



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) Elizabeth Kravtchenko	Project Number S1509
Project Title Who Are the Winners? Balancing the California State Science Fair Award System	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The purpose of this project was to analyze thousands of publicly available historical records and understand (a) who the winners of the California State Science Fair are and (b) how the school grade affects student's probability of winning a gold medal. My hypothesis was: if a student's grade increases, then the student's probability of winning gold also increases.</p> <p>Methods/Materials In my research and analysis, I analyzed the last 10 California State Science Fairs. My independent variable was school grade. My dependent variable was the probability of winning a gold medal. In my modeling and simulation, I developed a mathematical model to balance the award system, and ran a computer simulation to show how the new model would even out the probabilities of winning gold in the senior division. I used the following materials: historical data from cssf.usc.edu, PC, and Microsoft Excel.</p> <p>Results My analysis showed that in each division, as a student's grade increased, the probability of winning gold also increased. However, I discovered the discontinuity between the two divisions, which was caused by the "aging up" effect, similar to the one you witness in sports. When students "aged up" from the junior division to the senior division, their probability of winning gold significantly decreased. This probability rebounded and exponentially increased as students advanced to higher grades.</p> <p>Conclusions/Discussion My hypothesis was correct! I developed a mathematical model to address the "aging up" discontinuity. I proposed to split the senior division into two divisions (grades 9-10 and 11-12) and double the number of students in these new divisions. I ran a computer simulation to show how the suggested award model would even out the probabilities of winning gold among high school students. This innovative model would make it more attractive and motivating for freshmen and sophomores to continue participating in science fair competitions.</p>	
Summary Statement I developed a mathematical model to balance the California State Science Fair award system and ran a computer simulation to show how the new model would even out the probabilities of winning gold in the senior (high school) division.	
Help Received David Talcott (physics teacher), Michael Skrable (math teacher), Addison Lewellen (English teacher), and Bob Dubrow (mentor). They reviewed my project and presentation, and provided feedback and suggestions. Vladimir Kravtchenko (my Dad) taught me how to extract and clean data and to use	