Using Field Research Techniques to Enhance the Undergraduate Experience

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It is almost universally true that undergraduate faculty (and perhaps to a lesser extent, undergraduate students) recognize the value of getting students involved in the research process. Students learn the steps necessary to produce original knowledge, and then go on to create their own unique contribution, which gives them an appreciation of the effort necessary to the process. However, too often the students focus on the power of the experimental method, to the exclusion of other methodologies. It is my purpose in this paper to describe my laboratory course in Biopsychology (Animal Behavior), with the goal of reminding the reader of the availability and appropriateness of nonexperimental techniques. I will also list some resources that I have found appropriate for my class, and describe their merits.

My upper-level course in Biopsychology is somewhat of a hybrid course. I take a standard Animal Behavior or Comparative Psychology course, and add to it a healthy dose of neuroanatomy, physiology, and cell biology. This course typically enrolls 20 students every spring semester. The optional laboratory sections enroll 8-15 students. It is these laboratories that are the focus of this paper. It is in these lab sections where students learn to use the nonexperimental techniques that are a bastion of this type of research.

I teach this course in the spring to take advantage of the spring migration of the Sandhill cranes (*Grus canadensis*) through the Platte river valley in central Nebraska. Every year, approximately 500,000 Sandhill cranes spend about 2 months, from approximately February 15 to April 15, engaged in feeding and courtship in central Nebraska (Tacha, Nesbitt, & Vohs, 1994). This annual event provides a golden opportunity for my students. Not only do they get to observe one of the great migration events on the planet, but it gives the students a chance to follow in the shoes of such researchers as Karl Lorenz and Niko Tinbergen, gaining an appreciation for the power of focused observations in the natural environment.

The Course: Overview

My course is a standard semester-long course that meets once week for 75 minutes. The requirements for the semester include two empirical research papers. The first project is a naturalistic observation project on Sandhill cranes, which the students do as a group and write up individually. This project allows them to try out the various techniques they have learned earlier in the semester, and evaluate the appropriateness of the different techniques in different situations. The second project is a student-initiated project completed in small groups (2-3 students). This project, on a topic of the students' choosing, allows them to put the skills they have learned earlier in the semester to use.

The Course: Details

The course starts with a description by me of the purpose of learning about nonexperimental techniques. I emphasize that non-experimental techniques are not only appropriate for nonhumans, but for humans as well. I mention studies of aggression in fighting fish, (*Beta splendens)* and studies of aggression in daycare centers; studies of courtship and mate selection in guppies (*Poecilia reticulata*), and flirting behavior in humans. My purpose for this is two-fold. First, I am trying to ingrain the habit of thinking about humans in relation to the rest of the animal kingdom. Human behavior is novel in some ways, but in many other ways it echoes the behaviors we see in nonhumans. Second, and perhaps more important, I am inculcating in them the idea that there are some research questions that are not amenable to the experimental method. I do, however, talk about the limitations of non-experimental research at this time.

During the first lecture I assign Altmann's (1974) seminal paper on observational studies. This 40-page paper is broken up into nine chapters, and I assign the first two chapters. These two chapters explore the purposes behind observational research and deal with definitions of necessary concepts such

as the difference between *states* and *events*. The following week I lead a discussion of the first two chapters, and assign groups of students to present the following six chapters, on the various techniques.

In that second week, the students lead the discussions of various techniques such as focal animal sampling, sampling all occurrence of some behaviors, and instantaneous sampling. The students were instructed to focus their presentations on the purpose, the uses, the strengths, and the weaknesses of each technique. The students are a bit unsure about the material, so after making sure from their discussion that they have indeed done the reading, I do not allow them to flounder too badly before helping them to make sure they hit the main points as outlined above. I would not say that the students enjoy making the presentations, but I do believe that this procedure helps them learn and understand the material better than simply listening to me present it.

The following week, I introduce the students to ethology by using prepared videotapes of kittiwake behavior (Dickins & Clark, 1993). This exercise guides the student in developing an "eye" for behaviors that are unlike any that they have probably encountered before. The exercise guides them through the process of developing rudimentary behavioral categories, and, using focal animal sampling, teaches them to apply those categories in a naturalistic setting (via videotape). The exercise guides them through the nuts and bolts of behavioral categories, and helps the students understand the requirements for constructing good behavioral categories.

