



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2000 PROJECT SUMMARY

Your Name (List all student names if multiple authors.) Ryan M. Naylor	Science Fair Use Only
Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) Velocity, Distance per Stroke and Turnover Rate in Minor Swimming Competition	J1511
	Division J Junior (6-8) J Senior (9-12)
Preferred Category (See page 5 for descriptions.) 15 - Physiology	
Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges. OBJECTIVE: The objective is to discover the relationship between distance per stroke and turnover rate as related to velocity in age group swimmers. The relationship between distance per stroke and turnover rate will be studied by gender, age, ability level and race distance. Through these results, I hope to discover possible and practical ways to improve one#s swimming ability. METHODS: I timed swimmers ages 13-17 in both the 100 yard and 200 yard Freestyle events. Mathematical equations were used to find each swimmer's stroke rate, distance per stroke, turnover rate and average velocity. I used the data to determine if a swimmer was cycling faster (turnover rate) or swimming more efficiently (distance per stroke) to obtain the final race time. I manipulated the data graphically to look at the differences between ages, sex of swimmer and distance swum. RESULTS: The swimmers with the highest velocity had neither an extremely long distance per stroke nor an extremely fast turnover, they combined distance per stroke and turnover rate to achieve their high velocity. CONCLUSION: I found that distance per stroke was ultimately a bigger factor to a swimmer#s velocity, especially as the race distance increases. Distance per stroke was is efficient and conserves energy which will be used to concentrate on turnover rate. However, distance per stroke and turnover rate assist each other equally, therefore, to achieve the highest velocity possible, a swimmer must combine distance per stroke and turnover rate equally. I recommend to concentrate on distance per stroke more in practice because it teaches proper stroke technique and conserves energy for a swimmer to work on their turnover rate.	
Summary Statement (In one sentence, state what your project is about.) My project#s objective is to discover possible and practical ways to improve a swimmer#s ability by the data taken.	
Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. Elaine Gillum constantly revised my essay and helped design my display board. My mother and step father helped take data and gave suggestions on testing procedures.	