

SQUIRREL-OBSERVATION EXERCISE

The aim of this exercise is to provide you with some hands-on experience in conducting behavioral observations, and the opportunity to apply some of the theory you have learned in lectures to interpret specific patterns of animal behavior.

OBSERVATIONS

During the semester, you are required to observe and record the behavior of grey squirrels. Eventually, you will need to choose one specific behavior or behavior pattern to observe, formulate a hypothesis about why that behavior occurs, and try to test your hypothesis. You will need to present a final report using Adobe Spark, which will need to include your own photographs and videos of the behavior.

Initially, you should observe a variety of squirrel behaviors, until you choose a specific one on which to focus. It is recommended that each time you observe their behavior for at least **30 minutes**. You may choose to follow one **focal** squirrel and record its behavior each minute, for 30 minutes, or you may observe a group of squirrels and **scan** all their behaviors each minute, for 30 minutes. **Ensure that you do not interfere with the squirrels' behavior in any way.** Record all the behaviors you observe in an **ethogram**. Use the ethogram template on pages 4-5 as a guide. Specific examples of behaviors you might observe are given below and in the ethogram on pages 4-5, but feel free to observe additional behaviors and to address alternative questions.

- Are the squirrels eating or gathering any food? If so, what type of food (be specific).
- Are they storing / caching any food? If so, where and how?
- Are they retrieving any food? If so, how are they finding it?
- Are they using any domiciles (nests or tree holes)?
- Try to locate a nest. What are these nests made of? Where are they located (be specific about height, branch geometry, etc.)?
- Are individual squirrels interacting with each other? If so, what sort of interactions do these appear to be (play, aggression, mating, competition etc.)?
- Can you discern anything about age, gender, or position in a dominance hierarchy?
- Do squirrels respond to people? If so, what do they do? Do they always do the same thing?
- Are they interacting with any other species? What is the nature of this interaction (competitive, predatory, etc.)?
- What other species in this habitat are particularly important for squirrels?

As you conduct your initial observations and complete your ethogram, consider some possible genetic and environmental influences on the behaviors you observe. Some examples are given below, but feel free to consider areas outside of these examples. **Use these to develop a proposal for your main project.**

- The mechanisms and cues used for food caching and retrieval.
- What are the costs and benefits of food storing? How may these differ depending on the food type?
- What adaptations do squirrels have to increase their effectiveness of food storing?
- How squirrels would respond to periods of high and low resources (e.g. acorn season versus winter). How would changes in fruiting season (e.g. due to climate change) alter these strategies?
- How variation in resource availability may affect tradeoffs – such as between predator avoidance and foraging.
- Tameness versus wariness on a campus versus in a forest.
- Seasonal effects on behavior (such as feeding, intraspecific interactions, nesting).
- How nest size, shape and location would be influenced by climate.
- What are the different ways squirrels can communicate with one another? How might the effectiveness of these communication strategies vary in different habitats?
- Think of the different antipredator responses and strategies squirrels have. What do you think would affect which strategy squirrels use?

PROJECT PROPOSAL

Due date: Friday 18 October, 5pm

Once you have observed squirrels on a few occasions, formulate your ideas for your final project, i.e. what behavior or behavior patterns you plan to observe in detail. What specific behavioral question will you try to address? Describe your ideas in a 1-page proposal (single-line spacing).

In your proposal:

- Explain **what behavior or behavior patterns** you plan to observe, and **why you chose this behavior**.
- **State a hypothesis** that you will test
- Outline your **proposed methods** (where? for how long? how often? how many squirrels?)
- Explain **how you will record** your observations and provide an **example of the ethogram** you will use.
- Outline **how you will analyze your results** (statistical tests? what kind of graphs / tables?)
 - Remember that your final report must be presented as an **Adobe Spark document**.
- Include **at least one primary literature publication**. **Cite your source(s)** using APA format (ask for help!)

