CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY

Name(s)
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Project Number
J1909

Project Title
Knit Happens: A Yarn about Shrinkage

Abstract

Objectives/Goals
This experiment was designed to determine whether the type of yarn used in a knitting project affected its shrinkage rate when washed and dried. I hypothesized that the type of yarn would have an effect on the shrinkage rate, and that this effect would be due to the fiber material, and whether it was natural or synthetic.

Methods/Materials
Using six different types of yarn, I knitted 30 4-by-4 swatches: 5 swatches per yarn. After knitting them, I washed and dried them all in increments of 6, such that there was 1 swatch of each type in the washer and dryer at any given time. The swatches all washed and dried in the same circumstances. I then found the area after washing, and compared that to the area before washing, which was 16 square inches.

Results
I found that there was a significant difference in the post-washing areas of every swatch. After washing, they ranged in area from 16 square inches (no difference) to 11.2 square inches, which shrank 30%. However, when I found the average shrinkage rate of the natural and synthetic fibers, they came out to 12.9 and 13.9 square inches respectively; too close to be able to conclude a difference. So I examined other factors. I found the ply, or bulkiness, of each yarn, by calculating the wraps per inch (WPI) around a standardized stick. I found that the bulkier the yarn, the less it shrinks in the wash. For instance, the Homespun yarn, which did not shrink at all, had a ply of 7 WPI, whereas the Phoenix yarn, which shrank 30%, had a ply of 12 WPI.

Conclusions/Discussion
Using my data, I found a prediction equation for yarns of any ply. If x is the ply and y is the percentage shrunk, the equation $y=4.81x-33.71$ is approximately the percent any yarn will shrink when washed. While this equation will not provide you with exact numbers, it is a close approximation, and can be useful to determine whether a knitted object should be washed or not.

I hypothesize that the number of fibers in a yarn affects the shrinkage rate because more fibers add more insurance against shrinkage. If there are very few fibers, then a greater percentage of them will shrink, and vice versa. However, I do not believe that the ply is the only factor that affects shrinkage. There are many factors of yarn I did not test. This makes it very difficult to control all the variables when experimenting with yarn, but it also opens up an unlimited number of possibilities for further exploration.

Summary Statement
This project determines whether the type of yarn used in a knitting project affects its shrinkage rate when washed and dried.

Help Received
Mother taught me how to knit; friends and teachers offered help and support; parents both paid for supplies.