

AVIAN ETHOGRAM AND RESEARCH PROJECT AT THE ZOO

Mildred Sears Funk
Department of Biology
Roosevelt University
Chicago, IL 60605

INTRODUCTION

This ethogram and behavioral research project will be enjoyable for you, if you are interested in animal behavior, and will also help you learn how to more closely observe behavior. Observational skills will be helpful in many careers (e.g., clinical psychology, medicine, law, public relations, to name a few) that require closely watching behavior, accurately describing it, and understanding it in its context. You will practice these skills in the first part of the exercise, constructing an ethogram (a listing and description of species behavior). In this exercise, you will choose a particular species and, together with another student, you will describe the species' activities. The second part of the project, the behavioral research, helps you gain a better understanding of how scientists use the "scientific method." Scientists get their information by observing, experimenting and analyzing. You will choose a research question about some behavior of interest that can be answered through more specific observations of one or two individuals of the species. After collecting and analyzing data, you will interpret the results for the class in a poster session in which you display and discuss your work. You need to actively participate, carrying out observations and designing your project and planning your time well.

LEARNING OBJECTIVES

You will:

- Practice skills of close observation and detailed description
- On the basis of the observation, construct a research question
- Design an experiment to answer this research question
- Graph experimental data and the research process on a poster
- Explain what you did and why to the class and what you'd do differently next time

MATERIALS

Field notebook and pen or pencil for observations and diagrams

Timepiece (a second-hand is helpful but not necessary)