FINAL REPORT

You will each produce a report using **Adobe Spark**. Your report must include:

1. The **aim** of your project and a clearly stated **hypothesis** that you are testing
2. A brief description of your **methods**
3. **Results and Discussion** – You may present these separately, or together (your choice).
Results must include:
 - a. **Photos and/or videos** of the behaviors you observed
 - b. A **table** summarizing your ethogram results
 - c. Appropriate **statistical tests** to analyze your data
 - d. Appropriate **graphs** to present your data visually
 - E.g. you could use your ethogram to construct a **pie chart** representing the percentage of time your squirrel(s) spent performing each behavior you observed. To do this, determine the total time spent on each behavior during your observation period, then divide each of these values by the total number of minutes observed (i.e. 30 mins).
 - Or you could present your data as a **line graph / bar graph / histogram**, depending on what is most appropriate for YOUR observations and data
4. **Discussion (may be incorporated into Results section if you wish)** – interpret and explain the results you obtained and discuss them in the context of your hypothesis. Also cite external references to support your discussion / explanations. (NOTE: Your lecture notes are NOT an appropriate reference; rather cite the textbook and/or primary literature papers.)
5. **Cite all references appropriately using APA format.**

Keep your report concise. I would rather read your detailed thoughts about one particular line of thinking than a rambling superficial report of the list of things that you observed.

A DRAFT OF YOUR REPORT IS DUE ON WED NOV 20, BY 5PM.

THE FINAL REPORT IS DUE ON MONDAY DEC 9, BY 5PM.

Late reports will not be accepted without a valid University-approved excuse.

DON'T FORGET TO SHARE YOUR SPARK PAGE link with Dr. B. and with Nick Smerker, or we will not be able to view it!

ETHOGRAMS

An ethogram is a table that defines, describes and catalogues species-specific behaviors observed in study animals. It may also be used to determine the amount of time the animal(s) spend performing each behavior. An ethogram can be completed using either focal sampling of a single animal, or scan sampling of a large number of individuals.

Focal sampling: select a single (focal) animal and record its behavior each minute for a set period of time (e.g. 30 mins). The advantage of this observation method is that it allows you to determine the amount of time the animal spends performing specific behaviors. The disadvantage is that it does not provide you with any information about variation among individuals. To overcome this disadvantage, you could focal sample multiple individual animals, but that will require more observation time.

Scan sampling: scan multiple individuals for a short period of time (e.g. 30 sec – 1 minute) and record the number of individuals performing each type of behavior. Repeat this process over multiple intervals. This provides information on variation among individuals, but it does not allow you to assign sequences of behaviors to specific individuals.

SQUIRREL BEHAVIOR ETHOGRAM DEFINITIONS

Type of behavior	Behavior	Term	Definition
Food related	Eating	E	Squirrel consumes food it finds in its environment
	Searching	S	Squirrel searches for or gathers food in the environment
	Caching	C	Squirrel collects and caches food
	Drinking	D	Squirrel consumes water or other liquids
	Retrieving	RF	Squirrel retrieves food it has previously cached
Solitary	Nesting	N	Squirrel uses a domicile (nest / tree hole)
	Groom self	GS	Squirrel engages in washing or smoothing its own fur using tongue or forelimbs
	Sleep	SL	Squirrel is lying down in sleeping position with eyes closed, stays in one place and is not alert to environmental changes
	Resting	R	Squirrel stays in one place, is inactive, but may be roused easily by environmental changes
	Locomote	L	Squirrel moves from place to place
Social	Play	P	Squirrel interacts with other squirrels; may involve locomotion, manipulation of objects, or activities that indicate a relationship between the squirrels
	Groom others	GO	Squirrel engages in washing or smoothing fur of another squirrel; or is groomed by another squirrel
	Mating	M	Squirrel mates with another squirrel
Aggressive	Fight	F	Squirrel engages in physical conflict with another squirrel
	Stealing food	SF	Squirrel approaches another squirrel that has located food and removes food from the vicinity of that squirrel, either by physical force or distraction
Inter-specific	Interaction with humans	IH	Squirrel interacts directly with humans, or responds to humans
	Interaction with other species	IS	Squirrel interacts with another non-human species, e.g. by competition, predation, stealing food etc. (describe in notes section)

EXAMPLE OF AN ETHOGRAM

TIME (MIN)	BEHAVIORS	NOTES
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2:00		
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