Adaptation of the Primate Hand: The Opposable Thumb

Experimental Question: How does the opposable thumbs adaptation help humans?

Hypothosis:

Materials: Masking tape, paper, pen/pencil, shirt with buttons, scissors, textbook, zip-lock bag, tweezers, bean, graph paper, and a watch with a second hand or a timer (*student supplied items*)

Procedure: Perform each of the following activities with your 'normal hands' and have your partner time how long it takes to do each of them in seconds.

1. pick up a single piece of paper and fold it in half twice
2. pick up a pen or pencil from the table top and use it to write your name on the paper
3. put on the dress shirt and button two buttons
4. unbutton the same two buttons and take off the shirt
5. cut a circle out of a piece of paper using scissors
6. pick up all the scraps from the previous activity and throw them into the recycling box
7. write the numbers 1 through 10
8. find page 55 of a text book and open the book all the way to that page
9. close a zip-lock bag
10. use the tweezers to pick up a bean

2. Using masking tape, have your partner tape each of your thumbs to its adjacent index finger and the palm of your hand so that no thumb is visible when viewed from the top of your hand.
3. After your thumbs are securely taped, complete each of the activities again. Have your partner time how long it takes to do each. If an activity takes longer than 4 minutes, record the word "unsuccessful" on the data table.

Data:

Action Performed	Time (sec) with thumb		Time (sec) without thumb	
	person 1	person 2	person 1	person 2
1. Fold paper twice				
2. Write your name				
3. Button 2 buttons				
4. Unbutton 2 buttons				
5. Cut out paper circle				
6. Throw away paper				
7. Write numbers 1-10				
8. Find page 55 in textbook				
9. Close a zip-lock bag				
10. Pick up a bean with tweezers				

4. Based on your observations, summarize your conclusions about the movements of your hand and the usefulness of your thumbs.

Graph your Data: Make a **double bar graph** showing times using your thumbs next to the times without using your thumbs. You do not need to graph your partners data.

(Be sure to label the x and y axis and give the graph a title!)

Conclusions

1. An adaptation is a beneficial trait in a certain environment. Explain how the human hand is adapted to perform activities that have made us a successful species. Use data from the activity to support your answer.
2. If you did not have an opposable thumb how would our society and daily lives differ?
3. An adaptation helps an individual survive and reproduce, brainstorm at least five more examples of adaptations and explain how they help the species survive and/or reproduce.
4. Compare our hands to paws which don't have an opposable thumb. How do paws and primate hands provide an advantage in survival and reproduction?
5. Many of our adaptations have been passed down by our ancestors. List one adaptation three adaptations we share with other mammals.
6. Inheritable traits come from our genes. What process can alter a gene to produce new traits.
7. Over time, hypothesize how the population size of a less adapted species would change compared to the change in population size of a well adapted individuals.