

Zoo Field Trip for Ethograms

For details of recording methods read chapters 5&6 in Martin & Bateson 3rd ed.

Before lab:

Read: Martin and Bateson Chapter 5&6

Check out the website (<http://www.oregonzoo.org/>) and read this handout.

You may want to look at previous issues of the journal Zoo Biology.

The day of lab:

Meet in the lab. Wear appropriate clothing for the weather. Bring your lab notebook and this handout. Pick up a stopwatch and clipboard.

ETHOGRAM

An ethogram is a primary tool in ethology. The ethogram is a catalog of the discrete behaviors typically employed by a species. The included behaviors should be discrete and described with sufficient detail such that an observer can accurately identify each in order to record the number of acts, or the amount of time engaged in the behaviors. The ethogram may include drawings (or photographs) in addition to a written description of each discrete behavior. In an ethogram, behaviors should be described without explicit reference to their purpose. For example, although a specific movement may represent a putative threat display it should be described with neutral, structural characteristics that do not require subjective interpretation. The definition of the display as a component of antagonistic interactions arises from the context and surrounding behaviors in which the display is observed. Ethograms often represent an early stage of investigating the behaviors of a species and the contexts in which they occur, but may also be the basis of formal scientific research. In the early years of ethology, the primary goal of many studies was the description of behavior. Although complete ethograms are rarely published anymore, they are often used by zoos to describe normal behavior and monitor captive behavior in order to identify pathology due to illness or poor animal care. Ethograms also serve as a valuable tool for many lab and field experiments on both model organisms and ecological studies. As a tool, the ethogram usually describes only a small portion of an animal's complete behavioral repertoire.

The following is a sample ethogram that could be used for various species.

Sample Ethogram (List of Behaviors)

Type of Behavior	Behavior	Code	Description of Behavior
<i>Solitary</i>	Sleep	S	Animal assumes species-specific position for sleep, stays in one place and is not alert to environmental changes.
	Rest	R	Animal stays in one place but may be roused easily by environmental changes.
	Groom Self	GS	Animal engages in washing or smoothing its own fur or hair using tongue or forelimbs.
	Maintenance	M	Animal urinates or defecates.
<i>Food Related</i>	Travel	T	Animal moves from place to place.
	Eat	E	Animal consumes food it finds in its environment.
	Drink	D	Animal consumes water or other liquids found in its environment.
<i>Social</i>	Look for Food	LF	Animal searches the environment for food items.
	Groom Others	GO	Animal engages in washing or smoothing the fur or hair of another animal in its environment.
	Play	P	Animal engages in interactions with other that may involve locomotion, climbing, manipulating objects or other activities that show a relationship between two or more interacting animals.
	Contact	C	Animal comes in contact with another animal while engaging in a solitary behavior.
<i>Aggressive</i>	Fight	F	Animal engages in physical conflict with another animal in its environment.
	Steal Food	SF	Animal approaches another animal that has located food in the environment and either by physical force or distraction, removed that food item from the vicinity of the other animal.
<i>Off Exhibit</i>	Off Exhibit	O	Animal is not visible in exhibit.

In lab this week you will build an ethogram and develop a hypothesis that can be tested in the zoo. You will use different Sampling and Recording techniques in order to collect data and determine the best method given your goals. The **assignment** that will be evaluated is described on page 4. Pages 5-10 can be used to collect data at the zoo or you may record your observations directly in your lab notebook.

AT THE ZOO:

Walk around and appreciate the animal diversity. Then working with a partner, choose a group of animals, that you will observe for the next ~2 hours. Keep in mind that large charismatic animals are often very boring to watch for long periods of time, birds and small mammals are often more active. You will have a richer experience if you choose an enclosure with many animals (bats, cichlid tank, lorikeets, penguins etc.). Your goal is learn different behavioral observation techniques while appreciating the many functions of a zoo. You will formulate a question and collect data to answer that question. Several types of questions can be asked and answered with behavioral observation within a zoo setting. Remember that a zoo has several goals in addition to entertainment, the zoo also aims to educate the public, engage in conservation programs for endangered animals, and also participate in basic research. Your own question and observations today can address any of these goals of the zoo.



- You may be concerned with the welfare of a particular animal such as Sayer et al., (2007)(A) who studied the behavior of a particular one-armed gibbon in the Lincoln park zoo. Or you may be interested in how a particular aspect of the enclosure affects animal behavior. David Shepherdson and colleagues have recently redesigned the elephant house here at the Oregon Zoo (B) based on the results of a study regarding flooring type (Meller et al., 2007).
- Simple behavioral descriptions are often possible in a zoo that would be much more difficult to obtain in the wild but which will greatly facilitate future identification of behavior in the wild, for example, differentiation of two species (Marlof et al., 2007) or the details of mating behavior (Xie, 2006) (C).
- The zoo setting also offers the possibility to repeatedly obtain physiological measures or hormone samples from the same individual, making captive animals a great resource for understanding animal biology. Consider how your own questions might be augmented by such repeated measures, though this is beyond the scope of our exercise today.

During lab you will create an ethogram and pose a question. You will then apply different recording and sampling techniques. Some techniques will work well for your question and others will not. You will try all of the techniques in order to devise a protocol that works for you and allows you to address your question. The data you collect today can be viewed as "preliminary data". When one applies for a grant to conduct a large study, it is important to have solid preliminary data and a detailed protocol. These demonstrate to the granting agency that your study is not only worth doing, but also that it is doable.

Your data should either be recorded on the data sheets provided and permanently attached to your lab notebook or recorded directly into your lab notebook.

