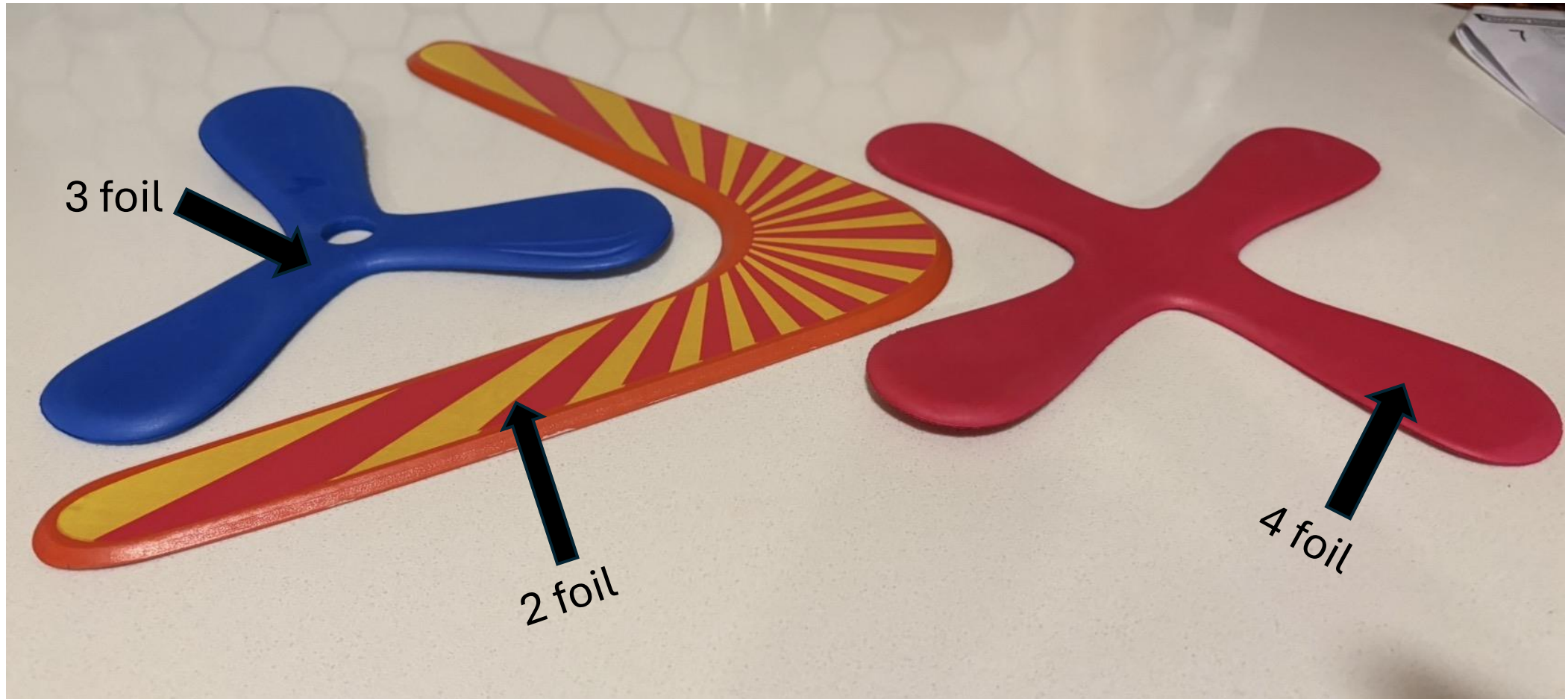


The Best Boomerang



History

Empires that invented boomerangs without communicating with each other:

- Ancient Egypt
- American Southwest (Hopi)
- Eastern Europe
- Native Australians (earliest boomerang inventors, the Stone Age)

Original Boomerang uses:

- To kill or stun animals from long distances (birds, bears, dears, etc.)

