Anthropology 160: The Human Life Course
NM HED Area III: Laboratory Science Competencies
UNM Core Area 3: Physical and Natural Sciences

Student Learning Objectives:

1. Define basic concepts in evolutionary theory, including natural selection, sexual selection, and reproductive success. (Competency 1 & 3)
2. Describe the major life history tradeoffs and apply this framework to understanding variation in the human life course. (Competencies 1-3)
3. Describe life history pattern in human foraging societies and explain how and why they differ from modern industrialized societies. (Competencies 1-3)
4. Discover how humans fit in the natural world, and use comparative data from other primates to investigate how human features have changed from our evolutionary relatives. (Competencies 1-5)
5. Evaluate scientific hypotheses using empirical evidence. (Competencies 2 & 4)
6. Apply evolutionary/scientific reasoning to understand real-world phenomena, such as modern health problems and the demographic transition. (Competency 2, 3 & 5)

Assessment Questions:

Competency 1: Describe the process of scientific inquiry.

1. Which of the following is NOT a testable hypothesis?
a. The amount of sugar that can be dissolved in water increases as the temperature of the water increases
b. A divine creator is responsible for the origin of life
c. All biological organisms arose in their present form and have never changed
d. There is water on Mars

2. A scientific "theory" can best be defined by which of the following statements?
a. A provisional conjecture
b. A set of statements or principles that use existing knowledge to generate testable predictions
c. A set of statements or principles for which there is no evidence
d. A set of rules or facts that are indisputable

Which of the following is NOT one of the steps of the Scientific Method?
a. Formulate a question
b. Design experiments to test predictions
c. Generate hypotheses
d. Draw a conclusion based on the evidence
e. All of the above are steps of the Scientific Method

True/False

Biological foundations for behaviors should influence our moral judgments about them. (False)

When applying the scientific method, it is desirable to evaluate simpler explanations before formulating more complex explanations. (True)

Competency 2: Solving Problems Scientifically.

1. Which of the following is NOT a major life history tradeoff?
    a. current vs. future reproduction
    b. quantity vs. quality of offspring
    c. genotype vs. phenotype
    d. mating effort vs. parenting effort

2. Which of the following is NOT a condition for evolution by natural selection?
    a. A trait exhibits variation
    b. A trait is heritable
    c. A trait is complex
    d. A trait contributes to reproductive success

3. Which of the following traits would likely have resulted from sexual selection?
    a. Feather coloration in male birds that attracts the attention of females
    b. Feather coloration in birds that disguises them from predators
    c. The production of "crop milk" by birds to feed their young regurgitated food
    d. Large, thick beaks that enable cracking of hard seeds

4. Which statement about natural selection is correct?
    a. Natural selection occurs when some individuals reproduce more successfully because of genetic traits that they possess
    b. Natural selection helps to find the ideal solution to a biological problem
    c. Natural selection rewards groups that outcompete other groups
    d. If natural selection has shaped a behavior, that behavior is morally justified

5. Haldane said: "I would gladly drown to save the lives of 2 of my brothers or 8 of my cousins". Which evolutionary concept does this demonstrate?
    a. Kin selection
    b. Reciprocal altruism
   c. Group selection
    d. Prisoners' dilemma

6. If a trait is shown to be 70% heritable, you can conclude that:
   a. **The trait is strongly influenced by genotype, but the environment causes some phenotypic variation among individuals with the same gene**
   b. Most of the variation in the trait is due to the environment the individual grew up in
   c. 70% of individuals in a population share the same gene
   d. An individual has a 70% chance of passing the gene for that trait on to their offspring

7. You discover a new species of primate in which males are nearly twice the size of females. Which is the most reasonable hypothesis about their behavior?
   a. Paternal care is an important part of the breeding system
   b. **Reproductive opportunities will be monopolized by a small number of males**
   c. This species encounters substantial threats from predators
   d. The sex ratio in groups will be biased towards more males

8. You discover a new species of primates in which males have very large testes. Which is the most reasonable hypothesis about their sexual behavior?
   a. Males and females mate monogamously
   b. One male monopolizes access to multiple females
   c. **Each female mates with multiple males**
   d. You cannot make any predictions about sexual behavior from testes size