BACKGROUND INFORMATION - Record

- Common name and scientific name and geographical distribution of animal:
- What characteristics can be used to distinguish sex, age and individuals?
- Describe the zoo enclosure habitat and population objectively (sketch the cage?).
- Describe the zoo habitat subjectively, compare it to the animal's wild habitat.

FIRST OBSERVATION – *Ad libitum* – 15 minutes

Fifteen minutes (or more) *ad libitum* (record everything you see),

SECOND OBSERVATION – create an ethogram ~ 15 minutes

Using your first observation notes, spend some time to create an ethogram of the behaviors you expect to see during your later observations. The ethogram should be as complete as possible, describing and depicting as many discrete behaviors as you observe.

BEFORE GOING ANY FURTHER - formulate a question ~ 15 minutes

With your partner, formulate a question or two about the animals and enclosure you are observing. Is there a dominance hierarchy? Are the females more aggressive than the males? Do the juveniles have a different time budget than the adults? Which food source is preferred? Decide which behaviors are important to record to address your question.

THIRD OBSERVATION – Scan sampling – 15 minutes

Use a subset of your ethogram (~ 5 behaviors) to do a fifteen-minute scan sample with timed recording. At the end of each 1-minute interval, record what each animal in the cage or enclosure is doing. This method gives a snapshot behavior. The value of scan sampling is that it allows collection of data from large groups of individuals. It does not provide the most accurate time budget. (Consider how the time interval used will change your results.)

FOURTH OBSERVATION – focal sampling – 20 minutes

Use your ethogram to do a 5-minute focal sample with continuous recording for each individual in the enclosure (up to 4 animals). The value of focal sampling is that it can be used to construct accurate time budgets based on individuals.

FIFTH OBSERVATION – behavior sampling – 15 minutes

From your ethogram, select a few behaviors that occur most frequently. For these behaviors, record each instance of the behavior that occurs in a 5-minute period. Do 3 5-minute observations. Like scan sampling, behavior sampling allows you to collect data from multiple individuals simultaneously, but because you use continuous recording you will obtain more accurate measures of specific behaviors although it is not possible to count as many behaviors.

SIXTH OBSERVATION – 1/0 method - 15 minutes

Use your full ethogram to do three five-minute 1/0 sampling periods. Record only whether the behavior did or did not occur during that 5-minute period. The value of 1/0 sampling is that it allows for a greater number of behaviors to be scored but also captures brief intermittent behaviors. (Compare these results to those you obtained with behavior sampling.)

EVALUATED AFTER THE ZOO:**One page written "grant application" Due before lab next week**

What question do you propose to address?

Why is this question important?

Why is the zoo the proper place to address this question? (if not state why and justify the need for field observation of wild animals)

What is the observation protocol you propose? (if your question would require physiological measures or tissue samples, state this but do not go into detail on those methods).

Why is this sampling and recording technique better than other techniques?

Can you provide preliminary data to demonstrate the feasibility of this study?
(a single graph, or table from your work at the zoo is sufficient)

The proposal will be evaluated for clarity, and demonstration that you have mastered the concepts of behavioral observation. The proposal will NOT be evaluated on the relative scientific merit of the project, or the quality of the preliminary data, but you are encouraged to be realistic.

Also, turn in a copy by posting it to Moodle before lab next week.

References available on Moodle or see Zoo Biology journal for many more examples.

Marlof, B., McElligott, A.G., Miler, A.E. (2007) Female social dominance in two *Eulemur* species with different social organizations Zoo Biology 26:201-214.

Martin and Bateson "Measuring Behavior: an introductory guide. 2nd edition" Cambridge University Press 2001. (chapter 6 particularly (5 if you have 3rd edition)

Meller, C.L., Croney, C.C., Shepherdson, D. (2007)
Effects of rubberized flooring on Asian elephant behavior in captivity. Zoo Biology Zoo Biology 26:51-61.

Sayer, E.C., Whitham, J.C., Margulis, S.W. (2007) Who needs a forelimb anyway? Locomotor, postural and manipulative behavior in a one-armed gibbon Zoo Biology 26:215-222.

Xie, Y. (2006) Primary observations on rutting behavior of the captive red goral Zoo Biology 25:117-123.

FIRST OBSERVATION – *Ad libitum* – 15 minutes

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SECOND OBSERVATION – create an ethogram ~ 15 minutes

Behavior	Description
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

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THIRD OBSERVATION – Scan – 15 minutes

		Scan sample number														
BEHAVIOR		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1																
2																
3																
4																
5																

Select ~5 behaviors to scan for. For 15 minutes, scan the enclosure each minute on the minute. Use a tick mark in the appropriate box to indicate the behavior that is being performed by each individual in the group. Consider how duration of the time interval between your scans will impact your results for the different behaviors. Consider which behaviors are accurately captured by this method. Does this give an accurate time budget for these behaviors?

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FOURTH OBSERVATION – focal – 5 minutes each (20minutes total)

Use a tick mark to record each occurrence of each behavior for the focal animal

Behavior	focus on 1	focus on 2	focus on 3	focus on 4
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				

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FIFTH OBSERVATION – behavior record – 5 minutes each = total 15 minutes

Explain why you selected these behaviors (are they related, of particular interest, too difficult to accurately record with the other methods etc.)

Use a tick mark to record each time you observe one of these behaviors during the designated 5-minute observation period.

	NUMBER OF OCCURENCES		
	period 1	period 2	period 3
1			
2			
3			
4			
5			

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SIXTH OBSERVATION – 1/0 method - 5 minutes each (15 minutes total)
Use a 1 or a 0 to record if each behavior occurs during each observation period.

Behavior	period 1	period 2	period 3
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			