Optional: tape recorder, camera or camcorder, binoculars

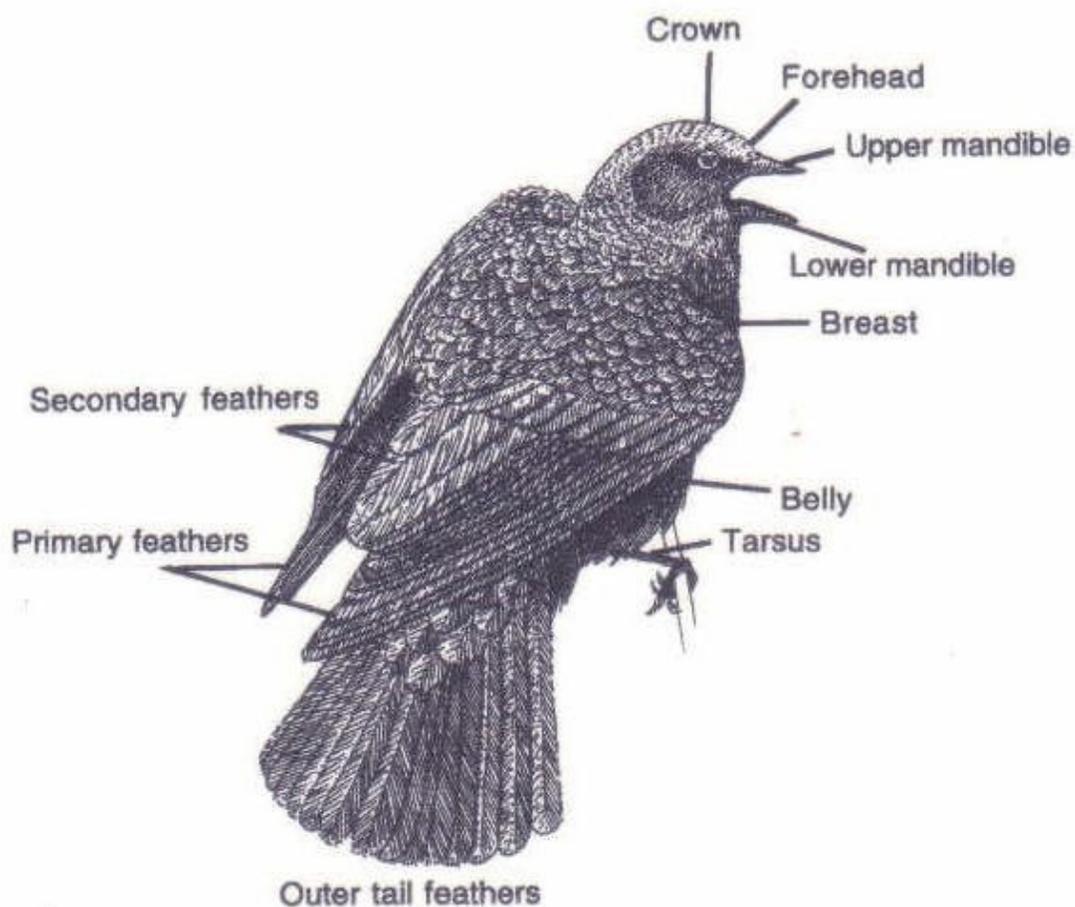


Figure 1. Some anatomical terms that will be useful for referring to the external features of birds.

METHODS

Getting started on your subjects

Choose an active species. Try to be unobtrusive and quiet because your behavior may affect the birds' activities. Stay close enough to see all the activities but not so close that you disturb your subjects by your proximity or staring at them or by any noise you make. They may flee or become immobile, neither of which is helpful for your data collection. They may become habituated to your presence after some time and then behave in their normal fashion even though aware of your presence. Describe the birds. Field guides in the library will be helpful. Diagram the habitat.

After your description of the birds, you need to familiarize yourself with the behavioral repertoire of your chosen species. Observing for an ethogram gives you the time and a framework in which to gain understanding of the animals by noting what they do and how they do it. To get started, watch the birds for an hour and take notes of their different activities. In

your field notebook, note the date and time, conditions such as weather, crowd numbers, etc. and then keep track of the time and behavior you see. This is called **AD LIB sampling**, an informal note-taking procedure of as many behavior patterns as you see. You will be trying to describe at least a dozen. One student can describe the actions and the other can write them down and time them. The behavior may be motoric (e.g., flying and climbing, or concerned with body maintenance [feeding and elimination, bathing and preening] or exploratory, such as searching or scanning, or social: affiliative (friendly) or agonistic (threatening), or other behavior. Talk to the keepers. When are the birds most active? Consult two or three articles in scientific journals about the natural history of the species you have chosen. Then you are ready to begin your ethogram.

What is an ethogram?

An ethogram is a catalogue of the different action patterns of your species such as those listed above. When you think you are familiar with many of the species behavior patterns that are repeated in their daily routine, start listing these patterns as you watch the animals. Try not to be subjective or label the patterns at the beginning. Use descriptive names. Pretend that you are describing your chosen species and its behavior to a Martian who has never seen the species. Write down careful descriptions of the movements so that others could read your descriptions and recognize those exact same movements. Exactly how was the movement done? Was there any sound? (EXAMPLE: Open beak thrust. One bird is opening its beak and thrusting it in the direction of another bird.) Is there any movement of the rest of the body toward the other bird? Any change in the eyes or in the plumage? Any sound? Any other movement that goes along with the open beak? The above behavior could be a begging movement by young or by a mate for food or it may be a threat display. What was the context of the behavior? Your label for a behavior does not describe the behavior. If you call a behavior a “threat behavior” that label does not tell us what the actions were; it tries to tell us something about the situation, it passes judgment on the action. One must exercise care in labeling behavior patterns. Sometimes the movements may belong also to a different pattern of behavior and then they may be done for different reasons. So, try to keep a human bias out of your observations in the beginning. Simply note that one bird is opening its beak at another and describe what happens. Later, you can label the behavior when you are more familiar with it and the context in which it is performed.

Using your list of behavior patterns, you need to find out the frequency of those patterns in an hour’s time. For this type of record, you will use **FOCAL ANIMAL SAMPLING**. You cannot record all activities of a group of animals at the same time, but you can get good behavior notes on one animal for a short period of time. Be sure you can identify the one subject --how does it differ from the rest? Choosing a time when the animals will most likely be active, simply note how the activity is done and when it changes. Again, write down date, time and conditions and then list behavior patterns and times. Abbreviations save time (feeding-FD), but provide a key to your abbreviations. Each person takes a turn at observing or recording activities until you have 3-4 hours of data so that you can calculate the time your subjects spend on the activities you have listed in their behavioral repertoire.