9. You encounter a previously undescribed population of humans living in the deepest, darkest jungle. The people hunt and gather for food have no recognized mode of wealth. Which is the most reasonable hypothesis about their behavior?
   a. Sons are favored over daughters
   b. They will be highly polygynous
   c. **Males will invest in direct care of children**
   d. Women will have higher than average fertility

Competency 4: Apply Quantitative Methods to Scientific Problems
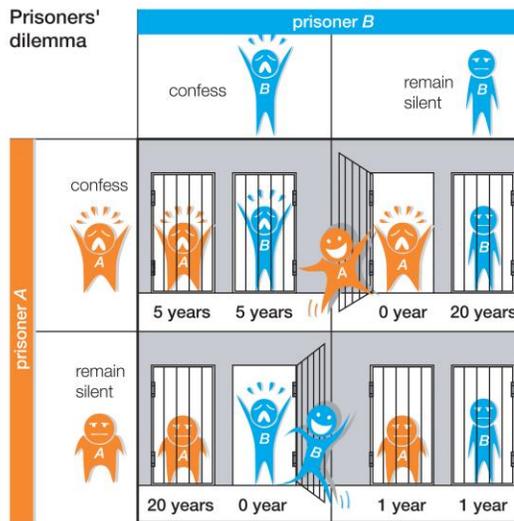
1. In the Prisoners' dilemma (above), what is the most rational choice of behavior for Prisoner A if (s)he wants to minimize costs?
    a. **Betray your partner and confess**
    b. Cooperate and remain silent

2. In the Prisoners' dilemma (above), what is the dilemma?
    a. There is never a benefit to cooperating
    b. Prisoner A and Prisoner B receive different benefits for cooperating
    c. People don't like to cooperate
    d. **In order to receive a collective benefit, individuals take greater risks than if they were selfish**
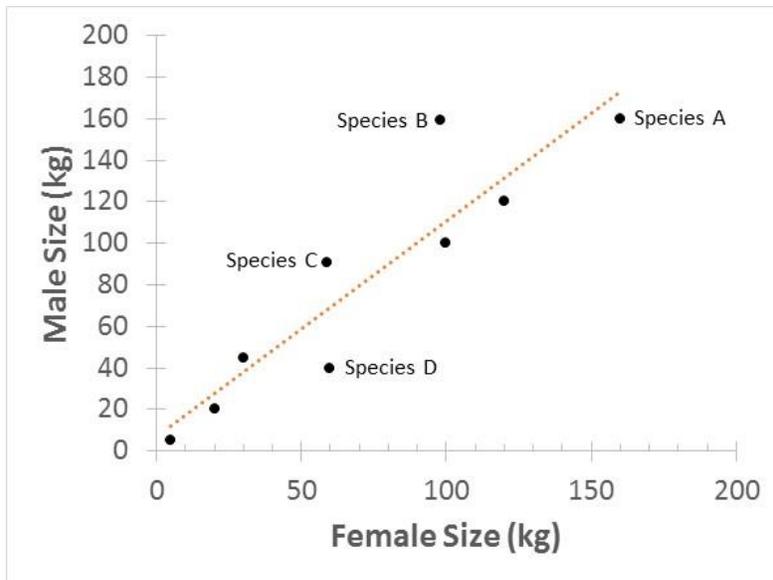
3. In the graph above, which species is the most sexually dimorphic?
   a. Species A
   **b. Species B**
   c. Species C
   d. Species D
4. In the graph above, which species would probably exhibit the most male-male competition?
   a. Species A
   b. Species B
   c. Species C
   d. Species D

5. In the graph above, which species would be most likely have the longest lifespan?
   a. Species A
   b. Species B
   c. Species C
   d. Species D

