



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Kyle J. Lin	Project Number S1209
Project Title A Prospective Study on the Effect of Strength and Flexibility Conditioning on the Velocity of a Tennis Serve	
Abstract Objectives/Goals The objective of my experiment was to determine if building rectus abdominis muscle strength or increasing wrist flexion over a period of 6 weeks improves tennis service velocity. Methods/Materials 9 male test subjects were given questionnaires and informed consent forms. They were then randomized into 3 groups: trunk exercise, wrist exercise, and control. The subjects each served 5 serves at maximum velocity into the correct service box. Velocity, in miles per hour, was measured using a radar gun. During the experiment, the subjects in the trunk exercise group did 60 sit-ups each day. The maximum number of continuous sit-ups they were able to do was recorded. The subjects in the wrist exercise group did 3 minutes of wrist flexion extension stretching each day. Their maximum degree of wrist flexion was measured using a goniometer. After the initial baseline test, all measurements were repeated every 2 weeks for a time period of 6 weeks. Results The average service velocity of the trunk group increased from 91.1 mph to 91.7 mph (+0.8%). Their average maximum number of sit-ups changed from 104 to 131. The average service velocity for the wrist group increased from 86.3 mph to 88.4 mph (+2.5%). Their average wrist flexion improved from 60.7 degrees to 80.7 degrees. The average service velocity of the control group decreased from 84.9 mph to 81.7 mph (-3.8%). Conclusions/Discussion The results met the objective; they supported the hypothesis. Both experimental groups showed improvement in service velocity. Each group also demonstrated physical progress because of their respective conditioning regimens. The wrist exercise group showed a larger percentage of improvement in service velocity. Several uncontrolled variables that may have caused inaccurate results are temperature, fatigue, noncompliance in the exercise routines, and imprecise measurements.	
Summary Statement This experiment demonstrates the positive effects certain types of conditioning can have on the velocity of a tennis player's serve.	
Help Received My mother assisted with scheduling dates for subject testing. Mrs. O'Donnell and my father guided data collection, organization, and analysis.	