

## BIO 45 -- Journal Exercise #2 -- Due Wed., 9 October - in class Quantifying Behavior - Focus on foraging + observing in pairs

**Important warning:** this exercise will take careful planning and time budgeting. There is a lot to do and we require you to do it all -- don't wait until the last minute or until after the first exam!

You will still focus on details, but this time the goal will be to quantify patterns in the behaviors you observe. You will do this in the context of foraging behavior. We will be talking about optimal foraging models in class. Quantifying things like time between prey encounters, handling times when catching and eating things, and tradeoffs between foraging and other activities tests the models. These models will make more sense if you have collected these kinds of data.

Observing in pairs will help you see how differently people view the same behavior. You can discuss what caused your observations to be similar or different. It will also allow you to plan your data collection and gather more data more efficiently. You and your partner will design and collect data for a small-scale experiment on foraging behavior -- see below.

**ASSIGNMENT: Note there are 3 parts to the assignment**

**Before you start,** review the "journal basics" handout you got at the first class and the comments we made on your first assignment. Watch some animals you are familiar with and try out some new ones. **We expect you to do a minimum of 300 min. of observations for this assignment.** **Plan on an additional 3-4 hours of time commenting, planning and analyzing data. That is a total of 8-10 hours over two weeks** (one contains the exam). Make sure you do all of this assignment **and** any that you did not complete last time. Some of you already are behind by several observation hours and must make those up! Plan ahead!

*\*\*\* Why are the journal assignments so unstructured? Why not tell us exactly what to do? Why ask us to answer our own questions? We took the course so you could teach us. -- If I told you what to watch for, which questions to ask, where to find the answers, and how to design the tests of them; what would that do? It would delay your actually learning how to study animal behavior. Why not work through the basics now, on your own? We'll be there to help. The more you work with it, the more you will draw from your own imagination and from the course material. That lets you learn how rather than learning about. I know this works. \*\*\**

### **1. Paired General Observations: - 1, 20-30 min observation with your partner.**

You will each do a general observation on the same animal(s) without talking about it. After the observation, exchange journals, read and make comments on your partner's observations in their journal. Be both supportive and constructively critical. Comment on differences in what you each saw or in the way you interpreted it. Then talk about the behaviors and about the way in which your observations differed. **Make sure you mark the observation so we can read it too.**

### **2. Foraging Observations – at least 270 min of data collection in pairs and on your own:**

First, plan the data collection on foraging described next. This works best if each of you has already thought about it on your own. Discuss the question to ask, the animal to use, and how to collect data and the hypothesis you might test. You will pool your data with your partner's but each of you will do the analysis on your own. I'll outline the easiest study to do. You are welcome to try others instead.

**One possibility:** Find some pigeons or squirrels or starlings. Break each 20-30 min. observation period into 5 min. periods (sub-samples). For each sub-sample, focus on one individual and record how much time it (pigeons are the easiest to tell apart as individuals) spends: looking around (? for predators), interacting with others of its species, looking for food, and catching and consuming food (you may want to combine the last two). Do sub-samples for as many different individuals as you can.

**You should make your sub-samples in two different contexts** like: time of day, or presence or absence of other individuals. **You goal is to collect enough data to make a comparison or test a hypothesis about the effect of something on the distribution of time among activities.** For example, would there be differences in the percent of time spent on each behavior for pigeons foraging alone versus those foraging in groups? Keep your hypotheses simple!

### 3. Foraging Data Analysis: (several hours)

Summarize your data once you have done at least 10 of these samples (the more the better!!). Calculate the percentage of time spent doing these different things for each sub-sample and then calculate it again for your entire collection of sub-samples. Forget about statistics for now. Just present the data as graphs or tables. You will find a lot of variation among animals sampled. Some of that variation is due to them and some is due to your data collection or external events that startle the animals. How can you find any patterns among all this variation? You could calculate some means and compare them. You could make pie diagrams for each animal or a composite one for the animals in each context. There are a number of possibilities. Try some and see how satisfying they are.

The important part of this assignment is for you to come to grips with quantitative sampling of behavior. I am leaving it open-ended because the conditions will vary a lot and the “best” way to sample and analyze will also vary. Use the criteria that you (and your partner) are satisfied with. Remember that finding no pattern or no difference between situations is an interesting result -- as long as you take enough data to allow a pattern or difference to show up if it was there.

When you do the foraging observations in pairs each of you should record some of the data in your own journal. Then make sure each of you has a summary of the total data collected pasted or taped in their journal. Once you have that summary, each of you should independently present the study you did and interpret the results you got. The shared part is in discussing what to collect and how to collect it, and in taking turns collecting data (you can continue to collect your own and share the data sets). You are welcome to discuss what you think the data tell you, but we want each of you to independently interpret it in your journal. **Be sure to mark the analysis section for us to read.**

#### **SOME HINTS FOR SAMPLING AND ANALYSIS:**

1. Think of the exercise as one of figuring out how animals budget their time in different situations. For example, would the percentage or duration of time spent looking around for predators differ if we were to put a pigeon: out in the open versus close to the bushes? “Put” is a manipulation to test the hypothesis that one situation will result in more watching and less feeding. For your study you must find the pigeons already in these situations and collect the data from them.

2. What are the right kinds of data to collect? Think about the kinds of quantitative data you could collect and then think about how they could be used. What do you need to answer to your question -- does the animal's behavior differ between context A and B? How about counting the number of times in 5 min. that they do something? How about the percent of total time spent doing each kind of thing? Frequency and duration are your major alternatives. You can collect data in a way that allows you to get both frequency and duration, right? Do you want to compare absolute frequency or duration or relative frequency or duration? What will be your unit of time? Suppose you watched some pigeons for 4 min. before they flew away but others you watched for 6 min. How do you compare these behavior samples for different pigeons? You and your partner have to sort it out.

#### **Alternatives to the looking for food/looking for predators assignment above:**

1. How efficient are squirrels at finding buried food? You could record the number of things eaten per minute or the number buried per minute. What factors might affect it – location, food type, presence of other squirrels...?
2. How often do ducks or geese perform a specific display? Does it vary between sexes or contexts?