What boomerangs were originally called:

- Native Australians called them Kylies
- American Southwest (Hopi) called them Rabbit sticks

Characteristics of the original boomerang:

- Heavy
- Don't return
- They threw it horizontally

Characteristics of today's boomerang:

- Light
- Returns
- We throw it vertically



Science

There are 3 main ideas that impact how a boomerang works:

- Lift: A force that pushes objects sideways and up
- Relative Velocity: How fast an object moves to another
- Gyroscopic Prestation: A spinning object gets pushed on its side and starts spinning in a circle

How it floats:

- The top moves forward when the bottom moves backward
- Air flows faster on the top, creating more lift

How it turns:

The unequal forces create torque (a twisting force that causes objects to rotate)

The fast spin of the boomerang makes angular momentum (Gyroscopic Prestation)

As its spinning the torque changes the angle of the boomerang until the boomerang has no more lift

How to throw a boomerang:

Pinch the bottom of the boomerang with your dominant hand (any foil)

Stand straight and tall

Lift the boomerang over your head

Shoot it vertically

Flick the boomerang then let go when your fist lines with your nose



Research Question

Which type of boomerang goes the farthest and returns the closest to me?



Hypothesis

I predicted the 2 foil boomerang would go the farthest and the 4 foil boomerang would land closest to me. I thought this because the 2 foil would have more lift because of how big it is. I believed the 4 foil boomerang would come closest to me because the more foils the more the boomerang would curve back towards me.

Method

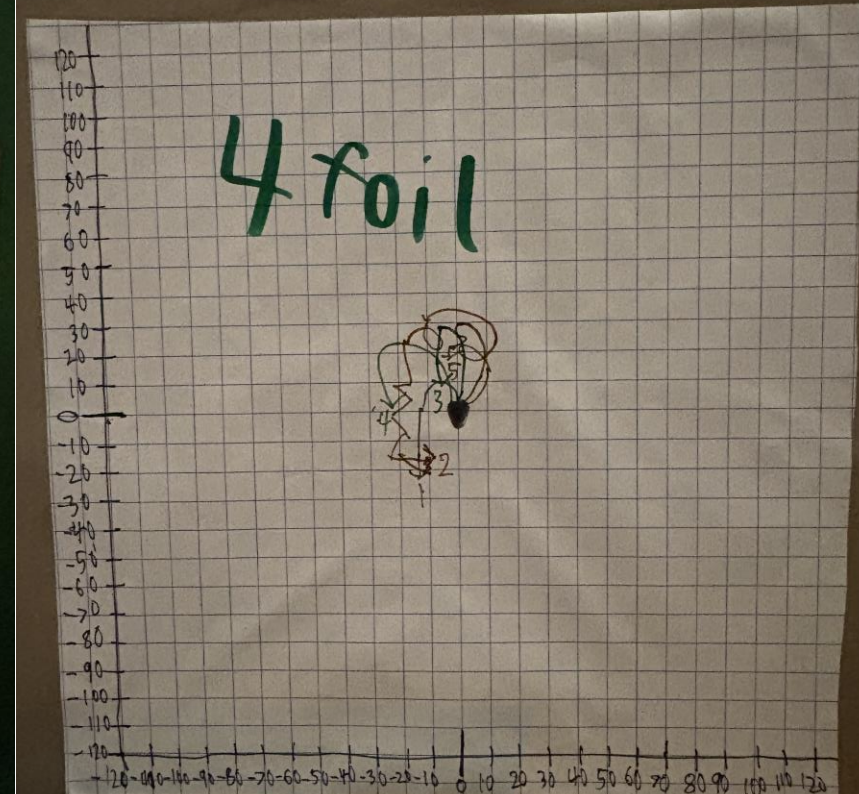
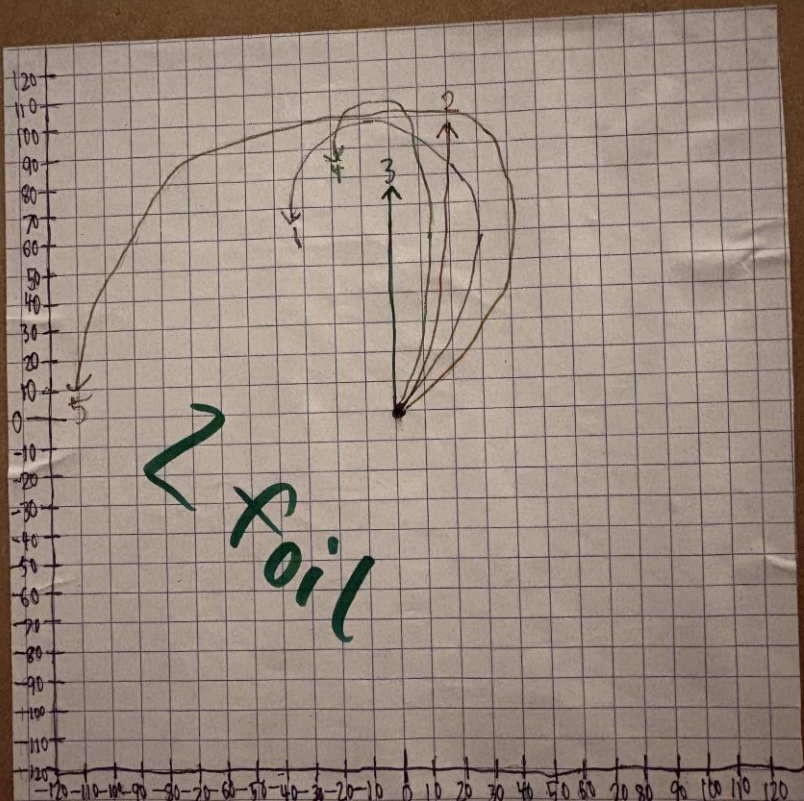
1. Buy 3 boomerangs (2, 3, and 4 foil) from the same brand
2. Get a notebook, pencil, and an assistant
3. Research how to throw a boomerang
4. Research the science of a boomerang
5. Make 2 hypotheses about which boomerang will go the farthest, and which one will return the closest to me
6. Walk to Wilshire Park with a notebook, pencil, assistant, and 2, 3, and 4 foil boomerangs
7. Then take 5 practice throws from each boomerang
8. Throw the 2 foil then measure the distance with the iPhone Measure App
9. Once the boomerang lands, use the iPhone Measure App to measure from where it lands to where the boomerang was thrown
10. Do steps 8 and 9, 4 more times with the boomerang
11. Do steps 8 – 10 but with the 3 foil boomerang
12. Do steps 8 – 10 but with the 4 foil boomerang

