

Read each question carefully and don't hesitate to ask if a question seems unclear. If possible, answer each question in the space provided, but if needed, continue on the back. If you use a drawing as part of your answer, be sure to also include a written explanation. These questions have specific answers, although for some, more than one answer is possible. To receive full credit you must clearly and fully answer the question being asked. The points for each question are noted in parentheses totaling 100 points.

1. Using rules one and two of Strong Inference answer the following question: What object catches a person's visual attention most rapidly? (15 pts)

State multiple hypotheses and then at least one experiment to disprove the hypotheses. Example: Hypo's- A ball. A flower. Grass. Trees. The sun. Etc. Expt.- In a grid of many objects, see which object can be most quickly identified.

2. While the DNA in each of your cells is very similar, there can be some differences. Describe **two** mechanisms that would cause the DNA in your cells to be different. (10 pts)

Mutations. Transposon movement.

3. You are reviewing the data from the twin study looking at Body Mass Index (BMI), and you notice one set of identical twins that grew up in different families and have radically different BMI's. Why is this surprising, and how is it possible? (10 pts)

BMI has a significant genetic component. So we expect identical twins to have similar BMI. They may have been raised in very different environments. One with plentiful food, and one lacking food.

4. Alex is a vole that has only 10% of the oxytocin that a normal vole has. Would you expect Alex to be monogamous or non-monogamous? Why? (10 pts)

Non-monogamous. Oxytocin promotes bonding. With so little oxytocin, Alex is not likely to bond with its mate.

5. For a species to successfully evolve, when would it be more important to have a large amount of genetic diversity, during a period of rapidly changing environment or during a period of a relatively constant environment? Why? (10 pts)

When the environment is rapidly changing, having a lot of genetic diversity is necessary so that while some individuals might have traits that decrease their ability to reproduce, other genetically distinct individuals will have traits that allow them to reproduce.

6. Marco Polo traveled from Italy to China in the 1200's. Would you be able to find evidence about whether Marco Polo had any children in China by looking at the mitochondrial DNA of people in China? Why or why not? (10 pts)

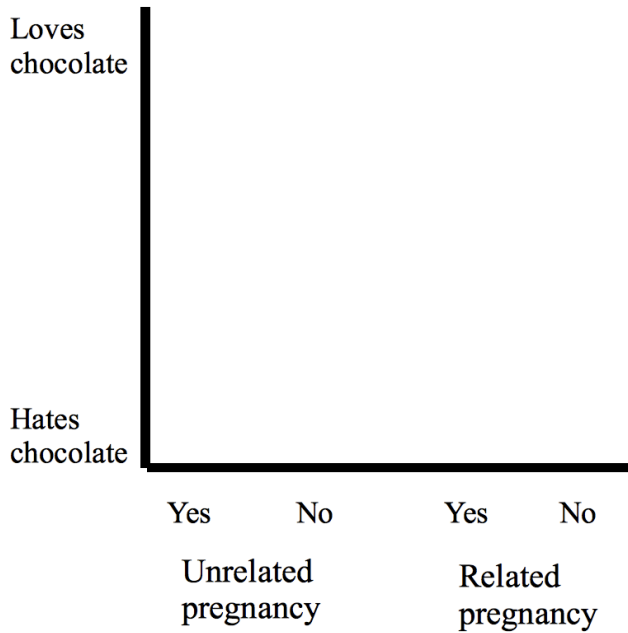
No. Males do not pass on their mtDNA.

7. Which species would be able to evolve faster, elephants that reproduce once every 5 years or rabbits that can reproduce 4 times per year? Why (10 pts)

Evolution occurs during evolution, who reproduces and what genes they have. So elephants will evolve much more slowly than rabbits.

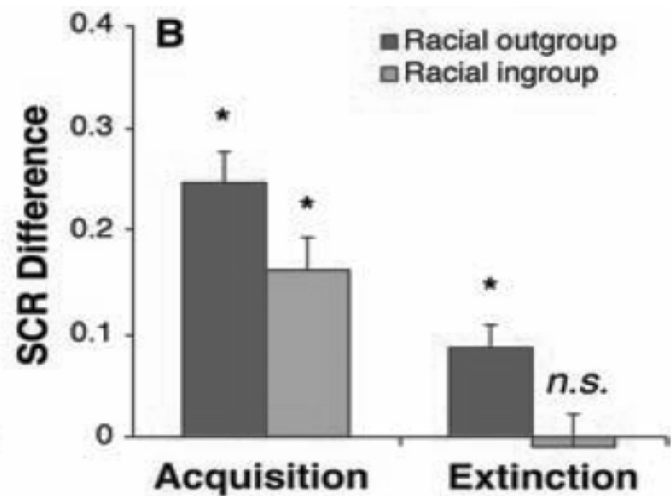
8. To test the genetic and environmental influence on liking chocolate, you have tested chocolate preference in children born of four different sets of women. All of the children were the result of *in vitro* fertilization. Mothers who like chocolate ate it when they were pregnant and are marked by a

“yes”. Mothers that do **not** like chocolate did **not** eat it when they were pregnant and are marked with a “no”. If chocolate preference is equally influenced by genetic and fetal experienced environmental factors, draw the bars on the graph that would represent the chocolate preference for each of the four groups of offspring. Explain the reasons behind each bar that you draw. (10 pts)



Because of the environmental influence, expect the children whose moms ate chocolate to prefer chocolate. But because of the genetic influence, expect the children related to their chocolate eating moms to like chocolate more. The children unrelated to their moms, but who were exposed to chocolate might also have some preference for chocolate.

9. Can you differentiate between a genetic or environmental influence on racism by only looking at the data in this figure? Why or why not? (15 pts)



No, the increased nervousness in response to the racial outgroup can reflect an affect of the environment or of genes. Neither genes nor the environment is being tested.