Optimal Slingshot

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INTRODUCTION

This experiment was initially constructed to answer the question of what the ideal slingshot design would be. Our hypothesis was that a narrower base with one loose band would demonstrate the most “accurate” response, and that two tight bands with a wide frame would similarly result in the greatest distance traveled. By adding constants for variables such as the angle theta and release height, we were able to centralize our data around the previously-mentioned variables without over-complicating the data.

OBJECTIVES

Our main objective was to create the perfect slingshot by testing different elastic bands on different slingshots. To achieve this we had to come up with a couple different goals for this experiment. One goal we had was determining the perfect head shape. The other goal we had was determining the perfect band size, band shape, and the number of bands.



Figure 1. Setup of Slingshot and Base

METHODS

We measured the average distance and accuracy of each combination of slingshot head shape, band type, and band amount when possible. Specifically, we tested the distance achieved when firing along a straight marked path and the average deviation from that path. Three trials were run with each combination of 1 tube band, 2 tube bands, and 1 flat band with 3 slingshot heads with widths of 6.525cm ± 2.525cm. Each band was stretched to 25cm and fired at a 45 degree angle from a height of 250cm. The projectile’s landing location was tracked excluding any bounce or roll it may have incurred.



Figure 2. Setup of Gym

RESULTS

One tube elastic rubber band has a better accuracy than a slingshot with Two elastic rubber bands and a slingshot with One flat elastic band (and springs)
A wider headed slingshot has a better accuracy than slingshots with smaller heads
So in turn the best combination is to have One tube elastic band with a larger head for the most optimal or accurate while shooting at long distance.

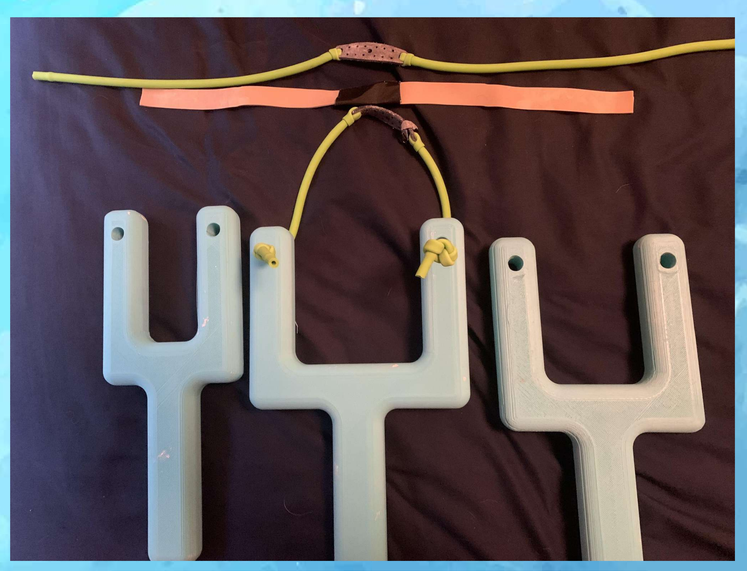


Figure 3. Setup of Slingshot and Base

CONCLUSION

Our findings ultimately yielded that single elastic-banded slingshots were more accurate than the double-banded or single flat rubber bands, the wide-headed slingshot produced greater accuracy than the narrower ones, and that the wide single elastic-banded slingshot ultimately proved most effective. This generally coincides with our theories, save for the narrow slingshots being more accurate.There were of course human errors and inconsistencies in our data; for one, we overcomplicated the setup of the box supporting the slingshot by awkwardly taping the slingshot to the base.
A major issue was the tape being unable to withstand the drawback and periodically breaking, so we were stuck attempting to retape the slingshot to the box. The other issue with this was that it messed with the initial point between trials because the slingshot had a tendency to shift as the string was being drawn back; a method we discovered after the fact would have been to punch a hole in the box acting as a catalyst holding the slingshot, which after a few trial runs not only drastically improved the distance and accuracy, but also the consistency in the starting position.

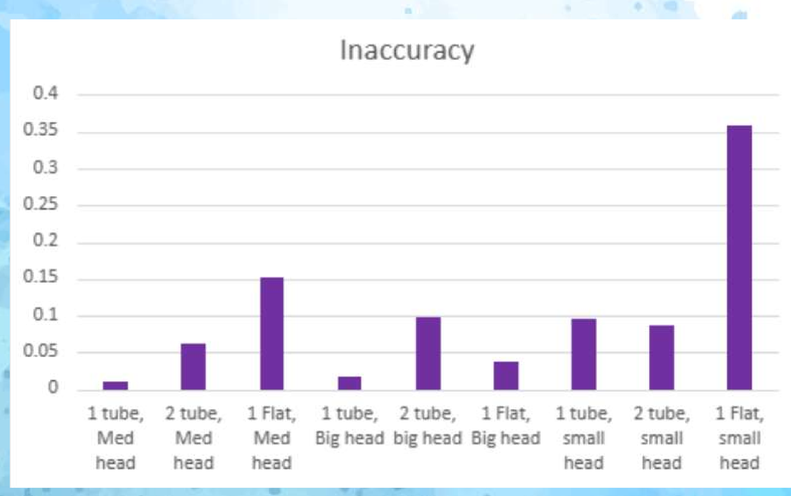


Figure 4. Chart Based On Accuracy in Relation to Band and Slingshot Head

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