In the next two weeks, the students engage in some "live fire" exercises such as those contained in Brooks and Yasukawa (n.d.) and Ploger and Yasukawa (2002). These exercises have the advantage of using live animals, with all the unpredictability that entails. We have an animal colony, so we use the exercise from Brooks and Yasukawa, which involves a mouse ethogram (description of the repertoire of behaviors of an organism). Because of the nature of mouse behavior in a cage, the ethograms are relatively straightforward. The students get the experience observing live organisms, developing behavioral categories, and applying those categories to the organism. The students are surprised at the difficulty of developing these categories, given the dual goals of making the categories simple yet precise. It is also necessary that the ethogram be usable by other students in the class.

While the students are completing these ethograms, they are also reading papers on Sandhill cranes (e.g., Tacha, 1988; Tacha, et al. 1994). These and other related papers describe the Sandhill crane migration through the Platte river valley in central Nebraska. The students are aware that they are going to be collecting data on the cranes as they migrate through the area on their annual trek north. The cranes migrate from their winter habitat in Texas and surrounding regions via the central flyway through Nebraska to their nesting grounds in Canada, Alaska, and Siberia. The cranes are present in large numbers for approximately two months, depending on the weather here, to the south, and to a lesser extent, to the north, The students are (usually) amazed that such a large and significant migration is taking place in their own backyard.

While here, the cranes are engaged in two major classes of behaviors. First, they are consuming as much food as they can to prepare both for the remaining migration to their summer nesting grounds and to ensure successful nesting. Second, the unmated cranes are engaging in courtship and mate choice behaviors. That the cranes are engaged in so many biologically important behaviors provides for an excellent living laboratory for field research. The students will collect data on both classes of behaviors.

After reading various papers on the topic of Sandhill crane migration, I take the students on a field trip south of Kearney, where we observe the behavior of the cranes. I point out, using examples from Tacha (1988), the various classes of affiliative, agonistic, and courtship behaviors that are being displayed. I then require the students to go out on their own and record data. The students engage in focal animal sampling for periods of 10 minutes on each crane. I require 10 complete records from each student. The students sample behaviors at different times of day and at different locations, to provide an adequate activity budget for the cranes. These data are compiled across observers and times (by me, using software), and discussed in lab. The students then write a paper on the activity budget of Sandhill cranes staging in central Nebraska.

While the students are independently collecting data on Sandhill cranes, we are meeting as a group to discuss independent research projects. These projects are conceived by each small student group. They are discussed in the round by the entire lab, so that everyone has input to the project. The only requirement for the project is that each project must somehow involve the biology of behavior. Approximately half of the independent projects usually involve some form of naturalistic observation, and half involve some type of experimental technique. I regard this as a victory of sorts, since in their previous lab classes in psychology, the students have only been exposed to the various experimental protocols. For example, I

have had student projects in the last several years that have investigated (a) accelerators and decelerators in flirting behaviors, and their differential use by men and women, (b) use of public displays of affection by various age categories as a mechanism for territorial marking, and (c) differences in wayfinding in men and women based on whom they are directing to a location. I have also had experimental student projects, for example (a) differences in attractiveness of pictures depending on whether the person is depicted as married or single, (b) ability of naïve adults to determine the sex of an infant by odor, and (c) differences in men and women in ability to engage in multitasking behavior.

I find the quality of research projects that are conducted using experimental versus non-experimental techniques to be approximately equal. Once the students are trained in nonexperimental methodologies, they appreciate the nuances of the techniques. The students are also better consumers of the literature after learning about these techniques. They are able to more easily distinguish between correlation and causation, and are therefore wary of conclusions drawn in the popular press. Such training also prepares the students for lab classes in such disciplines as developmental psychology, which also uses naturalistic observation for data collection. Students understand the benefits and limitations of observational data in these cases, and are perhaps better able to appreciate the results in such studies. Because of these benefits, I heartily recommend that all students should, at some time in their career, experience a course in nonexperimental methodology.

You may be thinking that I am very lucky to have the spring migration of cranes and waterfowl through the Central Flyway in my backyard, and of course you're right. However, there are many opportunities in every part of the country to observe nature, and teach naturalistic observation. Brooks and Yasukawa (n.d.) and Ploger and Yasukawa (2002) provide many exercises using organisms as ubiquitous as squirrels and local birds. Additionally, naturalistic observation can use laboratory animals in large (compared to body size) arenas (often called "open fields" in the literature). Finally, naturalistic observation can use children or other humans, including those on college campuses. I therefore encourage you to start using this technique to expand the repertoire of lab exercises. Students really do enjoy them.

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