The teacher should check your ethograms before you begin the research question part of

the project. (No need to re-write all the descriptions if they are legible.) You may need a category for “Other” behavior, such as some activity done when your subject is out of sight. Be sure that all the behavior patterns you see will fit in one of your categories.

How will you display the data?

Using your data, make an activity chart with percentages of time devoted to each activity.

Activity	Time in minutes
Sit	108
Yawn	2
Scratch	10
Rummage	37
Eat/Chew	17
Bite Branch	13
Walk	13
Look at People	31
Stand	13
Stare	11
Rest	24
Be Groomed	6
Groom Self	9
Miscellaneous	6

Add up the time spent on each behavior during the time you watched your subjects. Then divide the number of minutes spent in an activity by the total number of minutes spent in all the observations to get the percent of time spent on each activity. Make a **Pie Chart** of the percentages of time spent in various activities so that the observer can quickly understand the interrelationships of the behavior patterns and their relative frequency in the daily routine of the subject (Figure 2). The percentages on the Pie Chart should add up to 100%.

PERCENT OF TIME IN ACTIVITY

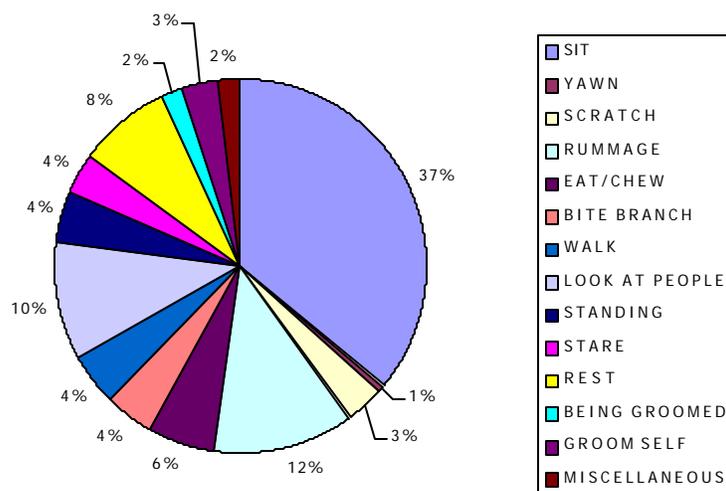


Figure 2. Pie Chart showing the proportion of time spent in each of the activities observed.

So far, you have 1) chosen a species, 2) observed group activities, 3) observed individuals for a time budget analysis, and 4) made activity charts and graphs. Now you are ready for the Research Project.

Research project: What is your hypothesis?

Figure out a question about behavior you have seen that you can eventually answer through tallying more observations. What question do you want to study about your subject? These observations will be taken on one or two animals and you will be looking for “**ALL OCCURRENCES OF A SELECTED BEHAVIOR**”, another sampling method. Familiarized with your chosen species, you should design a simple research question, one that you will be able to answer with several more hours of data collection on the behavior in which you are interested. This question should be framed as a hypothesis, a statement that predicts a set of observations. You should be able to test your hypothesis with a limited set of data. Here are some possibilities:

(1) The question might concern time budgets: Is feeding intensity the same at noon as in late afternoon? You will then suggest a tentative or “null hypothesis” to be tested: There is no difference between feeding intensity at noon and in late afternoon. The alternative hypothesis: There is a significant difference between feeding intensities at noon and in late afternoon. In such a study, you may also want to consider comparing the zoo birds to what you observe of feeding behavior at your backyard feeder. Find out some of the factors that determine how long a bird in the wild remains in one spot to feed.

