_\_\_\_ Time observations began \_\_\_\_\_

Name of Research Scientist & Observer \_\_\_\_\_

Observation time intervals \_\_\_\_\_

Hypothesis \_\_\_\_\_

<b>Behavior</b>	<b>Code</b>	<b>Tally</b>	<b>Total</b>

Frequency of Behavior Graph for Animal Species \_\_\_\_\_

Frequency of Behavior

42										
41										
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35										
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Behavior