CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

S1716

Project Title

Biomechanical Analysis of Throwing Discus

Abstract

Objectives/Goals

The purpose for conducting this experiment was to analyze the several different aspects of discus throwing and ultimately come up with the 'perfect' form for a throw to make the discus go the farthest distance. We wanted to figure out a way to quantify how various parts of the discus throwing technique affects the ultimate distance of the throw. We thought that a torqued back wind-up would be more effective and result in a longer official distance because the torqued back windup would allow the throwing arm to stretch further back and create a greater stretch reflex.

Methods/Materials

We needed a discus, a thrower, a measuring tape, a video camera, a field, a video analysis software, a speed-measuring device, and an anemometer. All of these items contributed to ensuring we factored in all possible variables when analyzing the aspects of throwing the discus and how to optimize the throw.

Results

The positive correlation showed that the greater the speed of release, the farther the discus will go, and the more successful the throw will be. Overall, the average official distance resulting from a static windup throw was farther than that of a torqued back windup throw. The duration of foot contact with the ground does not have much of an effect on the throw. There is a positive correlation between angle of release and official distance, but we did not find the balance point between a small angle of release to allow for the discus to travel farther in less time since it is more parallel to the ground and a large angle of release to allow the discus more flight time.

Conclusions/Discussion

From video analysis, we can see that the throws with a higher speed of release show more separation between the upper and lower body as well as a powerful block of the left portion of the body to stop the momentum of the body and transfer this energy to the discus, causing a farther throw of the discus. In the static windup, there is more upper and lower body separation and more of a stretch reflex, resulting in a farther throw. The complex nature of the relationship between angle of release of the discus and the official distance include a small range of variation and possible non-linear relationship between distance and selected kinematic variables; it is likely due to a lack of the ratio of the release height to the standing height.

Summary Statement

The purpose for conducting this experiment was to analyze the several different aspects of discus throwing and ultimately come up with the 'perfect' form for a throw to make the discus go the farthest distance.

Help Received