(2) Another question might be comparative in nature: compare time spent on preening behavior (or other types of maintenance behavior) in two species. Null hypothesis: There is no difference in time spent preening in the ___ species and the ___ species. Alternative hypothesis: There is a significant difference Describe preening. What parts of the body are preened? Why do birds preen? When? Is there a precise timetable to preening? Do birds in your species allopreen (preen others)? Why would they do this? Does one species preen more often but for shorter periods?

(3) There is no difference in vocal and motor activity between male and female (species)

(4) Do juveniles stay closer to each other than to their parents? (There is no difference in proximity of the juvenile to the mother than in proximity to the other young.)

(5) Juveniles are more exploratory (or playful or aggressive, etc.) than adults.

(6) _____ - (Parrot) species is left-footed (or right-footed) when feeding.

Your hypothesis will be supported by your data or disproved. If it is rejected (still a result!), then the statement needs to be changed. Would more data be helpful? What is your new hypothesis?

DISCUSSION

The poster: How will you present the data?

After you collect your data, tabulate your results. You should calculate a statistical measure to determine if your findings can reject your null hypothesis. For help on statistics see Zar (1984) or Hailman and Strier (1997) for a short text on research writing and planning. Graph your data. Do sketches or take pictures of the area and the birds.

For the research project, you have (1) chosen your research question, (2) observed individuals to gather data, (3) analyzed that data. Now you are ready to design your poster. Your finished poster (22” X 28” is appropriate) should have 7 parts:

- (1) Title.
- (2) Abstract: a paragraph that summarizes your research question and findings.
- (3) Methods: describe subjects, what you did for the project, where, how often, when.
- (4) Results: what you found. Include ethogram: one or two sentences to describe each behavior. Draw the time budget graph and chart and give any other data.
- (5) Discussion: Conclusions. What would you do differently next time?
- (6) Brief natural history of subjects and bibliography of articles you read about your species.
- (7) Picture of birds and a diagram of the habitat.

When you explain your poster to the class, you can tell them any other information you learned about your species in your research.

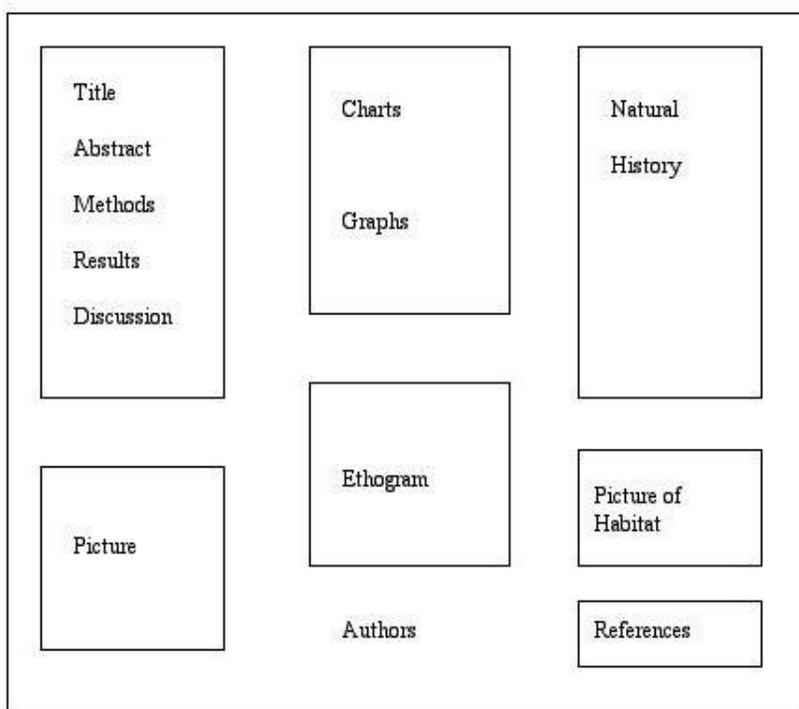


Figure 3. Sample layout for a poster. Notice the use of space, the use of pictures, and the limited use of text.