6. In the graph above, which species most closely represents humans?
   a. Species A
   b. Species B
   c. Species C
   d. Species D
7. In the graph above, which species would be most likely to exhibit reversed sex roles (e.g., female competition for males)?
   a. Species A
   b. Species B
   c. Species C

d. Species D
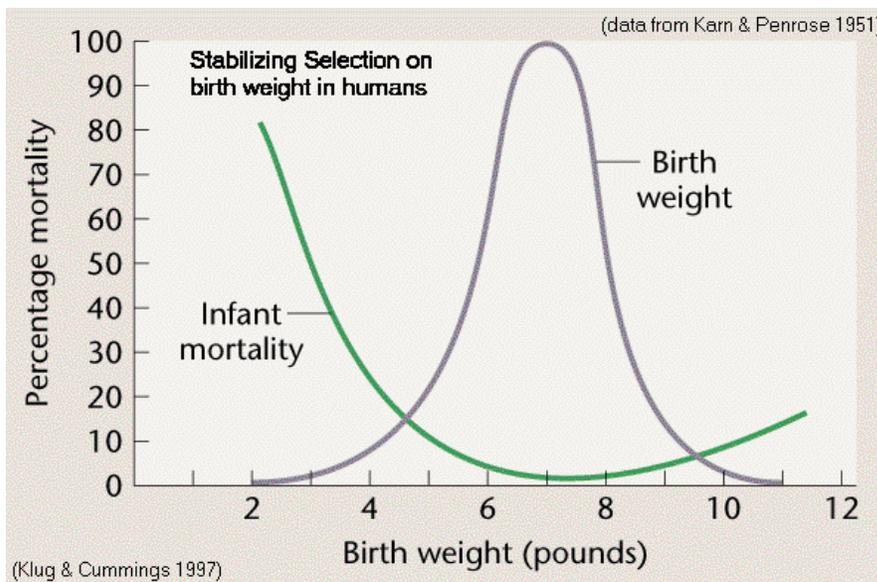
8. In the graph above, how would you interpret the relationship between birth weight and infant mortality?
   a. The heavier a baby at birth, the more likely it is to survive
   b. Babies born between 6-8 pounds have the lowest infant mortality
   c. Infants born large are more likely to die than small birthweight infants
   d. Infant mortality is not related to birth weight

9. In the graph above, how would you interpret the relationship between birth weight and infant mortality?
   a. There has been selection against giving birth to very large infants
   b. There has been selection against giving birth to very small infants
   c. The average birth weight for human infants is optimal for infant survival
   d. All of the above

10. According to Hamilton's rule for kin selection: C < Br, which of the following is true:
   a. It is always important to help kin, no matter the cost
   b. An increased value for *r* increases the likelihood of helping
   c. The cost of helping is reduced by the likelihood of future payback
   d. The cost of helping behavior is reduced by the degree of relatedness

Competency 5: Apply Scientific Knowledge to Real World Problems

1. What condition most strongly favors sex bias in investment toward male offspring?
  a. wealth stratification
  b. warfare
  c. bridewealth
  d. indirect care

2. What effect does increased education have on women's reproduction?
  a. Reduced fecundity
  b. Reduced fertility
  c. Earlier age of first reproduction
  d. Increased fertility

3. Which of the following is UNlikely to contribute to low fertility in industrialized countries?
  a. Later age of marriage
  b. Increased availability of contraception
  c. Increased presence of women in the workforce
  d. Failure of men to provide parental care

4. Which statement about the demographic transition is NOT accurate?
  a. After modernization, people do not appear to maximize their reproductive success
  b. Modernization gives women greater control over their own fertility
  c. Reductions in fertility eventually lead to lower rates of child mortality
  d. All around the globe, modernization has led to similar demographic changes

True/False

Humans are ideally adapted to live in a modern, industrialized environment. (False)

Infectious disease has been a strong selection pressure throughout human evolution (True)

Knowledge of our evolutionary past helps us understand modern health problems such as obesity and breast cancer (True)

Interpersonal violence is more frequent in traditional foraging societies than in modern, industrialized cultures. (False)

Assessment Protocol:

At the end of each term, all students in each section of Anthropology 160 will take an online exam consisting of four questions randomly drawn from each of the five competencies, for a total of 20 questions. The average grade for each competency will be collated by members of the undergraduate committee. The committee will report the grades to the Anthropology 160 professors, who will meet to evaluate the results. The professors will identify the competency with the lowest average score, and will work together develop curricular changes to improved instruction.