



Adaptations in Action

Background

Every organism on earth, from the smallest single-celled bacteria and fungi to the towering redwoods and colossal great blue whales, possess characteristics that allow them to survive and succeed in their particular environments. These characteristics are called **adaptations**, and they are the result of natural selection acting upon their ancestors for hundreds of millions of years! Through **natural selection**, organisms with adaptations that are better suited for their environment will survive and produce more offspring, which then possess those same adaptations.

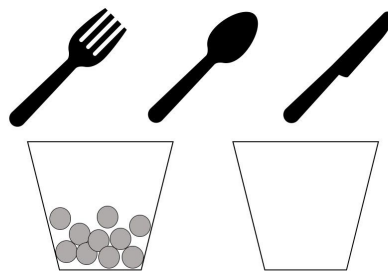
One of the most famous examples of adaptations is Darwin's Finches in the Galapagos Islands. Charles Darwin discovered natural selection after observing that finches, which are a type of bird, had differently shaped beaks. The size and shapes of the finches' beaks, he determined, were related to the size and shape of the seeds nearby for the birds to eat! He found finches with small beaks on islands with small seeds, and finches with large beaks on islands with large seeds.

To get an idea for how beak size and shape may help birds eat the food available to them, let's try an activity!

Supplies

For this activity each student will need:

- 20 small round objects (beads or dried beans)
- A plastic spoon, fork, or knife. There should be an even mix of each among students.
- 2 plastic cups



Activity Instructions:

1. Place an equal amount of beads or dried beans in a cup for each participant (~10)
2. Provide each participant with a utensil, either a fork, spoon, or knife, and a second, empty cup.
3. Record the number of utensils of each type.
4. Start a 30 second timer and let each participant try to move objects from the first cup to the second cup **using only their utensil and without moving the cup with their hand or lifting the cup.**
5. At the end of the 30 seconds, record how many objects each participant successfully moved to their second cup
6. Replace the utensil of the participants with the fewest objects moved with a utensil of the same type as the participant with the most objects moved
7. Place all the beads from each participant back into one of their cups and repeat steps 3-6 until there are only two types of utensils left
8. Graph the number of utensils (y axis) versus the number of rounds the game was played (x axis) to see how the quantities of forks, spoons, and knives changed over time.
9. **Bonus:** To show that the conditions each year are always changing, explore changing the time participants have to collect their beads/beans or the number of objects in each cup each round to represent shorter feeding seasons or food shortages respectively!

Think about what we've learned:

- What are the three requirements for Natural Selection?
- Each beak shape is a trait that may be best for different conditions. Can you imagine what might the knife beak be best at eating? What about the fork?
- Can you think of any adaptations that you have?
- When no one has one of the utensil types anymore, what does this represent?
- Why does the most successful beak type increase in quantity each round?

Detailed Instructor Activity Instructions:

1. Place an equal amount of beads or dried beans in a cup for each participant (~10)
2. Provide each participant with a utensil, either a fork, spoon, or knife, and a second, empty cup.
3. Record the number of utensils of each type.
4. Start a 30 second timer and let each participant try to move objects from the first cup to the second cup **using only their utensil and without moving the cup with their hand or lifting the cup.**
5. At the end of the 30 seconds, record how many objects each participant successfully moved to their second cup
6. Replace the utensil of the participants with the fewest objects moved with a utensil of the same type as the participant with the most objects moved
7. Place all the beads from each participant back into one of their cups and repeat steps 3-6 until there are only two types of utensils left
8. Graph the number of utensils (y axis) versus the number of rounds the game was played (x axis) to see how the quantities of forks, spoons, and knives changed over time.
9. **Bonus:** To show that the conditions each year are always changing, explore changing the time participants have to collect their beads/beans or the number of objects in each cup each round to represent shorter feeding seasons or food shortages respectively!