

Bio 45 -- Study Guide - Exam 1 - 2 October 2002 – Covers material through Lecture 11 on Reading List

I. Major themes so far:

A. Shifting Perspectives on the Study of Behavior

- What kinds of questions one can ask about behavior?
- What caused and what resolved the Ethology-Behaviorist debates of the 40's and 50's

B. Basics of evolution and behavior

- Adaptation, genes and behavior - how evolution works
- Understanding when something needs an adaptation explanation
- What is the problem with "for the good of the species" thinking
- What limits adaptation – genes, environment, constraints and trade-offs

D. Doing Science

- Weak and strong, direct and indirect tests
- The dangers of correlation and telling "just-so" stories
- Dealing with biases - how to turn them into alternative hypotheses
- Avoiding conflicts between hypotheses (explanations) of proximate and ultimate causality
- The challenge of doing science on an evolutionary time scale
- Studies that do a good job of investigating both proximate and ultimate causes

II. Important points from readings:

A. See chapter summaries in Alcock for most major points:

- Be able to explain what he summarizes and to provide examples (you choose the best ones)
- Explore the discussion questions at the end of each chapter – know how you would go about answering them if you cannot figure out an answer (some do not have "answers").

B. All readings are important - I may ask about the significance or the take-home (key) message in Y's study. Don't overlook the take-home messages in the course packet readings!

C. Don't let the details in Alcock throw you. Organize Alcock into major themes related to lectures:

1. How animals are designed to deal with complex and changing environment:

- Ch 2 - Different ways to build a singing bird – teasing out the role of "environments".
- Ch 3 - What does "genetic basis for behavior" and how do we find out the role of genes?
- Ch 4-6 – If you have trouble seeing what you "need" to know, think of the text as giving examples of solutions to basic problems animals face. These are good chapters to view the proximate-ultimate blending that comes with an evolutionary perspective. Start with a conceptual level: How do animals get the necessary information from a very complex environmental, how ought genetic, developmental and learning mechanism be designed to serve the needs of different kinds of animals, what are the trade-offs involved, how do organisms "know" when and how to do things? Here is where you come to grips with how organisms interact with "environment" as stimuli and as a developmental influence!
- Ch 4 - How the environment can modify behavior during an animal's lifetime
- Ch 5 - Focus on Stimulus filtering, selective perception from the perspective of designs for dealing with a complex world. You can learn a lot about adaptation here!
- Ch 6 - Here how animals sense and respond to their environment gets organized for you – start at the conceptual problem/kind of solution level. How are animals able to deal with the timing of behavior? Focus on concepts and not details in this chapter

2. One of the major problems faced by animals

- Ch 7 - Avoiding predation -- look at this chapter from the perspectives of natural history of predator avoidance and how one tests our ideas
- Chs 5 & 9 – navigating and migrating

3. How to study the evolution of behavior

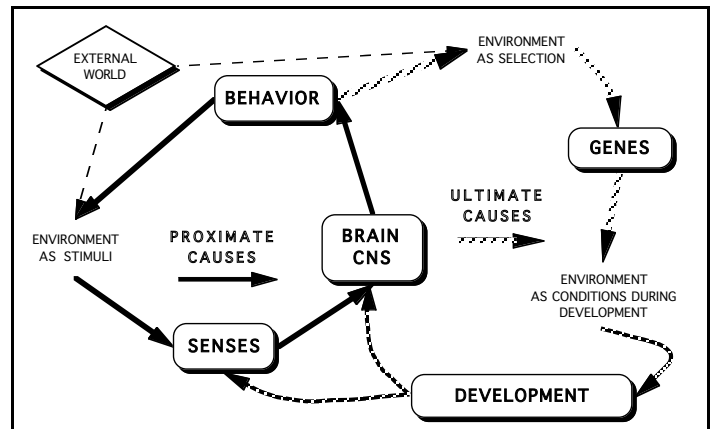
- Ch 1, 2, 3 & 7 - adaptation and the testing of proximate and ultimate hypotheses.

III. Look for connections among all parts of the course? Try the following diagrams:

The whole course can be linked to this diagram. Use it as a framework for organizing information and to remind you that we can't fully understand how the left side (Chs. 2,5,6, 7) works without an understanding of the right side (Chs. 1, 3, 4, 7) and vice versa.

Use this figure to organize the material in Alcock and lecture in your mind. Can you relate bird song or dispersal from the natal area to it? Add "Hormones" to the diagram and explain their proximate and ultimate connections to it.

You should be comfortable with using what you know about biology and evolution to: 1) make guesses about possible solutions to problems animals face, 2) discuss how the solutions could work based on what you know of similar solutions discussed in Alcock and lecture, 3) explain why they might be adaptive, and then 3) outline a way to test your ideas.



If this diagram does not help, build your own framework for organizing your studying as well as for seeing how the various parts of this course fit together. The course is complex and you need to find a way to tie things together conceptually so that you can work synthetically and creatively with the material. Step back from the details and you can see the connections and general concepts. Then zoom in on the details to enhance your argument or provide examples. Note that you should look at how the studies cited in Alcock and other readings were done and not just what was found out. You can use the "how they did it" as tools for designing your own experiments with similar problems and organisms!

IV. Practice exam – Use exam and answer key for last year's exam on the web site:

Right way: After you have been reviewing and studying, print a copy of last year's exam by going to the **Exams** section of the web site. Take the exam, don't just read it, write down answers. Once you have worked through the exam you can check your answers against the exam key also on the web site. Make sure you see how terminology is very important and how some questions have more than one part to them and require some understanding in order to figure them out. Better yet work with someone else and swap exams – grade each other's exams and discuss your answers. Make up more questions like those on last year's exams or answer questions raised in lectures or section or on handouts or at the end of the chapters in Alcock.

Read exam questions VERY carefully. Pay attention to the emphasized words. One of the trickiest aspects of this course is determining between something making sense to you and your actually understanding it. The concepts in the course seem pretty straight forward but they may actually require you to move to another level of understanding before you can really deal with them. That is why I gave you a handout about playing with these ideas. Therefore, when studying and testing each other, beware of the feeling: "Yeah, we know that, let's go on to something else". Those people who have been expressing their ideas in their journals and in sections have a **big head start**. It works best if you study with others who are willing to challenge you -- use the discussion questions in Alcock and ones you make up. When something seems to make sense to you make sure you can explain it to others as well -- it often is harder than you think and it is best to find that out before the exam!

Wrong way: Do not use last year's exam to predict the questions on the exam or the areas to be covered -- those vary from year to year and the questions change in subtle ways. Don't just read through the answer key to get a sense of whether you "understand" the answer. What counts is whether or not you understand the question and have a way to answer it that we will understand – use the vocabulary and factual information gained in the course in your answers.

Other Types of Questions and Advice:

1. Identify and test between two hypotheses about the behavior of animals you have been observing. For example, I could ask for one function of a squirrel's tail or why they bury acorns.
2. I might give you some quotations and ask which one is false and why it is.