



**CALIFORNIA STATE SCIENCE FAIR  
2006 PROJECT SUMMARY**

<b>Name(s)</b> <b>Luke E. Stagner</b>	<b>Project Number</b> <b>S0214</b>
<b>Project Title</b> <b>House of Flying Daggers: The Physics of Knife Throwing</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this experiment is to find the most efficient way to throw a knife and to see which factors affect thereof. <b>Methods/Materials</b> The way the project was performed was by find the best angle of entry of the knife and measuring how much the knife penetrated the target. I did this by throwing the knife 100 times for every fifth angle and taking the average penetration all the while throwing at the same angular and linear velocity and filming myself. I controlled the angle of entry by adjusting the distance from the target in order to allow the knife to rotate less or more in accordance with the physics of the knife while its traveling through the air. I then calculated the total kinetic energy, the velocities and the penetrations using the data collected from the video and from the throwing process. After all the data was collected for this particular velocity I repeated the experiment with 2 different velocities. To prevent errors I did not accept data that was flawed in a way that it shouldn't have been such as the angle of entry and the velocities. The materials needed to do this experiment were a center-balanced knife, a target made of Trex Board (a plastic sawdust compound that has uniform density), a video camera, and video editing software. <b>Results</b> My results show that 90°, 85°, and in between 85° and 90° penetrated the deepest. The data cooresponds with my hypothesis that the best angle would be the inverse tangent of the vectors. <b>Conclusions/Discussion</b> I have concluded that the best angle of entry would be the inverse tangent of the vectors because the knife utilizes the linear kinetic energy to the fullest effect. It was also concluded that as the kinetic energy of the knife is increased, the closer the best angle would be to being orthogonal.	
<b>Summary Statement</b> This project is a study of the physics of knife throwing and the factors that affect thereof.	
<b>Help Received</b> My friend filmed me throwing the knife.	