

ANSWERS ARE FOR BOTH EXAM VERSIONS; ONLY THE ORDER OF THE QUESTIONS WAS DIFFERENT

Fall 2009 Animal Behavior – Psychology 300 – Midterm exam 1

Short answers (4 points each- 20 points): Write the word or phrase that answers each question on this sheet.

1. Which level of questioning in animal behavior (using Tinbergen's 4-level system) *cannot* be tested experimentally? Why?

Level 4: Evolutionary history or phylogeny of behavior. Today's observed species differences in behavior are the result of past events which cannot be directly observed or manipulated.

2. Natural selection does not always lead to evolutionary change. Why not?

Selection is a force; there will only be a response if the behavioral variation that is selected on is heritable. In other words, if offspring behavior doesn't tend to resemble their parents' behavior because of genetic similarity, then the behavior cannot evolve by natural selection.

3. What are the *two* main components of Darwinian fitness (also known as Reproductive Success)?

**Survival- remaining alive until reproductive age.
Fecundity- production of viable offspring.**

4. Why do scientists believe that humans share a single common evolutionary ancestor with other mammals, as well as with insects?

The principle of descent with modification, carried out to its logical conclusion. All animals are born to other similar (but not identical) animals. Biochemical and genetic evidence suggest that all animals are descended from and related to a single stock species in the distant past.

5. In 1973, Lorenz, Tinbergen, and von Frisch shared the Nobel prize in medicine. Why?

Developing the field of Ethology, which showed that behavior could be studied as a set of traits that evolves biologically.

True/False section

F 1. In animals, all cognition occurs in the brain.

F 2. Humans share a single common evolutionary ancestor with other mammals, but not with insects.

F 3. In 1973, Lorenz, Tinbergen, and von Frisch shared the Nobel prize because they were the first to demonstrate that animal behavior could be analyzed experimentally.

F 4. Within many neurons, an inhibitory action potential can cancel an excitatory action potential by moving in the opposite direction.

F 5. Because behavior is variable both within and among individuals, it is not influenced by genetics and therefore usually does not evolve in response to natural selection.

T 6. In both Galapagos (Darwin's) finches and in Hawaiian honeycreepers, bill design and foraging behavior diverged strongly from a common ancestral species.

F 7. Experiments are the best way to test hypotheses about the evolutionary history of behavior, or phylogenetic effects.

F 8. In wild populations of animals, natural selection inevitably leads to evolutionary change.

F 9. If we observe that some aspect of behavior matches ecology or living situation in a large number of species, we can be confident that that behavior is an adaptation.

F 10. One general conclusion of behavioral ecology is that within a species, we can expect to find a single, most adaptive form of any behavior we study.

Multiple choice section: Correct in bold text

11. The behavioral subdisciplines of Ethology and Comparative Psychology:

- a. Were developed almost independently during their first decades
- b. Differed in their emphasis on experimentation versus observation
- c. Have been mostly abandoned in favor of more modern approaches to the study of behavior
- d. All of the above**

12. The concept of descent with modification, as it applies to Darwin's dogma, means that:

- a. Species with different behaviors are not related
- b. Natural selection is the cause of all evolution
- c. All species are directly genetically related to each other, like members of a family**
- d. If we look far back in time, we can find species that are similar due only to analogy

13. Behavioral similarity in flying and hunting methods between carnivorous bats (mammals) and owls (carnivorous birds) would probably be due to:

- a. Evolutionary convergence**
- b. Behavioral homology
- c. Shared common ancestry
- d. Fundamental shared characters

14. According to Darwin, the effects of artificial selection on animals such as dogs gives us a strong analogy for the operation of:

- a. Heavy farm machinery
- b. Random mating in large populations
- c. Evolutionary convergence
- d. Natural selection**

15. According to chapter 1 of the Alcock text, scientific inquiry:

- a. Cannot be applied to animal behavior as easily as it can to Physics
- b. Leads to the acceptance (proof) of models (hypotheses and theories)
- c. Both A and B
- d. Neither A nor B**

16. Similarities in behavior among distantly related species:

- a. Can provide evidence for adaptation**
- b. Argue against the importance of natural selection
- c. Are the best evidence for shared common ancestry
- d. Are rarely observed by definition

17. The following observations contributed to Darwin's ability to generate his theory of evolution by natural selection:

- a. Skinner showed that rats could learn to perform complex tasks for simple rewards
- b. Malthus noted that many more offspring are produced than survive to adulthood**
- c. Konrad Lorenz noted that species often differ in their behavior in predictable ways
- d. Fruit fly larval crawling behavior is affected by strong single-gene effects

18. Chapter 3 of your textbook (Alcock, Animal Behavior) discussed genetic effects on behavior. Which of the following statements is true according to the text:

- a. Some complex behaviors like maternal care can be influenced by single genes**
- b. All behavioral variation is affected by large numbers of genes, with each one having small effects
- c. Behavior is developmentally complex and is rarely related to genetic variation
- d. Most behavior is learned and therefore is non-genetic in its expression

19. Evolution of behavior by natural selection requires:

- a. Variation in behavioral phenotypes within a population**
- b. Decreasing population sizes
- c. The appearance of Fixed Action Patterns (FAP)
- d. Learning

20. The study of animal behavior most often involves the measurement of:

- a. Movement and its consequences**
- b. Neurotransmitters
- c. DNA, mRNA, and Proteins
- d. Thought processes and feelings

Problem (20 points):

1. A fur trader from Alaska takes a vacation in Mexico, and makes the following observations about the fur thickness of four mammal species:

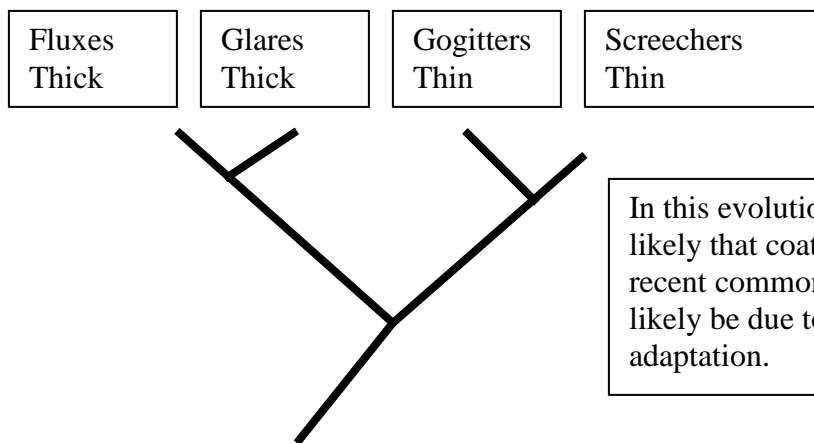
Arctic fluxes- Thick fur coats Mexican screechers- Thin fur coats

Arctic glares- Thick fur coats Mexican gogitters- Thin fur coats

She concludes based on these data that coat thickness evolved by natural selection- thick coats are an adaptation to a cold climate.

As an evolutionary animal behaviorist, you decide that evolutionary history could affect the results. You want to convince the fur trader that the phylogeny of these species could matter.

A 10 points. Draw a phylogeny of the four species with their coat thicknesses in order to diagram what the data would look like if similarity in fur thickness was mostly *homologous*. Explain in a few words.



B 10 points. Draw a phylogeny of the four species with their coat thicknesses in order to diagram what the data might look like if similarity in fur thickness was mostly *analogous*. Explain in a few words.

