

## Human Foraging Behavior and Ecology

### Introduction

We have spent or will spend some time considering optimal foraging, at least as it concerns species foraging in patches. We learned a method by which we can predict the patch residence time based on knowledge of travel time and the density of prey in a patch (which determines the gain curve). There are many other predictions about optimal foraging that can be made, including what prey animals should include in their diet when they are attempting to maximize their net energy intake or minimize their time spent foraging.

We are going to investigate some of these foraging concepts, using humans as foragers (Kangas and Risser 1979). Sometimes it is helpful to use humans to examine general ecological problems. We are able to gain more information in less time than with other animals, as other animals may be difficult to locate in the field, constraining our sample sizes, especially in a three-hour time frame.

The stations at Vail Commons are somewhat analogous to a set of resources that foragers (humans, in this case) encounter. Generalist foragers, like humans, must make choices about what to eat when faced with an array of potential prey. Our point of view will be on the human forager and you and your group will make predictions about how students forage during the breakfast, lunch, or dinner hour and how that may differ depending upon time of day, whether the forager needs to minimize their time and run off to class, or whether the forager is attempting to maximize their net rate of energy intake. Of course, we will not know whether they make their choices based on availability of resources or in an attempt to minimize time spent foraging, but we might be able to infer and assess general patterns of students foraging in a cafeteria. And as always, going through the process of brainstorming ideas, designing, performing, and analyzing an experiment continues to develop your core scientific competencies.

### Materials and Methods

#### The Food Stations at Vail Commons

You will design a study to observe, BUT NOT INTERACT WITH, human foragers in Vail Commons to investigate a question of your choosing. For instance, you might collect data to determine whether foragers are choosing the shortest line, or whether they are willing to wait in line for their meal. You and your group will brainstorm a question and appropriate response variables to measure to answer that question.

Data that you collect may include menus at the different stations, various behaviors of randomly selected foragers, time spent waiting in line or consuming food, and number of people ahead of your subject when they enter the line. Our goal is to determine whether diet choices are made based on availability of resources or time or some other currency.

You will need a timer and a notebook or tablet to collect data. When collecting data you and a partner should find a table where you can observe foragers enter the Commons and see

where they go. Be as inconspicuous as possible with your timer and observations. You don't want to influence any of the foragers or employees. The best observers are those that can collect the data without anyone else knowing it! **Do NOT initiate conversations** or feel compelled to explain what you are doing, at least until after you finish collecting your data. Again, you don't want to affect foraging patterns of any customers.

Be sure to record the posted menu. These can be downloaded at the Vail Commons website (<http://www.davidson.edu/student-life/dining-services/dining-locations/vail-commons>), and should be recorded for each day's observations.

Then, depending upon your protocol, you will need to devise a plan for sampling to collect as much data over the first two weeks of February as possible. You will try to cover as many of the appropriate mealtimes as possible.

Some variables that you can consider to help you brainstorm your experimental design will be discussed. For your design, you must devise a standard protocol that will be used by all members of your group. Menu width (or breadth,  $n$ ) will be calculated as the size of a station's menu in terms of the number of offerings relative to the total number of offerings within the Commons.

You should then calculate some or all of, but not limited to, the following information, depending upon your question or design:

1. Mean time in line
2. Average number of people in line
3. By totaling people in line, comparable proportion over one hour
4. Niche overlap (menu overlap) and niche breadth (menu width)
5. Categorization of station's service

What is the best way to present these data graphically? You and your group should prepare graphs and tables to best illustrate your results. Think about assumptions we have made in our data collection. What are they, and can we justify them?

### **Analysis and Considerations for Presentation**

You will prepare a full laboratory report to be due during **the week of 16 March**. During the weeks of 10 and 17 February, there will be no lab, but you and your group are expected to be hard at work collecting data (each of you should expect to devote ~5-6 hours to data collection over the course of these two weeks). During the week of 24 February we will meet to analyze your data and work on writing your reports. See the handout with guidelines on writing scientific research reports to assist you in your efforts.

### **References**

- Brown, JL & Orians, GH (1970) Spacing patterns in mobile animals. *Annual Review of Ecology and Systematics* 1:239-262.
- Kangas, PC & Risser, PG (1979) Species packing in the fast-food restaurant guild. *Bulletin of the Ecological Society of America* 60:143-148.