



**CALIFORNIA STATE SCIENCE FAIR  
2003 PROJECT SUMMARY**

<b>Name(s)</b> <b>Bonnie Cao</b>	<b>Project Number</b> <b>J0105</b>
<b>Project Title</b> <b>Swim Faster! But How?</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The purpose of this experiment was to find which hand angle in the stroke of freestyle produced the greatest amount of propulsion. <b>Methods/Materials</b> A propeller was built from chopsticks, spoons, and a NERF foam ball, with the spoons representing the "hands." The propeller was stuck to a chopstick axle which was firmly attached to the axle of a motor that was used more as a power generator. The propeller was placed under a steady stream of water, and every 15 seconds for one-minute and 45-seconds, the microvolts produced were recorded. A survey among competitive swimmers was also conducted. <b>Results</b> The 30-degree angle created noticeably the greatest amount of voltage. The 0-degree angle had a considerably lower amount of voltage than the other degrees. All results were constant, with each tests' results within 0.16 microvolts of each other. The survey showed that the majority of the swimmers used the 30-degree angle. <b>Conclusions/Discussion</b> This data suggests that the 30-degree angle is the most efficient angle for a swimmer's hand during the stroke of freestyle.	
<b>Summary Statement</b> My project is a study of the propulsive force of different hand angles in the swimming stroke of freestyle.	
<b>Help Received</b> Aunt lent Multimeter; Dad supervised use of glue-gun; Classmates held propeller during testing	