Throw Distance Data

Throw #	1		2		3		4		5	
	Distance Traveled	Distance from Thrower	Distance Traveled	Distance from Thrower	Distance Traveled	Distance from Thrower	Distance Traveled	Distance from Thrower	Distance Traveled	Distance from Thrower
2 foil	98ft 10in	65ft 1in	97ft 11in	97ft 11in	74ft 9in	52ft 2in	106ft 5in	86ft 5in	110ft 6in	110ft 6in
3 foil	51ft 7in	24ft 7in	33ft 6in	26ft	30ft 4in	30ft 4in	30ft	30ft	37ft 2in	37ft 2in
4 foil	25ft 6in	25ft 6in	33ft 10in	29ft 3in	39ft 4in	9ft 4in	23ft 1in	23ft 1in	31ft 10in	18ft 8in

Throw Averages Per Foil		
	Distance Traveled	Distance from Thrower
2 foil	97ft 8in	81ft 5in
3 foil	36ft 4in	29ft 3in
4 foil	30ft 6in	20ft 4in

Overall Throw Average	
Distance Traveled	Distance from Thrower
54ft 6in	43ft 4in



Spray Chart Data

Results

- The farther a boomerang goes, the less accurate it is (at least for my test)
- The boomerang does not constantly go to the exact spot
- (at least for my test)
- The 2 foil is the best for distance (goes the farthest)
- The 4 foil is the best for accuracy (comes the closest to me)



Credits

- My teacher who helped me understand this assignment
- My mom who taught me how to use Excel
- My dad who was my research assistant at the park
- “History,” United States Boomerang Association, <https://usba.org/history/>
- “How Does a Boomerang Work,” Veritasium, YouTube Video
- “How Does a Boomerang Work,” History of Simple Things, YouTube Video