Special Terms

AD LIB (AD LIBITUM) sampling is an informal type of observation and note-taking; describing all the activity that is seen. This method is good at getting information on what leads up to an event and what happens during and after the event. It is a first step in finding out all you

can about the activities of various subjects.

FOCAL ANIMAL SAMPLING concentrates on getting all possible information about one subject's activities and how those activities are performed.

SAMPLING ALL OCCURRENCES OF A SELECTED BEHAVIOR gives the viewer data on just the one behavior of interest to the observer.

PIE CHART has each segment of the circle proportional to the frequency of a particular behavior.

ACKNOWLEDGEMENTS

I thank Bob Shonk for the illustration of morphological terms for birds and Rebecca Popovich and Ben Messmer for use of the activity charts of a mammal.

REFERENCES

Altmann, J. 1974. Observational study of behavior: sampling methods. *Behaviour* 49:227-267.

Hailman, J. P. and K. B. Strier. 1997. *Planning, Proposing, and Presenting Science Effectively*. Cambridge University Press, Cambridge.

Washington Park Zoo and Minnesota Zoological Garden. 1947. *Research methods for studying animal behavior in a zoo setting: Parts 1 and 2 {VHS}*. University of Minnesota film and video catalogue.

Zar, Jerrold. 1984. *Biostatistical Analysis*. Prentice-Hall, Englewood Cliffs, NJ.

ADDITIONAL SOURCES

Brooks, R. and K. Yasakawa. *Laboratory exercises in animal behavior*. K. Yasakawa: Department of Biology, Beloit College, Beloit, WI 53511.

DeCoursey, P. 1994, July. *A laboratory exercise: zoo ethograms*. Paper presented at the Animal Behavior Society, Seattle, WA.

SUGGESTIONS FOR INSTRUCTORS

The main campus of Roosevelt University is located a short bus ride from Lincoln Park Zoo in Chicago. Lincoln Park Zoo offers free admission to the public so students can return to observe their chosen subjects whenever they want. If the zoo closest to your school does not have free admission, the instructor can very likely work out arrangements for a free pass for students for a limited time.

This exercise could also be adapted for use in watching birds at bird-feeders or watching ducks on a pond or pigeons in a park.

Expenditures for this project consist of transportation and posterboard, perhaps some photos of the animals and their enclosure.

Students need to understand the time requirements of this exercise. Figuring on groups of 2, each pair should gather 3-4 hours of data to compile for the ethogram activities and then the same amount of time for the research question. They'll need to spend more time finding other information on their chosen species and putting the data and results together and deciding on statistics and the design of the poster.

Students should understand that the time budget of a captive animal is not the same as that of a wild animal. This can be a part of a general discussion on zoos: benefits zoos offer (preservation of rare and endangered species, the chance to view these rare animals) and problems (captivity and boredom, excess animals, breaking up mated pairs in order to increase their reproductive potential, etc.).

Methods of data gathering should be discussed. Would they prefer to keep a running count of all behavior of one animal or do a "behavior scan" every minute or 30 seconds and record what the animal is doing at that time? Interesting discussions could be based on which method is better for getting duration of a behavior or for getting unusual behaviors, or catching a stimulus for a behavior. This exercise can introduce the many ways of sampling behavior. See discussion in Altmann (1974).

A helpful video on ethograms is from Washington Park Zoo (1947).

Ethograms are often assigned in animal behavior courses and only that part of the exercise may be done if time is short. When only the ethogram is used in the short session, students may work individually. They try to get an exhaustive catalogue of behavior for their subject species and also locate resources on the natural history of that species. A semester offers sufficient time to combine the ethogram with the research question. This combined exercise is an easy and enjoyable way to acquaint the non-Biology major with scientific investigation. I find that the several parts of the project (the ethogram, research project, oral presentation, and the poster), also make it easier to grade.

Students have enjoyed this research at the zoo and everyone seems very interested in the poster session at the end of the class.