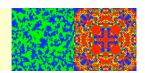


# THE EVOLUTION OF COOPERATION



## **Group Activity:** Evolutionary Trivia Prisoner's Dilemma

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**Objective:** Working with a partner, try to maximize the number of points that you can earn on an evolutionary quiz.

## **How the Activity Works:**

- 1. You and your partner have each been given a quiz on the principles of evolutionary biology (see the opposite side of this page). The quizzes you have are identical. In addition, each of you have been given a list of "Principles of Evolutionary Biology". These lists are different, and contain non-overlapping information on how evolution works.
- 2. Working simultaneously, you will have the opportunity to exchange information relevant to each question before separately and privately recording your own answer. After everyone has completed the quiz, we will grade it. If both players get the correct answer, they each earn six (6) points; if only one player gets the correct answer, that player earns ten (10) points. Wrong answers for either partner receive zero (0) points.

#### Instructions:

- 1. Before working with your partner, review the list of information that you have below under "Principles of Evolutionary Biology". DO NOT SHOW THIS INFORMATION TO YOUR PARTNER.
- 2. Once you and your partner have reviewed the information contained on your list, begin by reading the first quiz question together. Feel free to discuss each question and offer each other help, but work out your own means of discussion and information-sharing. Although you should read over the question together, you are not obligated to help each other in any particular way, nor do you need to record the same answer.
- 3. After you have discussed each question, each person should record an answer under the "My Answer" column on the opposite side of this page. DO NOT SHARE YOUR ANSWER WITH YOUR PARTNER.
- **4.** Continue discussing each question until you have both completed the quiz. Notify your instructor when you are done.

### **Principles of Evolutionary Biology:**

- ★ Evolution as a process depends on heritability: in order for a trait to change, it must be passed on from generation to generation. In addition, there needs to be variation in a trait in order for change to occur: if there is no variation in a population, it remains the same. Mutation is one source of novel variation.
- ★ Natural selection is a blanket term encompassing many different factors that can influence survival and reproductive success. These factors include predation of or by other individuals, competition with other individuals, choices made by potential mates, and elements of the abiotic environment.
- ★ The theory of evolution is actually a multi-faceted array of different mechanisms (including natural selection, genetic drift, speciation, and coevolution) which help explain why we see change in populations of organisms through time.
- ★ Evolutionary biologists spend a fair amount of time arguing about the details of how evolution occurs. However, there is very little controversy within the field of evolution about the overall validity of the theory.
- ★ Evolutionary fitness is defined by reproductive success. To have "high fitness" has nothing to do with physical condition or even survival: it is strictly a measure of how many offspring an individual produces in relation to other organisms.

## Quiz: Correct Answer My Points **Principles of Evolutionary Biology** 1. The theory of evolution is best described as: **a.** the survival of the fittest. **b.** one of many plausible hypotheses explaining how organisms change. **c.** a collection of mechanisms explaining why populations change through time. d. a means of explaining the origin of life. **2.** Throughout time, evolution has allowed organisms to: **a.** gain traits that will help them survive in future environments. **b.** possess the best possible genes. c. gradually become better than their predecessors. d. pass on favorable traits to their offspring. **3.** Adaptations are best described as: a. favorable traits that allow for survival and reproduction in a given environment. **b.** favorable traits provided to organisms by natural selection. **c.** favorable traits which developed as the result of random chance. **d.** favorable traits which individual organisms develop in order to survive. 4. Which of the following definitions best describes "evolutionary fitness"? **a.** Fitness is defined as the stamina and physical condition of the individual. **b.** Fitness is a measure of how successful a species is through time. **c.** Fitness is the ability to survive for longer periods of time than others. d. Fitness is proportional to the reproductive success of an individual. 5. Which of the following *does not* potentially act as a force of natural selection? a. Interactions between predators and their prey. **b.** Random mutations (i.e. errors) in the genetic code. c. Climate, weather, and geography. **d.** Interactions between organisms competing for the same resource. 6. Which statement best describes the relationship between genes and traits? a. Genes determine which traits an organism possesses. **b.** Most traits are influenced by multiple genes. **c.** Natural selection on genes changes the traits that organisms possess. **d.** Organisms who possess different genes will have different traits. 7. Speciation is a prominent evolutionary process because it: a. allows a single population to divide into two isolated populations. **b.** favors beneficial mutations and purges deleterious mutations. c. allows individual organisms to adapt to changes in their environment. **d.** prevents organisms from becoming too different from others.

- **8.** Evolution cannot occur if there is *not*:
  - **a.** A more complex biological solution to environmental problems.
  - **b.** Heritable variation present in a given population of organisms.
  - **c.** Natural selection favoring one trait over another.
  - **d.** Sexual reproduction occurring in a given population of organisms.
- 9. Which of the following statements best describe controversies over evolution?
  - **a.** Scientists are still debating the role of intelligent design in evolution.
  - **b.** Scientists are still working to fill in all the gaps in evolutionary theory.
  - c. Scientists are still debating how evolution took place.
  - d. Scientists are still debating whether or not evolution took place.
- **10.** Evolution has potentially dangerous social implications because:
  - **a.** it suggests that humans are like other animals and therefore without morals.
  - **b.** it can be misrepresented for political purposes.
  - **c.** it provides scientific justification for oppression and discrimination.
  - **d.** it demands that we choose between religion and science.